‘Sensory Intelligence’. An Exploratory Programme Evaluation in a Secondary School Autism Resource Base.

by

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ABSTRACT

Up to 95% of the autistic population are considered to have atypical sensory modulation which can lead to mal-adaptive strategies for self-regulation. Some argue that atypical and fluctuating sensory profiles could be 'core' autistic features underlying behavioural manifestations and poor academic and life-long prognoses. Evidence also suggests that this is more prevalent in the general population than previously thought, resulting in sensory modulation becoming an emerging field in mental health and well-being.

Despite empirical evidence suggesting that adolescents can be taught adaptive self-regulation strategies, and secondary schools being sensory challenging, school-based interventions with evidence bases to support them, remain sparse in the literature. Barriers include the heterogeneity of autism, austerity, 'intervention overload' in schools, and a significant 'research-practice' divide undermining effectiveness in messy 'real-life' contexts. Little is currently known about what works, for whom and in what context, as a result.

Diverse fields, using insights from process rather than product orientated techniques from Implementation Science and Realist evidence bases, are, however, bridging their own research-practice divides with some success. Consequently, the aims of this study were to adopt process-orientated approaches to explore if the 'Sensory Intelligence' programme was worthy of further investigation and potentially offered a role for educational psychologists.

Using a Case Study approach in an Autism Resource Base attached to a mainstream secondary school, Deductive Thematic Analysis enabled three main themes and ten sub-themes to be generated based on interviews with the participants, field notes and individual sensory profiles. The programme was considered 'definitely viable' by all three groups despite some tension regarding respective responsibilities. Considerable process issues were identified providing insights for ways forward including the need for detailed implementation planning via a systemic approach. Key roles were also implicated for Educational Psychologists working at individual, group and organisational levels.

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List of Abbreviations

AIT	Auditory Integration Therapy
AP	Alert Programme
ARB	Autism Resource Base
ASC	Autistic Spectrum Conditions
ASI	Ayers' Sensory Integration
BPS	British Psychological Society
CBT	Cognitive Behaviour Therapy
CIPP	Context, Input, Process and Product
C-M-O	Context-Mechanism-Outcome
CYP	Children and Young Persons
DSM 5	Diagnostic and Statistical Manual of Mental Disorders 5th Edition
EMMIE	Effect, Mechanism, Moderator, Intervention, Economic
ECHP	Education, Care and Health Plan.
EP	Educational Psychologist
EPHPP	Effective Public Health Practice Project
ESEA	Education, Elementary & Secondary Act
MUPS	Medically unexplained physical symptoms
OT	Occupational Therapist
RAMESES	Realist & Meta-narrative Evidence Syntheses: Evolving Standards
SCERTS	Social Communication, Emotional Regulation & Transactional Support
SDP	Self-Discovery Programme
SEN	Special Educational Needs
SENCo	Special Educational Needs Co-ordinator

SMD	Sensory Modulation Disorder
SSP	Short Sensory Profile
TA	Thematic Analysis

GLOSSARY OF TERMS

Atypical sensory modulation. The under or over-response to sensory input from the body or the environment which can be apparent in all sensory domains.

Gene x Environment interaction. The focus on the interaction of genetic presentation with environmental triggers.

Fluctuating profiles. The presence of high and low thresholds in the same modality.

Habituation. The process where inhibitory neurons decrease or block the neuronal activity related to an event or stimulus due to recognition that something familiar has occurred which does not require attention.

Hypersensitivity. Low sensory threshold causing sensitivity toward stimuli.

Hyposensitivity. High sensory threshold contributing towards insensitivity towards stimuli unless intense.

Local processing bias. A focus on details rather than global properties,

Low registration. A high but passive sensory profile.

Neurological threshold. The threshold at which neurons fire.

Programme theory. Explanatory accounts of how an intervention is considered to work.

Proprioception. The sense of self-movement and body position.

Sensitization. The neurological enhancing of potentially important stimuli.

Savantism. Domain-specific abilities which are both superior to the individual's other skills and superior to the majority of the general population.

Self-regulation. The ability to adjust to changing conditions through internal processes that are coupled with behaviours to maintain a sense of control over arousal level, supporting meaningful interactions with the environment by reducing stress and promoting a sense of calmness.

Sensory diet. Activities introduced in daily living routines to meet sensory needs in a prolonged manner.

Sensory discrimination. The central process of distinguishing between and organising temporal and spatial characteristics of sensory stimuli. It is the ability to correctly register (or recognise) sensory input on a neurological level in order to use it functionally.

Sensory ergonomics. These are recommended changes in the physical environment, based on the individual's sensory needs to ensure a better match for the person.

Sensory intelligence. The insight and understanding of how the brain perceives sensory information from the environment to incorporate necessary accommodations to enhance optimal levels of functioning via self-regulation.

Sensory Integration Theory. A theory originally credited to A. Jean Ayres that has the key assumption that it is possible to remediate atypical sensory processing through interventions due to plasticity within the central nervous system.

Sensory modulation. This refers to the ability of the individual to regulate and organise responses to sensations in an adaptive manner, appropriate to situational demands

Sensory processing. The ability of the central nervous system to receive, organise and make sense of internal and external sensory input from contextual experience. It is an umbrella term incorporating sensory modulation, sensory discrimination and sensory based motor output.

Sensory Processing Disorder. Sensory processing patterns that are deemed extreme and considerably interfere with psychosocial functioning and/or participation/involvement in daily life.

Sensory Processing Sensitivity. A temperament incorporating sensory sensitivities, depth of emotional response and processing of information due to a highly sensitive nervous system, considered to be evident in up to 20% of the population of many species and to have an evolutionary benefit.

Sensory snacks. Activities introduced in daily living routines to meet sensory needs in the moment rather than in a prolonged manner.

Vestibular sense. Sense of balance and spatial orientation for the purpose of coordinating movement with balance.

Chapter 1: Introduction

1.1 Overview of Chapter One

In this chapter, an overview of the research area is introduced to map out, in broad terms, the conceptual and theoretical territory, as suggested by Pawson, Greenhalgh, Harvey, & Walshe (2004) in the tradition of the Realist approach. This will commence with a consideration of the key concepts and their definitions, acknowledging that these are not always clearly defined in the literature.

This is followed by a discussion of whether the key topic of this study; sensory modulation differences, should be considered a social and cultural construction in modern day society given that it is associated with advantages as well as disadvantages in everyday life. Whilst disadvantages have been given more attention in the literature, two diverse theoretical perspectives are beginning to converge, suggesting that atypical sensory modulation may be an aspect of natural neurodiversity.

It has also been suggested that the development of conscious awareness of natural sensory preferences can facilitate adaptive rather than mal-adaptive coping strategies. This has led to sensory modulation research as an emerging field attracting multi-professional interest due to wide-ranging applications, including mental health and well-being. The implications of this topic for autistic adolescents, and whether such programmes are worthy of further investigation are discussed. The importance and challenge of developing an intervention in a 'real-life' context such as an Autism Resource Base (ARB) attached to a mainstream secondary school is explored. The distinctive contribution of the research and potential roles for educational psychologists are also indicated.

1.2 Sensory Processing, Sensory Modulation and Life Experiences

Sensory Processing is the ability of the central nervous system to receive, organise and make sense of internal and external sensory input from contextual experiences. It involves interaction between neurological thresholds for alerting to sensory input; the ability to self-regulate and to manage the sensory input being experienced (Dunn, 2001). Sensory Processing encompasses seven different senses: auditory, visual, tactile, olfactory, taste, proprioception and vestibular (Miller, et al., 2007).

Differences in sensory processing can be separated into two broad constructs, (1) difficulties in sensory discrimination and sensory based motor output, placing the person at

risk of or resulting in deficits in postural stability, visual-motor control and motor planning, and (2) differences in sensory responsivity, which has implications for the modulation of sensory information from the environment (Lombard, 2015; Reynolds et al., 2017). Sensory modulation is, therefore, a subset of the broader term 'sensory processing'. This will be the key focus of this study.

Lombard (2015) provided a useful analogy of a coin to encapsulate the relationships between the different terms:

- **Sensory processing (Analogy of a coin – this is the coin).**
  Sensory processing has been proposed as the umbrella term covering various sensory functions: sensory modulation, sensory discrimination and sensory based motor output.
- **Sensory modulation (Analogy of a coin -this is one side).**
  Modulation involves matching the body's energy level and attention to the demands of the environment. It requires the brain to filter information and attend to certain information while disregarding other stimulation.
- **Sensory discrimination (Analogy of a coin – this is the other side).**
  Sensory Discrimination is the central process of distinguishing between and organising temporal and spatial characteristics of sensory stimuli. It is the ability to correctly register (or recognise) sensory input on a neurological level in order to use it functionally. It is associated with sensory-based motor output. (p. 5).

The researcher has noted, nevertheless, that many studies still refer to the more generic term 'sensory processing' in their studies without specifying whether their focus is on either or both of 'sensory modulation' and 'sensory discrimination'. Where this is unclear, it is considered prudent to use the same terminology as the authors to avoid any misrepresentation.

Occupational therapists appear to agree that understanding sensory modulation requires attention to both neurological threshold (how sensitive) and reactivity (active or passive responses to stimuli) across all seven modalities (Dunn, 2014). Sensory modulation incorporates both physiological reactions and behavioural responses.

Physiologically, the nervous system operates excitatory and inhibitory neuronal activity via synaptic transmission altering the structure and/or function of nerve cells. Excitatory neurons increase the activity related to a particular event or stimulus. This is known as sensitization, whereas inhibitory neurons decrease or block the neuronal activity related to an event or stimulus, which is referred to as habituation (Lombard, 2015). These cellular mechanisms of habituation and sensitization affecting synaptic transmission underlie sensory modulation. When sensory modulation is working efficiently, the nervous system responds to some stimuli whilst ignoring others. Without habituation, people would be constantly distracted by each and every new stimulus in the environment rather than being able to focus on that which is most relevant and important at the time.

Accumulating evidence from physiological (e.g. Zuckerman, 1999) and neurological studies (e.g. Schaaf et al., 2010) have identified individual differences in the processing of sensory events in the nervous system. Distinct patterns of sensitization and habituation responses have been shown in skin conductance measures, for example (Brown, Tollefson, Dunn, Cromwell, & Filion, 2001). Physiological measurement is, however, beyond the scope of this study, which necessarily focuses on behavioural manifestations.

Behaviourally, people with low thresholds react quickly and frequently to stimuli whilst those with high thresholds respond less readily to stimuli and, in both cases, such responses can either be active and passive. Sensory modulation refers to the ability of the individual to regulate and organise responses to sensations in an adaptive manner, appropriate to situational demands (Humphery, 2002; Lombard, 2015). An example of an active response, for someone with a low threshold for auditory processing, would be to turn down music in order to concentrate on a conversation. An example of a passive response, from the same person, would be avoidance by not engaging in conversation because of music in the background. Responses can be conscious or unconscious (Dunn, 2014).

Dunn (1997) has provided a useful Behavioural Response continuum to illustrate relationships between neurological thresholds and reactivity, and she has suggested four main classifications of Low Registration, Sensation Seeking, Sensation Avoiding and Sensory Sensitive, which will be adopted throughout this study. These are illustrated in Table 1.

Table 1

Relationships between Behavioural Responses and Neurological Thresholds (Dunn, 1997)

Neurological Threshold Continuum	Passive behavioural response	Active behavioural response
High	LOW REGISTRATION	SENSATION SEEKING
Low	SENSORY SENSITIVE	SENSATION AVOIDING

Measurement of neurological thresholds and active versus passive responses to stimuli, from a behavioural perspective, is predominantly dependent on the use of standardised parental or self-report questionnaires, such as the Sensory Profile (Dunn, 1999) and the Adolescent, Adult Sensory Profile (AASP) (Brown and Dunn, 1999), respectively. Extremities ('atypical modulation') are usually represented by resultant scores at least two standard deviations from the mean.

The interaction of genetic (Goldsmith, Arnerson, & Gernsbacher, 2006) and environmental factors (Dunn, 2003) are considered to underlie individuality in responses to excitation and inhibition causing people to have different thresholds for noticing, responding to and avoiding certain sensations. Patterns also emerge across ages suggesting both developmental influences and stability over time (Ben-Sasson, Carter, & Briggs-Gowan, 2010). Differences in responsiveness have been linked to temperament (Rothbart, Ahadi, Hershy, & Fisher, 2001) and personality traits (Aron and Aron, 1997), with implications for emotional development and psychopathology (Gouze et al., 2012).

Dunn (2003) considered that '*the experience of being human'* is imbedded in the sensory events of everyday life, because they strongly influence daily choices, interests/hobbies, careers, living arrangements and other ways of organising our lives. Blackwell, et al. (2014) further suggested that sensory modulation should be conceived of as a multifaceted concept which encompasses management of emotions, attention and behaviour as well as physiological arousal.

Researchers have also begun to identify distinct sensory processing patterns in children and adults with various conditions such as Fragile X (e.g. Belser and Sudhalter, 1995), autism (e.g. Baranek, 1999), brain disorders such as Dementia (e.g. Ragneskog &

Kihlgren, 1997) and Schizophrenia (Light & Braff, 2000) suggesting that sensory processing may have a very pervasive influence on human experience.

1.3 Sensory Modulation as an Emerging Field

According to Barnes, Vogel, Beck, Schoenfeld, & Owen (2008) multiple models have been used to describe 'sensory processing' with sensory modulation contained within it, and the concept remains a contentious issue within the field of Occupational Therapy. Ismael, Lawson & Hartwell (2018) considered that studies predominantly relying on questionnaires and behavioural observations have been hampered by inconsistency in ways of conceptualizing and measuring the different aspects of sensory processing. The field remains at an early stage of development, as a result (Gouze, et al., 2012).

Despite such an emergent stage of conceptual development, the field of sensory modulation is a rapidly developing multi-professional approach. Applications, which started with occupational therapy paediatrics, are now being considered relevant for all ages, pathology and non-pathology, including wellness promotion and mental health (Scanlan & Novak, 2015). This is on the understanding that individuals can be guided cognitively to develop conscious awareness of their largely unconscious sensory preferences to facilitate the use of suitable sensory modulation approaches to manage emotions, attention and behaviour more easily (Lombard 2015; Dunn, 2014). In this way, 'mal-adaptive coping mechanisms' for modulation difficulties (Johnson, 1975) have the potential of being replaced by more adaptive and socially-acceptable coping mechanisms.

Clear understanding of the relationships between sensory modulation and life experiences has, however, been hampered by a lack of cross-disciplinary communication to date (Gouze et al., 2012; Lombard, 2015). Edgington, Hill, & Pellicano (2016), amongst others, argued that the development of a 'holistic' multidisciplinary approach is an extremely important way forward. The researcher suggests that such an application is highly relevant within the sphere of Educational Psychology professional practice and that EPs should consider becoming active contributors to the development of this emerging holistic multidisciplinary approach.

1.3.1 Sensory Modulation 'Differences' as a social and cultural construction.

Atypical sensory modulation is deemed to be the under or over-response to sensory input from the body or the environment (Hanft, Miller, and Lane, 2000), and sensation-seeking (Smith

and Sharp, 2013), which can be apparent in all sensory domains. Within the tactile domain, for example, over-responsivity may manifest in extreme dislike of being touched, under-responsivity could result in not noticing when being touched or bruised and sensation-seeking could be the active pursuit of tactile experiences such as stroking a dog or swimming. An aversion to noisy places (over-responsivity), not noticing when your name is called (under-responsivity) and a craving for loud music (sensation-seeking) are also examples of the range in the auditory domain.

Engel-Yeger, et al. (2018) have suggested that sensory processing patterns, which do not impair daily life activities, should be considered individual/specific trait characteristics. If they are 'extreme' and significantly interfere with psychosocial functioning and/or participation/involvement in daily life, however, they need to be considered as 'sensory processing disorders'.

The concept of 'atypical' sensory processing could be considered a social and cultural construction, nevertheless (Linton, 1998). Heller (2003) emphasised the importance of acknowledging a mismatch between the evolution of the human central nervous system and brain, on the one hand, and rapid changes to modern day life, on the other, arguing that such a mismatch could cause challenges for a substantial minority of the population. Valued talents in the 'hunter and gatherer' era, such as the ability to notice deer and other animals easily amid forest camouflage, for example, could cause individuals with the same talents difficulties blocking out subtle visual distractions in modern day society and busy classrooms, in particular (Fisher, Godwin, & Seltman, 2014; Heller, 2003). Heller further indicated that the world is now much noisier than when our ears were designed thousands of years ago whilst evolutionary adaptation may remain minimal over this time span.

Amid increasing awareness of sensory-processing insights from research with children and adults with disabilities, it has also been suggested that sensory processing challenges are more universally applicable than previously thought (Dunn, 2009). Personality research, for example, has estimated that up to 20% of the population have 'Sensory Processing Sensitivity' (Aron & Aron, 1997) which includes a low sensory threshold. This theoretical strand will be discussed in section 1.4.2.

Gere, Capps, Mitchell, & Grubbs (2009) also found that their sample of 80 6 to 11-year-old gifted children, had more intense sensory sensitivities, as measured by the Sensory Profile (Dunn, 1999) than a normative comparison group. It is also implicated in

Autism (Robertson & Simmons, 2013; Little, Dean, Tomchek, & Dunn, 2016), ADHD and specific language impairment (Little, et al., 2018), bipolar disorders (Engel-Yeger, et.al., 2018), cerebral palsy (Pavao & Rocha, 2017), general learning difficulties (Engel-Yeger, Hardal-Nasser, & Gal, 2016) and preterm infants (Cabral, Da Silva, Martinez, & Tudella, 2016).

Whilst it has been estimated that between 15 – 20% of the general population are deemed to have atypical sensory modulation (Ben-Sasson, Hen, Fluss, Cermak, Engel-Yeger, & Gal, 2009), it may be as high as 95% in the autistic population (Tomchek & Dunn, 2007; Baker, Lane, Angley, & Young, 2008), however, and relatively stable over the lifetime of individuals with autism (Billstedt, Gillberg, & Gillberg, 2007). The implications of atypical sensory processing are likely to be more readily apparent in autism, as a result, making autism a particularly fruitful area for investigation.

The recent inclusion of atypical sensory processing, which includes modulation, as part of the criteria for Autistic Spectrum in the publication of the most recent Diagnostic and Statistical Manual of Mental Disorders 5th Edition (DSM 5: American Psychiatric Association, 2013) also reflects an increasing recognition of its impact, and the possibility that sensory processing plays a central role in autism (Edgington, Hill, & Pellicano, 2016). This criteria includes 'hyper- or hypo-reactivity to sensory input or unusual interests in sensory aspects of the environment, (e.g., apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with lights or movement)'.

1.3.2 Potential advantages of atypical sensory modulation in modern society.

Potential advantages of atypical sensory modulation, in modern day life, may have been neglected in the literature, overshadowed by study of disadvantages (Dean, Little, Tomchek, & Dunn, 2018), despite sensory preferences having significant implications for aptitudes in both employment/careers and hobbies (Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001; Dunn, 2016). A rapid growth in the Positive Psychology approach, however, may help alter this imbalance. Positive Psychology focuses on promoting optimal functioning and well-being through identifying strengths and skills that enable individuals and communities to thrive (Seligman, Ernst, Gillham, Reivich, & Linkins, 2009). Ciarrochi et al. (2016) has added the concept of 'Contextual Positive

Psychology' as an important development. 'Context' refers to situational and historical events that influence behaviour. They recommended that both contexts and inner strengths should be key areas of focus.

Positive aspects of atypical sensory modulation, in conjunction with enhanced sensory discrimination, may be implicated in a very small subset of individuals with autism showing 'savantism', domain-specific abilities which are both superior to the individual's other skills and superior to the majority of the general population (Baron-Cohen & Lombardo, 2017). Neurobiological evidence suggest that some, but not all, non-savant individuals with autism show superior performance on local, detail-focused tasks (Haigh, 2017), superior auditory processing under certain conditions (O'Riordan & Passetti, 2006), including pure tones (O'Conner, 2012) and a higher sensitivity to touch (Robertson & Simmons, 2015).

Jolliffe & Baron-Cohen (1997) identified a cognitive style associated with a local processing bias; a focus on details rather than global properties, which is also enhanced in autism and can be more or less advantageous depending on task demands (Robinson & Baron-Cohen, 2017). Particular talents have been identified in recognising repeating patterns in stimuli resulting in hyper-systemizing which can enhance ability in pattern-based subjects such as Mathematics (Baron-Cohen, Wheelwright, Skinner, Martin, Clubley, 2001; James, 2009) and the Sciences (Baron-Cohen, Ashwin, Ashwin, Tavassoli & Chakrabarti, 2009). This remains a contentious issue, however. Baron-Cohen, Ashwin, Ashwin, Trvassoli, & Chakrabarti (2009) suggested that sensory hypersensitivity gives rise to excellent attention to detail, which is a prerequisite for hyper-systemizing. Bennett & Heaton (2012) considered, on the other hand, that superior working memory, as well as attention to detail, was implicated in their study of skilled individuals with autism, which included Music, ICT, Art, and Mechanical ability as well as Mathematics.

In Personality research Ahadi & Basharpoor (2010) further indicated that individuals with Sensory Processing Sensitivity also tend to be more conscientious and better at avoiding errors as they are greatly aware of subtleties and small changes in the environment.

Dean et al. (2018) also researched the contribution of sensory processing to protective factors. Their study of 51 children aged 6 – 11 from the general US population investigated specific relationships between sensory processing patterns and behaviour,

focusing particularly on challenging and adaptive behaviours. The study provided correlational evidence that sensory avoiding (active low threshold) predicts resiliency and adaptability, in addition to internalising behaviour such as depression, whilst sensory seeking (active high threshold) predicts resiliency and depression. Sensory sensitivity (passive low threshold), on the other hand, predicts externalising behaviour, and a higher intensity of reaction to sensory stimuli, such as aggression.

Dean et al. (2018) suggested that interventions focusing on teaching children to notice their responses to sensory stimuli and to actively plan a reaction may be helpful in reducing externalising behaviour. They hypothesised that a key component of the seeking pattern is active engagement with the environment, and another is the sensory characteristics of the environment. Establishing individual sensory profiles followed by collaboration in modifying environments that support socially acceptable self-regulation strategies is suggested to be an important way forward for sensory intervention programmes (Lombard, 2007;2015; Dunn, 2014).

1.3.3 Potential disadvantages of atypical sensory modulation in modern society.

Potential disadvantages of sensory modulation differences in modern society have been studied in much more depth than positive affects (Dean et al., 2018). This substantial body of research has identified wide-ranging and, in some cases, potentially debilitating implications for this population. A narrative review of the literature suggests that sensory over- and under-responsivity and associated emotional reactivity may contribute to a range of behavioural difficulties (Edgington, Hill, & Pellicano, 2016).This includes challenging behaviour (e.g. Pisula et al., 2017), in conjunction with stereotypical, repetitive behaviour and ‘shut down’ or ‘meltdown’, particularly, but not exclusively in the autistic population (Keke-Szabo & Szokolszky, 2012).

Atypical sensory modulation is also associated with poorer academic achievement (Koenig & Rudney, 2010; Turner, Remington, & Hill, 2017), sleep difficulties (Reynolds, Lane, & Thacker, 2012), and obesity as a result of ‘emotional eating’ as a maladaptive self-regulation strategy (Herbert, 2018). Sensory modulation differences can also have a considerable impact on families, with respect to parental stress, employment, family and leisure activities (Schaaf, Toth-Cohen, Johnson, Outten, & Benevides, 2011; Gourley, Wind, Henninger, & Chinitz, 2012). Schaaf et al. (2011) found, for example, that

socialization with other families outside the home could be limited as a result of the child's sensory modulation differences because of the danger of the autistic child 'running wild' or 'damaging items' in unfamiliar surroundings.

There is also arguably a degree of agreement that individuals with atypical sensory modulation in modern day society are at a higher risk of mental health issues such as anxiety and depression (Pfeiffer, Kinnealey, Reed, & Herzberg, 2005; Engel-Yeger and Dunn, 2011; Kreslins, Robertson & Melville, 2015).

Evidence of an elevated risk of premature mortality, due to suicide, is also emerging among individuals on the autistic spectrum compared with the general population, particularly when depressed (Hirvikoski et al., 2016; Cassidy, et al., 2014). Cassidy, et al. (2014) reported that 66% of their Swedish cohort of 374 adults with a late diagnosis of Asperger's syndrome, self-reported suicidal ideation; 35% self-reported plans or attempts at suicide, and 31% self-reported depression. Depression is a known risk factor for completed suicide and, according to the Barraclough, Bunch, Nelson, & Sainsbury (1974) study of 100 cases, more than 90% of people who die by suicide have depression.

Whilst the influence of sensory processing challenges on suicidal ideation has yet to be systematically addressed in the literature, Bitsika, Sharpley, & Mills (2016) found a significant correlation between sensory processing profiles and depressive symptoms in a sample of 150 young males with autism, with low registration (high threshold but passive reactivity) the most powerful predictor of depressive symptoms. This was supported by Serafini et al. (2017) in their study of 281 euthymic participants. Engel-Yeger, et al. (2018) subsequently provided strong correlational evidence associating specific sensory profiles, such as low registration and sensory sensitivity, (both passive response modes to stimuli) with depression/hopelessness. They also indicated, however, that sensation-seeking (an active response mode) may have protective benefits. Meredith, Rappel, Strong, & Bailey (2015) also suggested that some sensory intervention approaches, which enhance self-regulation, may incorporate protective elements.

Further research to clarify to what extent sensory processing patterns play a potentially fundamental role in the pathophysiology of people with major affective disorders and to tease out factors providing resilience as well as vulnerability is clearly indicated.

1.4 Main Theoretical Perspectives

Atypical sensory processing (which includes modulation) continues to be described as both a 'disorder' and a 'difference', in the literature. The two main theoretical approaches, from a behavioural perspective, are Sensory Integration Theory (SIT) (Ayers, 1972) which has traditionally taken a 'disorder' or 'deficit' position, until recently (Dunn, 2014) and Sensory Processing Sensitivity (SPS) (Aron and Aron, 1997), from personality research. The latter conceptualise SPS as a 'difference' which has evolutionary advantages, and as such, is an aspect of human neurodiversity. The two approaches will be considered separately below.

1.4.1 Sensory Integration Theory.

The strand of empirical work originally credited to A. Jean Ayres and her theory of Sensory Integration (Ayres, 1972) is well established in the Occupational Therapy (OT) literature (Lane and Schaaf, 2010). Ayres was an occupational therapist, a psychologist and a post-doctoral neuroscientist (Miller, Anzalone, Lane, Cermak & Osten, 2007). The theory, based on work with children who had disabilities, suggested that impairment in their ability to process sensory information may contribute towards their difficulties (Kinnealey & Miller, 1993). A key assumption was that it was possible to remediate atypical sensory processing through interventions based on sensory integration theory, due to plasticity within the central nervous system (Pollock, 2009).

Sufficient divergence in theory and practice across the field of Occupational Therapy led to Ayres' Sensory Integration (ASI) being trade-marked in 2007 to distinguish it from other sensory approaches (Pollock, 2009). ASI therapy typically involves intensive, direct intervention on a one-to-one basis in an environment that has a variety of specialized equipment. This can include large pieces of equipment such as big balls/rolls, trampolines and suspended equipment designed to provide intensive proprioceptive, vestibular and tactile stimulation.

Early theoretical work was hampered by insufficiently robust methodology but in the last decade, amid the call for 'evidence-base practice' for the Occupational Therapy profession, this has increasingly been addressed (Mailloux & Miller-Kuhaneck, 2014). Supportive evidence of the approach's ability to remediate any underlying impairment remains elusive, nevertheless (May-Benson and Koomar, 2010; Lang, Register, Lauderdale, Ashbaugh & Haring. 2010).

The core assumption of the theory; that sensory integration therapy can change the central nervous system, is not supported by empirical evidence (Pollock, 2009; Lang et al., 2010; Dunn, 2014) contributing to concern that Sensory Integration Therapy is still being used by many occupational therapists (Thompson-Hodgetts & Magill-Evans, 2018). In their survey of 211 occupational therapists working in 16 countries, Thompson-Hodgetts & Magill-Evans (2018) reported that 98% used such approaches for children with autism and would recommend the approaches for 57% of the children they treated. The occupational therapists were particularly influenced by country of residence and more likely to use it if outside of North America or Australia; had clinical experience of over 5 years and if their mentor had recommended the approach. Pollock (2009), amongst others, argued that for such a resource-intensive intervention, the time and resources devoted to this therapy meant that the child was not receiving another type of intervention which may be more beneficial.

Studies using sensory integration approaches targeting adaptive behaviour rather than attempting to 'fix' sensory profiles are having more success, (Schaaf et al., 2014) suggesting that at least some of the elements of the programme could help enable people to cope with modern day challenges. It would, therefore, be premature to discount the approach in its entirety.

Dunn (2014) suggested that ecological models of human development and behaviour emphasizing the person as they are situated in their own lives, in conjunction with evidence from strengths-based approaches, has also led to some acceptance of individual differences in sensory processing as a normal aspect of 'neuro-diversity' in the field of Occupational Therapy. She used Sensory Processing 'Differences' as a preferred term of reference, as a result.

1.4.2 Sensory Processing Sensitivity.

Jung (1915) suggested that certain people possessed 'innate sensitiveness' of both a sensory and emotional nature and a trait of high sensitivity. He argued that such innate sensitiveness predisposed some people to be especially impacted by negative or traumatic childhood experiences. Jung also noted positive aspects of being highly sensitive, however, resulting in 'an enrichment of the personality' under better circumstances.

This trait was subsequently linked with various other theoretical concepts including introversion (e.g. Eysenck, 1981), inhibitedness in children (e.g. Kagan, 1994), reactivity

(e.g. Rothbart, 1989), innate shyness (e.g. Daniels & Plomin, 1985) and has also been referred to as 'behavioural inhibition to the unfamiliar' (Kagan et al., 1984).

Aron and Aron (1997) coined the term 'Sensory Processing Sensitivity' (SPS) to describe this temperamental trait. They developed the Highly Sensitive Person Scale via large-scale interviewing to identify people displaying these attributes. This scale, containing 27 items, has shown good content validity, reliability, convergent validity, and discriminant validity (Smolewska, McCabe, & Woody, 2006). Questions probing to ascertain sensitivity to sensory data using a seven-point Likert Scale include 'Do you seem to be aware of subtleties in your environment?' and 'Are you easily overwhelmed by things like bright lights, strong smells, coarse fabrics, or sirens close by?'

Pluess et al. (2018) subsequently developed a 12-item Highly Sensitive Child (HSC) scale for use with children and adolescents. Lionetti, Aron, Aron, Klein, & Pluess, (2019) have more recently developed an observer-rated instrument; the Highly Sensitive Child-Rating System (HSC-RS), to capture different levels of sensitivity to the environment in children aged 3 – 5 years.

Evidence from observations, questionnaires, cross-over interactions, functional Magnetic Resonance Imaging (fMRI) and genotype studies provide support for SPS as an innate personality trait possessed by circa 15-20% of the population, equally distributed across genders and cultures (Aron, Aron, & Jagiellowicz, 2012). Non-human research has also discovered similar traits including enhanced environmental sensitivity in up to 20% of the population of at least 100 other species, ranging from sunfish (Wilson, Coleman, Clark, & Biederman, 1993) to primates (Suomi, 1997) supporting the argument that this trait serves an important evolutionary function.

According to Wilson et al. (1993) this significant minority sub-group, within most species, observe and think carefully before acting, with the benefit of a more sensitive nervous system designed to detect subtle differences. The remaining 80% are bolder and prone to act without complete information. Two different, but complementary inherited traits are considered to advantage the species, which could be important for survival when faced with environmental challenges.

Whilst Aron & Aron (1997) considered SPS to be a single unitary construct, others, such Smolewska et al., (2006), identified three: low sensory threshold (sensitivity to

sensory stimuli), ease of excitation (becoming emotionally overwhelmed by internal and external demands) and aesthetic awareness and appreciation, the latter being considered a positive consequence of noticing and experiencing more deeply than others.

SPS is reported to be valued more in certain cultures than others, such as China (Chen et al., 1992), Thailand and, to a certain extent, Denmark (Zeff, 2010). In his clinical interviews of 30 highly sensitive males, Zeff (2010) reported that in Western society, particularly USA and Canada, reflection and sensitivity is considered a particularly negative trait in men, however.

Correlational evidence has associated SPS and negative childhood experiences with anxiety, including social phobia and depression (Neal, Edelmann, and Glachan, 2002). According to Boterberg & Warreyn (2016) children with high SPS are also more likely to complain of medically unexplained physical symptoms (MUPS), eating and sleeping problems compared to children with average or low SPS. Neuroimaging studies have also found that both reward and fear areas of the brain are more easily activated in 'inhibited' adolescents (e.g. Bar-Haim et al., 2009).

Aron (2002) reported that many people with SPS intuitively adapt their environments and participate in activities which aid their self-regulation, but this is not always the case, placing them at risk of stress and symptoms of ill health (Benham, 2006). In a recent study by Brindle, Moulding, Bakker, & Nedeljkovic, (2015) it was suggested that the relationship between SPS and negative affect may be mediated by emotional regulation. Brindle et al. (2015) added that a lack of access to effective emotional regulation strategies could lead to a level of learnt helplessness, potentially impacting more widely on the person's subsequent use of emotional regulation strategies. The argument of Dean et al. (2018) that individuals benefit from being taught to notice their response to sensory stimuli and to actively plan socially acceptable self-regulation strategies is likely to be very relevant in this respect.

The investigation of SPS has a rapidly growing interdisciplinary and international evidence-base, encompassing, amongst others, the fields of Developmental Psychology (e.g. Pluess et al., 2018), Personality and Individual Differences (e.g. Boterberg & Warreyn, 2016), and Neuropsychology and Pathology (e.g. Ellis et al., 2011). It has yet to make a discernible impact in the field of Educational Psychology, however. Several books for the general public have been published by clinical psychologists and lay researchers,

based on clinical interviews and personal experience, offering advice on adult life, parenting and schooling, nevertheless (e.g. Aron, 2002; Zeff, 2010; Davenport, 2015). The importance of positive home and school experiences and the implications of negative experiences for mental health are emphasised in such publications. Anecdotal evidence from clinical interviews and personal experience are not considered methodologically sound, however, on the grounds of potential investigator bias (Yin, 2009).

1.4.3 Atypical sensory modulation and autism.

Whilst Robinson & Simmons (2012) identified a significant linear correlation between sensory features and broader autistic traits in the general population, the relationship between the two remains unclear. Mayer (2017), in her study of 591 neuro-typical student participants provided evidence that atypical sensory processing exists throughout the neuro-typical population and is not specific to autism. Atypical sensory processing has also been found in parents (Uljarevic, Prior, & Leekham, 2014) and siblings (De La Marche, Steyaert, & Noens, 2012) of children with autism, suggesting a possible genetic link.

Available evidence suggests some differences in the profile of atypical sensory related behaviours in children with autism compared with those with other developmental disorders (Ermer and Dunn, 1998; Baranek, David, Poe, Stone, & Watson, 2006). Few studies have directly compared children with autism and neuro-typical children with sensory modulation 'disorder', however (Schoen, Miller, Brett-Green, & Nielsen, 2009; Tavassoli et al., 2017; Fernandez-Andres, Sanz-Cerverza, Salgado-Burgos, Tarraga-Minguez, & Pastor-Cerezuela, 2018).

Schoen et al. (2009) identified some differences in physiological arousal and sensory reactivity in children with autism compared with children presenting 'sensory modulation disorder' (SMD). Using the Short Sensory Profile (Dunn, 1999) both groups were reported to have significantly more sensory-related behaviours than typically developing children. Similarities between the two groups included impairment in auditory filtering and tactile sensitivity, but profiles differed. The autism group had more atypical taste/smell sensitivity and sensory under-responsivity while the SMD group presented more sensory seeking behaviour. Tavassoli et al., (2017) also identified greater symptoms of sensory under-responsivity in the autism group but there were no significant differences on sensation seeking or over-reactivity in any modality. They concluded that given the

considerable overlap in sensory symptoms in ASC and SPD, sensory symptoms alone are not adequate to differentiate these two groups.

Context may be a confounding factor, however. Fernandez-Andres et al., (2018) compared family and school contexts. Whilst no differences were found for some of the sensory modalities in the home environment, under-responsiveness was identified to a greater extent, as a prominent and exclusive sensory symptom of children with ASC, within a school environment. They hypothesised that the greater demands, requirements and environmental factors making the sensory surroundings in the school more varied, abundant and unpredictable, could have contributed to greater detection of sensory difficulties.

The relationship between senses and behavioural manifestation is clearly complex suggesting that the transaction of the person, activity and context is paramount with respect to a person's ability to participate effectively in modern day life (Dunn, Little, Dean, Robertson, & Evans, 2016). This suggests that intervention research needs to explore the importance of contextual factors, in combination with sensory profiles, as a result.

1.5 Sensory Sub-types in Autism

In the light of great heterogeneity in sensory features across the autistic population (Ausderau et al., 2014); other diagnostic groups, such as ADHD and specific language impairment (Little, Dean, Tomchek, & Dunn, 2016), recent research has focussed on identifying subtypes of children based on sensory processing patterns (Lane, Molley, & Bishop, 2014; DeBoth & Reynolds, 2017). Sensory subtype research is deemed particularly important for several reasons; to help clarify whether atypical sensory processing is a core component of autism or a co-morbid phenomenon (Ben- Sasson et al., 2009; Marco, Leighton, Hinkley, Hill, & Nagarajan, 2011); to establish its relationship with core autistic features (Leekam, Prior, & Uljarevic, 2011; Robinson & Simmons, 2012; Lundqvist, 2015; Leekham, 2016; Robertson & Baron-Cohen, 2017) and to design suitably individualised interventions to influence both the developmental course of sensory processing aspects of behaviour in autism and to support the child's sensory processing as they participate in their daily lives (Dunn et al., 2016).

The identification of unique patterns of sensory processing associated with autism is proving extremely elusive, however, (Lane, Young, Baker, & Angley, 2010; Ermer and Dunn, 1998; Lane, Molley, & Bishop, 2014; DeBoth & Reynolds, 2017). Many studies

have been hindered by variability in investigative approaches, such as differences in assessment measures used, a reliance on imprecise parent reports and inclusion or otherwise of diagnostic sub-groups, making interpretation and comparison of studies difficult. Heterogeneity in the autistic population is another major issue (Uljarevic et al., 2017), which has led to some researchers to refer to 'autisms' rather than 'Autism' as a unitary concept (Wing, Gould, & Gillberg, 2011).

Physiological and behavioural evidence is now amassing to suggest that the severity of sensory processing issues within any modality is more pertinent, in autism, than definitive sub-groups (Schaaf et al., 2010). Hyper- and hypo-reactivity has been shown to occur in the same child and even within the same modality (Lombard, 2015; Bogdashina, 2003; Haigh, 2017). Haigh (2017) further suggested that deficits in complex sensory processing may appear in the form of greater trial-to-trial variability reducing the stability of the sensory information, which impacts upon further sensory processing and impairs the individual's ability to interact with their environment. Inconsistent sensory information would interfere with the compilation of processing and selective attention and decrease the capacity to generalise, as a result (Gerrard & Rugg, 2009; Haigh, 2017). Researchers, such as Lane et al. (2010), consider that such 'fluctuating' profiles may be a particular issue in autism as opposed to other conditions.

Given the considerable heterogeneity within the autistic population (McKay, Greig, & Connolly, 2017), which may have contributed to a lack of progress in the development of effective and evidenced-based interventions, there is a compelling argument to work with a fairly homogenous subgroup of CYP with autism (Gerrard & Rudd, 2009; Amaral, 2011) to facilitate ways forward. Regard for individual sensory profiles when formulating intervention approaches, even with homogenous groups, also remains important, nevertheless.

1.6 The Need for an Individualised Approach

Despite growing evidence to support the premise that contextual factors may influence the results, Uljarevic et al. (2017), amongst others, advise that in sensory-based interventions with CYP with autism, the individual characteristics of the pupils should also be a key area of focus. This data can be omitted, however. Very few intervention studies consider individual differences in sensory processing, namely the relative performance of each child across specific sensory domains. The SCERTS early intervention programme

(Prizant, Wetherby, Rubin, & Laurent, 2003) is a rare exception. There is a tendency to treat samples as homogeneous groups of 'typical' or 'atypical' sensory processors, often based on imprecise parent report measures (Lane et al., 2010).

Inconsistencies in results and the enigma of 'non-responders' who show no evidence of improvement (Strain, Schwartz, & Barton, 2011; Vivant et al., 2014) may be associated, at least in part, with heterogeneity within each group. McKay, Greig, & Connolly (2017) called for the urgent need for more detailed assessment of the individuals' strengths and weaknesses for advising on and planning interventions. Howe and Stagg (2016) also advised against any 'one size fits all' approach with dealing with sensory challenges, placing the emphasis on schools to work with individual child profiles.

Uljarevic et al. (2017) added that sensory profiling remains relatively superficial despite the inclusion of sensory features in the DSM-5 (American Psychiatric Association, 2013). The further development of sensory profiling techniques is vital to facilitate the provision of comprehensive and individualised sensory profiles, which may be critical for determining "what works for whom, and why" when it comes to designing and evaluating intervention strategies (Trembath & Vivanti, 2014, p 58).

McKay, Greig, & Connolly further indicated that small-scale qualitative studies have their place in building up a case-by-case understanding. Lickel, MacLean, Blakeley-Smith, & Hepburn (2012) added that success in working with youths with autism may necessitate an individualized approach which requires time, flexibility and creative problem-solving.

1.7 School Environments, Sensory Processing and Autism

According to Turner, Remington, & Hill, (2017) Children and Young People (CYP) with autism constitute 11% of all children with special educational needs in England, of which 70% are educated in mainstream settings. Humphrey and Lewis (2008) consider that school is a particularly stressful and anxiety-provoking place for many pupils with autism and one in five are excluded at least once. Government figures for 2013 to 2014 further indicated that only 28% of young people with autism achieved five good GCSEs (A* -C) compared to 66% of students overall (Turner et al., 2017).

Kuhunock and Kelleher (2015) highlighted a wide range of challenges for sensory sensitive pupils in schools including bright (fluorescent) lighting; additional visual

stimulation on wall/hanging displays; people moving about the room; learning activities providing touch, movements and smells; background noise in class exacerbated by poor acoustics in conjunction with high levels of noise in cafeterias and hallways.

In a study conducted by Ashburner, Ziviani, & Rodgers (2008), of 28 autistic children aged 6 -10 years, compared with their neuro-typical peers, under-responsive/seeks sensation and auditory filtering were significantly negatively associated with academic performance and attention to cognitive tasks. The children had difficulty tuning into verbal instructions in the presence of background noise. High levels of tactile sensitivity were also associated with attention difficulties. Humphrey and Lewis (2008) also identified high levels of anxiety moving through corridors full of children pushing into each other.

Studies investigating the views of autistic adolescents regarding their sensory challenges within the classroom are rare. Howe and Stagg (2016) elicited written questionnaire responses from 14 CYP aged between 12 – 17 who presented atypical sensory processing, as measured by the AASP (Brown and Dunn, 2002), however. Data indicated a wide range of sensory profiles, confirming heterogeneity in this sphere, with severity of symptoms a more pertinent issue. All the participants reported difficulties with at least one sense whilst 86% scored outside of the normal range on two or more quadrants. 88% were affected by auditory processing, 75% by tactile processing, 50% by visual processing and 38% by smell. All participants felt that their sensory difficulties affected their learning with the majority reporting a reduction in concentration. Noise was particularly distracting. Physical discomfort ranged from actual pain ("shouting makes my stomach hurt") to more minor issues ("the scraping sound makes my tummy feel strange"). Howe and Stagg (2016) also supported Humphrey and Lewis' (2008) evidence of atypical sensory processing contributing to feelings of anxiety.

Not all reports were negative, however, with many positive comments related to enhanced sensory processing as a bonus (e.g. "I know what's going on because my hearing is so good"). Self-awareness of negative sensory experiences was also viewed positively, as having some control over these was deemed an important method of elevating stress and anxiety. A consistency found across all the data, however, was that sensory experiences were not a constant state, as they were mediated by stress and context.

Pfeiffer et al. (2017) further indicate that parents of autistic children often intuitively incorporate strategies either directly related to sensory factors of the home

environment or focused on reducing behavioural responses associated with sensory factors. Six consistent strategies were identified as supporting children's participation in daily living. These were 1) maintaining or establishing routines; 2) allowing the child to have more control and choice in the environment; 3) preparation and anticipatory planning; 4) ensuring the presence of certain sensory factors that are naturally part of the environment (movement in parks, darkness in the cinema, deep touch input in gymnastics etc.); 5) adapting the sensory features of the activity or environment and 6) implementing sensory strategies. Participants indicated that some of the strategies were implemented with little effort, and often with minimal awareness, but others were perceived as effortful but necessary.

1.8 School-based Sensory Intervention Programmes

Despite the sensory challenges of school environments, The Autism Education Trust (ACT) identified significant gaps in provision for sensory processing issues, in UK schools, which has been highlighted as a concern by both parents and teachers of children and young people (CYP) with autism (Wittemeyer, et al., 2011). In their review report, Farrell, Fidler, Christie, & Lyn-Cook (2015) established that only 7% of schools were using an established programme, such as SCERTS (Prizant et al., 2003), which includes a focus on sensory issues underlying emotional regulation.

There is also a paucity of peer-reviewed school-based sensory intervention studies targeting autistic children, of any age, and even fewer studies were found for high functioning adolescent pupils with autism (see Chapter 2). The majority of the studies identified tended to focus on younger children; for example SCERTS with children aged 3 to 7 years (Morgan et al., 2018; Yu & Zhu, 2018); sensory snack time for 4 – 10 year olds (Galpin, Osman, & Paramore, 2018), a sensory activity schedule intervention for children aged 5 – 7 years (Mills, Chapparo, & Hinitt, 2016), Sensory Integration Therapy with 3 – 8 year olds (Schaaf, et al., 2014; Kashefimehr, Kayihan, & Huri, 2018), and the use of smartwatches for 10 years olds (Torrado, Gomez, & Montoro, 2017).

A dearth of sufficiently evidence-based interventions (Critz, Blake, & Nogueira, 2015; Vivanti, Prior, Williams, & Dissanayake 2014), and inconclusive results, may have also led to schools and colleges underestimating the importance of sensory processing issues. In the UK in recent years, school staff have also been faced with ever-increasing numbers of new interventions resulting in 'initiative overload', cynicism about the

longevity and sustainability of interventions and a reluctance to invest limited time, resources and personal effort into new initiatives, as a result (Lendrum & Humphey, 2012).

1.9 Process Issues for Interventions in 'Real Life' Contexts

Weeks, Grimmer, Boshoff, & Stewart (2014) consider that a key issue undermining autism intervention research is the tension between Random Controlled Trial (RCT) requirements and pragmatic conduct of community-based research that recognises the realities of working with children and families in 'real life' contexts. There is considerable concern that, whilst clinical trials have shown beneficial effects of hundreds of specific child and adolescent interventions since the 1950s, few have made their way into real-life settings (Weisz, 2000). This is considered to be due to a 'poor fit' between research and practice and between clinics/laboratories and school environments with regards to autism research, in particular (Kasari & Smith, 2013).

Weisz (2000) argues that there was an urgent need to put 'science into practice' by conducting the research in 'authentic' settings, i.e. embedded in the contexts where the intervention is most likely to be implemented. This would facilitate gaining both a better understanding of the mechanisms through which change takes place and the ability to identify those moderators that limit the range of treatment effects. Lendrum & Humphey (2012) agree that the study of implementation of an intervention, in context, is critical for understanding which programme components are important; how they work and interact within the constraints of real-world settings and for the examination of barriers undermining implementation.

Kasari & Smith (2013) suggest that carrying out research on new interventions should be in school settings from the outset, conducting 'partial effectiveness' trials, ideally in partnership with school staff. Parsons and Kasari (2013) indicate that based on experience, working in a school environment is 'not for the faint hearted', however, due to a lack of control of many aspects of the school day. They argue, nevertheless, that there could be considerable benefits in the collaborative development of interventions between research teams and schools to ensure that the intervention is 'school-ready', and that researchers should 'raise the bar' to rise to that challenge.

This researcher established, whilst searching the literature, not only that school-based intervention studies are rare, but that the reporting of barriers undermining implementation in such contexts is even sparser. Blackwell et al. (2014) and Drmic,

Aljunied, & Reaven (2017) provided some insight, nevertheless. Blackwell et al. (2014), for example, indicated that whilst most activities and experiences occurred, as planned, in their feasibility study using the Alert Programme in an early childhood setting, others did not. Teacher absence in training sessions, cancellation of sessions due to lack of teacher coverage, modifications to the daily routine, causing teachers to forget the researchers were coming and failure to send home materials in a timely manner were noted. The implications of these barriers for the intervention were not fully explored, nevertheless.

In their feasibility study of a school-based Cognitive Behavioural Therapy intervention programme called 'Facing your Fears: School-Based' (FYF-SB) for adolescents with autism and anxiety in Singapore, Drmic, Aljunied & Reaven (2017) identified both facilitating factors and barriers in school-based contexts. Facilitating factors included strong and consistent support from stakeholders, joint planning sessions, appropriate and meaningful resources, identification of students who are motivated, facilitating positive rapport and more enjoyable sessions and optimal structure of the programme. Barriers, on the other hand, included scheduling difficulties, lack of parental support, some students not being 'group ready', absence of locally developed resources, more knowledge and skills required by teachers and additional 'logistics and person power problems'. Drmic, Aljunied & Reaven (2017) considered that these findings provided 'valuable lessons' about working with schools and significant implications for the next implementation phase of their programme.

Odom, Duda, Kucharczyk, Cox, & Stabel (2014) further described the study of autistic adolescents in a school environment 'a perfect storm of complexity' due to a combination of the expression of autism during adolescence in conjunction with the complicated logistic nature of senior schools, which may be off-putting for many researchers. This might contribute towards a general lack of research relating to outcomes, strengths and needs of adolescents with autism, as a result (Keen, Webster, & Ridley, 2016).

A combination of the heterogenic nature of autistic sensory profiles with the challenges involved in working in school environments may also contribute towards a history of inconclusive results in school-based sensory intervention research with autistic children and young people. This may include a possibility of Type 2 errors by under-

estimating the value of the intervention itself and '*throwing the baby out with the bathwater'*, as a result.

1.10 Atypical Sensory Processing and Educational Psychology

I want to see more data generated by the profession to show what works, clearer information about teaching techniques that get results, more rigorous, scientifically robust research about pedagogies which succeed and proper independent evaluations of interventions which have run their course. We need more evidence-based policy making, and for that to work, we need more evidence. (Gove, 2010, p 6).

Gove (2010), the former Secretary of State for Education, was referring to educational research which has been subject to heavy criticism regarding its nature, quality, relevance and usefulness to education (Gardner, 2011).

Within the field of education, Doctorial level Continuing Professional Development has been available to educational psychologists for two decades (Cameron, Frederickson, Lunt, & Lang, 2008), and Doctorate initial training was introduced in 2006. The purpose was to provide educational psychologists with the appropriate knowledge and skills to identify and conduct quality educational research (Lunt & Majors, 2000). The vision was for educational psychologists to become increasingly involved in educational research where theory is turned into specific and viable recommendations, which policymakers and practitioners may consider relevant and useful, thus providing a pivotal role in shaping policy and practice.

This study presented a welcome opportunity to explore the role of the EP as a scientist-practitioner (Lane & Corrie, 2006) by translating the multi-disciplinary theory underlying the sensory intelligence approach into practice via a teaching programme; to evaluate both the process and product in a 'real-life' setting and to draw upon psychological theory to add to any evidence base to support it. Such feasibility studies are an important first step in determining whether an intervention is of any value; whether it is acceptable and practical in a desired context, and whether it warrants further testing (Tickle-Degnen, 2013).

As EPs are increasingly becoming involved in the implementation of interventions through direct or indirect service delivery (Stoiber, 2002), it is considered important to explore suitable frameworks to assist the profession in doing so transparently and

successfully (Lodal & Bond, 2017). The researcher suggests, therefore, that approaches emerging from other fields, which focus specifically on the process of implementation to help bridge the research-practice divide (Lodal & Bond, 2017), would benefit from further investigation as potentially useful additions to the EP's 'toolkit'.

Given that a sizeable minority of pupils who may have atypical sensory processing are at high risk of difficulties in a range of spheres, as outlined above, it is also crucial to explore the wider roles that educational psychologists might play. Such roles are likely to impact on individual work with CYPs, work with families, groups and systemically with schools, thus practicing at different levels of systems. The British Psychological Society (BPS, 2015) highlight the importance of EPs working as consultants for school staff, other professionals and parents; developing interventions which would include ensuring the understanding of practitioners if they were delivering such interventions, and contributing to multi-agency planning processes for CYP, in addition to direct work with children.

Autism is also a particularly major dimension for educational and applied psychology due to the increasing prevalence of the condition, and the implications of sensory processing issues affecting the whole of childhood and adolescence including young adults up to the age of 25 (McKay, Greig & Connolly, 2017). Both Shattuck et al. (2012) and Taylor & Seltzer (2011) report that young people with autism have very low rates of community employment after leaving school, relative to others with speech/language impairments or learning difficulties. Other aspects of adult life, such as participation in the community and moving out of one's childhood home, are also inconsistently accessed by young people with autism, despite average or near-average cognitive abilities (Farley et al., 2009). Test, Smith, & Carter (2014), suggest that problems coping with change and even small changes in routines and environment can be contributory factors. Both may, therefore, be critical areas of focus for sensory modulation strategies in equipping them particularly for secondary transition and adulthood.

Central to the entire EP discipline is also the remit to support children and young people to achieve their full academic potential and to safeguard their mental health (Roffey, 2015).

1.11 Summary of Chapter One

In this chapter, an overview of the conceptual and theoretical territory associated with this topic and consideration of the importance of the area has been provided. The

distinctive contribution of the research and its potential relevance for educational psychology practice has been introduced.

1.12 Outline of the Remainder of the Thesis

The thesis continues with a systematic literature review in Chapter Two. This will focus on the period between 2005 - 2018 to establish which school-based sensory programmes for adolescents with autism are 'evidenced-based' and the extent of any positive intervention outcomes. In the light of the heterogeneity of sensory profiles in the autistic population in conjunction with particular challenges bridging the theory-practice divide in school-based studies, the aim is to consider factors associated with individual-level variability in response amid the challenges of school-based as opposed to clinic-based interventions, namely 'what works for whom in what circumstances'. This will consist of a systematic realist review and synthesis to establish the programme theories of sensory-based intervention approaches already investigated and the empirical support for these approaches using the 'EMMIE' realist framework (Johnson, Tilley, & Bowers, 2015). This will be followed by the rationale for the current study in the light of gaps in the research literature, its relevance for EPs and why the Sensory Intelligence approach was considered worthy of investigation. The research questions, which have evolved to address gaps in the empirical literature, will also be provided.

Chapter Three will outline the ontological and epistemological positions of the researcher including axiological considerations. It will provide reasons for choosing a deductive qualitative research methodology in conjunction with an evaluation framework incorporating EMMIE with CIPP (Stufflebeam & Coryn, 2014) and the use of Context-Mechanism- Outcome configurations for the first time. This section also provides details of the CYPs, the other participants and the context of the study, within a Case Study approach. The chapter will outline the procedure followed, including data gathering and analysis.

The results of the research, as interpreted using Thematic Analysis, will be presented in Chapter Four in terms of main themes and sub-themes. The sensory profiles of the CYPs established, will also be provided.

Chapter Five will discuss the outcomes of the research with reference to the remaining research questions, the strengths and limitations of the study, the literature review and any new knowledge emerging. The ethical considerations that the study raised

and how these were addressed will be considered. The implications for EP professional practice will be discussed and recommendations for future research regarding school-based sensory interventions for adolescents with ASC are made. It will also provide a conclusion reflecting on the current study and its findings.

Chapter 2: Literature Review

2.1 Outline of Chapter Two

Following the overview of the conceptual and theoretical territory associated with this topic in Chapter One, this chapter will consider the potential benefits of adopting a (critical) Realist approach in interrogating autism intervention research. This will be followed by a consideration of evidence suggesting that sensory-based interventions for adolescents with autism are limited, arguably due to priority being given to early intervention and other areas of concern over sensory needs. Realist reviews and a Realist framework, 'EMMIE' (Effect, Mechanisms, Moderators, Implementation, Economic) will be introduced.

A systematic Realist review of literature will be conducted, using the EMMIE framework, to ascertain the range of sensory-based interventions available for this age-group, followed by interrogation of the programme theories underlying the interventions and the empirical evidence-base to support them. The chapter will conclude with a summary of what has been established empirically and what gaps in the evidence-base remain with respect to school-based sensory modulation programmes for adolescents with autism aged 12 years and above. It will also consider why the Sensory Intelligence programme may be worthy of empirical enquiry.

2.2 The Potential of a Realist Approach to Autism Intervention Research

Kelly & Woolfston (2008) emphasise the importance of accountability, transparency, continuous improvement, best value and evidence of effectiveness for contemporary Educational Psychology to develop the means to express coherently what it is doing and why. The researcher would argue that this should be evidenced in both the interrogation and production of research as well as in EP professional practice.

Central to a realist methodology is the endeavour to answer explanatory questions through constructing models, subject to refinement, to try to explain why the empirically recordable look and behaves in the way that it does. In this respect realists are less interested in methods and are more concerned about how insights add to a pool of theory (Pawson, Greenhalgh, Harvey, & Walshe, 2004). Bringing ideas/insights into relation with evidence to construct fallible and provisional but testable models, is argued to lead to the

refinement of theory (Wong, 2018). This has practical utility, particularly for intervention research, as refined theories provide clues into why something happened/did not happen, where and under what circumstances. It also provides guidance about where to look next, who/what to purposely sample and the most appropriate method to use to test and further refine theory (Pawson, 2018).

Outside of the field of autism research, realist methodologies, focusing on 'what works for whom under what circumstances' are gaining momentum in the social and human sciences, internationally and across disciplines, as measured by citations (Emmel et al., 2018). This approach has also been widely adopted to explore complex systems in health service intervention studies in the UK (Tolson, McIntosh, Loftus, & Cormie, 2007).

Vivanti, et al. (2014) argued that autism research also needs to be more theory-driven and to focus on more proximal predictor variables reflecting specific and clearly defined processes which might explain inconsistencies in response to interventions. They consider that current theoretical and methodological approaches are not adequate to address predictors of treatment responses for children with autism. Reviews and meta-analyses tend to focus on group-level outcomes ("does the treatment work for this condition?") but fail to focus on predictors of outcomes for either identifiable subgroups or individuals. As such trials and meta-analyses show variable effect sizes, there is a clear need to delve deeper and analyse profiles of "responders" and "non-responders" to the programme to enhance understanding of the main mechanisms and moderators involved.

Mechanisms relate to 'what is it about the programme that generates change?' Mechanisms consist of the interactions between the opportunities or resources provided by the intervention and the reasoning or responses of the participant. These may include norms, collective beliefs and broad conditions (Wong et al., 2013). Moderators include the nature of the participants, including their unique sensory profiles and the context in which the intervention takes place.

The researcher suggests that a realist approach may have potential to facilitate, arguably much needed progress in autism intervention research, and as such, could usefully be investigated by EPs as a way forward for this area of focus. What is important is the development of an understanding of how a context acts on a mechanism to produce outcomes, i.e. how it modifies the effectiveness of an intervention. From a pragmatic perspective, it is prudent to focus on the main mechanisms (intended and unintended)

rather than attempt to identify them all, namely those that are common and significant enough to contribute to a pattern of outcomes of the intervention. According to Doung et al. (2016) and others, understanding the mediators and moderators are crucial to theory refinement and development of more effective interventions.

2.3 The Choice of a Realist Review

Systematic review selection criteria routinely reject case-studies and qualitative studies due to the requirement of a different approach to synthesis that is outside the scope of their reviews (Zimmerman, Ownsworth, O'Donovan, Roberts & Gullo, 2018). This limits the data available to consider process as well as product evaluation. It prioritises a consideration of 'what works' without dealing with the complexity of different contexts and evidence about what works for whom, in what exact circumstances and the mechanisms explaining why (Monaghan & Boaz, 2018).

Narrative reviews (which are also known as expert or ad hoc reviews) are informed by the skill and experience of the reviewer, but without purposive or exhaustive strategies for obtaining evidence are open to hidden bias (Gough, 2007).

A Realist review can be considered a bridge between the two. It is a systematic narrative approach as it is designed to be sufficiently systematic in the use of strategies to obtain evidence to help reduce bias, whilst, at the same time, also purposely process-orientated to enable consideration of factors that influence programme implementation (Wong, 2018). The keystone of realism is the exposure, elaboration and exposition of theory (Booth, Wright & Briscoe, 2018). A Realist review is, therefore, considered to provide the best means with which to effectively interrogate the current evidence base. This is based on the challenges of the heterogeneity of the autistic population, the complexity of school systems and limited progress in developing effective school-based sensory interventions for this age group, introduced in the previous chapter.

A Realist review is also particularly useful when there is a paucity of empirical evidence available on the topic of interest. This is because a Realist approach provides the opportunity to search for 'nuggets of evidence' (Wong, 2018) via the consideration of a wider range of sources including 'grey material' such as unpublished dissertations, book chapters and articles providing expert opinion.

It involves a systematic background search, to demonstrate transparency, whilst endeavouring to ascertain previously published research in the area of enquiry. This is followed by identification of further lines of enquiry requiring collateral search of related literature from multiple disciplines, including citation searching and snowball searching from a set of key references, to build a larger evidence base.

A search for programme theory, namely explanatory accounts of how an intervention is considered to work is followed by a search for empirical evidence to support or dispute the programme theory. This allows the researcher to ascertain the nature of the evidence base and whether there is enough data to corroborate, refute or refine programme theory (Pawson, 2006; Booth, Wright, & Briscoe, 2018).

2.3.1 A Paucity of Research in This Area.

It was noted that most of the research into atypical sensory processing has taken place in USA, Canada, South Africa and Australia. Sensory processing is less evident in published research in the UK. Within Educational Psychology journals such as Educational Psychology in Practice, British Journal of Educational Psychology and Education and Child Psychology, only two articles were found referring to sensory processing. These acknowledged that autistic pupils in their studies were experiencing sensory issues, but no suggestions were made regarding intervention (Billington, McNally, & McNally, 2000; Barrett, 2006)

In their critical review of comprehensive, community-based treatments for young children with ASC, Stolte, Hogetts, & Smith (2016) conducted an analysis of outcome measures which noted a predominance of cognitive and adaptive functioning measures, neglecting other behavioural constructs associated with autism, including sensory processing. None of the studies took sensory processing into consideration.

In addition, relatively little of the autism intervention literature is conducted specifically with adolescents, as priority appears to have been given to pre-school and primary school-aged children (Mesibov & Shea, 2011). The suitability of strategies used with younger children to address the needs of adolescents is unknown. Weisz & Hawley (2002) advise that adolescence involves biological, psychological and social transformation, which makes it a relatively unique developmental stage. A key consideration when reviewing the literature, is therefore, the age range of participants

A rare systematic review of intervention research specifically with adolescents with autism was conducted by McDonald & Machalicek (2013). They analysed 102 studies over a 31-year span (1980 -2011) targeting adolescents with autism aged between 12 – 21 years. The focusses of these studies were categorised into seven domains; a) social skills; b) communication skills; c) challenging behaviour; d) academic skills; e) vocational skills; f) independence and self-care; and g) physical development. The authors indicated that few studies investigated communication, vocational or academic skills, however, and they expressed concern that issues, such as sensory processing, had not been considered.

2.3.2 Key sources and search strategy.

Literature included in this review was located using PsycINFO, ERIC, SCOPUS, Web of Science, Google Scholar, Science Direct and PubMed. The review strategy included reference harvesting and manual searches within autism specific journals to locate any additional research papers, which met the search criteria. 'Grey material', namely literature which was not peer-reviewed (Hart, 2001), such as book chapters/articles and unpublished dissertations were also investigated given the paucity of peer-reviewed publications available.

Search terms were initially applied to the whole publication, but subsequently limited to title and abstract due to the large number of irrelevant articles returned. The search terms are summarised in Table 2.

Table 2

Search Terms for the Realist Review.

Sensory*	Intervention	Autism	School	Adolescent
"Sensory diet"	Treatment	Autis*	School-based	"Young people"
"Environmental adaptations"		Asperger*	Classroom	Children
"Sensory-based"			Secondary	
"Sensory integration"			"High school"	
"Sensory processing"			Elementary	
Modulation			"in-class"	

Initial inclusion criteria consisted of the following:

- At least one high functioning autistic participant.
- At least one participant aged between ages 12 – 18.
- School-based.

- Sensory intervention involving sensory modulation strategies.
- Conducted between 2005- 2018.
- Reported in English.

Due to the scarcity of peer-reviewed studies (n = 6) of high functioning adolescents with autism receiving school-based sensory interventions it was decided, in the Realist tradition, to source and include related studies either without '*at least one high functioning autistic participant'* or '*school-based'* which, nevertheless, focus on improving participation in education for adolescents via sensory modulation strategies, which may also provide relevant information.

This produced 4 additional studies.

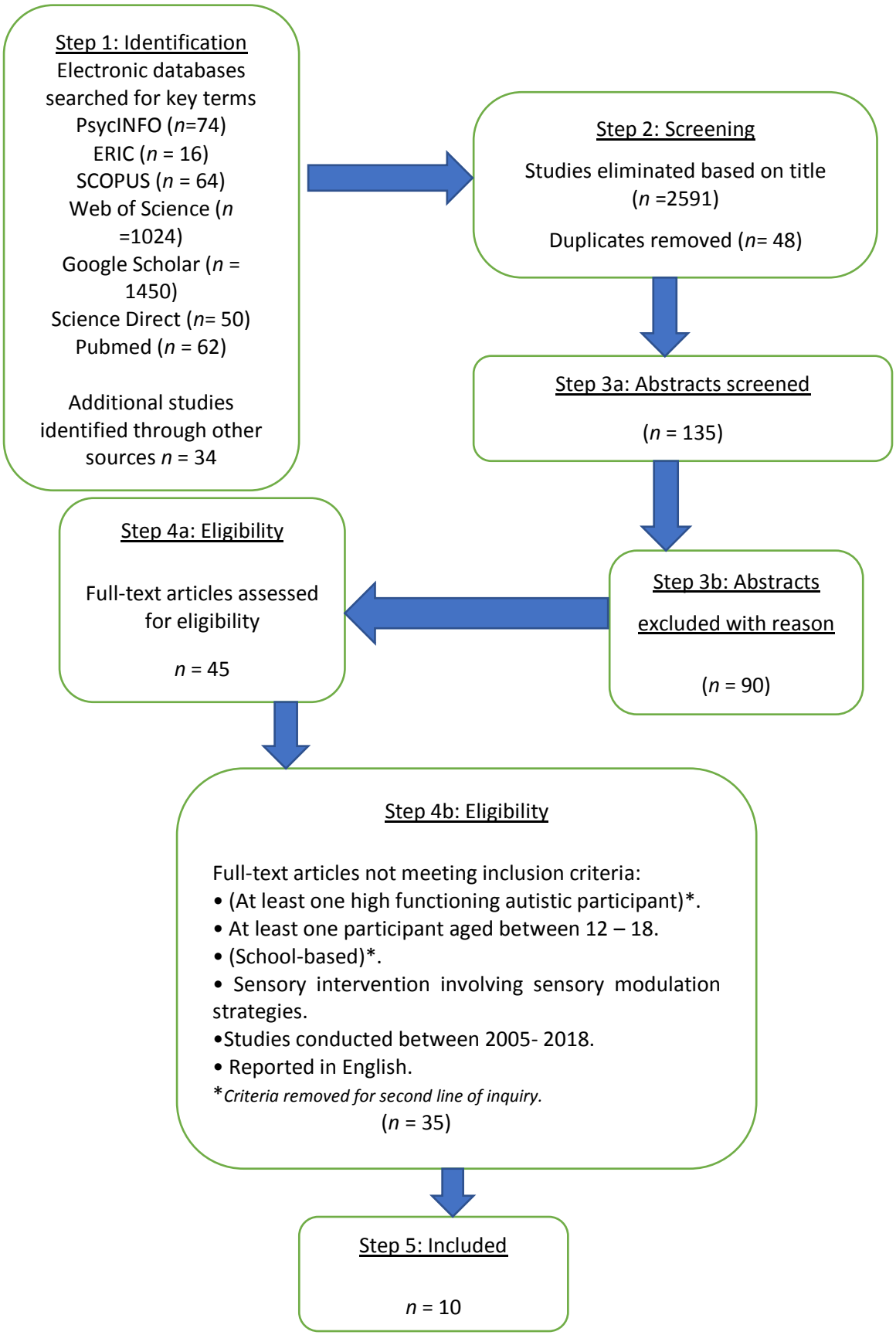
The latter consisted of:

- Two studies of adolescents without an identified autism who received school-based sensory interventions (MacCobb, Fitzgerard, & Lanigan-O'Keefe, 2014; MacCobb, Fitzgerard, Lanigan-O'Keefe, Irwin, & Mellerick, 2014). These were included on the grounds that the same intervention (the Alert Programme) had been used with younger children with autism with some success.
- A systematic review of the Alert Programme (Kamaldeep, Thompson-Hodgetts, & Ramussen, 2018) as it included school-based studies for adolescents, though not with autism.
- A systematic review (Villasenor, Smith, & Jewell, 2018) and a primary study (Al-Ayadhi, Al-Drees, & Al-Arfaj, 2013) of sound-based intervention programmes to improve participation in education for children with autism, conducted outside of school, on the grounds that the programmes are also designed to be provided in schools.

A flow diagram of the literature search and results are summarised in Table 3.

Table 3

Flow Diagram of Literature Search and Study Selection.



The 10 studies, included in the review, consist of two systematic reviews and eight primary studies. They are summarised in Table 4.

Table 4

Summary of studies selected and key areas of focus.

Study/Article	Design	Type of intervention*	Focus
1) Lydon, Healy, & Grey (2018).	AB crossover design. (Primary study).	Sensory Integration Therapy (SIT)	Comparison of SIT to a behavioural intervention.
2) Cullen-Powell, Barlow, & Bahn (2005).	Qualitative Pilot Study (Primary study).	Single modality sensory based.	Hand massage in conjunction with breathing techniques (Self-Discovery Program).
3) Villasenor, Smith, & Jewell (2018).	Systematic review	Single modality sensory based.	Sound-based interventions
4) Al-Ayadhi, Al-Drees, & Al-Arfaj (2013).	Non-randomised quantitative study: no control. (Primary study).	Single modality sensory based.	Auditory Integration Therapy
5) Edgington, Hill, & Pellicano (2016).	Non-randomised mixed methods study: no control. (Primary study).	Cognitive incorporating multi-modality sensory-based approaches.	Cognitive Behaviour Therapy
6) Gill, Thompson-Hodgetts, & Ramussen 2018).	Systematic Review	Cognitive incorporating multi-modality sensory-based approaches.	The Alert Programme
7) Mac Cobb, Fitzgerald, & Lanigan-O'Keeffe (2014) & Mac Cobb, et al. (2014).	Qualitative pilot study. (Primary study).	Cognitive incorporating multi-modality sensory-based approaches.	The Alert Programme
8) Kinnealey et al. (2012)	Mixed -methods multiple single-subject. (Primary study).	Environmental modifications.	Sound-absorbing wall and halogen light installation.
9) Ikuta, Iwanaga, Tokunaga, Nakane, Tanaka, & Tanaka (2016).	Non-randomised quantitative study: no control. (Primary study).	Environmental modifications.	Standard earmuffs & noise-cancelling headphones.
10) Mandy et al. (2016).	Unblinded non-randomised, control design. (Primary study).	Environmental modifications.	Quiet spaces as 'safe havens' and raising staff awareness.

Note: Types of sensory intervention are outlined in Section 2.5.

2.4 The 'EMMIE' Approach

A consortium of universities led by University College London (UCL), in collaboration with the UK College of Policing are now systematically rating existing systematic reviews using the realist 'EMMIE' approach to evaluation and synthesis, formulated by Johnson, Tilley, & Bowers (2015). The starting point for the coding system was concern for the evidence needs of policymakers and practitioners. It builds on previous scales developed to assess the integrity, coverage and utility of evidence in public health, medicine and criminal justice interventions, drawing on realist principles.

EMMIE is considered to have more pragmatic benefits than guidance such as Preferred Reporting Items for Systematic Reviews & Meta-analyses (PRISMA: Moher, Liberati, Tetzlaff & Altman, 2009), which tend to focus most on internal validity and effect size and lacks descriptive validity as a result. This can result in the omission of important contextual information, which is unhelpful to practitioners who want to know more about what works for whom and in what circumstances and why, in order to further refine their intervention approaches.

Johnson et al. (2015) endorse the view of Lipsey & Wilson (1993), following their review of 302 meta-analyses of evaluations of diverse psychological, educational and behavioural interventions. They concluded that it is important to look beyond internal validity and focus on intervention effectiveness, particularly which intervention variants are the most effective; the mediating processes involved and the characteristics of recipients, providers, and settings that influence their results.

In addition to explicit focus on the causal mechanisms through which interventions bring their effects, the context/conditions needed to activate potential causal mechanisms, the outcomes and the costs are also given due consideration. It was noted that an alternative Realist framework, the Realist & Meta-narrative Evidence Syntheses: Evolving Standards (RAMESES: Wong et al., 2013) did not focus on economic cost. Johnson et al. (2015) argue, however, that limited budgets means that resourcing one intervention results in something else not being available, echoing the sentiment of Pollock (2009), regarding SIT. They add that the most effective intervention would be of limited practical value if it was prohibitively expensive to implement or maintain. Information on the relative costs and benefits of interventions and their alternatives are, therefore, extremely important for decision-making purposes, particularly in times of austerity, yet Johnson et al. (2015) note

that studies are typically silent on these matters. The EMMIE, with its inclusion of economic cost implications, rather than RAMESES framework was chosen for this study, as a result.

EMMIE is extensively used by the UK Government 'What Works' initiative for crime prevention (Johnson, et al., 2015) and in health interventions (see for example Owens et al., 2014; MacDonald et al., 2016). Tilley (2016) has also made a strong argument for its use in engineering and related industries.

EMMIE identifies five dimensions for analysis:

- E- the overall **effect** of the intervention.
- M – the identification of the causal **mechanisms/mediators** activated by the intervention in question.
- M- the **moderators/contexts** relevant to the production/non-production of the intended and unintended effects.
- I – the key sources of success and failure in **implementing** the programme (process).
- E – the **economic** costs and benefits of interventions.

(Johnson, Tilly and Powers, 2015).

Kazdin (2014) advises that a mediator is a construct showing a statistical relation between an intervention and outcome, whilst mechanism refers to a greater level of specificity than mediator as it reflects more minute processes through which the intervention unfolds and produces change. The two terms are used interchangeably within the EMMIE framework, nevertheless.

According to Pawson (2018), context may refer to any characteristics of:

- the participants;
- the interrelationships between stakeholders;
- the institutional arrangement into which the programme is embedded;
- the infrastructure including the wider societal, economic and cultural setting.

Because the context can be so wide-ranging, Pawson advises that the 'golden rule' is to prioritise and focus on hypothesising and testing those contexts for which a strong case can be made for their relevance,

The EMMIE framework is designed to interrogate systematic reviews as well as primary studies, which serve to complement each other. Whilst systematic reviews can provide pertinent evidence for E -Effect size, they do not always necessarily provide enough contextual information to establish programme theory and the other 'MMIE' dimensions. These are more often found in primary studies and 'grey material' such as unpublished dissertations, which can be a rich source of data, that also helps reduce the effects of publication bias. Publication bias potentially overestimates the effectiveness of interventions through a bias toward the publication of interventions with positive outcomes. (de Bruin, Deppeller, Moore, & Diamond, 2013).

Johnson, et al. (2015) provides five-point scales for assessing quality on each dimension. This is outlined in Table 5.

Table 5

EMMIE Evidence and Five-point Scales for Assessing Quality in Each Dimension.

EMMIE Component	**EMMIE – E (evidence itself)**	**EMMIE-Q scoring component**
Effect	Effect size Moderator analysis Measurement/consideration of unanticipated effects	0: Insufficient consideration of validity elements (see Table 6). 1: Sufficient consideration of one element of validity. 2: Sufficient consideration of two elements of validity. 3: Sufficient consideration of three or four elements of validity. 4: Sufficient consideration of five or six elements of validity.

CONTINUATION: Table 5

EMMIE Evidence and Five-point Scales for Assessing Quality in Each Dimension.

EMMIE Component	**EMMIE – E (evidence itself)**	**EMMIE-Q scoring component**
Mechanism/Mediator	Map of possible mechanisms/logic maps. A priori mediator or mechanism-based moderator analysis. Post hoc mediator or mechanism-based Moderator analysis. Assessment/statements of most likely mechanisms and any contextual conditions (these can be narratives).	0.No reference to theory; simple black box 1: Broad statement of assumed program theory stated (mechanisms and/or processes). 2: Detailed articulation of theory, based on interrogation of relevant literature and/or elicited from practice. 3: Formalization of theory and derivation of precise predictions from it. 4: Test, corroboration, falsification and refinement of theories, using data Assembled for the purpose.
Moderator/Context	A priori context-based moderator analysis/ subgroup analysis (analysis testing the differences that context makes to outcome; theoretically driven). Post hoc context-based moderator analysis/ subgroup analysis (analysis testing the difference context makes to outcome: conducted due to data availability/not theoretically driven/not mentioned prior to analysis). Statements qualifying contextual variations (these can be narratives).	0: No reference to condition contexts or moderators that may be significant for activation of mediators or mechanisms. 1: Ad hoc description of possible relevant moderators or contexts. 2: Tests of the effects of moderators or of mechanisms defined post hoc using variables that are at hand. 3: Theory-based pre-specification of expected Moderators and mediators relevant to the activation of mediators or mechanisms. 4: Collection and analysis of relevant data relating to the pre-specified expected moderators and contexts.

CONTINUATION: Table 5

EMMIE Evidence and Five-point Scales for Assessing Quality in Each Dimension.

EMMIE Component	**EMMIE – E (evidence itself)**	**EMMIE-Q scoring component**
Implementation	A list/statement of key components necessary for implementation of reviewed interventions. A list/statement of key components deemed necessary for replication elsewhere.	0: No account of implementation or implementation challenges. 1.Ad hoc comments on implementation. 2: Systematic efforts to document implementation issues. 3: Detailed evidence-based account of expected levels of fidelity to program policy or treatment plans. 4: Complete evidence-based account of expected levels of fidelity to program, expected obstacles and specification of elements necessary for replication elsewhere.
Economic	Quantification of inputs to the intervention. Quantification of intervention outputs. Quantification of intensity (e.g. spend per head). Estimate of cost of implementation. Estimate of cost of implementation by subgroup. Estimate of cost-effectiveness per unit output. Estimate of cost-effectiveness by subgroup. Estimate of cost-benefit. Estimate of cost- benefit by sub-group.	0: No mention of costs (and/or benefits). 1: Only direct or explicit costs (and/or benefits) estimated. 2: Direct or explicit and indirect and implicit costs (and/or benefits) estimated. 3: Marginal or total or opportunity costs (and/or benefits) estimated. 4: Marginal or total or opportunity costs (and/or benefits) by bearer (or recipient).

Johnson et al. (2015), pp 465-466.

Additional criteria provided to aid assessment of Systematic Reviews (EMMIE Effect) is included in Table 6.

Table 6

Six Factors to Inform the Assessment of the Methodological Adequacy of a Systematic Review in Terms of Estimating Effect Sizes.

Theme	Components (where appropriate).
1) A transparent and well-designed search strategy*	
2) High statistical conclusion validity (at least four of the following are necessary for a study to be considered sufficient). *	1) Calculation of appropriate effect sizes 2) The analysis of heterogeneity 3) Use of a random effects model where appropriate 4) Attention to the use of dependency 5) Appropriate weighting of individual effect sizes in the calculation of mean effect sizes.
3) Sufficient assessment of the risk of bias (at least two necessary to sufficient consideration). *	1) Assessment of potential publication bias 2) Consideration of inter-rater reliability. 3) Consideration of the influence of statistical outliers
4) Attention to the validity of the constructs, with only comparable outcomes combined and/or exploration of the implications of combining outcome constructs*	
5) Assessment of the influence of study design (e.g. separate overall effect sizes for experimental and quasi-experimental design).	
6) Assessment of the influence of unanticipated outcomes or spin-offs on the size of the effect (e.g., quantification of displacement or diffusion of benefit).	

Items highlighted with an (*) symbol (1 – 4) are considered particularly important for the E EMMIE-Q rating (see Table 5). Taken from Johnson et al. (2015) p 464.

The use of an EMMIE framework is considered beneficial in helping practitioners and other researchers to assess the confidence they should place in the conclusions provided and to explicitly note the absence of any evidence for each dimension of EMMIE (Johnson et al., 2015).

The researcher would argue that the realist EMMIE approach warrants investigation to ascertain what it can offer autism intervention research. Delving more deeply and systematically into the context, mechanisms and outcomes of interventions may have the potential to facilitate any fine tuning required to both individualise and match to context

school-based sensory interventions for autistic adolescents, thus minimising both research-practice divide and inconclusive results.

A Realist review of the ten studies was, therefore, conducted using the EMMIE dimensions to consider the following questions:

1) What are the programme theories of school-based sensory modulation interventions for adolescents, including those with autism?
2) What is known about what works for whom, how and under what circumstances?
3) What pertinent evidence is absent in the empirical literature?

2.5 Types of sensory intervention

Sensory interventions identified in the adolescent literature, can usefully be grouped into four main categories despite, inevitably, a certain amount of overlap between them:

1) Sensory Integration treatment.
2) Single modality sensory-based approaches.
3) Cognitive incorporating multi-modality sensory-based approaches.
4) Environmental modifications.

These will be explored in more detail in this section.

There are also multifaceted, integrative approaches available, but the empirical literature suggests that they are either targeted exclusively at younger children, such as SCERTS (Prizant, et al., 2003) or ignore sensory processing, as in the 'comprehensive' programme developed by the Center on Secondary Education for Students With Autism Spectrum Disorder (CSESA; Odam, Duda, Kucharczky, Cox, & Stabel, 2014). Such approaches are not included in this review, as a result.

2.5.1 Sensory integration treatment.

Sensory Integration Treatment (SIT), including Ayers' Sensory Integration (ASI) is normally restricted to Occupational Therapists, due to specialist training requirements. They are also predominantly conducted in clinics to access equipment which is not normally available in school environments, such as therapy swings and climbing walls.

SIT individualises interventions based on an initial assessment of sensory processing and integration. This is followed by a play-based approach that uses active engagement in sensory-rich activities (Walting & Hauer, 2015).

Following concern that SIT and Sensory-based approaches were not being distinguished from each other in the early literature, Parham, et al. (2007) provided a widely used Fidelity Measure defining the essential elements of SIT. This is now used to separate the two approaches. The 10 essential elements for SIT are summarised in Table 7.

Table 7

Essential Elements of Sensory Integration Treatment. (Taken from Parham et al., 2007)

1) Ensuring safety.
2) Presenting a range of sensory opportunities (specifically tactile, proprioceptive, and vestibular).
3) Using activity and arranging the environment to help the child maintain self-regulation and alertness.
4) Challenging postural, ocular, oral, or bilateral motor control.
5) Challenging praxis and organisation of behaviour.
6) Collaborating with the child on activity choices.
7) Tailoring activities to present the 'just-right challenge".
8) Ensuring that activities are successful.
9) Supporting the child's intrinsic motivation to play.
10) Establishing a therapeutic alliance with the child.

Interventions must adhere to all 10 elements to be classified as SIT including ASI (Parham et al., 2011). The programme theory is that the ten essential elements of SIT facilitate the development of the central nervous system's ability to process input and thus 'normalise' that system through multi-sensory integration. It can also be designed for desensitization purposes, to increase tolerance by raising the child's threshold for arousal, via the provision of specific sensory stimuli to elicit an adaptive response (Bogdashina, 2003). Reynolds et al. (2017) indicated that outcomes of Sensory Integration are therefore, assumed to be the result of the brain's ability to change both biochemically and structurally, in response to experiences in the environment, and that this translates into observable changes in behaviour.

Individualisation of approach based on assessment of sensory profiles, addresses concerns regarding the heterogeneity of children and young people with Autism. SIT is also cited as the most commonly used approach when providing services for children with

Autism (Case-Smith & Miller, 1999). Researchers, such as Barenek (2002) and Gilman (2005), questioned whether such interventions are suitable for use within an educational setting, however, due to space limitations in schools, requiring the use of specialised equipment (such as suspended equipment, balls and crash pads) away from the classroom, in conjunction with access to SIT trained occupational therapists to deliver the programme.

In a Systematic Review of literature published from January 2006 to April 2013, Walting & Hauer, (2015) reported on 22 studies, limited to peer-reviewed scientific literature, of which 4 were ASI approaches and 18 were Sensory-based interventions (SBI), suggesting that SBIs are becoming more prominent in the literature. SBIs are based on Sensory Integration Theory but one or more of the 10 Fidelity elements, outlined by Parham et al. (2007) are missing. Only one of the 22 studies met the criteria to be included in this literature review; that of Kinnealey et al. (2012), focusing on environmental modifications in a school setting, which is discussed in Section 2.7.4.

Of the total of 133 children with autism aged 3 to 12 participating in the ASI intervention studies, the children were younger than 12 in three out of the four studies. Whilst the fourth study did include one 12-year-old, none of the studies were conducted in a school environment. This suggests both a preference for using SITs with younger children and support for Gilman's (2005) concerns about the suitability of school environments due to the need for specialist equipment and SIT trained occupational therapists.

The Realist literature search identified one primary study investigating Sensory Integration Therapy with autistic adolescents in a school environment (Lydon, Healy, & Grey, 2017), nevertheless. Lydon, Healy, & Grey (2017) used an AB crossover design to compare SIT and behavioural intervention (BI) on the challenging behaviour of 10 pupils with autism aged 3.10 – 15.4. The AB crossover design randomised order of treatment to AB or BA for each child to control for any sequence effect.

The children were attending a variety of school settings including one for children with mild learning difficulties, an ASD specific unit within a mainstream school, and a preschool for children with ASD. Six adolescents aged 13.1 – 15.4, were included in the study. Their IQs ranged from borderline to average.

The ‘challenging’ behaviour of the adolescents targeted was wide-ranging. It included selective mutism (non-responsiveness) or delayed echolalia, self-injurious behaviour such as biting, hitting, pinching, head-banging, and/or non-compliance, hand flapping, grabbing and touching staff. Changes in behaviour, deemed to be as a result of the interventions were measured by trends via event recording

The study circumvented difficulties accessing SIT trained occupational therapists by using Special Needs Assistants (SNA) trained by an OT, to deliver the programme. This consisted of use of SI techniques (i.e., gross motor activities, oral motor exercises, Wilbarger brushing protocol and joint compression) and equipment provided to support up to 22 different activities (including a trampoline, ball, weighted vest, Bear hug vest, obstacle course, Theraband, scooter board, inflatable ball chair, swing, brushes, obstacle course and/or push and pull activities). SIT recommendations were based on outcomes from sensory assessments including the Short Sensory Profile or the Sensory Profile Caregiver Questionnaire (Dunn, 1999), direct observations, parent and staff interviews. Individualised SIT recommendations were provided in scripted format and training sessions took place in situ with each SNA trained by the OT working directly with a participant.

Each treatment (A then B or B then A) was provided over 10 days (two school weeks). In each condition, each child received daily sessions of 5 hours in duration (50 hours + 50 hours in total per child) during which time he/she accessed regular instructional and free time activities, with the SIT programme based on the individual sensory profile and the BI programme based on a behavioural assessment carried out prior to intervention. Behavioural interventions were provided in a scripted format in the form of a Behavioural Support Plan which included environmental accommodations, direct interventions, skill teaching and reactive techniques provided by SNAs trained by a behaviour therapist.

The results, which were subject to strong inter-rater reliability (Intra-class correlation coefficient .998) suggested that behavioural intervention successfully reduced challenging behaviour to low- or near-zero levels, whilst SIT resulted in higher and more variable rates of challenging behaviour. One exception was the adolescent with delayed echolalia, who reduced such echolalia during the SIT intervention.

Apart from the child with delayed echolalia SIT resulted in higher and more variable rates of challenging behaviour, irrespective of the sequence of treatment (BI/SIT

or SIT/BI). The authors commented briefly on a possible process issue to help explain this; that in the absence of guidance on the order of delivery of SI techniques, variability in such delivery may have contributed to the variable levels of challenging behaviour observed during SIT. They added that SIT does not account for the variables maintaining challenging behaviour and the delivery of SI techniques was typically either contingent on that behaviour or non-contingent during a 30-minute session. Thus, contingent intervention may have provided social positive reinforcement or escape from demands serving as a maintaining variable of the challenging behaviour, as a result. They concluded that SIT may have inadvertently reinforced the function of the participant's behaviour (an unintended consequence) but without due regard for context, mechanism and outcome, such conclusions cannot be supported by the available evidence.

From an EMMIE perspective, this study provided sufficient consideration of two validity elements (the influence of study design and unanticipated outcomes). There was, however, no reference to programme theory or underlying mechanisms. Whilst the study collected individual sensory profiles these were not discussed in terms of outcomes and the only comment on implementation related to restrictions on the availability of participants for follow-up. There was no information provided on challenges faced in 'real-life' contexts or on Treatment Fidelity. The extent to which the SNAs were able to adhere to the '10 Essential Elements' of Sensory Integration Treatment remains unclear and there was no consideration of cost/benefit for either condition. The resulting EMMIE -Q Scoring is summarised in Table 8.

Table 8

EMMIE-Q Scoring for Lydon, Healy & Grey (2017).

EMMIE-Q	***EFFECT 2*** Sufficient consideration of two validity elements	***MECHANISM*** *0* No reference to theory: simple black box.	***MODERATOR 1*** Ad hoc description of possible relevant moderators or contexts.	***IMPLEMENTATION 1*** Ad hoc comments on implementation.	***ECONOMIC 0*** No mention of costs (and/or benefits).

The strength of Sensory Integration Therapy including ASI, is that it individualises programmes based on the sensory profiles of the children, thus addressing heterogeneity but the need for specialist equipment and, ideally fully qualified OTs to deliver the programme, can cause difficulties in school environments logistically and financially.

These approaches also have yet to demonstrate discernible cost-benefit analyses, do not clearly map the mediating and moderating processes involved and have yet to focus empirically on the feasibility and challenges of implementation in a school environment.

2.5.2 Single modality sensory-based interventions.

Programme theories underlying single modality sensory-based approaches are of two main categories. One is that they are designed to influence the child's state of arousal, either to lower a high state of arousal such as agitation, hyperactivity or self-stimulating behaviours or increase arousal to enhance attention and concentration (Case-Smith, Weaver, & Fristad, 2015). The other is that, like SIT, they can help 'normalise' the sensory modalities targeted by the approach. Both are based on sensory integration therapy (Ayers, 1972) but deviate from the Fidelity Measure in one or more ways.

Single modality sensory-based approaches focus on one modality, for example the use of sound-based interventions such as Auditory Integration Training (AIT) and tactile interventions such as weighted vests, massage and brushing.

Sound-based interventions involve listening to electronically modified music, nature sounds or a voice using specialised headphones and an amplifier. In addition to AIT, sound-based approaches used by school-based occupational therapists include The Listening Programme (Advanced Brain Technologies, 2017), Therapeutic Listening (Vital Links, 2017), and Integrated Listening Systems (Integrated Listening Systems, 2017).

Auditory Integration Training (Berard, 1993), is the most frequently used sound-based approach with children with autism (Villasenor, Smith, & Jewell, 2018). It involves electronically filtered sounds delivered through headphones. It is argued that behaviour is a direct result of how well a person hears and that AIT enhances the functioning of hair cells in the cochlea, leading to improved auditory perception and fewer unusual responses to auditory stimuli, as a result. The AIT procedure involves audiometric testing followed by the filtering out of sounds at certain selected frequencies in accordance with the individual audiogram. When an accurate audiogram cannot be obtained, a basic modulation system without filters is used. The modulation of the music is provided by alternatively dampening and enhancing the bass and treble musical output, on a random basis. Two sessions of 30 minutes each is provided daily for 10 days. This is followed by a reassessment of hearing, and the readjustment of filters, if required.

Weighted vests and massage are both designed to provide deep touch pressure. Brushing is used to address hypersensitivity to touch via desensitization and involves stroking the child with different textures, which should be done by a trained therapist (Ayers, 1979). The Wilbarger Brushing Protocol (Wilbarger & Wilbarger, 1991) requires the use of a small brush and massage protocol. It involves brushing the child's arms and legs with a surgical scrub brush using stroking motions in certain directions. The brushing is followed by deep compression of specific joints every two hours. This protocol is considered to improve the child's physiological capacity to tolerate and process tactile information, which enhances behaviour and emotion.

Secondary school-based single modality intervention studies remain extremely rare in the literature. Only the Self-Discovery programme (Cullen-Powell, Barlow, & Bahn, 2005), providing hand massage and breathing techniques, has included adolescents with autism in mainstream secondary schools. Whilst not school-based, a systematic review of sound-based interventions conducted by Villasenor, Smith, & Jewell (2018) and a study by Al-Ayadhi et al. (2013) investigating Auditory Integration Therapy have also been included as the studies target school participation outcomes for adolescents with autism, amongst other diagnostic groups, despite being conducted outside the school environment (clinic based).

2.5.2.1 The Self-Discovery Programme.

The Self-Discovery Programme (SDP), designed by Cullen-Powell, Barlow, and Bagh (2005) involves massage, yoga, breath work and relaxation. It was developed for children aged 10 – 14 years with behavioural and emotional difficulties and children at risk of exclusion in both primary and secondary education. SDP is designed to be delivered over a whole school year via 16 sessions divided into three modules (four sessions of 45 minutes over each of the autumn, spring and summer terms), but has also been delivered over two terms (Cullen-Powell & Barlow, 2005). Small groups of four to eight children are used to allow for attrition due to sickness or poor attendance at school.

Tutors qualified in Complementary Therapy (yoga and massage) are trained to deliver the programme with a teaching assistant. The teaching assistant is required to support the tutor and ensure children maintain the discipline expected within a school environment. When working with particularly challenging children, three adults have delivered the programme (a Complementary Therapist, a teacher and a teaching assistant).

In the Cullen-Powell, et al. (2005) study 34 pupils (14 girls, 20 boys; aged 10 to 13 years) participated, of which 26 (10 girls and 16 boys) attended senior school. All the children were considered to require additional learning support by teachers; four had diagnoses of autism, and all were recruited through contact teachers within the schools. The primary themes of the programme include sensory awareness, touch therapy (e.g. hand shaking), and relaxation (deep-breathing and self-hand massage). The sessions are designed to facilitate children's self-discovery of their senses, feelings, psychological and physical wellbeing. There is considerable overlap with cognitive behaviour therapy (see section 2.7.3) in this respect.

The theoretical foundations (programme theory) are based on self-efficacy theory (Bandura, 1977; Bandura, 1988). Bandura argued that self-efficacy is a central, mediating mechanism in human agency. He considered perceptions of capability to carry out necessary actions to meet situational demands influenced choice of actions pursued; level of motivation; thought patterns and emotional reactions. Key strategies considered to enhance self-efficacy are 1) mastery experience, 2) role modelling, 3) persuasion and 4) reinterpretation of physiological and affective states (Bandura, 1988).

The SDP is designed to provide the children with a safe environment (quiet room) in which the techniques can be practised (mastery experience); each child could observe their peers also practising the techniques (role-modelling). The tutor is instrumental in providing guidance in the effective use of the techniques (persuasion) and the relaxation techniques provide a means of down-regulating physiological and affective states, such as anger (reinterpretation of physiological and affective states). The children were encouraged to recognise that they can change their thoughts and feelings and choose how they react or respond to situations, in this respect.

Cullen-Powell, et al. (2005) indicated that delivery and content of the programme is adapted to the age and prior attainments of the children. Much flexibility is afforded the tutors, as a result, which has implications for programme fidelity. Programme content information lacks detail, as they merely state 'during each session children are led through a series of practical and discussion-based activities. Each session ends with a summary highlighting the key learning points, praise for participation, a relaxation exercise and a handshake before leaving the SDP' (p193).

One of the strengths of the study, nevertheless, was collection of data from several sources:

1) Behavioural profiles of children completed by teachers at baseline.
2) Observations of the first and last session by an independent researcher.
3) Reviews at the end of the programme (at one year) with relevant teachers (via a focus group) and tutors (via field notes).

They did not interview the children or their parents, however, which could be considered lost opportunities.

Observation field notes and notes from the focus groups were subjected to content analysis allowing the data to be organised into broad themes and categories in which subcategories can be nested (Becker and Greer, 1982). There was, however, no evidence trail in the reporting.

For the senior school children, it was considered that all the children started the programme with very low self-esteem, poor social and interpersonal skills and limited attention span. Some of the children were at risk of being excluded from school and five were on reduced timetables due to poor attendance. Some individual variation in behaviour between children was documented and, unintended consequences recorded. With respect to the latter, it was noted a) that an element of group competitiveness emerged which appeared to reflect the ratio of boys to girls (group competition depended on the dominant sex), which needed to be addressed and b) there was embarrassment about using some of the techniques (e.g. hand massage) publicly and the children needed to be shown how to do so discreetly to avoid being teased by peers. Such observations are important when considering process issues but are rarely recorded in the literature.

Cullen-Powell, et al. (2005) reported that all children's attendance at school increased; one child showed a decrease in self-stimulating behaviour and overall the children were calmer and more relaxed by the end of the year. All children showed improvements in their communication skills; their body language appeared more relaxed and eye contact with the tutor had improved. Two children (out of the 26) were also better able to express their emotions. Teachers were also reported to have noticed children generalizing some of the SDP skills into the wider school environment. Examples given were that one boy was seen to use a relaxation technique to calm his nerves before seeing

the head teacher for poor behaviour, whilst previously he would have screamed, cried and become violent. Another child was noted to become calmer and was less easily upset when reprimanded for bad behaviour and one girl was noted to use deep breathing to help calm herself down, to prevent a confrontation situation with another pupil.

Cullen-Powell, et al. (2005) acknowledged some limitations of the study, such as the small sample, lack of standardized measures and that most of the children were in receipt of other support programmes within school. The latter resulted in the potential for confounding variables. It was not possible, therefore, to confidently attribute improvements to the SDP per se.

This study has strengths and limitations from an EMMIE perspective. Strengths include the strong programme theory and some consideration of process issues but insufficient consideration of validity elements and potential bias, only ad hoc comments on implementation and no mention of cost/benefit ratio. It is not possible to link the programme theory with outcomes as there is no explicit evidence trail, which should be grounded in the data, such as quotes. It would also have been helpful to have been provided with a list of key components deemed necessary for replication elsewhere. To be able to consider what works for whom and in what circumstances, more detail regarding the children's individual profiles and responses to the programme, ideally including feedback from the children themselves, in conjunction with detailed mapping of the themes emerging from the content analysis would be necessary. Analysis of non-responders would have also added weight to the study. Whilst being presented as an exploratory study, it had significant methodological weaknesses, which undermines confidence in the wide range of claims made suggesting that the SDP has potential to improve self-esteem, social competence, communication skills, behaviour and attendance at school. The resulting Emmie-Q scores are summarised in Table 9.

Table 9

EMMIE-Q Scoring for The Self-Discovery Program (Cullen-Powell, Barlow & Bagh, 2005).

EMMIE-Q	***EFFECT 0*** Insufficient consideration of Validity elements	***MECHANISM*** *2* Detailed articulation of theory, based on interrogation of relevant literature and/or elicited from practice.	***MODERATOR 1*** Ad hoc description of possible relevant moderators or contexts.	***IMPLEMENTATION 1*** Ad hoc comments on implementation.	***ECONOMIC 0*** No mention of costs (and/or benefits).

2.5.2.2 Sound-based interventions.

Villasenor, Smith, & Jewell (2018) conducted a systematic review of peer-reviewed sound-based intervention studies published between 2000-2017, involving children aged from 2 – 19 with challenges processing sensory information explicitly stated in the article, thus insuring that the participants were suitable for such an approach. Due to the limited number of published experimental studies, evidence hierarchy Levels III and IV were included, resulting in 10 studies overall totalling 185 children. 138 children were provided with Auditory Integration Therapy, 25 children the Therapeutic Listening Programme, 15 children The Listening Programme and 7 children the Integrated Listening Systems.

The children involved had varying diagnoses of autism, attention deficit disorder (ADD), attention deficit hyperactivity disorder (ADHD) and developmental delays. The majority were young children, however, with only one study, (Al-Ayadhi et al., 2013) focusing on adolescents with autism.

Although sound-based interventions were reported by Villasenor, Smith, & Jewell (2018) to be 'easily' conducted in school environments, it was noteworthy that all reviewed studies took place outside of the school environment, predominantly in clinics. These studies are included in this review, nevertheless, as they reportedly focused on outcomes of improved participation in education for children with sensory processing and integration challenges.

Participation in education was defined as an engagement in activities needed for learning and participating in the educational environment (AOTA, 2014). The outcomes identified in the studies were: attention, following directions, completing a task, person

engagement, fine motor skills, visual motor skills, communication, social skills, sensory processing, and sensory modulation.

The systematic review had a transparent and well-designed search strategy (E-Emmie), made use of frameworks such as the Quality Index (Downs & Black, 1998) to assess the risk of bias and a five-level grading evidence strength system adapted from the United States Preventive Services Task Force (USPSTF, 2016) to provide a rating scale for the strength of evidence. The total score was grouped into four quality levels: excellent, good, fair and poor based on a 27-item checklist provided by the Quality Index which focused on a study's risk of bias in reporting, measurement of the intervention and outcome, participant selection, external validity, and power of the study to enable comparisons among reviewed studies. All authors assessed each article and any discrepancy in the rating was resolved by discussion until agreement occurred.

Improvements reported across the studies (with $p<0.01$ significance) included the following; completes spelling work in a timely manner, completes writing assignments without emotional incident and completes morning routines without incident. Improvements in performance skills and client factors considered to have the potential to support a child's participation in education with $p<0.05$ included fine motor skills, visual motor skills, communication and social skills. Following directions achieved $p<0.001$ and sensory modulation $p < 0.01$ (auditory over-responsivity, auditory filtering and visual/auditory sensitivity were combined under sensory modulation). No studies explicitly measured participation-level outcomes in educational contexts, however.

According to Villasenor, Smith & Jewell (2018), the limitations of this study, in addition to a lack of standardised outcome measures, included the use of convenience sampling, heterogeneity of autism severity, and the potential for confounding variables as other on-going input/interventions were not explicitly stated.

The 10 studies scored an average Quality Index of fair (one study poor, six studies fair, and three studies good). The one study, (Al-Ayadhi et al., 2013), focusing on adolescents with autism achieved a fair rating.

Villasensor, Smith & Jewell (2018) advised that the current limited findings underscore the need for researchers to clearly define and quantitatively measure targeted outcomes to determine the level of efficacy of sound-based interventions for the individual

child. They concluded that caution was required in the use of sound-based interventions for children with sensory processing and integration challenges prior to the development of stronger experimental designs explicitly measuring educational participation.

Al-Ayadhi et al. (2013) conducted a pre-test/post-test design study using AIT with a sample of 72 children aged 3 to 17 years. AIT was performed over 10-20 days, 30 minutes twice a day and had a 1 – 2-day break after 5 days of listening (10 – 20 hours in total). Pre and Post testing was conducted using the CARS (Childhood Autism Rating Scale), SRC (Social Responsiveness Scale) and ATEC (Autism Treatment Evaluation Checklist), three and six months following the AIT intervention. None of these are standardised outcome measures, however.

They reported statistically significant changes in social awareness, social cognition, and social communication but not social motivation or autistic mannerisms using SRS subcategory scoring. Statistically significant improvements in speech and communication and sociability were also reported using ATEC subcategory scoring. Improvements were also found in the percentage change of means CARS scoring but the specific elements of the CARS which changed were not reported. These improvements ranged from 19.5 – 22.5% over the six-month follow-up.

From an EMMIE perspective, there was only a broad statement of programme theory with insufficient consideration of mediators or moderators to be able to test theory. Whilst there were some reported beneficiaries there were also a significant number of non-responders which were not explained. Such unintended consequences require further investigation to highlight underlying mechanisms and moderators to help explain this variability in response. Al-Ayadhi et al. (2013) also omitted any consideration of implementation issues or cost/benefit analysis. From an EMMIE perspective scoring for Sound-based interventions are summarised in Table 10.

Table 10

EMMIE-Q Scoring for Sound-based interventions (Villasenor, Smith & Jewell, 2018 incorporating Al-Ayadhi, Al-Drees, & Al-Arfaj 2013).

EMMIE-Q	***EFFECT 1*** Sufficient consideration of one element of validity.	***MECHANISM*** *1* Broad statement of assumed program theory stated (mechanisms and/or processes).	***MODERATOR 0*** No reference to condition contexts or moderators that may be significant for activation of mediators or mechanisms.	***IMPLEMENTATION 0*** No account of implementation or implementation challenges.	***ECONOMIC 0*** No mention of costs (and/or benefits).

2.5.3 Cognitive incorporating multiple modality sensory approaches.

Although 'cognitive' is a broad term that varies in its definition on the basis of targeted outcome, within the current context this type of intervention generally focuses on teaching people processing strategies to improve outcomes in self-regulation (Pfeiffer, Clark, & Arbesman, 2018), as a 'top down' approach. It includes Cognitive Behaviour Therapy (CBT), The Alert Program for Self-Regulation and Social Stories. The Realist literature search identified only one School-Based CBT intervention programme for adolescents with autism targeting sensory intervention modulation (Edgington, Hill, & Pellicano, 2016) necessitating the need to 'widen the net' to consider adolescents without autism. This resulted in the inclusion of a pilot study using the Alert Programme in secondary schools (MacCobb, Fitzgerald & Lanigan-O'Keefe, 2014; MacCobb, et al., 2014), and a critical review of the Alert Programme conducted by Gill, Thompson-Hodgetts, & Rasmussen (2018).

2.5.3.1 Cognitive behaviour therapy for self-regulation.

Edgington et al. (2016) argue that self-report accounts of sensory experience support the view that sensory experiences are complex and idiosyncratic and incorporate past experience, interpretation, cognitions and emotions. This suggests that observable behaviours may be misleading. They quote Donna William's (1998) report of 'shutting down' processing in response to 'overload' of sensory information, as an example of behaviour which could be construed as 'hypo-sensitivity' when in fact it is a response to 'hyper-sensitivity'. As a result, prevailing accounts of sensory processing and the measures used to capture them may underestimate or misrepresent such difficulties in autism. They

considered, therefore, that there is a pressing need for interventions to target individual's sensory experiences at the level of cognition and behaviour. A Cognitive Behaviour Therapy (CBT) approach was deemed to be warranted, as a result. CBT is focused on the development of self-awareness of the interaction between behaviour, thoughts and feelings in response to environmental demands (Hofmann, 2011). Edgington et al. (2016) further indicated that in view of the suggestion that some anxieties and repetitive behaviours in autism are associated with the unpredictable nature of sensory stimuli, management of sensory processing difficulties may also have a positive effect on both.

On that basis, they designed an 8-week CBT-based group intervention for self-regulation of sensory processing difficulties. A small sample of seven high functioning adolescents diagnosed with autism aged 11 – 16 years in one mainstream secondary school participated in their feasibility study delivered by one of the researchers. The programme, consisting of eight 45-minute weekly lessons, was provided to two groups; the first to younger children (Years 7 – 9, n = 3) and the second to older students (Years 10 -11, n = 4).

The programme theory was that a conscious awareness of their sensory processing being different, and how this relates to others' and impacts on behaviour, might help the participants to develop effective coping strategies which impact positively on anxiety and repetitive behaviours. Edgington et al. noted that in self-report studies of sensory experiences in children with autism, possibly unconscious coping strategies of avoiding or controlling stimuli are already present even in the youngest children (e.g. Kirby et al., 2014). Their study was considered the first to examine how facilitating conscious awareness would enable participants to develop more effective and socially acceptable coping strategies.

The primary outcome measures used were the Adolescent/Adult Sensory Profile (AASP: Brown & Dunn, 2002), to be completed by the adolescents and the Short Sensory Profile (SSP: Dunn, 1999) completed by their parents to measure sensory reactivity. Secondary outcome measures were the Repetitive Behaviour Questionnaire (RBQ: Turner, 1999) and the Spence Children's Anxiety Scale – Parent (SCAS-P: Spence, 1997). Primary outcome measures were administered at baseline (0 week), post intervention (9 weeks) and follow-up (17 weeks). SSP total raw scores were used to capture change within

the same individuals. Secondary outcome measures (repetitive behaviour and anxiety) were administered at baseline and follow-up only.

These quantitative measures were supplemented with the following qualitative measures collected immediately post-intervention; 30-minute focus groups with the adolescents in conjunction with semi-structured telephone interviews with parents in the week following the intervention (week 9).

A pre-intervention interview addressed the CBT stages of establishing rapport, problem discussion, identifying the adolescents' goals for change in conjunction with bringing some sensory experiences and coping strategies to conscious awareness. The first 4 sessions focussed on 'problem formulation' by building adolescents' awareness of their own thoughts, feelings and behavioural responses to sensory situations. This was supplemented by 'live' sensory experiences from a 'feely box', which included some items matching their sensory preferences to personalise experience. The final 4 sessions focused on new behaviours using role-play, breathing relaxation exercises, listening to music and positive thoughts, referred to as 'coping tools'. The adolescents were also provided with a prompt sheet of examples of emotions (Henry, 2013) and body feelings (Attwood, 2004) to build up their emotional vocabulary.

Sessions were delivered in a familiar room in school and timetabled to fit in with the school's curriculum. The structure of each session followed the following format:

1) Checking in (sharing recent progress and events).
2) Providing an overview of the session outline.
3) An introduction and demonstration of ideas.
4) An opportunity for participants to 'have a go'.
5) A plenary where the ideas were shared.
6) A homework task set (which was optional).

These were considered core components of the programme.

Parents were also emailed weekly copies of the resources and were encouraged to ask questions or communicate any events, experiences or thoughts. Time to enable adolescents to develop a sense of how others may perceive and respond to stimuli, by sharing sensory pictures (templates of a 'stick man' representation illustrating the interplay between thoughts, feelings (body and emotional) and behaviours and outcomes) was

considered an important mechanism. Individuals' awareness of how their sensory experiences might be different to others was deemed to influence the development of conscious coping strategies (Smith & Sharp, 2013).

Programme fidelity was monitored using a checklist approach, assessing the presence or absence of the 6 core components on a session-by-session basis. The researcher also received ongoing clinical supervision and training throughout the study.

The quantitative measures indicated no significant changes in scores on either the primary or secondary outcome variables, using repeated-measures ANCOVA analyses. The magnitude of the effect sizes for the measures of sensory reactivity was moderate to large, however, suggesting that significant gains might be apparent in a larger sample size.

Changes in the SCAP-P and RBQ scores (group means) were in the unexpected direction, suggesting an increase in parent-reported anxiety and repetitive behaviours in adolescents. Whilst such changes could be due to measurement error and variability due to the small sample size, it was considered that they might also be a consequence of parents' increased awareness of these behaviours in their children. Alternatively, it was also possible that the perceived rise in adolescents' anxiety and repetitive behaviours were real and unintended consequences of the programme. The researcher notes that in contrast to this CBT programme, which draws attention to autistic sensory experiences as different from that of 'neuro-typicals', both the Alert Program (discussed in the next section) and the Sensory Intelligence approach are more inclusive. They actively avoid labelling and consider all individuals to have their unique sensory profiles as part of normal 'neuro-diversity', thus avoiding any negative connotations and associated anxiety on their part.

Qualitative data was subjected to inductive thematic analysis. Analysis of focus group discussions identified 5 themes which were grounded in the data (actual quotes):

1) Raised awareness of sensory experiences.
2) A new-found self-expression.
3) Motivation for using coping strategies.
4) Learning generalisation to new situations.
5) Improvements to the programme.

With respect to the latter, these largely consisted of requests for a greater number of sessions. Overall, the participants were positive about the intervention and reported that it had an impact on their own cognitions and behaviour.

Thematic analysis of the parents' responses also identified 5 themes which were also grounded in the data:

1) Challenges to parental involvement (particularly lack of communication from the adolescents about the programme).
2) Importance of communication with parents (via the provision of resources weekly which aided their understanding).
3) Post-intervention changes (including the use of new coping tools and a growth in maturity).
4) The importance of group dynamics (including feeling comfortable with the adult leader, having 'a safe space to think' and being able to identify with peers and see how far their experiences differ).
5) Improvements in future support and delivery.

With respect to the latter, several parents suggested the importance of embedding learning into daily routines and making more support available during particularly stressful times.

The authors concluded that the qualitative results provide clear evidence of the acceptability of the intervention for both adolescents and their parents. Success in the main aims of bringing sensory experiences to awareness, by developing adolescents' understanding of how their experiences may be different or similar to others' and enabling them to develop coping strategies for problematic situations, including new contexts and broader situations such as homework, were highlighted. Parents were also reported to have benefitted from increased awareness, which facilitated their communication and understanding. Edgington et al. (2016) suggested that their programme could be a promising intervention for professionals to implement in schools to relieve sensory sensitivities and support the management of sensory difficulties, which fits squarely with the aims of other UK initiatives to increase access to mental health support in schools, for example, Mental Health and Behaviour in Schools (Department for Education, 2014a, 2014b), arguing that schools should intervene as early as possible to build pupils' resilience.

From an EMMIE perspective, the mixed methods methodology was very encouraging. It was not surprising that primary and secondary outcomes regarding sensory reactivity, anxiety and repetitive behaviour did not reach statistical significance given the small number of participants, the limited duration of the intervention and, at present lack of association between the particular theoretical constructs embodied within the measures for anxiety and repetitive behaviour chosen, and sensory processing. The quantitative data did, however, identify possible unintended consequences in trends showing increased anxiety and repetitive behaviour, which would benefit from further exploration with larger samples and a control group.

The qualitative data provided numerous 'nuggets of information' from both parents and adolescents. On the understanding that this was a feasibility study, it provides a useful foundation on which to consider ways forward using a realist perspective. Whilst there is already enough information to start to map possible mechanisms, to explore the question of 'what worked for whom in what circumstances' more detailed data regarding moderators/context and process would be warranted. This could usefully include a consideration of individual sensory profiles, a case study approach to ascertain individual responses to the intervention in conjunction with on-going process evaluation to evidence possible condition contexts or moderators that may be significant for activation of mediators or mechanisms. There was a statement of key components deemed necessary for the success of the intervention, and for replication elsewhere, but no detailed evidence-based account of process issues which may have impacted expected levels of fidelity in a school environment. There was also no mention of cost to benefits or whether the programme could be delivered by a member of the school staff. Eliciting the views of teachers as well as parents and children would also have been revealing given that the intervention was conducted in a school environment. Overall, this would result in an EMMIE-Q score summarised in Table 11.

Table 11

EMMIE-Q Scoring for Cognitive Behaviour Therapy for Self-Regulation (*Edgington, Hill, & Pellicano, 2016).*

EMMIE-Q	***EFFECT 0*** Insufficient consideration of Validity elements	***MECHANISM*** *1* Broad statement of assumed program theory stated (mechanisms and/or processes).	***MODERATOR 1*** Ad hoc description of possible relevant moderators or contexts.	***IMPLEMENTATION 2*** Systematic efforts to document implementation issues.	***ECONOMIC 0*** No mention of costs (and/or benefits).

2.5.3.2 The Alert Program for self-regulation.

One of the most widely used cognitive behavioural approaches to self-regulation, particularly in school environments, is The Alert Program, designed by occupational therapists, which teaches children directly about self-regulation (Williams & Shellenberger, 1994). Whilst the programme has also been described elsewhere as a 'sensorimotor therapy' (Gill, Thompson-Hodgetts, & Rasmussen, 2018) or 'a sensory-based approach' (MacCobb et al., 2014), it is included in this category in recognition of its central role of raising conscious awareness of sensory processing as an integral element of the programme.

The Alert Program is designed to be a 12-week manualized intervention that uses the analogy of a car engine to explain and provide child-friendly vocabulary for arousal levels by describing the body as 'high gear', 'low gear' or 'just right gear'. Participants learn to monitor their arousal level and use sensorimotor strategies from five sensory categories (look, touch, move, listen and put something in the mouth), known as 'Take 5', to achieve 'self-regulation', namely shifting their arousal level into an optimal or 'just right' position to meet the demands of a particular task or situation. There are three stages, each with a series of steps and activities, in the programme 1) identifying engine speeds, 2) experimenting with techniques to change engine speeds, and 3) regulating engine speeds.

The programme has been used within a range of settings including clinic, home, whole class, small groups and 1:1 within schools with a wide range of children from kindergartners to adolescents (Salls & Bucey, 2003) including young children on the Autistic Spectrum (Blackwell et al., 2014). The researcher was unable to find any studies

focusing on adolescents with autism, however, even though the developers endorse its use with this group (Therapy Works, 2010).

Gill, Thompson-Hodgetts, & Rasmussen (2018) included six studies in their review, three of which were Random Controlled Trials focussed on children with Fetal Alcohol Spectrum Disorder (FASD) outside of the school environment, whilst the other three were qualitative school-based studies. These were Blackwell, et al. (2014) investigating an adaptation of the programme, called the Ready CLASS Project, with 3 – 5 year olds presenting psychosocial needs and speech/language impairment; Barnes et al. (2008) with 12 children aged 9 – 11 years with emotional disturbances, providing the programme over 8 weeks, and MacCobb, Fitzgerald, & Lanigan-O'Keeffe (2014) using the programme for 5 – 8 weeks in two phases with 85 children, aged 12 -13, presenting Social, Emotional and Behavioural (SEB) difficulties in post-primary schools in socially deprived areas in Ireland.

A total of 288 participants with ages ranging from 3 to 13 years were included in the review. Gill, Thompson-Hodgetts, & Rasmussen (2018) conducted a transparent and well-designed search strategy with sufficient assessment of risk of bias. They highlighted several methodological issues undermining results, including a lack of fidelity measures, particularly as several studies modified the manualised version of the programme, a lack of blinding, small sample sizes, and the possibility of volunteer bias. MacCobb, Fitzgerald, & Lanigan-O'Keeffe (2014) also relied on their own questionnaire, and therefore perceived benefits were not supported by objective outcome measures.

The Effective Public Health Practice Project (EPHPP) quality assessment tool (Thomas, Ciliska, Dobbins, & Micucci, 2004), was used in this review. It is based on public health nursing interventions reviews and consists of six domains of methodological quality including selection bias, study design, confounders, blinding, data collection methods and participant drop out. Two of the three RCTs were given an overall rating of 'moderate' and one was deemed 'weak'. The three school-based studies were more qualitative in nature, and both the Barnes, Vogel, Beck, Schoenfeld, & Owen (2008) and MacCobb, Fitzgerald, & Lanigan-O'Keeffe (2014) studies, were judged overall 'weak' whilst the Blackwell et al. (2014) study was deemed 'moderate' even though it was abandoned after six weeks due to perceived boredom of the young participants.

Whilst the strength of evidence ranged from weak to moderate using the EPHPP, it was, however, deemed strong to promising for the use of the Alert Program in school settings when using the US Department of Education, Elementary and Secondary Act (ESEA) guidelines. In addition to a rating scale for internal validity, similar to that of the EPHPP, the ESEA adds two further criteria from a school-based intervention perspective:

- Demonstrates a rationale based on high-quality research findings or positive evaluation that such activity, strategy, or intervention is likely to improve student outcomes or other relevant outcomes; and
- Includes ongoing efforts to examine the effects of such activity, strategy, or intervention. (Gill, Thompson-Hodgetts, & Rasmussen, 2018, p215).

The ESEA guidelines recommend that interventions supported by higher levels of evidence (strong or moderate), which describes the effectiveness of an intervention through causal inference should be given priority. The three school-based studies were considered to be presenting 'promising evidence' for the use of the Alert Program in schools. Authors of all six studies reported the programme to be effective for self-regulation in both clinic and classroom settings.

From an EMMIE perspective, however, there was insufficient consideration of programme theory in addition to an acknowledgement that outcomes measures were diverse. The variability of outcome measures makes it challenging to determine what functional area the Alert Program is the most effective at improving. In addition to sensory regulation, measurements included executive functioning, emotion regulation, neuroanatomic changes in the brain, self-control, attachment and behaviour, without consideration of possible mechanisms/logic maps. There was no reference to condition contexts or moderators that may be significant for activation of mediators or mechanisms; only ad hoc comments on implementation and none on cost-benefit analysis.

In the systematic review it was noted that MacCobb, Fitzgerald & Lanigan-O'Keeffe (2014) did not provide a control group; there was a lack of justification for changes in implementation dosage, and no mention of incorporating fidelity measures in addition to an absence of objective outcome measures using their own questionnaire. Qualitative data emerging from their study was encouraging, and enlightening from a Realist perspective, nevertheless, given the detailed consideration of implementation issues provided (MacCobb et al., 2014).

Entire first year classes (aged 12 and 13 years) and their teachers in four mainstream schools took part in the academic year 2011-2012. The schools were state-funded and gender specific, as is common in Ireland. Three boys' schools and one girls' school participated. This consisted of 84 students and four volunteer subject teachers. The classes were chosen as the most challenging in each of four schools serving populations of social disadvantage and already partnering a National Behaviour Support Service (NBSS). The NBSS employ school-based occupational therapists who incorporate theories, from its own discipline, such as the Person-Environment-Occupation Model (Law et al., 1996), in their endeavour to enhance the student's ability to fully access the curriculum and be successful in school. Two NBSS occupational therapists adapted and facilitated the Alert Program for two trial time periods delivering the programme with the subject teacher, hence there were three adults in each class, which ranged from 16 -25 children.

The Person-Environment-Occupation Model resonates well with a systemic realist perspective, and from an ecological systems perspective, in which implementation in a classroom/school is embedded within the larger school organization and sometimes the wider community (Odam et al., 2014). The three components, as in the CMO (Context-Mechanism-Outcome) configuration acknowledge that the person, the context (environment) and the task (occupation) are intrinsically embedded, and as such the context of the school and the class grouping has considerable impact in how behaviours are triggered, interpreted and managed. The OTs, therefore, gave serious consideration to all three in their process evaluation of the AP intervention. This was evident in the planning, delivery (with reflective discussion between all three adults after each session); questionnaires provided to the teachers and children at the end of the trials and therapist reflections with the benefit of field notes and session documentation, which were reviewed by three occupational therapists. The participant OTs were also interviewed a month following the conclusion of the programme to gather a summative assessment of the overall intervention process (MacCobb et al., 2014).

The programme theory articulated is that in order to be successful in school self-regulation is essential and students must develop skills to regulate the motivational, emotional and social determinants of their intellectual functioning as well as the cognitive functions. With competent adult support and with the development of effortful control it suggests that children can learn to develop effective regulation. It adds that, through a collaborative model, a change in teachers' and students' understanding of behaviours

might move towards a better "Person-Environment- Occupation". Core competencies are considered to be self-awareness, self-management, social awareness, relationship skills and responsible decision-making which improves resiliency and promotes adjustment to life challenges. Bandura's self-efficacy theory is considered to be an important theoretical root, but MacCobb, Fitzgerald, & Lanigan-O'Keeffe (2014) also argued that with sufficient guided experiences, neurophysiology processes can be altered to develop pathways less reliant on "fight or flight" responses, retaining aspects of Sensory Integration Theory (Ayers, 1979) as well.

MacCobb et al. (2014) suggested that a major benefit of using the AP is that students are not labelled 'bad' or 'good'. They are empowered to be in control of their 'engines' and therefore their behaviour as well. Thus, awareness of self-efficacy in owning and regulating behavioural responses is the first step towards self-management. Each session was planned with short focused listening sections followed by demonstration of a theme and practical activities.

In Stage 1 ('Identify engine speeds') students learn the language of the AP and facilitators encourage learning by modelling /demonstrating their 'engine' and encouraging students to practice. In Stage 2 ('experimenting with methods to change engine speeds') facilitators introduce different sensorimotor strategies using the five senses approach, and students experiment and explore different strategies to find the 'just right' level of arousal appropriate to the task in hand. Students practise different movement exercises, such as chair push-ups, explore a fidget box, make a hand fidget, taste different foods and listen to different types of music. The effects of visual stimuli are also explored, such as how an overstimulating classroom can contribute to distractibility. Students make posters of their own findings and discuss this with a partner. In Stage 3 ('regulating engine speed') students are encouraged to be aware of their fluctuations in arousal and to decide on the best strategy that they can use to regulate themselves for different demands.

They completed worksheets to summarise their learning and recorded their preferred strategies on a sticker which was put on the front of their diary for ease of reference. Students are also given a wristband to act as a fidget aid and movement breaks are incorporated in each session. Debriefing and session planning with the teachers were conducted weekly which appeared to support the teacher in integrating learning from the programme into regular class work and routines. The therapists also noted the value of a

positive relationship between the teacher and the students for the success of the programme.

Trial 1 ran for 40 minutes a week over five weeks during the first term in two schools (one all boys and one all girls). It was designed to be delivered over seven weeks but was shortened due to organisational restraints which were not specified. Trial 1 specifically sought to explore the appropriateness of the content, teaching strategies and use of resource materials adapted for the cultural context and ability levels of challenging classes.

Feedback from Trial 1 resulted in two major changes; the first was raising wider school staff (including management) awareness via a two-hour presentation on sensory processing difficulties and how these may impact on behaviour in conjunction with a brief overview of the AP programme. This was because teachers in other classes were questioning some of the strategies used by the children. The second was increasing the programme to 8 weeks. It was found that the 5-week trial was rushed and over-stimulating for the participants. The longer second trial enabled better opening and closure of the sessions and more practical exploration of the strategies. During the second trial, hand-made fidgets, when made were also swapped for pencil fidgets, as these were deemed less distracting by the teachers.

It was noted that attendance could fluctuate and that the lowest rates were related to the boys' attendance at a football match, during Trial 1 and 'school sporting activities' in Trial 2. Both teachers held individual and group 'catch-up' sessions for those who had missed AP sessions. Children could also be self-conscious, and one teacher commented on the benefit of the strategies which were more discreet and could be used without anyone noticing. Hand fidgets and stress balls were not deemed useful as they were used inappropriately by some students. Students also needed constant reminding to incorporate the engine language into their own repertoire and more suitable teaching space was located in both Trial 2 schools for the duration of the programme. The focus on working individually, and then in pairs or small groups was continued to facilitate a culture of peer learning in which the students would recognize both their own behaviour and its impact and that of others.

The feedback from the qualitative data was encouraging as 85% (72) of the students felt that the learning tasks were enjoyable and relevant. The group of students perceived to

be the most challenging gave the most positive scores and 100% of them indicated their intention to continue to use their new self-management strategies in class. Teachers also considered that the programme provided a very clear link between senses, behaviour and body language. Teachers added that the shared vocabulary in regular class sessions helped in keeping the students focused during the week. The teachers preferred strategies; however, where there was no need for materials/equipment, such as chair push-ups and 'at desk' exercises and were reticent about using food in class.

There were, however, individual differences in response. The girls' school answered more positively on all questions than the boys' school in Trial 1. 53% of girls indicated that they 'loved' the programme while no one 'hated it', compared with scores of 15% of boys loving it and 5% (1) hating it. Also, 94% of girls reported that they would use the 'Take Five' strategy in the classroom compared to 85% of boys. Analysis of the Trial 2 data (both boys' schools) also identified differences between the two schools with 3 pupils in school 4 'hating' it whilst 100% of school 3 felt that it ranged from 'OK' to 'Loved it'. 100% of the pupils in school 3 indicated that they would take the 'Take 5' strategies in the classroom whilst only 58% would in school 4. School 3 were the class group considered to have the most challenging behaviour, and MacCobb, Fitzgerald, & Lanigan-O'Keefe (2014) considered that the programme may have had more relevance for them, as a result. It was acknowledged, nevertheless, that other factors could have influenced these differences, including the larger class size of School 4 (24 compared to 16 in School 3), the timing of the class (just before lunch, whereas School 3 was held just after lunch), the difference in teaching styles and the use of the AP by teaching staff. One of the Trial 2 teachers commented that the use of strategies during class can distract children and considered that it was best to restrict them to the start or at the end of class. A teacher added that the use of food in school 'can be awkward-sweets could subsequently be thrown etc.', whilst, by the end of the programme, it was noted with the most challenging group that 'Water and fruit consumed when completing worksheets worked very well and kept 'alertness' levels stable'.

In the other school practical activities such as the introduction of tasting food in the classroom were against school policy. Therapists also noted concerns about the class teacher engaging with the programme as the AP activities and subsequent noise level/activity level did not appear to be compatible with teaching style. This teacher required children to remain in seat, at all times. This concern resulted in discussion of the

ethos of the programme in conjunction with liaison with school management to arrange an alternative and more appropriate teaching space removed from other classrooms so that noise and excitement did not disturb other classes. Following this, staff reported more positive impressions and the view that the program was beneficial to the students. The Occupational Therapists considered that an environmental audit of classroom space and routines would also be an important aspect of the programme implementation, as a result. There was also a concern that students with complex difficulties might be better served in small group settings over a longer time span. The researcher would suggest that the ethos of each school could also have been taken into consideration in more detail, as there was no within school control group to counter-act differences between schools.

The Person-Environment-Occupation Model used in the MacCobb, Fitzgerald, & Lanigan-O'Keeffe (2014) study provides valuable insights into mediators/mechanisms and moderators/contexts which might be pertinent in 'real life' school settings. The realist recommendation of providing a complete evidence-based account of programme fidelity, obstacles and specification of elements necessary for replication elsewhere, in conjunction with knowledge of student sensory profiles, would be better able, however, to answer the question of what works for whom in what circumstances with regards to the Alert Program. In addition, from an Effect-EMMIE perspective, none of the criteria specified in Table 6 were met. Overall, the Alert Program would warrant an EMMIE-Q score as summarised in Table 12.

Table 12

EMMIE-Q Scoring for The Alert Program (Gill, Thompson-Hodgetts & Rasmussen, 2018 & MacCobb, Fitzgerald & Lanigan-O'Keeffe. 2014).

EMMIE-Q	***EFFECT 0*** Insufficient consideration of validity elements.	***MECHANISM*** *2* Detailed articulation of theory, based on interrogation of relevant literature and/or elicited from practice.	***MODERATOR 1*** Theory-based pre-specification of expected Moderators and mediators relevant to the activation of mediators or mechanisms.	***IMPLEMENTATION 2*** Systematic efforts to document implementation issues.	***ECONOMIC 0*** No mention of costs (and/or benefits).

Considered as a whole, cognitive behaviour therapy approaches for self-regulation including The Alert Program are likely to be much less costly to implement than programmes such as Sensory Integration Therapy and SCERTS (Prizant et al., 2005). They also show some promise, despite criticisms of experimental design undermining internal validity (Gill, et al., 2018). Both Edgington, et al. (2016) and MacCobb, Fitzgerald, & Lanigan-O'Keeffe (2014) highlight the ability of adolescents (with and without autism) to develop their self-awareness of sensory processing and its impact on behaviour, thoughts, feelings and relationships with others. They also provide evidence that many of these children have some success regulating their arousal level via a variety of strategies which facilitates their ability to cope with demands made upon them in school environments and beyond. Further exploratory study of potential primary and secondary outcomes is clearly warranted, nevertheless.

Both Edgington et al. (2018) and MacCobb, Fitzgerald, & Lanigan-O'Keeffe (2014) have given process issues some serious consideration via systematic analysis of qualitative data. Including teachers' views as well as those of parents and children adds an important dimension, as in the MacCobb, Fitzgerald & Lanigan-O'Keeffe. (2014) as opposed to the Edgington et al. (2016), study particularly given Odam's et al. (2014) warning that intervention studies in post-primary schools are a 'perfect storm of complexity'. MacCobb et al. (2014) highlighted some potential barriers relating to the culture of one of their schools, in this respect.

2.5.4 Environmental modifications.

These are interventions incorporating compensatory changes to environments, focussing on the intensity, complexity, or quality of one or more sensory elements to support the successful functioning of the children and young people (Bodison & Parham, 2018). This could involve removing clutter, providing quiet workstations, the use of earmuffs or noise-cancelling equipment or changing the lighting in the classroom, for example.

Whilst Pfeiffer et al. (2017) reported that parents of children with autism often intuitively incorporate strategies directly related to sensory factors of the home environment and Lombard (2015) outlined a wide range of compensatory changes to environments in the workplace, studies relating to the school environment remain sparse.

Only three studies were found regarding autistic adolescents in a school context (Kinnealey et al., 2012; Ikuta et al., 2016; Mandy et al., 2016b).

Kinnealey et al. (2012) investigated the effect of sound-absorbing wall installation and halogen light installation in a classroom on the attending behaviour of 4 male students, aged 13 – 20 years, three of which had diagnoses of Autism and the other of Dyspraxia. They were all attending a small independent school specialising in severe communication disorders and autism. The equipment was donated to the school; hence economic cost was not taken into consideration in this case. Two of the strengths of the study, however, were that the students' perspectives and their individual sensory profiles were both considered. Parents provided a completed Sensory Profile six weeks prior to the study and were also requested not to change medications or diet during the study. The Sensory Profile data was used to provide insight into individual differences and context for behavioural change, both of which are very useful from a realist perspective.

The programme theory was that students who have problems modulating the sensory information in their environment have difficulty attending to the stimuli relevant for learning. In this study, sensory modulation difficulties affecting the auditory system (hyperactivity and over-responsiveness to pitch, volume, specific sounds or multiple sounds) and lighting (fluorescent lights due to an unnatural colour and a discontinuous spectrum, which were deemed too bright for people who experience light sensitivity) were judged to be linked to avoidant behaviour in class. Grandin (1995), for example, reported that some people with autism perceive the 60-cycle associated with fluorescent lighting, resulting in a 'pulsating' room, headaches, or eyestrain. In contrast, halogen lighting is soft, with continuous spectral distribution which is more like sunlight.

In their mixed-method, multiple single-subject study a two-week baseline (BL) was followed by a two-week trial with the installation of sound-absorbing wall installation (WP wall phase), followed by the addition of halogen lighting for the subsequent two-week trial (LP light phase). The latter consisted of the installation of sound-absorbing ceiling panels as well as halogen lights. They interviewed each student three times in each phase with predetermined, open-ended questions about the student's perceptions of the environmental modifications. Journaling was used to record the responses of the students. The interviews, all conducted by one researcher, took place in a familiar quiet room. Three students used spoken language to respond, which were transcribed, and one typed the responses. The

student interview transcripts were analysed for themes for each student and then across students. Two independent reviewers established interrater reliability for the themes at 96 % agreement.

Before the intervention, an occupational therapist familiar with the students developed behavioural descriptors of non-attending behaviour specific to each student, which were corroborated by the teachers. Examples given for one student included rubbing of his eyes/face, covering his ears, getting out of seat and requiring three or more teacher prompts for a response. ‘Attending’ was measured via video recording of 10-minute classroom segments two days a week during four academic periods in each of the BL, WP and LP phases, resulting in a total of sixteen 10-minute video segments for each student for each phase. Two observers not familiar with the students and blinded to the phases independently viewed the videotapes and scored the presence or absence of attending behaviours at 15 second intervals, for a total of 40 intervals within each 10-minute segment. Interrater reliability of 96% was established using the interval-by-interval approach.

The results demonstrated an overall reduction in the frequency of non-attending behaviours across the two intervention phases. There were individual differences, however. All four students demonstrated a decline in the wall installation phase but a continued decline in the light installation phase was apparent in three not four of the students. The non-responder (P3) in the light phase, (diagnosed with autism) showed an initial increase followed by a reduction in non-attending behaviour (BL, 12.8%; WP, 3.3%; LP, 7.3%). P3’s sensory processing indicated typical processing in all areas except for auditory processing, which might help explain this difference.

P4, also diagnosed with autism and definite differences in auditory processing but not visual processing, only showed a slight decline in the visual phase (frequency of non-attending behaviour (BL, 17.2%; WP, 13.5%; LP, 12.2 %), possibly for the same reason whilst the third autistic pupil (P1) did not show definite differences in either auditory or visual processing and yet, in the LP showed a significant reduction in inattentive behaviour (BL 18.3%; WP, 18.1%; LP, 1.9%), During BL and WP he was frequently observed with his head down on his desk and looking away from the task or teacher. After the installation of halogen lighting, however, there were no occurrences with his head down on the desk or eyes closed. Interview data did not capture his subjective responses to the modifications.

The data suggests that there is a potential visual processing issue that was not apparent in the parent-completed Sensory Profile or subjective experience response thus supplementary evidence may be required, in certain cases.

No cross-student themes were identified at BL. The WP and LP, however, produced three cross-student themes: perception of environmental improvement, positive emotional response to the changes, and self-assessment of improved classroom performance. These themes were grounded in the data (actual quotes). P4 commented, for example, "better ability to hear teachers, sounds identified easier'. P2 further indicated 'I'm really happy, very happy that I have finally come in a nice quiet room', 'I can see, and I can listen better, and I can do a lot of stuff now……. finally, I can concentrate'. A subsequent analysis of videotaped segments further identified an increase in social interaction in 3 of the 4 participants in Weeks 2 and 3 of the LP, suggesting that a more comfortable sensory environment also improves engagement with other pupils.

Whilst this was a very small scale exploratory study, which did not return to baseline condition as would an ABAB design to strengthen the reliability of the results, and there was no indication of the nature of the lessons (occupation) to complete a Person-Environment-Occupation analysis, it has much to commend it from a realist perspective. Of note, this was one of very few studies which used individual sensory profiles to help interpret results. The observations that P3's behaviour did not match his parents' Sensory Profile data and that he was unable to comment on his own subjective experience warrant further consideration, though. The study was alert to unintended consequences, nevertheless, regarding a possible link between environmental adaptations and increased social exchange and put in place suitable blinding and inter-judge reliability checks to increase confidence in the data. Overall, such environmental modifications would warrant an EMMIE-Q score as summarised in Table 13.

Table 13

EMMIE-Q Scoring for Sound-absorbing wall and halogen light installation. (Kinnealey et al., 2012).

EMMIE- Q	***EFFECT*** ***2*** Sufficient consideration of two elements of validity.	***MECHANISMS*** *1* Broad statement of assumed program theory stated (mechanisms and/or processes).	***MODERATORs*** ***2*** Tests of the effects of moderators or of mechanisms defined post hoc using variables that are at hand.	***IMPLEMENTATION*** ***1*** Ad hoc comments on implementation.	***ECONOMIC*** ***0*** No mention of costs (and/or benefits

Kinnealey et al. (2012) concluded that occupational therapists' role in school systems should include strategies that address the sensory environment, as well as within-child issues, to contribute to student self-regulation, of which sound-absorbing walls and halogen lighting are worthy of further investigation.

In the second study Ikuta et al. (2016) piloted the effectiveness of standard earmuffs and noise-cancelling (NC) headphones related to hyper-reactivity to auditory stimuli in children with autism. Earplugs were not incorporated in the study due to concern that they may cause unwanted tactile stimuli to the ear canal.

21 participants aged 4 – 16, were recruited from 220 families who were members of the Autism Society of Nagasaki, Japan. The inclusion criteria included hyper-activity to auditory stimuli. The study wanted to find out which type of hyperactivity in children with autism could be controlled by these devices.

Sounds causing the children distress were quite idiosyncratic, which included voices of other students, singing voices, loud music, grinding sound of sharpening a pencil, sounds of construction work/motorcycle engine/sirens/thunder/ dogs barking/slamming doors/toilet flush/baby crying/sneezes and sniffing. Responses were also quite idiosyncratic, as they included becoming nervous and aggressive, covering ears with hands, crying, running away, biting fingers, withdrawing, yelling, hiding, screaming, biting, rolling around on the floor, growling, hitting own face, and freezing.

Participants were randomly assigned to one of two conditions that consisted of a sequence of a two-week control period followed by two weeks of either earmuff use followed by two weeks of NC use, or vice versa. Each participant chose when and where to

use the equipment, and the parents or teachers were asked to record the total time of using earmuffs or NC headphones per day.

A strength of the study, from a realist perspective, was detailed reporting of implementation issues. Four participants refused to wear either the earmuffs or NC headphones. Five children refused or discontinued to wear NC headphones because they could hear human voices better and disliked human voices. As a result, the researchers compared baseline and earmuff period in 16 children and between baseline and NC headphone period in 12 children.

To complicate matters further, three participants used the equipment at school only and five participants used them at home only. The rest used them both at home and at school, but none continually. The use time per day ranged from 65 – 360 minutes (mean 136.9) for earmuffs and from 30 – 360 minutes (mean 94.6) for NC headphones.

To evaluate changes in behaviour Goal Attainment Scaling (GAS) was used. The GAS has a rating scale ranging from -2 to +2; 0 being the anticipated performance by the end of the study (Kiresuk, Smith, & Cardillo, 1994). One of the members of the research team developed the goals together with the parents and teachers, based on prior assessment reports, to ensure that the goals were developmentally appropriate and relevant. This researcher was subsequently blinded to the experimental schedule assignment. Another researcher was responsible for randomization and was also blinded to the assigned schedules whilst a third researcher was responsible for double-checking each GAS item to ensure that it met all quality criteria. In order to observe the children's behaviour, at all times, their GAS ratings were checked by the teacher at school and by the parent at home. The attainment levels for the chosen personal goals were then combined in a single aggregated T – score.

The GAS T-score was significantly higher for the earmuff period than for the control period (p= .006) but there was no significant difference for the NC headphones compared with the control period, nor between earmuff and NC headphone periods. It was noted, however that the GAS T-scores of five children improved during the NC headphones period. Parental feedback highlighted individual differences in preferences. One boy disliked the pressure of the earmuffs but tolerated the NC headphones, whilst another felt stressed when he wore the NC headphones because he could hear human voices clearly when the other noises diminished. One parents of a participant whose GAS

T-score was better during the earmuff period than during the NC headphone period reported that 'If he wore earmuffs, he could enter the bathroom' and another commented 'He could tolerate the noise of the air towel' when wearing earmuffs.

Ikuta et al. (2016) concluded that the usefulness of earmuffs for children with autism and auditory hypersensitivity, even for a short period of wearing time, was demonstrated in their study despite the limitations of a small sample and lack of control over frequency of intervention and duration of using the devices. The researcher further notes the absence of a return to baseline measure and only ad hoc comments from parents and children. There were no comments from teachers or from the students themselves, contextual detail was missing and there were a significant number of non-responders, which were not explained. As a result, there was limited information, from a realist perspective, to map context-mechanism- outcome and EMMIE-Q scores are low across the board as summarised in Table 14.

Interviewing the teachers, parents and children, matching response to sensory profile and formally grounding that evidence in the data, in conjunction with mapping device use with context/task would have been much more illuminating from an EMMIE perspective.

Table 14

EMMIE-Q Scoring for standard earmuffs and noise-cancelling headphones (Ikuta et al (2016).

EMMIE- Q	***EFFECT*** ***0*** Insufficient consideration of Validity elements	***MECHANISM*** *0* No reference to theory; simple black box	***MODERATOR*** ***1*** Ad hoc description of possible relevant moderators or contexts.	***IMPLEMENTATION*** ***1*** Ad hoc comments on implementation.	***ECONOMIC*** ***0*** No mention of costs (and/or benefits

The third study, Mandy et al. (2016) provides a 'low-intensity' intervention for reducing problem behaviours and distress in children with autism as they transition to mainstream secondary school. This has been formulated by clinical psychologists attached to Great Ormond Street Hospital and subsequently manualised (Murin, Hellriegel, & Mandy, 2016) for use by schools. It is described as a 'low intensity' programme because the intervention seeks to modify and improve existing practices in schools, through raising

staff awareness and providing general strategies, rather than impose extensive additional tasks on what they consider to be already burdened school staff.

The Systemic Transition in Education Programme for Autism Spectrum Disorder (STEP-ASD) is designed to modify the school environment before, during and after transition to improve the fit between the child with autism and their educational environment. The programme incorporates co-operation between primary school staff, parents and a key person in the secondary school, such as the SENCO, to develop their shared understanding of the child's needs and abilities. This is supported by screening devices to devise a pupil profile at a pre-transition bridge meeting. This pupil profile, in conjunction with a transition pack, consisting of a 'tool-box' of practical photocopiable resources targeting sensory sensitivities, anxiety and difficulties with planning and organisation, is then disseminated to all staff having contact with the pupil. The authors argue that the provision of practical strategies for teachers is critical, due to their already heavy workload, to avoid any view of the intervention being burdensome, confusing or unacceptable in any way. The SENCO of the receiving school is also provided with a 'Transition Management Plan' and acts as the key person to oversee the programme, which is reviewed with the parents following transition and modified as appropriate. Environmental adjustments include access to a 'Safe Haven' to de-stress and pro-active solutions to 'sensitive locations' such as school corridors and canteens.

Consideration of sensory issues is very limited. The establishment of sensory profiles of the children relies on only four general questions targeting sensory sensitivities. The strategies suggested for addressing sensory needs are also minimal. In addition to suggestions to provide 'Safe Havens' and pro-active solutions to 'sensitive locations', the authors only provide references to access resources and suggest the involvement of an occupational therapist. Priority is arguably given to other issues such as social relationships and executive functioning skills, as a much wider range of assessment and intervention suggestions are provided for these topics.

In their pilot study, to provide an evidence-base for the programme, Mandy et al. (2016) focussed on school-reported emotional and behavioural problems exhibited by an intervention group (n = 17) compared to a control group (n = 20) in an un-blinded, non-randomised, controlled design. No two children attended the same school. STEP-ASD workers sought to promote compliance with the transition management plan by making

scripted monitoring phone calls to school staff over the first two terms. The results indicated that 47% of the intervention group compared to only 10% of the control group exhibited a large reduction in problem behaviour, which was attributed to the intervention. Whilst the non-blinded outcome measures may have inflated positive results to please the researchers, and there was no evidence of generalisation beyond the school environment, the results are considered encouraging. 86.6% of secondary school staff reported using the transition pack and felt that its contents influenced the way the school managed the pupil; 93.3% found the transition pack helpful and 80% considered that it improved their knowledge of autism.

Whilst establishing an association between receiving STEP-ASD and a reduction in emotional and behavioural problems in school, which included reduced hyperactivity (which very nearly reached significance of $p = 0.05$), Mandy et al. (2016) acknowledged that they did not investigate which processes underpinned this. There was also an absence of programme theory and consideration of implementation challenges. 'Full' implementation of STEP-ASD was only reported by 53.3% of school respondents and in 20% of secondary schools which also suggested that some 'real-life' barriers were in evidence but not examined.

From an EMMIE perspective, focus on programme theory, moderators and process issues to identify underlying mechanisms and those specific components which were more challenging to put in place than others were missing. A wide range of individual and contextual variables were left un-examined preventing them from considering differences between responders and non-responders and differences between schools. From an EMMIE perspective, therefore, EMMIE-Q scores are low across the board as summarised in Table 15.

Table 15.

EMMIE-Q Scoring for 'Safe Havens' and Raising Teacher Awareness (Mandy et al., 2016).

EMMIE- Q	***EFFECT*** ***0*** Insufficient consideration of Validity elements	***MECHANISM*** *0* No reference to theory; simple black box	***MODERATOR*** ***0*** No reference to condition contexts or moderators that may be significant for activation of mediators or mechanisms.	***IMPLEMENTATION*** ***1*** Ad hoc comments on implementation.	***ECONOMIC*** ***1*** Only direct or explicit costs (and/or benefits) estimated.

The empirical data indicates that use of environmental adaptations including sound-insulating walls and halogen lighting, the use of earmuffs and noise-cancelling headphones, and the provision of 'safe havens' in conjunction with raising staff awareness can produce some benefit but this is not clearly defined. Costs relative to the perceived benefits are also pertinent for policymakers and schools in times of austerity, and yet these receive scant mention, in the literature. Also, of note are individual differences in preferences and response, which would benefit from more finely tuned exploration. In the case of Ikuta et al. (2016), the behavioural response of one child also brought into question the accuracy of parental report assessments such as the Short Sensory Profile, suggesting data could usefully be gleaned from more than one source to counteract this.

2.6 Summary of the Literature Review

The realist review of the literature has highlighted the scarcity of studies available focusing on autistic adolescents' sensory modulation issues, particularly in school environments. Given the arguably, serious implications of sensory modulation differences for academic achievement and social, emotional and mental health (which were introduced in Chapter One), there is clearly an urgent need to pursue and encourage more research in this area.

The review has also indicated that what limited research is available continues to be hampered with methodological challenges undermining internal and external validity, such as small samples, insufficient analysis of heterogeneity, in conjunction with insufficient attention to the validity of constructs. In addition, programme theories and context are not always made explicit, process issues are under-reported and cost-benefit analysis is rarely conducted.

The literature also suggests, nevertheless, that adolescents (with and without autism) have the capacity to develop their own self-awareness of sensory processing and its impact on behaviour, thoughts, feelings and relationships with others (Edgington et al., 2016; MacCobb et al., 2014). It further suggests that 'low intensity' approaches are worthy of empirical investigation as cost/benefit analysis is a very important consideration. The delivery of arguably labour-intensive programmes, such as SIT, for up to 25 hours a week by specialist professionals, could be challenging logistically and financially in school contexts. It is purported that it is not always necessary to use specialist equipment or specialist staff to deliver a viable programme, however (Cullen-Powell, Barlow, & Bahn, 2005; Edgington et al., 2016; Mandy et al., 2016).

EMMIE was introduced as a useful framework for evaluating interventions from a realist perspective. Whilst using such an approach is a very time-intensive process, due to the necessary focus on fine detail, the researcher considers that it has considerable potential for EPs. A major strength of EMMIE is that it goes beyond internal validity to consider mechanisms/mediators, moderators/context, implementation (process) issues and economic costs versus benefits. All these factors are arguably critical for programme development, acceptability to stakeholders and successful programme implementation of interventions, particularly in 'real life' contexts such as mainstream schools.

Whilst none of the studies reviewed were designed with EMMIE, in mind, the use of the EMMIE perspective proved illuminating in highlighting what is included and what is absent in studies, that would facilitate decision-making regarding future study design.

Effect E – EMMIE was deemed low across the board due to the stringent criteria outlined in Table 6. Whilst there was also scant regard for cost/benefit analysis, some studies provided programme theories, consideration of potential mechanisms and implementation issues, to varying degrees, which are all important for future study design.

Of particular note was the benefits of collecting data from different sources, including field notes, the perspectives of teachers and tutors (Cullen-Powell, Barlow, & Bagh, 2005; Edgington et al., 2016) and the children themselves (Kinnealey et al., 2012). The identification of unintended consequences also provides important information undermining or supporting implementation (Edgington et al., 2016). In addition, staff training and/or awareness-raising was highlighted as a pertinent factor in some studies (MacCobb et al., 2014; Mandy et al., 2016).

Individualisation of programmes based on sensory profiles was evident in SIT approaches, and the Kinnealey et al. (2012) study using environmental modifications to address heterogeneity of the participants. Mandy et al. (2016) also emphasised the importance of providing practical strategies for teachers, to avoid any view of the intervention being burdensome, confusing or unacceptable in anyway.

Systematic efforts to document implementation issues in conjunction with the provision of sufficient information regarding programme content is also critical for programme fidelity and for linking context to mechanisms and outcome (Pawson, 2018). Of fundamental importance, however, from a realist perspective is that the programme theory is made explicit. This was evidenced in studies such as Cullen-Powell et al. (2005), MacCobb, Fitzgerald, & Lanigan-O'Keeffe (2004), Edgington et al. (2016) & Kinnealey et al. (2012). What is also needed, however, is to link programme theory to outcomes, with an explicit evidence trail grounded in the data. Without such a link, it is not possible to provide insights towards understanding and explaining the relationships between the context in which the intervention takes place, the mechanisms by which the intervention works and the outcomes which are produced, in order to answer the key question of 'What works for whom, in what circumstances and why?'.

Based on this literature review a summary of what is included and what is absent in the 10 studies are summarised in Table 16.

Table 16

Summary of EMMIE review of the literature of sensory modulation interventions deemed suitable for autistic adolescents in secondary school environments.

Study/Article	Type of intervention and focus	Included.	Absent.	EMMIE rating.
1) Lydon, Healy, & Grey (2018).	Sensory Integration Therapy (SIT). Comparison of SIT to a behavioural intervention.	School-based. Autistic participants. Individualised sensory profiles. Very strong inter-rater reliability. Consideration of study design and unanticipated outcomes.	No programme theory. No explanation of mechanisms. No consideration of implementation (process) issues. Questions of programme fidelity. Need for specialist equipment and specialist staff (OTs). No cost/benefit analysis.	Effect- 2 Mechanism- 0 Moderator- 1 Implementation 1 Economic cost – 0

CONTINUATION: Table 16

Summary of EMMIE review of the literature of sensory modulation interventions deemed suitable for autistic adolescents in secondary school environments.

Study/Article	Type of intervention and focus	Included.	Absent.	EMMIE rating.
2) Cullen-Powell, Barlow, & Bahn (2005).	Single modality sensory based. Hand massage in conjunction with breathing techniques (Self-Discovery Program).	School-based. Identified autistic participants. Explicit programme theory. Collection of data from different sources. Unintended consequences recorded.	Insufficient consideration of validity issues. No explanation of mechanisms. No evidence trail. Need for specialist staff (Complementary therapists). Lack of individualised sensory profiles. Questions of programme fidelity. Lack of standardised outcome measures. Ad hoc consideration of implementation (process) issues. No cost/benefit analysis.	Effect- 0 Mechanism- 2 Moderator-1 Implementation-1 Economic cost-0
3) Villasenor, Smith & Jewell (2018); 4). Al-Ayadhi, Al-Drees, & Al-Arfaj (2013). 4) Al-Ayadhi, Al-Drees, & Al-Arfaj (2013).	Single modality sensory based. Sound-based interventions	Identified autistic participants. A transparent systematic review Post hoc consideration of potential mechanisms.	Not school based. Potential for confounding variables. External validity issues. Need for specialist equipment Lack of standardised outcome measures. Lack of individualised sensory profiles. No explanation of implementation (process) issues. No cost/benefit analysis.	Effect- 0 Mechanism-1 Moderator-0 Implementation- 0 Economic cost - 0
5) Edgington, Hill, & Pellicano (2016).	Cognitive incorporating multi-modality sensory-based approaches. Cognitive Behaviour Therapy	School-based. Autistic participants. Explicit programme theory. Content and rationale for each session. Standardised outcome measures. Collection of data from different sources. Programme fidelity. Unintended consequences recorded. Evidence trail.	No use of individualised sensory profiles to investigate individual differences in response. Ad hoc consideration of implementation (process) issues. No cost/benefit analysis.	Effect-0 Mechanism-1 Moderator- 1 Intervention-2 Economic cost- 0

CONTINUATION: Table 16

Summary of EMMIE review of the literature of sensory modulation interventions deemed suitable for autistic adolescents in secondary school environments.

Study/Article	Type of intervention and focus	Included.	Absent.	EMMIE rating.
6) Gill, Thompson-Hodgetts, & Ramussen (2018).	Cognitive incorporating multi-modality sensory-based approaches. The Alert Programme	School-based. A transparent systematic review. Some consideration of validity issues. Ad hoc consideration of implementation (process) issues. .	No identified autistic participants. Lack of individualised sensory profiles. No explanation of mechanisms. No evidence trail. No cost/benefit analysis	Effect- 0 Mechanism- 2 Moderator-1 Implementation- 2 Economic cost- 0
7) Mac Cobb, Fitzgerald, & Lanigan-O'Keeffe (2014) & Mac Cobb, et al. (2014).	Cognitive incorporating multi-modality sensory-based approaches. The Alert Programme	Explicit programme theory. Some consideration of mechanisms. Consideration of implementation (process) issues.	No identified autistic participants. Lack of individualised sensory profiles. Questions of programme fidelity. No objective outcome measures. Need for specialist staff (OTs). No evidence trail. No cost/benefit analysis.	Effect- 0 Mechanism- 2 Moderator- 1 Implementation- 2 Economic cost- 0
8) Kinnealey et al. (2012)	Environmental modifications. Sound-absorbing wall and halogen light installation.	School-based. Autistic participants. Explicit programme theory. Validity measures. Unintended consequences recorded. Individual sensory profiles. Evidence trail.	Ad hoc consideration of implementation (process) issues. Limited explanation of mechanisms. No cost/benefit analysis.	Effect- 2 Mechanism- 1 Moderator-2 Implementation -1 Economic cost - 0
9) Ikuta, Iwanaga, Tokunaga, Nakane, Tanaka, & Tanaka (2016).	Environmental modifications. Standard earmuffs & noise-cancelling headphones.	Autistic participants. Post hoc consideration of moderators. Post hoc consideration of implementation (process) issues.	Not school based. Lack of individualised sensory profiles. No explanation of mechanisms. Questions of programme fidelity. No evidence trail. No cost/benefit analysis.	Effect- 0 Mechanism-0 Moderator-1 Implementation-1 Economic cost- 0
10) Mandy et al. (2016).	Environmental modifications. Safe havens and raising staff awareness.	School-based. 'Low intensity' approach. No need for specialised equipment. Autistic participants. Use of school staff. Benefits indirectly estimated.	No consideration of implementation (process) issues. No explanation of mechanisms. Lack of individualised sensory profiles. Questions of programme fidelity. No evidence trail.	Effect- 0 Mechanism-0 Moderator- 0 Implementation -1 Economic cost- 1

To summarise, an EMMIE perspective provides important insights for ways forward in bridging the research-practice divide in implementation work. It encourages the collection of primary data, via multiple means, as recommended by Johnson et al. (2015) focussing not only on effect, but also causal mechanisms, moderators, practical implementation issues and economic costs of interventions.

Such an approach, in sensory modulation intervention studies, necessitates the following:

- Detailed articulation of programme theory.
- Analysis of moderators.
- Consideration of unanticipated effects.
- Assessment of most likely mechanisms and any contextual conditions.
- Sub-group analysis based on individual sensory profiles.
- Systematic efforts to document implementation issues.
- A consideration of key components deemed necessary for programme implementation and refinement.
- Estimate of cost-benefit by subgroup.

2.7 Rationale for the Current Study

The present study was prompted by 1) a lack of empirical evidence of successful school-based sensory modulation programmes for adolescents with autism, despite negative factors considered to be wide-ranging and potentially debilitating (Gouze et al., 2012; Johnson, 1975) and, 2) growing evidence that autistic adolescents can be guided cognitively to gain conscious awareness of their sensory preferences to facilitate adaptive rather than mal-adaptive strategies to manage emotions, attention and behaviour more easily (Dunn, 2014). This is deemed important for not only educational achievement, but also mental health and preparation for adulthood (Engel-Yeger et al., 2018; Pfeiffer et al., 2005; Dunn, 2014).

The empirical evidence-base has also highlighted challenges providing intervention approaches which are fine-tuned to meet the individual needs of autistic adolescents, given the heterogeneity of the condition, whilst also sufficiently ‘low intensity’ and low cost to encourage schools to participate.

The researcher was also motivated to explore ways in which to bridge the considerable research-practice divide reported in the literature (Wittemeyer, et al., 2011) attributed to a 'poor fit' between clinics/laboratories and school environments (Kasari & Smith, 2013). This suggests the importance of conducting research within 'messy' real-life contexts, such as schools, ideally in collaboration with the participants. A process-orientated approach conducted with the children, parents and school staff would help to provide 'valuable lessons' about the reality of working with schools (Drmic, Aljunied, & Reaven, 2017), facilitating a better understanding of the mechanisms of change and the nature of the moderators that limit or facilitate the intervention effects (Lendrum & Humphey, 2012).

The researcher would also argue that the EP profession is well-placed to contribute towards an empirical evidence-base, particularly with respect to school-based and community sensory modulation interventions, due to in-depth knowledge and understanding of the complexities of school systems. It is also considered that the novel application of Implementation Science (IS) and realist research instruments in autism intervention studies could potentially be an important way forward for EPs to bridge the research-practice divide.

Implementation Science is an emerging field which emphasises that capacity for change is only triggered in conducive circumstances, whatever the intervention and that such conditions need to be 'nurtured' (Kelly & Perkins, 2012). Within the context of school-based interventions, key research areas in IS include a) professional development and coaching for school professionals; b) intervention integrity; and c) intervention sustainment under typical school conditions (Owens et al., 2014). Realist approaches, designed to identify contextual factors and the mechanisms by which participants might contribute or undermine the successful implementation of programmes, is increasingly being used in Health Care intervention research in the light of their own research-practice divide (McIsaac et al., 2018), and is, therefore, considered worthy of consideration in educational psychology research.

The impetus for the choice of the 'Sensory Intelligence' approach emerged whilst the researcher was working as a consultant educational psychologist, with a small specialist school for children with significant Social, Emotional and Mental Health difficulties, who had all been excluded from mainstream school placements. The 25

children aged between 7 years- 16 years; many with diagnoses of autism, all presented with significant sensory sensitivities which may have contributed towards their difficulties coping in mainstream school placements. One child, for example, put his hands over his ears whenever a car drove up the gravel drive, and described the sound as a machine gun firing, and others could not concentrate in class, if there was a ticking clock or a fly buzzing in the room.

In the light of inconclusive evidence supporting any established school-based intervention targeting sensory processing, the researcher shared details of the relatively unknown 'low intensity' and low cost programme, with staff, following her participation on a practitioners training course, in South Africa, in 2015. Lombard (2007) had endeavoured to be at the forefront of developments in the field of sensory modulation. She took a holistic perspective considering additional evidence from Personality Theory (Aron & Aron, 1997), Evolutionary Biology (Boyce & Ellis, 2005), Neuroscience (Lane & Schaaf, 2010), Sensory Branding (Lindstrom, 2005) and Environmental Studies (Davis, Leech & Clegg, 2011) to incorporate a multi-professional perspective in the development of her 'Sensory Intelligence' programme.

The programme also draws upon strategies already well-established in other sensory-related and cognitive approaches (for example, Mac Cobb, et al., 2014; Drmic, Aljunied & Reaven, 2017). It incorporates promising aspects of cognitive behavioural approaches, sensory integration and core components of The Alert Program, whilst also using insights from environmental studies to incorporate environmental modifications into the programme. As a relatively low cost and low intensity intervention approach, without need of specialist staff or specialist equipment, it also has potential to be favoured more positively by schools than labour and resource intensive programmes such as SIT/ASI or SCERTS.

This approach also embraced a paradigm shift from the dominant idea, at the time, of sensory processing issues as a 'disorder', that needed to be 'fixed', to a conception of sensory processing 'differences', as part of human neuro-diversity, that needed to be managed 'intelligently' in modern-day society. The sensory intelligence approach endeavours to provide the individual with suitable insight and strategies to facilitate optimal conditions to match the person, with respect to their unique sensory profile, the occupation (task) and the environment.

Following the dissemination of the main tenets of the approach to staff, they discussed sensory preferences with all the children and additional resources were acquired to support their sensory needs. This included fidget toys, a trampoline and four Shepherd's Huts; the latter to enable children to benefit from 1:1 support in a quiet, distraction-free environment. Observations of significant reductions in anxiety in the children, in conjunction with reduction in the use of physical restraints by the staff, were very encouraging. Staff and the researcher also considered that the sensory intelligence approach could have contributed to the award of an Outstanding Ofsted in 2016, with the report commenting that 'A creatively designed curriculum and personalised learning programme for each pupil ensure their needs are met exceedingly well' (OFSTED, 2016).

In the light of the perceived success of the programme in a school environment, the researcher was motivated to explore the Sensory Intelligence approach empirically. The key aims of the study were to consider whether the Sensory Intelligence programme was worthy of further investigation; how such an intervention might assist autistic adolescents in coping with the demands of a secondary school environment and potentially offer a role for educational psychologists.

CYPs aged 12 years and above with autism were chosen as a population most likely to benefit, given the high incidence of sensory processing challenges evidenced in this group (Tomchek & Dunn, 2007).

The study will be conducted with a small group of children and young people (CYP) attending an Autism Resource Base (ARB) attached to a mainstream secondary school, in collaboration with their parents and teaching staff. Any perceived benefits, relating to individual sensory profiles and whether such an approach is feasible in a secondary ARB will be key areas of focus. Feedback on how the programme could be further developed to meet the needs of this population will also be elicited from the children, parents and school staff.

This study will focus on answering the following research questions:

Primary:

1) What Context-Mechanism-Outcome (C-M-O) configurations are required for the successful implementation of the ‘Sensory Intelligence’ programme in an Autism Resource Base attached to a mainstream secondary school.

Secondary:

2) What are the sensory-perceptual profiles of children attending a secondary school ARB?

3) What are the potential benefits and limitations of the ‘Sensory Intelligence’ approach for this population?

4) Which sensory-perceptual profiles, if any, might benefit most from the ‘Sensory Intelligence’ approach?

5) What is the impact on the students of the Sensory Intelligence approach?

6) What is the impact of parental involvement?

7) Can this intervention be delivered effectively to children in Years 7 – 11 who attend an ARB?

8) What do the participants suggest could be improvements to the ‘Sensory Intelligence’ intervention programme?

2.8 Critical Appraisal of the 'Sensory Intelligence' intervention programme and associated theory.

Multiple models have been used to describe 'sensory processing' and the concept remains a contentious issue within the field of occupational therapy (Ismael, Lawson & Hartnell, 2018). The core assumption of Sensory Integration Therapy that it is possible to change the central nervous system has also been largely discounted as this is not supported by empirical evidence (Pollock, 2009). More recent growing acceptance of individual differences in sensory processing as an aspect of 'neuro-diversity' has led to the emerging field of sensory modulation amid interest in its role in optimal functioning and well-being, as well as pathology (Dunn, 2014). Clear understandings of the relationships between sensory modulation and life experiences have, however, been hampered by small sample sizes, lack of standardised measures for assessment and outcome purposes, the presence of confounding variables, insufficient consideration of context, and a lack of coherence in the chain of evidence, as discussed in Chapters One and Two.

The 'Sensory Intelligence' approach builds upon practices already embedded in other sensory modulation approaches including elements of the Alert Programme and Cognitive Behaviour Therapy, in particular. Lombard chose against investing time in developing a theoretical basis for her programme, nevertheless. She indicated 'Making a difference first and foremost to your clients is the most important thing' (personal communication 20.04.20).

Given that a complication for any emerging theory involves its operationalisation, the first steps are necessarily exploratory, in nature, as is the case for the current study as the first to investigate the programme empirically. Theory generation can then evolve over time as moderators and mediators become increasingly apparent.

The complex interaction of genetic, epigenetic, biological and environmental factors underlying sensory modulation, also makes theory generation particularly challenging, suggesting the need for interdisciplinary co-operation.

Notwithstanding a lack of exploratory studies and limited interdisciplinary work within the field of sensory modulation to date, the key assumptions underpinning the 'Sensory Intelligence' programme and associated approaches have received some theoretical and empirical support from diverse fields.

The Sensory Intelligence approach is based upon two fundamental assumptions. The first is that personal attributes, the occupation (task in hand) and the environment (including physical, social, cultural and organisational elements) are intrinsically linked, forming a dynamic, interwoven relationship which cannot easily be separated. Thus, all are implicated in individual differences in sensory modulation, which are a consequence interaction between genetic and environmental influences, and all need to be taken into consideration when endeavouring to ascertain a 'good fit' to aid optimum functioning (Letts et al., 1994).

The second assumption is that self-administered sensory modulation interventions can be effective in aiding optimum functioning and well-being in modern day life, provided they are personalised to match individual differences in sensory profiles. It is argued that whilst sensory preferences are often unconscious, once brought into conscious awareness, they are deemed able to facilitate increased understanding of previously 'automatic' responses to tasks and environments. Awareness of self-efficacy in owning and regulating behavioural responses is then considered to be the first step towards self-management (Lombard, 2015).

These assumptions will now be considered in turn.

2.8.1 A dynamic, interwoven relationship between person, task and environment.

The 'Sensory Intelligence' programme is based on the theoretical model of person-environment interaction known as Person-Environment-Occupation (P-E-O; Law et al., 1996), which was introduced in section 2.5.3.2 as this model is also the basis of the Alert Program. At the time of its inception, the P-E-O framework was one of various models emanating from many disciplines, sharing a focus on a dynamic, interwoven relationship between personal attributes and environmental factors.

The perception of environment (i.e. context) as a critical factor in human performance is not new. Much of the original work was conducted by environmental psychologists (see for example, Holahan, 1986). Bruner (1989) subsequently developed the concept of transactional contextualism, arguing that persons both affect and are affected by their context. Gibson (1986) expanded on this by suggesting that the environment is both physical and phenomenological in that persons perceive objects in the environment by the affordances they offer.

Developmental psychologists have also examined the effect of environment on behaviour. Vygotsky (1978) considered the contribution that social environments make to development. Bronfenbrenner (1979) applied a 'transactional' ecological systems model for human development, with spheres of influence (encompassing person and environment, including culture and values) all contributing to each other by dynamic interactive processes. He also introduced the concept of 'ecological validity' arguing that research is not valid unless it is grounded in context; a concept which is now at the centre of Implementation Science's call for process-orientated research 'in-situ' to help bridge the research-practice divide. Bronfenbrenner's model also supports some of the conceptual underpinnings of contemporary educational psychology and is represented in a number of practice frameworks in the UK (Kelly, Woolfson & Boyle, 2008).

With the benefit of technological advances over the past three decades, considerable progress has been made in diverse fields, regarding the interrelationships between physiology, immediate settings and the larger contexts in which these settings are embedded. This includes the fields of 'New Biology' (Ji, 2020; Bjorkund & Ellis, 2014), and neuroscience including epigenetics (Immordino-Young, Darling-Hammond & Krone, 2019), where stress is increasingly being described as a 'modifiable lifestyle factor' and epigenetic factors are shown to include diet, lifestyle, environmental exposure and mind-set. The emerging fields of 'Embodied Cognition' (Pickersgill, 2020) and robotics (Barsalou, 2008) also deem cognition as 'situated' in sensorimotor experience as part of the organism's embedded interaction with the environment.

Advances in such diverse fields lend triangulated support for the theoretical position of the P-E-O model of a non-linear, dynamic relationship between the person-occupation (task)-environment. Early conceptions, based on modern Western philosophy, of a separation of mind-body (Cartesian duality) and of the person from the material world, in conjunction with the dogma of the 'nature versus nurture' debate have now been largely discounted (Traynor & Singleton, 2010). Nurture, rather than nature, is envisioned as the predominant influence when it comes to gene expression (Ji, 2020). Evolutionary ideas are also now well established in mainstream developmental psychology with genetic determinism replaced by bidirectional interactions emerging dynamically over time (Ketelaar & Ellis, 2000).

Whilst theorists differ regarding which environmental and personal factors are the most critical for achieving a 'good-fit' for optimum functioning and well-being, all theories, nevertheless, acknowledge a dynamic, interactive relationship between the person, the task and the environment. These appear to form a tapestry synergistically contributing towards the whole (Ji, 2020).

It is increasingly argued that an integral part of this tapestry is sensory processing. As sensation is the only known physical form of communication between the body and the environment (Jerome & Liss, 2005), researchers are beginning to consider the significance of sensory processing differences for a wide range of human functioning. This includes higher cognitive mechanisms (Wexler, Ikezawa, & Corbera, 2014) and mental health (Gardner, 2016; Bailliard & Whigham, 2017), in addition to its potential contribution towards core autistic behaviours (Keke-Szabo & Szokolszky, 2012) and poorer academic achievement (Turner, Remington, & Hill, 2017), as discussed in Chapter One.

2.8.2 Self-administered and personalised sensory modulation interventions can aid optimum functioning in modern day life.

As discussed in Chapters One and Two, evidence suggests that sensory modulation strategies such as 'sensory diets', 'sensory snacks' and environmental adaptations (referred to as 'sensory ergonomics' by Lombard, 2007), used in the Sensory Intelligence and associated programmes such as The Alert Programme, show promise worthy of further investigation. There have been insufficient consideration of modifiers and mediators, to date, however.

There is also general agreement that everyone has a unique sensory profile (Brown et al. 2019), and that people express all four of Dunn's sensory-processing patterns to a certain degree, which are relatively stable across the lifespan (Pohl, Dunn & Brown, 2003). Longitudinal studies are still required to support the findings (Kirby et al., 2019) and speculations about the etiologies of sensitivity remain to be tested more thoroughly (Boyce, 2016), nevertheless.

Despite the rapidly evolving fields of 'precision medicine' (Spinhoven & Cuijpers, 2020), and 'personalised psychological treatment' in psychiatry (Kessler, 2018),

which endeavour to identify which approaches will be effective for which patients based on genetic, environmental and life-style factors, individualised sensory modulation approaches remain virtually non-existent. The predominant 'one size fits all' approach to intervention contributing towards inconclusive results has energised the urgent call for more personalised approaches in this area (McKay, Greig & Connolly, 2017: Howe & Stagg, 2016). Lombard (2007, 2015) can be considered a pioneer in her endeavours in this regard.

Despite AOTA (2018) specifying that all sensory-based interventions should begin with a detailed assessment of the person, a pertinent barrier to personalised approaches in sensory modulation and attempts at theory-building, is that sensory profiling remains relatively superficial, nevertheless (Uljarevic et al. 2017). Parent and caregiver questionnaires are criticized for their limited evidence of validity, due to potential for respondent bias and lack of agreement with professional observation (Ben-Sasson et al. 2009). The widely used self-administered AASP is also designed for diagnostic rather than personalised intervention purposes in mind, and thus lacks the nuances required. This was recognised by Lombard (2007; 2015), resulting in her expansion of the AASP for her Sensory Matrix. The Sensory Matrix has yet to be investigated for its psychometric properties, however, and there is a potential problem with internal validity as questions such as 'Do you avoid crowds? are not necessarily related to sensory sensitivities due to other possibilities such fear of infection, for example. An interdisciplinary focus on assessment would be a valuable way forward in providing an individualised approach (Trembath & Vivanti, 2014) and thus aiding theory development. The additional use of interviews, observational and physiological measures, ideally combining informant reports with performance measures, are suggested in this respect. (Schoen, Miller & Sullivan. 2014).

The potential mediating roles of metacognitive strategies, such as Cognitive Behaviour Therapy (Drmic, Aljunied & Reaven, 2017), Self-Efficacy Theory (Bandura, 2008) and associated principles of Positive Psychology (Joseph, 2008), underlying the Sensory Intelligence approach were introduced in Chapter One. Such approaches have been shown to facilitate self-awareness of sensory processing and associated behaviour using strengths-based processes to facilitate thoughtful choices and deliberate actions (Edgington et al., 2016; Kirby et al., 2014). Challenges for not only the development of theory for the Sensory Intelligence programme, but also associated psychological theory

include the operationalisation of what is meant by 'meta-cognition', however, and the implications of sensory profiles for cognitive development (Dunlosky & Tauber, 2016). Emerging literature support the conjecture that cognition and genetic factors are not independent of each other, resulting in differing cognitive processing styles (for a review see Gibbs, Mcgeary & Beeves, 2016).

How different sensory processing styles influence cognitive processing has received little attention, to date (Boyce, 2016). This topic, has, however, been considered by the Cognitive Bias Hypothesis (Fox & Beevers, 2016) suggesting that sensitivity genes interacting with the environment influence the development of both 'toxic' and 'enhancing' cognitive biases. Cognitive processing styles are, therefore, considered to be integral to enhancing well-being but research remains highly speculative. Importantly it has also been suggested that cognitive biases can be modified through intervention. Due consideration of individual cognitive processing styles is, therefore, likely to be critical for the efficacy of interventions such as the Sensory Intelligence programme.

The study of the complex nature of metacognition by various disciplines have also resulted in an abundance of definitions, describing various constructs, assumptions, processes and mechanisms that impede a unified definition of metacognition. More inter-disciplinary theoretical work is required to achieve this aim (Dunlosky & Rawson, 2019).

The concepts of optimal functioning and well-being, which have been used interchangeably, but not operationalised by Lombard (2007), have also been inconsistently defined in the literature, with little agreement on its measurement due to the multi-dimensionality of the concepts (Schulz-Lutter, Schimmelmann & Schmidt, 2016). Dodge, Daly, Huyton & Sander (2012) propose a simple, universally applicable and optimistic definition of subjective well-being, however, which could be used as a basis for measurement. They suggest 'In essence stable well-being is when individuals have the psychological, social and physical resources they need to meet a particular psychological, social and/or physical challenge' (p230). This envisions an ever-changing rather than a static concept, and incorporates the importance of mindset regarding capabilities, which are both integral to the Sensory Intelligence approach. Bozic (2013) suggests that language associated with strength, resiliency and success is important in promoting positive expectations of the CYP and the motivation to assume a more positive mindset. This

proposition, which is also integral to the Positive Psychology movement, also requires empirical testing, nevertheless.

In conclusion, this emerging field remains at an embryonic stage of development, with still much to learn about what works for whom and in what circumstances due to limited conceptual understanding of both moderators and mediators in conjunction with a lack of coherence in the chain of evidence provided, to date. The emergence of the biopsychosocial perspective of human functioning provides particular challenges for theory development, but the Sensory Intelligence programme is not alone in this regard. This suggests the importance of process-orientated approaches and inter-disciplinary co-operation, ideally including that of educational psychology, to move the field forward both theoretically and empirically. An exploratory study of the 'Sensory Intelligence' programme with autistic adolescents, incorporating the novel use of process-orientated techniques originating from other disciplines, to assist explicit exploration of potential moderators and mediators, is considered both a useful starting point and a necessary precursor to theory development.

Chapter 3: Methodology

3.1 Overview

In this chapter, the methodology and methods used to answer the research questions will be discussed. The design is justified with relation to a (critical) realist perspective, then detailed with reference to sampling and participant recruitment, method, data-gathering and qualitative data analysis methods. The reliability, trustworthiness, and ethical considerations of the research are also presented.

3.1.1 Ontological and epistemological position.

Ontology relates to the nature of reality and its characteristics whilst epistemology focuses on the relationship between the researcher and that being studied. Critical realists consider this relationship to be interrelated, not independent, thus impacting on what can be known (Cresswell, 2013).

Archer et al. (2016) advised that critical realism encompasses a series of philosophical positions representing a broad alliance of social theorists trying to develop a 'properly post-positivist social science'. It situates itself as an alternative paradigm to both scientific forms of positivism searching for law-like forms and to the strong interpretivist or postmodern turn which favours interpretation to explanation with a focus on description at the cost of causation. There is not one unitary framework, set of beliefs or methodology that unite critical realists, however. Archer et al. (2016) described critical realism as a series of family resemblances in which there are commonalities, but these commonalities overlap and crisscross in different ways.

A variety of labels including 'scientific realism', 'theoretical realism' and 'social realism' have been used to reflect the diversity of realist research paradigms (Williams, 2018). Its philosophical position is that of critical realism (Blaikie, 2007).

Kelly, Woolfson, & Boyle (2008) discussed the central role of critical realism in Educational Psychology, due to the importance of providing a suitable theoretical framework for analysing and acting on the complexity of social and educational contexts. They defined critical realism as 'a position that maintains that there exists an objectively knowable, mind-independent reality, whilst acknowledging the role of subjective experience, mediated by perception and cognition, in providing access to this objective

reality' (p 10). Realists, such as Emmel et al. (2018) also synthesise interpretation and objective reality, integrating positivist and interpretivist positions.

Williams (2018) explained that the ontological basis of Realism is that the real, whether physical or social exists independently of our knowledge of it and that there is some order in both the natural and social worlds via underlying causal mechanisms (structure or systems). Bhasker (2008) added 'we can only know them under particular descriptions. Science, then, is the systematic attempt to express, in thought, the structures and ways of acting of things that exist and act independently of thought'(p 50).

This suggests that there will always be a conceptual gap between mechanisms formulated by the scientist, which are models or approximations of reality, and the 'real' mechanisms 'out there'. The realist approach argues, nevertheless, that mechanistic thinking provides the possibility of moving beyond the merely descriptive to tentative explanations of why things are as they are (Williams, 2018). This involves systems thinking integrating biological, cognitive and social dimensions, transcending outdated notions of a division between the physical and social sciences (Urry, 2003).

It is deemed fitting to use a critical realist perspective in this study as the focus incorporates physiology (measured by sensory profiling) cognition, social and cultural issues in specific organisational context (a school ARB). A critical realist perspective also enables the researcher to delve deeper into the 'nuts and bolts' of the intervention in question, without being prescriptive. One of the key tenets of realism is that causal uniformities between variables can be tentatively explained by establishing links between various inputs and outputs and thus generate important insights about a phenomenon. The researcher would argue that such an approach is lacking in autism intervention research, which may be a contributory factor towards a history of inconclusive results.

Creating congruence between one's belief systems and one's actions and method is also a critical foundation for ethical research. Realism resonates strongly with the researcher's professional approach, as a practitioner educational psychologist, who routinely uses critical realist ontological assumptions of underlying patterns and relationships to explore hypotheses in professional practice. The realists' epistemological cautiousness also resonates with the researcher's commitment to reflexivity both as a researcher and in professional practice. It is never possible to claim that proposed hypotheses, following the identification of possible causal mechanisms, fully explain any

outcomes observed. All explanations remain tentative and are subject to further refinement or even falsification in other contexts, and as such are considered merely starting points for further exploration (Williams & Karahanna, 2013). Reflexivity is discussed further in section 5.7.

3.1.2 Axiological considerations.

Axiology (from Greek axios, “worthy”; logos, “science”) refers to what the researcher values in his/her research. According to Hammersley (2018) the role of values has long been a contested issue in research, but the conception of science as ever being ‘value-free’ has generally been rejected in modern times.

Researcher values influence all aspects of the research from choice of topic to how the research is conducted and reported. As all research is value-laden and biases are present, it is important to be transparent and discuss values that shape the narrative (Cresswell, 2013).

Speedy (2008) pointed out relationships not only exist between researchers and the researched but also between researchers and text and between researchers and the ‘stuff’ of their research and vice-versa. As a result, everything we do and write is part of a reflexive cycle of meaning-making.

Mertens (2016) added that diverse values will be at play in evaluation research; not only the researcher’s own values but also those of the various stakeholder groups. All interventions are value laden (Mertens, 2015). The utilitarian theory of ethics, for example, holds that the inherent value of something is the extent to which the results work with respect to the problem that is being studied (Mertens & Wilson, 2012). A critical social theory, however, is also concerned with issues of power and justice and how social institutions and cultural dynamics interact to construct a social system (Kincheloe & Mc Laren, 2005). Such theoretical perspectives can contribute to a transformative paradigm to address issues of power inequities and the consequences of these for social justice. Iphofen & Tolich (2018) added that social responsibility may also require that those being ‘worked with’ are also being ‘worked for’ suggesting that the researcher may need to actively pursue social justice on behalf of those who agreed to participate in research.

Whilst a transformative paradigm does not dictate any particular approach, methodological decisions are aimed at determining the approaches that best facilitate the

enhancement of social justice via the use of the process and research findings. In addition to making visible their own values it is, therefore, also important to make visible the values of the various stakeholder groups (Mertens, 2015). Methodologically, this necessitates the need to establish a dialogic relationship and a deep contextual understanding using methods that reveal different aspects of the phenomenon under study and that engage the stakeholders throughout the process. A critical realist and transformative paradigm were chosen to reflect the researcher's values in this study.

3.2 Case Study Research Design

Whilst Bhasker (1998) did not recommend any specific research methodology, many critical realism researchers (for example Miles & Huberman, 1994; Mingers, 2004; and Wynn & Williams, 2012) have identified the case study as the best approach to explore the interaction of structures, events, actions and context to identify and explicate causal mechanisms.

The decision to choose a case study approach for this study was made on the grounds that:

1) It is a highly appropriate method to study real-life phenomenon in depth, where such understanding necessarily encompasses contextual conditions as integral aspects of the phenomenon in question (Yin, 2009).
2) In the attempt to bridge the theory-practice by conducting the research in a school environment, it is acknowledged that there would be limited control over behavioural events and that such events as part of complex social phenomena would, in fact, be a major focus of the research.
3) A transformational value system and a commitment to a collaborative approach involving all participants also suggested the benefit of a case-study approach.
4) It is in keeping with both ontological and epistemological principles underlying a critical realist position (Wynn & Williams, 2012).

Wynn & Williams (2012) suggest five methodological principles, which have been incorporated in the design of this study. These are summarised in Table 17.

Table 17.

Five Methodological Principles, for Case Studies, underlying a Critical Realist Position.

Methodological principles taken from Wynn & Williams (2012):

- **Explication of events.** This is the necessity to identify the detailed aspects of the events being studied to aid identification of what constitutes the outcomes. The sequence of these events provides evidence of the effects of the causal chain that constitutes a change or non-change in the research setting. The events are not part of the theory but tools to aid the development of theories.

- **Explication of structure and context.** This involves teasing out the components of the structure that are causally relevant and pertinent to the focus of the research, as describing causal tendencies that generate events is central to critical realism. (Structural entities and contextual factors in complex, open-system organisational settings, such as schools, include social, physical, artefactual and symbolic entities).

- **Retroduction.** Philosophically, Wynn & Williams (2012) indicated that retroduction is a form of inference that seeks to explain by identifying and verifying the causal mechanisms. Sayer, (1992) added that events are then explained by postulating mechanisms which are identified in the study, as being capable of producing them. Wynn & Williams suggested that retroduction is likely to benefit from an iterative approach to data collection and analysis 'involving corroborating interviews, high-order coding, within and cross-case analysis, process tracing and processing modelling' (p 800).

- **Empirical corroboration.** Following the identification of potential causal mechanisms, attempts are then made to corroborate them with empirical evidence (such as data from interviews and observation). Validation of any knowledge claims requires the empirical search for the mechanism and its effects. Evaluating the extent to which the proposed causal explanation holds across multiple perspectives, multiple cases and events is important.

- **Triangulation/multi-methods.** This leads on to the importance of including multiple approaches and perspectives to support causal analysis. The purposes of triangulation/multi-methods are to control for the influences of various biases and to acknowledge that reality is composed of many types of structure (including physical, social, conceptual and motivational).

Whilst existing case studies vary widely in the degree to which the fifth principle is applied (Wynn & Williams, 2012), the current study aimed to utilize data from interviewing key stakeholders (the pupils, parents and school staff), observation, informal conversation, formative process data from informants (recorded in field notes), standardized and non-standardized sensory profiles and trend data provided from student progress records. The trend data, agreed with school staff prior to the commencement of the study, consisted of pupil behaviour logs and Autism Education Trust progression checklists comparing trends in the Autumn term with the subsequent term during which the intervention took place (Spring term). Due to a change in the ARB record-keeping policy midway through the study, trend data was not subsequently available, however.

Yin (2009) advised that theory development was a critical precursor to the choice of case study design. He suggested that both single-case and multiple-case designs could be either 'holistic', incorporating a single unit of analysis or 'embedded', having multiple units of analysis. A single case design (the ARB) was chosen as the appropriate option between single versus multiple case studies, with the objective to capture the circumstances and conditions in depth related to a specific ARB attached to a mainstream secondary school.

The question of whether the single-case study should be 'holistic' or 'embedded' in design was informed by the research questions. A holistic design is only advantageous when the relevant theory underlying the case study is itself of a holistic nature and when no logical subunits are identified. An important aspect of this research involved looking at individual differences in response to the intervention based on sensory profiles. The over-arching realist perspective is also focussing on specifics ('What works for whom in what in what circumstances and how?). It became apparent, therefore, that the children attending the ARB should be considered 'embedded units'. The study is, therefore, presented as a single case study (the ARB) with five embedded units (the children). All information collated on specific children was collated from 'noticings' (Braun & Clarke, 2013) into case study 'pen pictures' of each child. These are included in Appendix 18.

3.2.1 The CIPP framework.

Whilst the EMMIE approach provides an important framework for evaluating and planning intervention studies, practical advice on how to collect process-orientated data in order to consider context-mechanisms-outcomes in detail, remain lacking.

The importance of monitoring the process (mechanisms) as well as the product (outcomes) via formative as well as summative assessment for the successful implementation of programmes, has led to important, trans-disciplinary developments in the intervention field (Kelly & Perkins, 2012). The researcher wanted to explore whether these have the potential to be relevant and helpful to both this study and to EP professional practice when involved in the implementation and/or evaluation of interventions, in general. They include Evaluation Theory models, such as Context, Input, Process and Product (CIPP) Evaluation (Stufflebeam & Coryn, 2014).

The CIPP Evaluation is one of a group of models designed to systematically evaluate the progress of an intervention study, with sensitivity to the context to arrive, with

the stakeholders, at a suitably accurate, clear and useful case conceptualization (Stufflebeam & Coryn, 2014).

The CIPP acronym of Context, Input, Process and Product represent the model's four types of evaluation. It is an improvement and accountability orientated evaluation model. This study uses Process and Product evaluation frameworks. The Process aspect is designed to facilitate the further development of the programme. It enables consideration of whether any possibly deficient programme outcomes are due to a weak intervention strategy, an inadequate implementation of the strategy or a combination of both via the use of a checklist (included in appendix 16) and a collaborative approach with all parties involved. The Product evaluation is used to ascertain the extent to which the programme meets the needs of the beneficiaries, helping to identify the full range of accomplishments including unintended outcomes. This necessitates feedback from all participants.

The CIPP framework incorporates formative as well as summative evaluation during the implementation of an intervention. Although not yet an established part of an EP's 'toolkit', the product element of the CIPP Evaluation approach was successfully used by Lodal & Bond (2017) to evaluate the use of the Manchester Motor Skills Programme in a school environment.

Formative (process) evaluation opportunities were planned as follow:

Children	**Parents**	**Teachers and TAs**
Feedback at the end of each lesson		Feedback at the end of each lesson (as co-presenter)
A four-week review – explaining the programme so far to a teacher/TA.	A four-week review – meeting with the researcher, teachers and TAs	A four-week review – meeting with the researcher and parents.

The purpose of these opportunities was to enable all participants to be involved in identifying issues and participating in the process of shared reflection and dialogue to collaboratively develop and evaluate the intervention package. Co-presentation of the lessons was deemed important by the researcher, to benefit from the 'local knowledge' staff had of the children in question. The researcher also kept daily field notes throughout the intervention phase to be continually alert to power differentials as well as to include observation data for analysis.

Summative (product) evaluation opportunities were planned as follows:

Children	Parents	Teachers and TAs
Provision of a review in Lesson 8 (choice of media).	Semi-structured interview (home visit or via telephone)	Focus group
1:1 semi-structured interview		
Trend data: behaviour logs and Autism Education Progression frameworks.		

Data was collected via semi-structured interviews with pupils and their parents and a focus group with ARB staff for triangulation purposes. The interviews and the Focus group questions followed the CIPP Process and Product Evaluation frameworks to reduce power differentials (Kvale & Brinkman,2009) and experimenter bias (Morgan, 1997). Discussions were designed to elicit views on the benefits, short-comings and effects of the Sensory Intelligence programme and constructive suggestions for the further development of the programme when working with CYP with autism. (The interview and focus group schedules are included in Appendices 12– 14).

The pupils' review of the programme (choice of media) produced during session eight was used to provide a concrete and contextual aid to facilitate discussion during the interviews with individual CYP with autism (Ashburner et al., 2013).

An opportunity for the children to present key findings and recommendations to the mainstream school via a video presentation was also suggested by the researcher to staff, as an important opportunity to raise awareness and affect change across the wider school.

3.2.2 The case.

The secondary school was commissioned by the Local Authority to provide Honeymede (pseudonym) Autism Resource Base (ARB) on their behalf. This is one of several ARBs in the county, which provides places for up to eight students with autism, with broadly average to above average cognitive ability, who are considered unable to cope with mainstream secondary education without support. The resource base staff are also commissioned to do out-reach work with families and local schools.

The ARB building is separate from the main school and is secluded by some bushes. There is limited space around the building other than walkways, a small patio area to the rear and a vegetable patch at the front, which faces the main road. Year 7 pupils from the mainstream school were using the vegetable patch to grow produce. Access is via a back door which necessitates walking through one of the classrooms.

There are three small classrooms, a larger room used as the office for staff which faces the patio area, a bathroom, a small kitchen (without space for seating) and a garage used for storage, which has problems with damp. Staff moved their office from one of the smaller classrooms to the largest room during the first week of the intervention. The office telephone remained in the original room throughout the term, however, resulting in it ringing at various times during the school day, and staff needing to enter to answer calls.

Two of the classrooms had bright, eye-level displays, whilst the third (smallest) room was designated the 'sensory' area, which housed a large bean bag, some Lego, a pyro light and less display work. It included a desk and computer, however, to enable one of the pupils to use it as a study room. The other classrooms also provided desks and computers for the pupils. Concern had been expressed by both parents and staff that the facilities were 'cramped' and 'difficult' for the pupils.

3.2.3 Participant recruitment.

Participant recruitment was achieved via convenience sampling. The researcher was approached by a member of staff of the ARB, who was aware of the proposed research study and that the researcher was looking for a school to participate. The researcher was not involved professionally with the ARB, at that time, and subsequently made a formal request to the Head Teacher to gain permission to approach the Head of Unit to discuss the possibility of participating in the study.

The original plan was to trial the programme content in the ARB, and then conduct a non-experimental pretest-postest study in a mainstream school. Difficulty promoting interest from mainstream establishments in conjunction with an increasing appreciation of the complexity of conducting such research in a 'real-life' setting, led to an agreement between the researcher and her supervisor to focus on the ARB as the main study, using a Case Study approach.

Initial contact was made with the ARB Head of Unit in February 2017. The study did not commence until January 2018, however, as a staffing change resulted in a new Head of Unit being appointed in May 2017. An invitation had also been made for main school involvement but this was declined. Following ethical approval participant recruitment consisted of the steps summarised in Table 18.

Table 18

Participant Recruitment Procedure.

Step	*Action*
1	Permission was granted by the head teacher to approach the Head of Unit. (Gatekeeper letter included in appendix 1).
2	The Head of Unit was approached to invite the ARB to participate in the study (appendix 2).
2	Parents and staff were provided with a written outline of the programme and consent forms (appendices 3,4 and 6).
3	A Power-point presentation was provided for parents and staff, outlining the programme and study requirements (appendix 7).
4	Parents and staff were each given a copy of the Lombard (2007) book. Sample pages are provided in appendix 9.
5	The parents and staff were invited to give informed consent (appendix 4). All 6 families and 4 members of staff agreed to participate.
6	The pupils were provided with an adapted Power-point presentation (appendix 8); invited to ask questions and to consider providing informed consent (appendix 5).

At the time of the study, there were six members of staff, (three teachers and three teaching assistants) employed in the base, but not all full-time. One of the teaching assistants was on long-term sick leave and the previous Head of Unit did mainly outreach work and was rarely in the building. The remaining four agreed to participate in the study. These consisted of two teaching assistants and two qualified teachers, one of whom was the Head of Unit. They will be referred to as Staff 1 – 4 to protect anonymity.

Whilst the ARB was designed to accommodate 8 pupils, there were currently six pupils regularly using the resource base. An additional Year 10 pupil had been excluded and was in the process of a 'Fresh start' arrangement and a Year 11 girl was receiving support on an outreach basis and rarely attended. All the pupils were in receipt of a Statement of Special Educational Needs or its replacement, an Education, Health and Care Plan (EHCP).

Whilst the Researcher was keen to invite all 8 pupils to participate in the study, the Head of Unit advised that the excluded Year 10 pupil was not available to do so. The Year 11 girl, who had frequent seizures and was currently non-verbal, was included for half of the programme. A lack of engagement by the fourth session suggested that informed consent may no longer be given. It was agreed that sessions should cease, at least temporarily and that the teacher could reintroduce them at a later point, if deemed appropriate.

One of the remaining six pupils was both under-aged for the programme (at 11 years) and presented significant speech and language difficulties. Staff expressed concern about his level of understanding, but his parents were keen to be involved. It was agreed that the pupil should participate in the first four introductory sessions, with adapted material, and then to review his understanding. This proved limited and the pupil did not continue with the remaining sessions. It was possible, nevertheless, to provide copies of his sensory profile and some guidance for staff and family to support his sensory needs.

To summarise, all 4 of the staff and all 7 of the children attending the ARB were invited to participate. At least one of each parent also agreed to participate. The under-aged child (aged 11), with additional speech and language difficulties, and the Year 11 pupil who were both introduced to the programme, but did not continue following week 4, were, however, provided with their own sensory profiles and all materials. This was to enable staff and/or parents to work with them on the programme, as and when deemed more appropriate to do so.

The participant details of the remaining five children who completed the programme are summarised in Table 19.

Table 19

Participant Information: Children's Age, Year Group and Special Educational Needs

Participant	Age	Year Group	Diagnosis	Specified needs (taken from EHCP/Statement)
Vince*	16.8	11**	Autism	Communication and social interaction Anxiety Self-esteem Coping with change
Simon*	15.6	11	Autism	Social interaction Processing information Managing academic demands Managing emotions and behaviour Anxiety Sensory processing Preparing for adulthood.
Peter *	13.11	9	Autism / Language	Expressive and Receptive Language Social interaction Accessing the curriculum Anxiety Self-esteem Sensory processing Gross motor skills
Tom*	13.1	8	Autism	Communication skills Understanding tasks Concentration and attention Emotional regulation and awareness Anxiety Handwriting Independence Sensory processing
Adi*	12.0	7	Autism/ADHD	Social interaction and communication Language impairment Concentration Independence Sensory processing Emotional regulation Anxiety Self-esteem Motor co-ordination

*Pseudonyms ** Vince was in a year below his chronological age group following extended school non-attendance.

Table 20 summarises parental participation. All the mothers of the remaining five children, and one father agreed to participate. In the case of Adi's mother, she was enthusiastic about involvement until an incident, following the conclusion of the intervention, when her son was excluded for physically assaulting another pupil in the ARB. Following this incident, she was unavailable for a pre-arranged telephone interview and did not to return calls to reschedule. Staff indicated similar difficulty engaging with this parent, at that time, and it was agreed that it would be unethical to pursue the matter further.

Table 20.

Participant Information: Parents

Family of	Participant(s)
Vince*	Mother
Simon*	Mother
Tom*	Mother and Father
Peter*	Mother
Adi*	Mother (did not provide interview)

* Pseudonyms

3.2.4 Planned involvement of participants.

Following gatekeeper permission, the respective involvement of the participants was designed to be as summarised in Table 21.

Table 21

Summary of Planned Involvement of Participants.

Parents/carers	Staff	Children
Provision of an information sheet outlining the study.	Provision of an information sheet outlining the study.	
A 30-minute presentation with staff.	A 30-minute presentation with parents.	A 20-minute presentation and information sheet.
Informed consent.	Informed consent.	Informed consent.
Assistance to staff completing the Sensory Profile Checklist Revised.	Completion of the Sensory Profile Checklist Revised.	Completion of Adolescent-Adult Sensory Profile and Sensory Matrix.
Supporting the child via a home-school file.	Involvement in lessons. Ongoing formative feedback after each lesson.	8 x 45-minute lessons and formative feedback after each lesson.
Interim meeting after lesson 4 to evaluate programme so far (staff and parents).	Interim meeting after lesson 4 to evaluate programme so far (staff and parents).	Review in Lesson 8 (choice of media).
Interview (up to 30 minutes) – telephone or home visit.	Focus group of staff (up to 30 minutes).	Interview of up to 20 minutes.
	Provision of behaviour logs and Autism Education Trust Progression data to ascertain trends.	Opportunity to present findings in a video presentation to the wider school.
Debrief.	Debrief.	Debrief.

Deviations from the intended design of the study occurred. These are summarised in Appendix 19 and discussed in Chapter 5.

3.2.5 Programme content.

Although Lombard (2007) had provided her book outlining her approach in layman terms for the general public, the programme had not been delivered to adolescents in a school environment.

The researcher developed a broad outline of the lessons ensuring that the key concepts, covering the programme theory, were incorporated. Programme fidelity was respected by making use of original material from Lombard (2007) and Lombard (2015) as much as possible. Given the ages of the children, however, physiological explanations were simplified by restricting this element to a specific focus on comparing and contrasting the respective roles of the Cortex and Amygdala. ‘Fun’ activities such as sensory explorations and blowing up balloons to aid deep breathing were also incorporated to help engage interest.

The programme theory of the 'Sensory Intelligence' approach, under the headings of Discover (providing knowledge), Acknowledge (providing insight) and Adapt (providing the power and strategies for change) is summarised in Table 22.

Table 22.

Sensory Intelligence Programme Theory

- Discover (Knowledge) – Acknowledge (Insight) – Adapt (Power)

Discover (Knowledge)	Acknowledge (Insight)	Adapt (Power for change)
• Your sensory profile • The constant, unconscious interaction between your brain and the environment • Individuals differ and are uniquely wired • Judging and labels are wrong	• Sensory processing has an unconscious yet fundamental impact on attention, emotion and behaviour. • These functions are fundamental to support relationships, teamwork, conflict, diversity, change management, leadership styles, performance and wellness. • How does it relate to you? • How does this relate to others?	• Getting back to basics and adapt our way of thinking, doing and leading • Re-engage with self and others • Self-regulation • Sensory diets • Sensory ergonomics

Note: Permission to reproduce the table from Lombard (2015) has been granted by the author.

It was agreed with staff, to trial this approach over eight 45-minute sessions in small groups, based on the ages of the children. This translated into Key Stage 3 (n= 4, initially) and Key Stage 4 (n = 2, initially) with Mondays considered the most appropriate day of the week as these pupils were all in attendance in the ARB on that day. The outline of the eight lessons is included in Appendix 15.

The core components, taken from the programme theory and incorporated in the 8 lessons, are summarised in Table 23.

Table 23

Core Components of the 'Sensory Intelligence' Programme.

The core components of the Sensory Intelligence programme are:

- Acknowledging that all individuals are different as part of 'neuro-diversity'.
- The identification of personal sensory profiles to understand the stressors and drivers that influence activities and relationships.
- To understand some of the more universal self-regulation strategies.
- To understand what sensory strategies are most effective for different sensory profiles.
- To identify 'how does your engine run' levels as brain alert concepts.
- To promote health and well-being through movement.
- To gain personal insight into the value of the senses to control emotion, attention and behaviours in order to use this awareness to implement strategies in the classroom; for private study/homework and in relationships.
- To recognise and understand 'sensory overload'.
- To understand the concepts of sensory 'snacks' and sensory 'diets'.
- To understand sensory ergonomics – the benefit of minor and practical adjustments to the environment.

3.2.6 Programme delivery.

The original intention was to deliver the programme with a member of the ARB staff as a co-presenter. Co-presentation with staff was considered important for the following reasons:

- to access 'insider knowledge' of the children;
- to help incorporate the child's own interests into activities;
- to collaborate to set realistic personal goals;
- to facilitate delivery of the programme in an engaging and interesting way;
- to encourage integration of the principles into regular classwork and routines within the ARB; and

- to increase the sustainability of the intervention after the researcher left, as suggested by Kasari & Smith (2013).

Co-presentation was not possible, however, due to staff sickness and competing demands on remaining staff time. The researcher took responsibility for the delivery of all the sessions with only infrequent presence of staff. Programme fidelity was monitored, by the researcher, by assessing the presence or absence of the core components on a session-by-session basis. Challenges encountered in the delivery of the programme are included in Appendix 19 and discussed in Chapter 5.

Due regard was, nevertheless, given to White et al. (2010) 'essential elements' relevant to working with CYP with autism, which include an individualised approach and parental involvement. Individual profiles were established to facilitate individualised lesson content (Lombard, 2007). Children with autism have been shown to have difficulties generalising behaviours taught in one setting or with one person (Lovannone et al., 2003). A collaborative partnership with the family was, therefore, considered an intrinsic aspect of the intervention to enable the strategies taught to be used at home and in the wider community as well as at school. The intention was, therefore, to share all materials with the family to enable them to discuss the programme with their child and to practice activities on a weekly basis. Materials were not forwarded to the parents on a weekly basis, however, due to competing demands on the Head of Unit's time. The implications of this are also discussed in Chapter 5.

3.3 Data Collection Methods

The study included quantitative and qualitative data in the case study data set. This incorporated standardized and non-standardized sensory profile assessment materials in addition to observation and interview data. The use of trend data based on behaviour logs and Autism Education Trust Progression Checklists was suggested by the Head of Unit, but such data was not subsequently provided due to a change in school policy. Autism Education Trust materials are now used for planning purposes only, as a result.

3.3.1 Sensory profiling.

Research question 2 considering the nature of the children's sensory profiles and research question 4, exploring whether children with certain sensory profiles may benefit

more or less from the programme, necessitated the use of a standardised sensory profile questionnaire to establish their profiles.

As levels of agreement between parent and self-report in autism research has been mixed (Jepsen, Gray, & Taffe, 2012; Bitsika, Sharpley, & Mills, (2016), researchers have suggested a multi-informant approach as a useful strategy and indicative of best practice (Silverman & Ollendick, 2005). Such an approach was followed in this study by using both caregiver and self-report measures.

3.3.1.1 The Adolescent-Adult Sensory Profile.

Widely used assessments for sensory processing research is now the suite based on Dunn's model, namely the Sensory Profile (Dunn, 1999), the Short Sensory Profile (Dunn, 1999) and the Adolescent, Adult Sensory Profile (Brown & Dunn, 2002), making comparisons of studies less difficult (Burns, Dixon, Novack, & Granpeesheh, 2017). The AASP is a self-report questionnaire, standardised for individuals between the ages of 11 – 65 but not on an autistic population. It has good internal consistency and convergent validity with an autistic population (Pfeiffer, Kinnealey, Reed, & Herzberg, 2005) and has been validated using measures of skin conductance and habituation (Brown et al., 2001).

The AASP is a 60-item self-report scale consisting of four 15-item subscales, containing statements about different responses to various sensory stimuli. The subscales cover four sensory quadrants; Sensory Sensitivity (passive) and Sensory Avoidance (active) targeting low thresholds and Sensation Seeking (active) and Low Registration (passive) targeting high thresholds. Participants are asked to rate each item on a 5-point Likert scale ranging from 1 ('almost never') to 5 (almost always). The AASP is a norm-referenced instrument and, based on scores provided for each quadrant, an individual's performance can be categorised via one of five categories. This scoring system is summarised in Table 24.

Table 24

Scoring Criteria for the AASP.

- '*Much Less Than Other People'* which is at least two standard deviations below the normative mean and signified by '- - '(double minus).
- '*Less Than Other People'* which is at least one standard deviation but less than two, below the normative mean, signified by '– '(single minus).
- *'Similar to Other People'* which is typical performance signified by 0.
- *'More than Other People'* which is at least one standard deviation but less than two, above the normative mean, signified by '+ '(single plus).
- *Much More Than Other People'* which is at least two standard deviations above the normative mean, signified by '++ '(double plus).

3.3.1.2 The Sensory Profile Checklist Revised.

As the presence of additional sensory perceptual difficulties, which are separate from sensory modulation and thus not identified in a standardised questionnaire such as the AASP, may have confounding influences on the programme, it was considered prudent to include an additional measure, which had the added benefit of incorporating parental and staff perspectives.

Bogdashina's (2003) seminal text on sensory-perceptual issues draws attention to an additional predominance of sensory discrimination and praxis difficulties in autism. Based on information provided from personal accounts of autistic individuals and close observations of autistic children, Bogdashina (2003) produced the Sensory Profile Checklist Revised (SPCR) as a screening for compiling a broader-based sensory profile. The SPCR is a 232-item parental/caregiver questionnaire, which includes 20 categories through all 7 sensory systems to cover possible patterns of autistic people's sensory experiences. Bogdashina emphasised that not all these sensory experiences are dysfunctional, as some of them could be classified as strengths rather than weaknesses, for which she termed as 'superabilities'.

The questionnaire focuses on the 7 sensory modalities in blocks, namely visual sensory and perceptual processing (Items 1 -50), auditory sensory and perceptual processing (items 51-92), tactile sensory and perceptual processing (items 93-125), olfactory sensory and perceptual processing (items 126-150), gustatory sensory and perceptual processing (items 151-175), proprioceptive sensory and perceptual processing (items 176-207) and vestibular sensory and perceptual processing (items 207-232).

The SPCR is not standardised but has good internal consistency with alphas ranging from .90-.95 (Robinson, 2010). High correlations between items of the SPCR; the Autism Quotient (AQ; Baron-Cohen et al, 2001) and the AASP (Pearson's correlation coefficient +.659) suggest that the SPCR is a more useful and in-depth tool than the AASP for evaluating the sensory and perceptual experiences of individuals with autism (Robinson, 2010).

3.3.1.3 The sensory matrix.

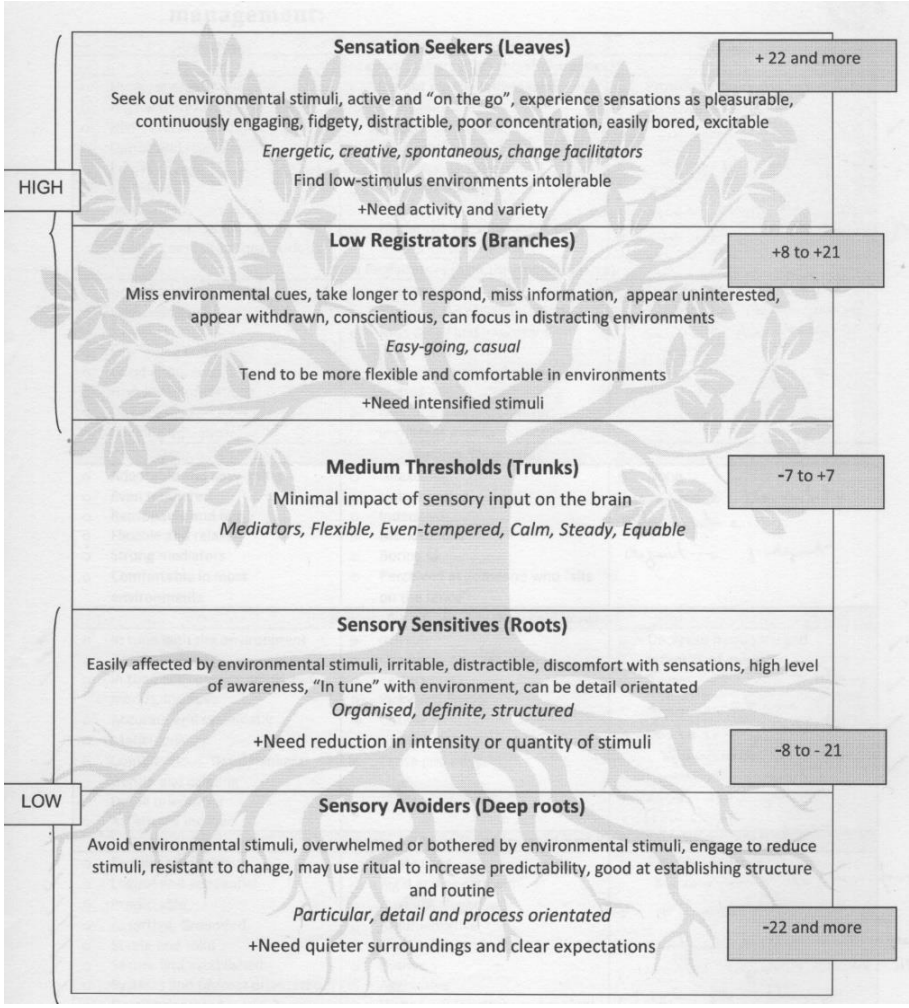
Lombard (2015) indicated that whilst the AASP provided a solid and standardised overview of one's sensory profile, more clarity was required with regards to each sensory system in order to provide enough information for intervention and strategy implementation. She therefore expanded the sensory sections to include five questions on each of the four sensory systems (20 questions in total) under the respective headings of Smell/Taste Processing, Visual Processing, Touch Processing, Auditory Processing, Movement Processing and Activity Level. This expansion had the added benefit of identifying fluctuating profiles more easily. Unlike the AASP required responses are binary yes/no rather than a frequency-based Likert scale.

High threshold (sensation seeking and low registration) responses are each allocated a +1 score whilst low threshold responses (sensation seeking and sensory avoidance) are allocated a – 1 score. Total scores (by deducting minus from plus scores) under each modality are transferred to a summary score sheet. The total accumulative score is then translated into a Sensory System using the analogy of a tree. An adapted copy of the Sensory System is provided in Appendix 17.

A Sensory Tree was designed as a user-friendly analogy to understand profiling and behaviours and was deemed to work particularly well with exploring relationship dynamics (Lombard, 2015). The classification is summarised in Table 25.

Table 25

Sensory Tree to Understand Behaviours (Lombard, 2015).



Note: Permission to reproduce the table has been granted by the author.

3.3.1.4 The Sensory Processing Sensitivity (SPS) Scale (Child).

Serious consideration was also given regarding the use of the SPS Scale (Child) (Pluess et al., 2018). On the grounds that the 'Sensory Intelligence' approach is inclusive and avoids diagnostic labels, it was considered unwise and also possibly unethical to introduce another 'label', however, with the added complication of insufficient time to do justice to what is known about Sensory Processing Sensitivity which remains an emerging construct.

3.3.1.5 Summary of sensory profiles used.

The sensory profiles of each child were, therefore, obtained by the completion of three questionnaires. Each child completed the Adolescent-Adult Sensory Profile (Brown

and Dunn, 2002), to acquire standardised information and the Sensory Matrix, as an expanded version of the AASP. The Sensory Profile Checklist Revised (Bogdashina, 2003) was also completed by the parents with help from school staff, for triangulation purposes and to establish the possibility of additional perceptual difficulties, which would not be addressed by the programme.

3.3.2 Field notes.

The researcher collected field notes daily during visits to the ARB over the eight week period of the programme. The advantages of recording observations over time were multi-faceted as it provided a more comprehensive understanding of the context. This included:

- The documentation of observed events which contribute towards a 'richer description' and a basis for further analysis and interpretation (Simons, 2009).
- An opportunity to observe the norms and values underlying the culture of the institution.
- Capturing data, which was not articulated in the interviews, which included giving 'voice' to some of the children who were more reticent when being audio recorded during the formal interviews.
- The provision of a cross-check on data obtained in the interviews (Simons, 2009).

At the same time, however, it was deemed important to make full use of other data available to avoid pre-formed judgements that were not supported by additional evidence. Ethical issues regarding the field-notes were also a key consideration, which has been highlighted in section 3.5. The field notes were subject to thematic analysis, which is discussed further in section 3.4.1.

3.3.3 Semi-structured interviews (children and parents).

The use of an in-depth interview schedule is designed to ensure that the themes are generated by the interviewee, and grounded in the data, to help reduce any interviewer bias. Previous research has indicated that CYP with autism are able to discuss their sensory experiences (Kirby, Dickie, & Baranek, 2014). As such experiences are intensely personal their first-hand accounts may also have far greater personal validity than observations or reports from third parties (Ashburner et al., 2013).

Whilst interviewing remains the predominant method of data collection for qualitative research studies, Kvale and Brinkman (2009) warn that the interviewer needs to be familiar with the nuances and problems of the material being worked with in order to gauge the value and strength of the product being delivered. Interviews are heavily context-dependent, with subject positions (such as role, age, gender etc.) of the interviewer and interviewee also influential factors in the interview context (King and Horrocks, 2010).

The researcher was keen to minimise power differentials during the interviewing process which meant taking much care over positioning. As the primary expert in their own experience of the programme, the interviewee was afforded enough time to enable them to reflect on their experiences, beliefs and opinions. Encouragement to consider both positive and negative aspects of the intervention to help further develop the programme was emphasised. Asking open-ended questions, listening with the minimum of interruptions and reflecting back own words as much as possible was also important to avoid assumptions that 'we know what they mean' (Speedy, 2008). The latter could cause alternative readings to be obscured or ignored because of methodological and theoretical assumptions underlying the approach. The researcher favoured a narrative approach, to enable the interviewee to 'tell their story' with minimum of interruptions to access rich data, whilst, at the same time being acutely aware of the need to gain sufficient data to answer the research questions. This necessitated the use of a semi-structured interviewing schedule (see Appendices 12-13).

Whilst the parents talked freely with interviews ranging from 13 – 49 minutes, it was noted that the shortest interview was the only one conducted over the telephone, as the other three involved home visits. This may have had implications for level of participant engagement. The children were quite reserved, and interviews were relatively short, ranging from 3 to 11 minutes with evidence of difficulties articulating thoughts despite the use of their reviews to help stimulate discussion. The researcher's lack of experience working with adolescents with autism resulted in an absence of additional supportive measures which may have helped facilitate discussion. The implications of both issues will be explored under limitations of the study in Chapter 5.

3.3.4 Focus group (staff).

Focus groups do not provide the detailed exploration of personal experience available in individual interviews and any intimacy could be undermined by group

dynamics, particularly in a work-base context. There is also the potential for group conformity leading to a reduction in diversity of ideas (Smith, 2004). Due regard was given to pressures on staff time and the need to facilitate the willingness of the school to participate in the research, however. The ARB was under-staffed and staff members had no non-contact time available to be interviewed individually. (It had been noted that the teaching assistants were not paid to attend staff meetings, and were, therefore absent).

The choice of a focus group for ARB staff was also aimed to facilitate both new thinking about the topic via group dynamics, and more in-depth discussion from different perspectives as the CYP has access to more than one member of staff (Cresswell, 2013). One of the strengths of a focus group approach is the facilitation of interactive discussion and the sharing of perspectives. A semi-structured schedule was followed to ensure that the data generated was able to answer the research questions.

Morgan (1997) advised that, practically, a range of 6 – 10 participants is advisable, as below six it can be difficult to sustain discussion. Whilst there were only four staff members participating in the research, all of whom agreeing to be in the Focus group, sustaining discussion was not a problem. It was noted that the Head of Unit and one of the teaching assistants were far more vocal than the other two members of staff, such that the quieter two needed some encouragement to contribute, however. This provided a useful insight into staff group dynamics. The researcher acted as moderator and the discussions were audio recorded.

3.4 Data Analysis Methods

The focus of data analysis was to identify and explicate 1) the significant outcomes associated with the sensory intelligence intervention and, 2) the elements of the physical and social structure and relevant contextual factors that interacted to generate the mechanisms to produce these outcomes. By focussing on the significant outcomes, it is possible to avoid getting overwhelmed by the data, whilst enabling the researcher to unearth evidence of the causal chain underlying the process, leading to the observed outcomes, as perceived by the participants. As Sayer (1992) indicated, the aim is to explain what it is about the structures operating in that particular setting, which produce the observed or perceived outcomes.

The data set for each child consisted of the following:

- Age of child and formal diagnosis.
- Adolescent-Adult Sensory Profile analysis.
- Sensory Profile Checklist Revised analysis.
- Sensory Matrix analysis.
- Parent interview.
- Child interview.
- Staff focus group interview.
- Child review product.
- Formative and summative evaluation comments noted from staff, child, and/or parent (s) relating to the individual child incorporated in 'pen pictures'.
- Field notes.

Analysis of interview data was initially conducted holistically, using Thematic Analysis, to identify main and sub-themes regarding the multiple perceptions of the Sensory Intelligence programme in the ARB. This incorporated analysis of themes relating to individual children to compare and contrast relative benefits and unintended consequences in the light of their individual profiles, and to aid the generation of working hypotheses regarding the underlying mechanisms involved. The formulation of case study 'pen pictures' for each child were used to assist in this process.

Table 26 provides an outline of the sources of data and the data analysis methods used to address each research question.

Table 26

Research Questions, Data Gathering and Analysis Methods.

Research Questions	**Data gathering**	**Data analysis methods**
PRIMARY: What C-M-O configurations are required for the successful implementation of the programme in this context.	Intervention content Field notes Child interviews Parental interviews Staff focus group.	Thematic analysis and interrogation of the literature.

CONTINUATION: Table 26

Research Questions, Data Gathering and Analysis Methods.

Research Questions	Data gathering	Data analysis methods
SECONDARY: What are the sensory-perceptual profiles of the children attending a secondary ARB?	AASP SPCR Sensory Matrix	Acquisition of: Standardised scores Non-standardised scores Non-standardised scores
What are the potential benefits and limitations of the 'Sensory Intelligence' approach for this population?	Field notes Child interviews Parental interviews Staff focus group Case Study 'pen pictures'.	Thematic analysis
Which sensory-perceptual profiles, if any, might benefit most from the 'Sensory Intelligence' approach?	AASP SPCR Sensory Matrix Field notes Child interviews Parental interviews Staff focus group Case Study 'pen pictures'.	Acquisition of: Standardised scores Non-standardised scores Non-standardised scores Thematic Analysis
What is the impact on the students of the 'Sensory Intelligence' approach?	Field notes Child interviews Parental interviews Staff focus group Case Study 'pen pictures'	Thematic Analysis
What is the impact of parental involvement?	Field notes Child interviews Parental interviews Staff focus group Case Study 'pen pictures'	Thematic Analysis

CONTINUATION: Table 26

Research Questions, Data Gathering and Analysis Methods.

Research Questions	Data gathering	Data analysis methods
Can this intervention be delivered effectively to children in Years 7 – 11 attending an ARB?	Field notes Child interviews Parental interviews Staff focus group Case Study 'pen pictures'	Thematic Analysis
What do the participants suggest could be improvements to the 'Sensory intelligence' intervention programme?	Field notes Child interviews Parental interviews Staff focus group Case Study 'pen pictures'	Thematic Analysis

3.4.1 Thematic analysis.

Attride-Stirling (2001) indicated that as qualitative research becomes increasingly recognised and valued, it is imperative that it be conducted in a rigorous and methodical manner to yield meaningful results. Nowell et al. (2017) further indicate that this is vital to facilitate trustworthy qualitative research which can be transparently communicated to others.

Thematic analysis is one of several methods for identifying, analysing, organizing, describing, and reporting themes found within a data set (Braun & Clarke, 2013). It was chosen in preference to other approaches, such as Interpretative Phenomenological Analysis (IPA) (Smith, Flowers, & Larkin, 2009) because the study required a range of data sources which went beyond providing insights into how the participants made sense of the programme. Thematic Analysis also offers a theoretically flexible approach compatible with both essentialist and constructionist paradigms within psychology, and is therefore, appropriate for the critical realist position taken in this study. It also provides clear guidelines to conduct analysis in a systematic and rigorous manner, providing core skills that are useful for conducting many other forms of qualitative analysis in the future (Braun

& Clarke, 2006; 2013). Joffe (2012) further indicated that Thematic Analysis is best suited to elucidating the specific nature of a given group's conceptualization of the phenomenon under study, which, in this case is the Sensory Intelligence programme. Braun & Clarke (2006) also commented specifically on the advantages of using Thematic Analysis for working within collaborative research paradigms with participants as collaborators and for producing qualitative analyses suited to informing policy development, both of which are pertinent in this case.

Thematic analysis can be inductive or deductive. An inductive approach is data-driven and can provide a 'rich description' of the data set, whilst a deductive approach is much narrower and is guided by the researcher's theoretical interests (Joffe, 2012). The use of a mainly deductive thematic analysis was considered appropriate in this study to answer the very specific research questions. A deductive approach was also deemed appropriate to provide more detailed accounts of causal mechanisms with relation to individual profiles.

A semantic approach was selected to identify patterns in semantic content, which are then interpreted to theorise the significance of these patterns and their broader implications in relation to previous literature. Given the sociocultural context of the research, some latent themes were also generated.

Braun & Clarke (2013) suggest six key stages which were adhered to in this study:

1. Reading and familiarisation with the data.
2. Generating Codes.
3. Identifying patterns across data (from Codes to Candidate Themes).
4. Reviewing and revising Candidate Themes.
5. Defining themes-theme definitions.
6. Producing the report.

These stages are summarised in Table 27.

Table 27

Braun & Clarke's (2013) Key Stages Adhered to in the Study.

Stage	Action
1. Reading and familiarisation with the data.	All of the interviews were conducted by the researcher facilitating familiarity with the data throughout collection. The writing of field-notes on the day of school visits and the personal transcription of interview data was also conducted by the researcher. Transcription was orthographic ('verbatim') using the transcription notation suggested by Braun & Clarke (2013) to produce a through record of the words spoken to 'give voice' to the group of people involved. Sections of text were preserved in their entirety in the transcriptions as removing codes from their contexts can strip data of its meaning (Joffe, 2012). Braun and Clarke (2013) suggested repeated listening and reading of the data, making note of anything of interest, which should be recorded as 'noticings'. 'Noticings' with respect to individual children were collated in their case study 'pen pictures' (see Appendix 18) as well as highlighted on the transcripts (see Appendix 20) prior to coding and development of themes.
2. Generating Codes.	Braun & Clarke (2013) indicate that a code is a word or brief phrase that captures the essence of its relevance to answering the research questions and they recommend coding as much data as possible as this may prove useful later. All data relevant to the research study, other than that excluded on the ethical grounds of 'nonmaleficence' was coded. Boyatzis (1998) suggested that a good code is one that captures the qualitative richness of the phenomenon. Attride-Stirling (2001) added that codes should have quite explicit boundaries, ensuring that they do not overlap with others. Closer reading of individual utterances led to the production of initial codes, produced manually, which were written into the margins of the transcribed material. This involved working systematically through the entire data set, giving due regard to each data item without bias, and identifying interesting aspects that appeared to be repeated across individuals. Different coloured highlighters were used, noting codes within the margins of the transcripts. Initial codes were checked with an EP colleague, not involved in the research, who independently generated her own codes for randomly selected samples of interview transcripts, and discussion contributed to general areas of agreement. A working

CONTINUATION: Table 27

Braun & Clarke's (2013) Key Stages Adhered to in the Study.

Stage	Action
3. Identifying patterns across data (from Codes to Candidate Themes).	example of initial coding is included in Appendix 21. This involved sorting and collating the different codes into potential 'Candidate' (provisional) themes by considering how different codes may combine to form sub-themes and main themes. All codes were categorised as a result of general similarities and differences between themes. Nothing was discarded during this phase as Braun & Clarke (2006; 2013) stated that following refinement certain themes may need amalgamation, re-categorisation or deletion. Subthemes were also identified as important aspects of main themes in different ways.
4. Reviewing and revising Candidate Themes.	This involves allocating each extract to the Candidate theme selected to consider whether the collated extracts form a coherent pattern. It is a process of double-checking the entire dataset as an important form of quality checking. This exercise, in conjunction with discussion with the research supervisor, led to slight revision of one central organising theme and some shifting of coded data in or out of different themes. A more coherent set of main themes and subthemes, distinctive from one another, but working together and relating to the research questions in different ways, was achieved as a result. This is provided in Appendix 22.
5. Defining themes-theme definitions.	This involves clearly defining themes to state what is unique and specific about each, by distilling to an essence what each theme represents. (Braun & Clarke, 2013). By the end of this phase, researchers should be able to clearly define what the themes are and what they are not, otherwise further refinement may be required. This phase therefore requires the investment of considerable time to develop the themes, which will increase the probability of developing credible findings (Lincoln & Guba, 1985). Together, the themes are designed to provide a rich, coherent and meaningful representation of dominant patterns in the data which address the research questions. This can be represented visually in a Thematic Map (provided in Table 31).

CONTINUATION: Table 27

Braun & Clarke's (2013) Key Stages Adhered to in the Study.

Stage	Action
6. Producing the report.	A narrative is written which tells the reader the 'story' of the results via a rich, interconnected, logical analysis, starting with a key theme, if apparent, then building on the previously discussed theme (s) to provide a rich and detailed narrative. Each theme is supported by extracts from the data. Braun & Clarke (2013) suggested that 'vivid and compelling' extracts should be used to illustrate analytic points being made about the data, with use of extracts across the data showing the breath as well as depth of a theme. Analysis involves telling the reader what is interesting and why, with extracts provided to enable the reader to make their own sense of the data. At the end of the analyses, the conclusions reached are drawn from across all the themes.

3.4.2 Context-Mechanisms-Outcome configurations.

The Realist approach to implementation is theory-driven (Pawson et al., 2004). In contrast to a 'one-size-fits-all' pass/fail evaluation approach to programme effectiveness, that fails to take into consideration the uniqueness and unpredictability of 'real-life' settings, the aim is to discover nuances which facilitate or hamper an intervention in that particular setting. This is in line with the Implementation Science approach (Kelly and Perkins, 2012). Whilst the latter refer to learning from failure, however, realists talk about gaining insights by considering the data generated amid the empirical literature. In this way theories can be modified and retested to achieve closer and closer approximations to what is required. There is no 'quick fix'. It is a time-consuming activity 'separating the wheat from the chaff' by focussing on detail. Realists provide a practical framework in which to achieve this aim, in the form of Context-Mechanisms-Outcomes configurations.

The Realist CMO configuration is used as a heuristic device focusing on programme theories that underlie social interventions within the contexts within which they are implemented. C (Context), M (Mechanisms) and O (Outcomes) are contingent upon each other and work in relationship to each other, thus epitomising the complexity of the processes under investigation (Emmel et al., 2018). According to Pawson, (2006)

mechanisms are the ‘engines of explanation’ indicating how the programme changes behaviour, i.e. what is it about a programme that makes it work.

The starting point is to establish the programme theory of the intervention, in question, to formulate a conjectured C-M-O, which states what the programme developers expect to happen and why. The study is then conducted and the programme theory is compared with the actual data generated. This data, in conjunction with what has also been established in the literature, provides insights to contribute to the formulation of a ‘re-conjectured C-M-O’ which can itself be tested and further reconfigured in future research.

The sensory intelligence programme theory outlined in Table 22 summarised as ‘Discover (Knowledge)- Acknowledge (Insight) -Adapt (Power for Change) in conjunction with the 10 ‘core components’ listed in Table 23 represent the theory underlining the way in which the approach is purported to work. This programme theory is converted into a C-M-O in section 5.2, which is then reviewed in the light of the data generated and consideration of existing literature, to suggest re-conjectured C-M-Os for further testing in future research.

3.5 Ethical Considerations

The Association of Educational Psychologist Code of Professional Conduct (AEP, 2012), the British Psychological Society Code of Ethics and Conduct (BPS, 2018), the relevant Health Care Professionals Council standards (HCPC, 2016) and university guidelines were all consulted to inform the decision-making process.

The researcher does not consider that there is any deception involved in this research. The CYP were also recruited from a population who are already aware of their sensory sensitivities.

Actions taken to adhere to the ethical considerations of informed consent, confidentiality and anonymity, safe and appropriate handling of data, debriefing and ‘Do no harm’ (nonmaleficence) are summarised in Table 28.

Table 28

Ethical Considerations Included in this Study.

Ethical consideration	Action
Informed consent	• Full information provided regarding the nature of the study and each component within it. This included the provision of the outline of the lesson before commencement of the lesson and of the content of the interview/questionnaire. • Informed consent checked regularly (before each lesson/interview/questionnaire completion). • Encouragement to ask questions, at any time. • Reminders that they could deny consent for any of the data collection sources and omit questions in the questionnaires. • Awareness that any information participants wished to be excluded from the analysis would be withdrawn up to the point of anonymization of the data.
Confidentiality and anonymity.	• Separation of consent forms from other data, before it was anonymised. • A confidentiality agreement agreed with all members of the focus group, but with emphasis on not say anything that they would not want broadcast beyond the group. • CYPs informed that confidentiality would only be breached, where there was concern regarding the safety of the participant or others relating to child protection issues. • Personal information and data stored anonymously, using pseudonyms following transcription. • Anonymised data to be held indefinitely by the university. • Participants informed that, in addition to the writing of a thesis, the research may be used to inform academic publications and training courses, where anonymised quotes would be used to support the findings. • Care taken to ensure that identifying information was removed from all quotes and documents used within the research paper.
Safe and appropriate handling of data.	• Consent forms, interview recordings and completed questionnaires remained in the possession of the researcher, prior to being held securely in locked cabinets. • Consent forms separated from other data in the locked cabinets. No-one else had access to the data. • Following transcription, all data anonymised, and the audio recordings destroyed.
Debriefing.	• All participants provided with a summary of the research aims; the opportunity to withdraw consent; the opportunity to answer any questions they may have and the opportunity to talk to The National Autistic Society Helpline or a key adult if upset by anything that has arisen during the research procedures (included in Appendices7-8). • Participants also advised that they could request a copy of the summary of the findings from the researcher.
'Do no harm' (Nonmaleficence).	• Reflexive questioning, taken from Simons (2009), (see below) regarding the nature of observations and the recording of field-notes. • No data published which would have undermined the trust of the participant. • Respect for participants privacy during non-contact time.

The participants were generally very interested in the study and the researcher was thanked by most of the parents and children for conducting the research. The only suggestions of withdrawal of informed consent related to the non-verbal behaviour of the non-speaking Year 11 girl after session 4 and the difficulty re-arranging a telephone interview with Adi's mother after her son was given a fixed-term exclusion. In both instances it was deemed unethical to pursue the matters further and the researcher withdrew involvement.

Simons (2009) reminds us that the fundamental ethical principle is to do no harm, which the researcher considers to be particularly pertinent in participant action case study research. For a researcher invited into a school environment for extended periods of time, the collection of observational field notes is an important additional source of data. As ethics in the field are based on establishing and maintaining trust, the content and use of the field notes require much ethical consideration. Simons (2009) reflexive questioning, used by the researcher when reviewing field notes, included questions such as:

- Have I portrayed participants fairly in reporting?
- Have I recorded participants perspectives accurately?
- Have my biases led to unfair selection of data or interpretation?
- Would the publishing of any of the data reflect badly upon an individual?

It was thus considered unethical to publish field data which would undermine the trust of any of the participants.

Whilst observing, another issue was the possibility of invading participants' privacy particularly at break and lunchtimes. Whilst the Head of Unit was not present at lunchtime, the other three members of staff stayed in the office and the children all remained in the ARB classrooms under the supervision of those staff. Given the lack of unconditional non-contact time available to staff, and the right of the pupils to some privacy, it was considered prudent to withdraw from the building at lunch times, and the researcher chose to go for a walk or sit in her car.

3.6 Trustworthiness

The traditional quantitative assessment criteria of validity and reliability are inappropriate for qualitative research (Nowell et al., 2017). Trustworthiness, refined by Lincoln & Guba (1985), is considered a more widely accepted criteria. Lincoln & Guba

(1985) introduced the criteria of credibility, transferability, dependability and confirmability to demonstrate trustworthiness in research methodology. These are summarised in Table 29.

Table 29

Lincoln & Guba (1985) 4 Criteria for Trustworthiness in Qualitative Research.

Credibility	Credibility addresses the 'fit' between respondents' views and the researcher's representation of them. Lincoln & Guba (1985) suggested several techniques to address credibility. For the purposes of this study, these included prolonged engagement in the field, observations recorded in field-notes on the day of the school visits, data collection triangulation, rigorous and systematic data analysis and the use of a colleague to check initial coding.
Transferability	Transferability refers to the generalizability of inquiry. This is limited due to the unique context in which the study took place, but the provision of thick descriptions and organising themes enables those who seek to transfer the findings to their own site to judge potential transferability (Lincoln & Guba, 1985). From a realist perspective what is provided are tentative hypotheses, based on systematic and rigorous analysis, which can be subject to further investigation.
Dependability	Dependability requires a research process which is logical, traceable, and clearly documented (Nowell et al., 2017). It also calls for an overlap of methods so that weakness of one is compensated by the strength of the other. The researcher has provided sufficient data in the appendices to enable the reader to conduct an 'audit trail' of the development of initial codes, sub-themes, and main themes. The archiving of all raw data also provides a benchmark against which later data analysis and interpretation can be tested for adequacy (Lincoln & Guba, 1985). The researcher also used three different sensory profiling measures and triangulation of interview data from three sources (children, parents and staff) supplemented by field-notes.
Confirmability	Confirmability requires that the researcher's interpretations and findings are rooted in the data, and that the researcher demonstrates how conclusions and interpretations have been reached. Guba & Lincoln (1989) consider that confirmability is established when credibility, transferability, and dependability are all achieved. Reasons for theoretical, methodological and analytical choices have been addressed throughout the entire study to enable the reader to understand how and why decisions were made.

A 15-point checklist, provided by Braun & Clarke (2006) to facilitate the provision of the method in a systematic and rigorous manner, was also adhered to in this study. These are summarised in Table 30.

Table 30

A 15-point Checklist of Criteria for Good Thematic Analysis (Braun & Clarke, 2006).

Process	Criteria
Transcription	1. The data have been transcribed to an appropriate level of detail, and the transcripts have been checked against the tapes for accuracy.
Coding	2. Each data item has been given equal attention in the coding process. 3. Themes have not been generated from a few vivid examples (an anecdotal approach), but instead the coding process has been thorough, inclusive and comprehensive. 4. All relevant extracts for each theme have been collated. 5. Themes have been checked against each other and back to the original data set. 6. Themes are internally coherent, consistent, and distinctive.
Analysis	7. Data have been analysed-interpreted, made sense of-rather than just paraphrased or described. 8. Analysis and data match each other -the extracts illustrate the analytic claims. 9. Analysis tells a convincing and well-organised story about the data and topic. 10. A good balance between analytic narrative and illustrative extracts is provided.
Overall	11. Enough time has been allocated to complete all phases of the analysis without rushing a phase or giving it a once-over-lightly.
Written report	12. The assumptions about, and specific approach to, thematic analysis is clearly explicated. 13. There is a good fit between what you claim you do, and what you show you have done – i.e. described method and reported analysis are consistent. 14. The language and concepts used in the report are consistent with the epistemological position of the analysis. 15. The researcher is positioned as active in the research process; themes do not just 'emerge'.

3.7 Reporting of the Findings

The findings, with regards to Thematic Analysis, following the process of analysis will be presented in Chapter 4, with an overview of the main themes and sub-themes. Evidence for each theme is presented in the form of data extracts to strengthen the trustworthiness of the data. This will be followed by the reporting of the results of the sensory profiling of the children to answer the research question 'What are the sensory-perceptual profiles of children attending a secondary school ARB?'

3.8 Reflexivity as a Researcher

Drake and Heath, (2011) provide a useful analogy of education research being analogous to a photograph of the coastline and the tide. Whilst the components (physical environment and participants) are represented in the 'photograph', the researcher decides on the perspective taken with regards to timing, what is included/not included and the

extent of the detail provided. Braun and Clarke, (2013) also acknowledge that the theoretical and knowledge frameworks researchers bring to the study, will allow them to 'see' particular things in the data, and interpret and code them in certain ways, and as a result no two analysts will code in exactly the same way.

What is important is to ensure researcher vigilance regarding his or her practice by acknowledging and remaining alert to respective 'positioning' (Pillow, 2003; Speedy, 2008) regarding the research topic and process, particularly in interaction with others, via a consciously reflexive approach throughout. Pillow, (2003) emphasised Chiseri-Strater's (1996) distinction between reflexivity and reflection: "to be reflective does not demand an 'other', while to be reflexive demands both an other and some self-conscious awareness of the process of self-scrutiny' (p130).

One of the researcher's key values is a belief in the inherent worth and dignity of all people resulting in some discomfort with respect to socially constructed 'deficit' diagnostic labels. Concern and an intellectual interest in underlying contributory factors towards educational underachievement was also the main impetus for choosing educational psychology as a career.

The researcher's personal history is pertinent to an interest and engagement with this topic matter following life-long experience of sensory processing challenges in modern-day life, due to her own low threshold toward auditory and visual stimulation. This led to professional interest in the subject matter resulting in close liaison and some multi-professional work with an occupational therapist specialising in sensory processing issues for almost two decades prior to the commencement of this study.

Her subsequent identification with the personality trait of Sensory Processing Sensitivity (Aron & Aron, 1997) was much more recent, however, following a preliminary literature review. This led to an enhanced appreciation of the influence of dominant paradigms (Kuhn, 1970) as the significance of Sensory Processing Sensitivity has yet to make any impact on key Educational Psychology publications internationally.

One of the researcher's strategies to accommodate her own sensory processing challenges was to work in independent practice and thus have maximum control over her working conditions. As a result, a significant proportion of her work has been providing an EP service, in a quiet office environment, that is directly commissioned by parents.

Given the researcher's interest in sensory processing, pre-assessment background questionnaires used in daily practice, for both parent/child and school staff included a question about the presence or absence of sensory issues. When indicated, sensory issues are routinely discussed as part of a holistic assessment approach. This led to an appreciation that sensory processing challenges can contribute to child anxiety in school environments, and this could, in some cases be a major contributory factor underlying school refusal. Targeting sensory needs and negotiating 'sensory diet' strategies in conjunction with environmental adaptations with school staff have also led to some success in reducing anxiety, improving school attendance and enhancing educational achievement.

These understandings motivated the researcher to enhance her understanding and repertoire of suitable strategies via attendance on a three-day 'Sensory Intelligence' residential practitioners' course in South Africa in 2015. Whilst many of the strategies provided had already, intuitively, been incorporated into the researcher's work and living arrangements, the suggestion that the programme was suitable for adolescents aged from 12 years was of considerable interest given the paucity of interventions available for this age group. The avoidance of diagnostic labelling and suitability for anyone with sensory challenges in everyday life, including those with autism, were also considered potentially positive attributes of the programme, given the researcher's values, highlighted above.

The potential of the 'Sensory Intelligence' approach in a school environment was reinforced by the anecdotal feedback from the staff and children in a small school for children with Social, Emotional and Mental Health difficulties, using the main principles of the programme. As the researcher was considering a suitable topic for her doctorate, at that time, curiosity regarding this programme's full potential led to the decision to explore it empirically.

The collaborative nature of the CIPP approach was also considered to be a vital element of the research process, due to the researcher's transformative rather than utilitarian perspective being a driving force underlying this research. According to Benjamin-Thomas et al. (2018) a social co-learning process embodying cycles of planning, acting, observing, and reflecting is required. CIPP provides a very useful framework facilitating equitable participation between the researcher and participants, acknowledging that they are all experts in their own worlds with important perspectives to share for realist theory-testing and refinement purposes. In this way the CIPP approach was deemed to help

dismantle unequal power relations within the research process as much as possible. In order to facilitate the social co-learning process, the researcher invited each of the participants to help evaluate and provide their perceptions of both facilitators and barriers to the programme.

The CIPP approach is also in keeping with the researcher's values regarding social justice, as it provides a framework which empowers the research participants by giving them the space to be part of the research and to be heard. This was deemed particularly important when working with adolescents with autism who may consider themselves misunderstood. This study also offered the possibility of improvement in the lives of all the participants involved, by creating a greater awareness of their own resources that could enhance self-reliance.

Chapter 4: Results

4.1 Introduction

The themes identified through the process of Thematic Analysis (Braun & Clarke, 2013), as outlined in Chapter 3, will be discussed in this chapter. The intention is to provide a holistic overview of the perceptions of the participants with respect to the 'Sensory Intelligence' programme in the specific Autism Resource Base targeted in this case study. The sensory profiles of the children will also be presented and discussed in addressing research question 2. The remaining research questions will be addressed in Chapter 5.

The data corpus consisted of the child and parental interviews, a staff focus group and the researcher's field-notes. The children's interviews were relatively brief, despite the use of their programme reviews as prompts, suggesting scope for the use of more concrete aids such as photographs, rating scales or more specific questioning to facilitate conversation. The focus group was limited by the lack of staff involvement in the programme. It was also subject to some interruptions and the possibility of power differentials, which will be discussed further in Chapter 5. The parents were the most forthcoming subgroup who presented as overwhelmingly pleased about a study focussing on sensory issues, which they considered very important as it 'filled a gap'. They are also generally very positive about the Sensory Intelligence programme itself. The researcher kept field-notes to provide contextual information to inform process considerations. Efforts to ensure impartiality in the writing of the field-notes were discussed in section 3.6.

4.1.1 Overview of main themes.

The study identified three main themes from the whole data set. These were:

- Theme A. Does it do exactly what it says on the tin?
- Theme B. 'Opening up that conversation'.
- Theme C. It would be better if….

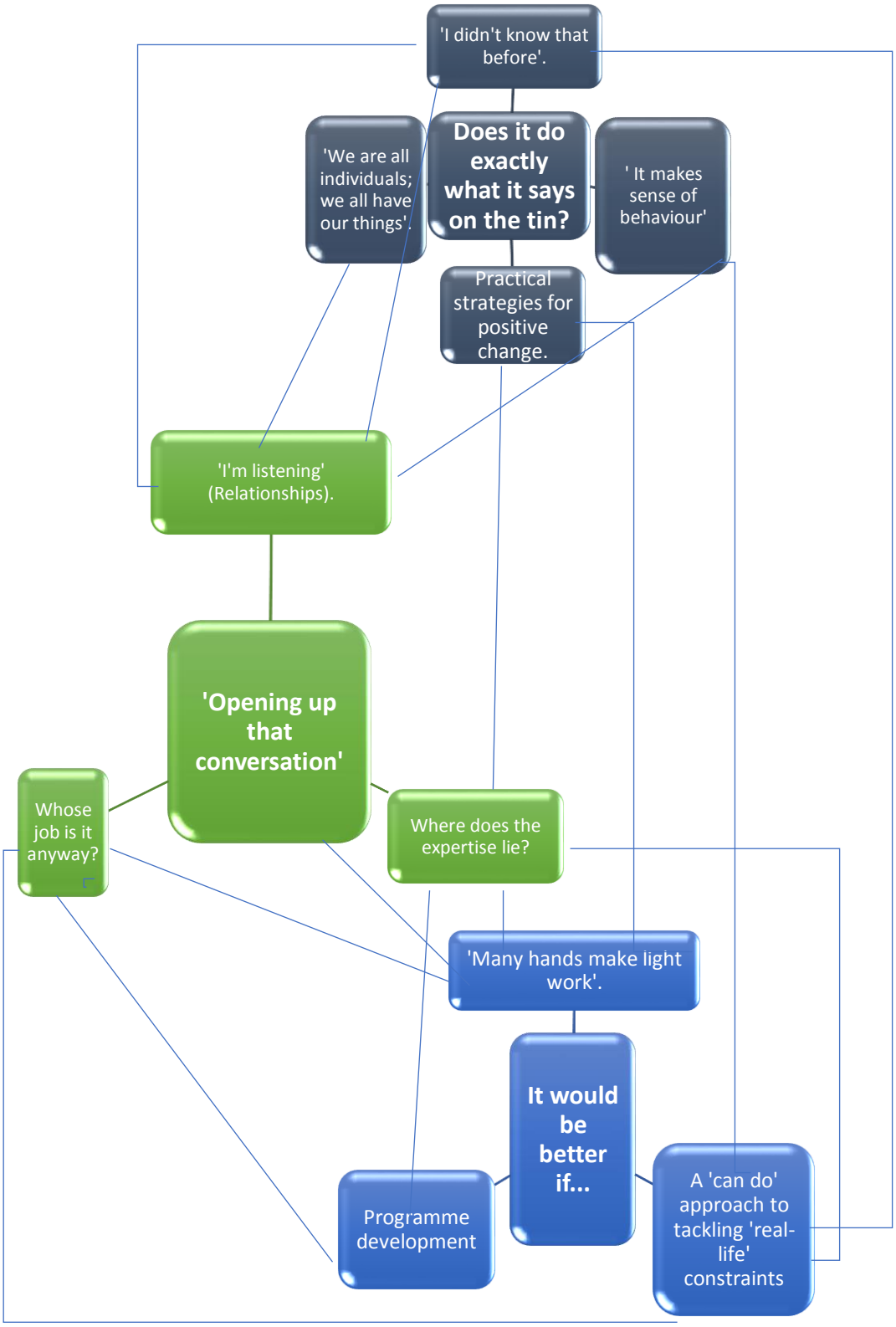
Theme A has four sub-themes which relate to the Sensory Intelligence programme theory. Theme B has three sub-themes, one of which explores the importance of relationships to 'open up conversations' about the subject matter, whilst the others consider respective responsibility and expertise. The third theme is process-orientated as its three

subthemes consider ways forward to enhance the effective development of the programme in its current setting.

Although each main theme is distinct, they are not wholly independent and relationships between subthemes exist. The relationships are presented by thin blue lines which maps out all the main themes and subthemes visually. This provides an overview of the findings for reference throughout this chapter. Each main theme and its sub-themes will be separately evidenced with illustrative quotes prior to a consideration of interaction between themes. A thematic map is provided in Table 31.

Table 31

Thematic Map.



4.1.2 Main theme A: Does it do exactly what it says on the tin?

The phrase 'It does exactly what it says on the tin' is a common idiomatic phrase originating from a 1994 advertising campaign in the UK. It means that something lives up to expectations and does precisely what it claims or is supposed to do. In the case of the 'Sensory Intelligence' programme theory, the key tenets are that awareness within an inclusive context, leads to understanding, and that understanding provides opportunities to implement positive change.

The theme title 'Does it do exactly what it says on the tin?' questions the extent to which there is evidence to support the programme theory. With the use of predominantly opened ended questions such as 'Did the programme help?' and 'What did you like/dislike about the programme?' the perceptions of the participants clustered around the key tenets of the programme theory which is promising.

4.1.2.1 Sub-theme: 'I didn't know that before'.

This sub-theme relates to the programme theory tenet of increased awareness, of which opportunities were provided via the provision of the copy of the book (Lombard, 2007) to all participating parents and staff; the eight lessons delivered by the researcher to the pupils, the content of which was also emailed to the parents, and the reference file given to each child which contained their individual sensory profiles, lesson summaries/exercises and strategies for future reference.

Four of the five children (Vince, Simon, Tom and Adi) acknowledged that they had learned something new, with the sensory profiling, analogy of a tree, information about underlying biology and individual differences highlighted. Tom felt that he knew most of it, however, as he already had the involvement of the occupational therapy service. Peter,

the fifth child, who was reported by staff to have speech and language difficulties and did not appear to understand all the lessons, felt that he learned more from a song on 'You tube'. He was interested in raising his parents' awareness of his sensory needs, however, and considered the provision of his sensory profile an important way of achieving this.

The fact that the children persevered with all eight sessions on a voluntary basis, would all recommend, to a certain extent, the programme to children in other ARBs and Simon commenting that it was more interesting than lessons, was also encouraging.

The parents were very positive about the programme even though three of the four families interviewed had considerable prior knowledge of sensory issues. They reported an increased awareness of sensory issues in all their children, particularly appreciating that the programme was 'geared at' the child himself. One commented that 'this felt different' from sensory profiling in the past, because her son was directly involved, which she considered 'invaluable'. Several parents reported that their children were now more vocal about their sensory needs. Several also commented on increased insight for themselves, as well as their children. When asked if there was anything they disliked about the programme, the predominant response was that there was nothing to dislike as it was a very interesting, useful and positive approach. Vince's mother questioned whether it might be 'too much' for some people, however.

The ARB staff were more cautious in their response than the parents. One commented that whilst 'it has probably gone over Mark's head', (the 6th child aged 11, who was withdrawn) both the staff and his parents had 'probably' become more aware. With respect to the five children who completed the programme, all were perceived to be more aware, other than Simon, who was considered the exception.

Table 32

Illustrative Quotes for Sub-theme 'I didn't know that before'

Children	Parents	Staff
Simon: Yea, the amygdala, was quite interesting, as I didn't know about that before, and the whole leaves and the roots system was actually quite well produced and well thought out. It was consistent pretty much. (Lines 12-15). *Vince: Um (..) it was interesting getting to know how different people think up here and whether they were leaves or roots, (…) yea (…) and calming techniques. (Lines 73-75).* *Peter: Well, I think that the programme did help me a bit, but it is mostly the song I heard on You tube. (Lines 338-339).* *Adi: Um interesting stuff about the brain (..) the amygdala, and how it can go (..) how it can make you sick if you are stressed and stuff.* *Adi: I found it all interesting really. (Lines 418-422).* *Tom: Well I already said I think the profile thing might be helpful (..) yea, I think the profile thing might have been helpful about the careers but I'm not sure about anything else because I mean I knew a bit about the amygdala and (..) (Lines 160- 163).*	*Simon's mother: I think for me and for my son, um, definitely I feel it's been more insightful, I think I've gained more insight into Simon's sensory needs, more than I had before, definitely, um (.) because I thought, I don't think I thought I knew it all, but I thought, oh yeah, I know about sensory needs, but I have gained more, definitely gained more insight. (Lines 2278-2284).* *Peter's mother; I suppose I do things automatically that I don't realise. Until I actually broke it down using this, I didn't realise why I was doing it. (Lines 2018-2020).* *Vince's mother: He liked the idea of the visual thing of the tree and that sort of struck a chord with him, um (.) and little things about (.), um (.) sensory things about working alone, you know, little things have dropped out in conversation'.(Lines 3027-3030).* *Simon's mother; I just see it as a positive. I think the programme, just learning more about himself, is very positive. (Lines 2300-2302).*	*Researcher…Has the programme helped? ((long pause)) Anyone like to make a comment?* *Staff 1: Yes and no. I'd say that it's helped with certain students when in terms of they know they can talk about their sensory needs and things that they might have needed. But I would say that for some students it has not been (.) overwhelmingly helpful. (Lines 493-497).* *Staff 1: Yes, I'd say all of them are more aware of their own needs now. (Lines 579-580).* *Staff 2: Simon is the exception…because I don't think that anything would work unless we experimented over a long period of time over the music and (…) (Lines 581-584).* *Staff 4: So Vince. It's had an impact on Vince. And he talks about kinda things being a sensory thing. Vince is very closed though. He doesn't really talk about his feelings or, you know, how things are affecting him, but you know. He will say and has said things like 'I suppose the reason why I don't like it in busy corridors is because of my sensory needs because I don't like the noise'. So, there's a bit of, you know, as a bare minimum, this raising of awareness of himself so, (.) yeah.*

4.1.2.2 Sub-theme: 'It makes sense of behaviour'.

According to the Sensory Intelligence programme theory, awareness leads to a better understanding of your own and other's behaviour. There was tentative evidence of

this developing understanding despite the relative shortness (eight weeks) of the intervention period. Such evidence came predominantly from parent interviews.

Whilst some parents' comments revealed an established knowledgebase, there was evidence of an increased depth of understanding, not only with respect of their children, but also of themselves. Examples included Peter's mother realising for the first time, why she was 'so grumpy' when there was a lot of noise around and why Peter may find mealtimes very difficult. Tom's mother also commented on a deeper understanding of why her son preferred certain activities over others after he told her 'I like to have my head still'. Vince's mother also felt that her son was now more tolerant of his peers, as a result of the programme.

It was also noteworthy that, towards the end of the study, staff appreciated the benefit of sensory profiling not only within the ARB but also for outreach work. This not only enhanced understanding for a pupil with autism in mainstream but also mainstream staff.

Table 33

Illustrative Quotes for Sub-theme 'It makes sense of behaviour':

Parents	Staff
Tom's mother: …a lot of it we knew but we knew on a level that we didn't even think about it. A lot of things that we were reading, we go 'Oh yeah we do that' but it gave a depth of understanding we didn't have before. It gave us an explanation. (Lines 1229-1234). *Vince's mother: He'll come back and say, you know, Mark didn't like this or Mark didn't like that and um (.) yeah, I think it made him think a bit more about it, rather than just think Mark was annoying ((laughs)). (Lines 3055-3058).* *Peter's mother: Um, you know it's like when my granddaughter came the other day. She was playing and my daughter came in and turned the TV on and my granddaughter was here, and she had a musical toy on, um Jodie, my younger daughter had come down and started to play with my granddaughter and I was sat here and all of a sudden I got up and I said 'I can't stay in here' and just went. And I've done that regularly for years and I've always thought 'Cor, I'm so grumpy!' But actually, I've broken it down and I do it in other situations as well and it's just too much noise, too much different noise. I can cope with loud but if it is too many different, you know, things like that, and this has helped me to recognise things in myself so (.). (Lines 2023-2034).*	*Staff 4….and what the sensory profiling did for him (outreach child) was explain things to him and it just made sense of things and made sense of some of the things he does and it made sense of some of the inappropriate things he does in lessons, and gets into trouble for, and just knowing (..). The other thing that was really important was that the teachers who were working with him, knowing that information about him and them being aware of it suddenly changed their perception of him from being a naughty boy who causes trouble to being someone who has particular issues and particular problems which can be solved, and him knowing that they are aware of those things just made a massive difference,… (Lines 1047-1059).*

During a day when the internet was not available, the field notes also noted '*Three boys were playing a game together and staff commented on how that was a pleasing sign of progress. All three had been together on two of the sensory intelligence sessions, which might have contributed towards this. Discussion of tolerance of people with other profiles could be a contributory factor, whilst the lack of access to the internet reduced their options' (Lines 3415-3421)*.

4.1.2.3 Sub-theme: 'Practical strategies for positive change'.

Another tenet of the Sensory Intelligence programme theory, that awareness and understanding would provide the foundations for the development of practical strategies for positive change, requires enough time and familiarity with the range of strategies available. There was, nevertheless, already evidence of some slight changes, possibly

attributable to the programme, from all four sources of evidence. These related to the children taking more responsibility for their own sensory needs.

Simon talked about ‘handy’ techniques, for example. Vince was very specific in his mention of smells and exercise being good for him. The field-notes included an observation of Simon taking exercise after a discussion of the importance of incorporating exercise into routines and of Peter discussing his use of relaxing images and music to enhance functioning. Simon’s mother added that her son appeared calmer over the past few months. Peter’s mother was also impressed about how, for the very first time, he had found his own strategies to settle down to do homework, which had previously been the cause of ‘meltdowns’ at home.

Staff noted Peter effectively using music ‘to fly’ and being better able to vocalise what he needed, when over-roused, and thus becoming less dependent on adult support, as a result. They also considered ways in which strategies might be incorporated into the ARB routine, such as ‘downtime’ for Adi, who was prone to ‘hold it all in’ on a good day but then explode when he got home. Tom’s mother further indicated that the programme provided more practical strategies than occupational therapy reports and ‘related better’ to them as a family, as a result.

Table 34

Illustrative Quotes for Sub-theme 'Practical strategies for positive change'.

Children	Parents	Staff	Field-notes
Simon… I think there are some techniques that might help, (…) come in handy. (Lines 20-21). *Vince: Yea, I was (.)um (.)smells I have found out have been good for me an (.) exercise. (Lines 78-79).*	*Tom's mother: It explained it in a more practical way and gave you things you could do, whereas occupational therapy reports, brilliant as they are, just sort of document how things are and give them a name, whereas the book had some (..) it seems to relate better to us as a family (Lines 1377-1382).* *Peter's mother: Yes, he found his own solutions. He went round and said 'I can't do in my bedroom because I know I'm going to want to play my game, so, you know, I bring it downstairs'. He said. 'I can't do it in the dining room because the dogs are in and out of the dog flap and that's annoying me, and I can't do it in that room, in there because it's cold. So, can I bring it in here and sit with you? And I said, 'That's fine' (Lines 2115-2121).*	*Staff 1: Again Peter is the one I work with most and I would say that he is more vocal about when he is finding something sensory overwhelming and he will say I need to go outside whereas before it was always I would say you need to go outside and just have a five-minute break or can you go outside and do star jumps whereas now he is a lot more vocal about saying it himself now when he needs a minute. (Lines 560-567).* *Staff 3: I think if he (Adi) had a couple of breaks or something (.) if he had some downtime would he be less likely to explode at home? (Lines 958-962).*	*Opportunities to incorporate movement into routines were discussed with Simon in the light of his impending examinations. He was seen taking exercise the next day (walking around the bench). (Lines 3467- 3470).* *During discussion of Take 5, Take a break, Peter reported that he already pictured a relaxing image in his mind, and that he worked better with music in his ears – decorating his room and doing homework. We discussed the possibility of having headphones in the unit and downloading songs from YouTube. (Lines 3321-3324).*

4.1.2.4 Sub-theme: 'We are all individuals; we all have our things'.

The fourth sub-theme 'We are all individuals; we all have our things' was adapted from parents' quotes which also epitomises the ethos of the Sensory Intelligence programme's rejection of labels on the understanding that everyone has their own individual sensory profile. This is emphasised in the importance given by the programme, to neurodiversity in society, and for careers.

Some of the children generally found it difficult to talk about autism or their diagnosis and objected to the word ‘Autism’, which was not used, at all, during the intervention. Vince’s mother commented, for example ‘ …he particularly doesn’t like talking about autism or his diagnosis, he finds that very difficult’ (Lines 3022-3023).The lack of labels and the inclusive ethos, which was reinforced by the collaborative approach in conjunction with both the researcher and parents sharing their own sensory challenges with the children, could, potentially be a major mechanism underlying the children’s willingness to engage. The fact that several parents were aware of and willing to disclose that they had their own sensory challenges also suggests their personal experience helped them relate better to their children.

In addition to reinforcing this sense of inclusivity, there was also, however, a sense that children in secondary schools are less accepting of diversity than in primary schools, a topic which will be revisited in the sub-theme ‘Many hands make light work’. The evidence came mainly from the parental interviews, supported by the field-notes.

Table 35

Illustrative Quotes for Sub-theme 'We are all individual; we all have our things'.

Parents	Field-notes
Peter's mother: I would like to do the whole family because it's obvious, since looking through this and having a discussion with you and things, it is obvious that we've all got our little things, (Lines 2039-2042). *Simon's mother: We've all got our profiles and the more we understand them and work together, say within a family, and the more that we support each other and accept them and not, you know, work alongside them we will work in harmony. It is fine, isn't it, we're all individuals, (Lines 2956-2959)* *Vince's mother: .because whatever normal is, I think people have lost sight of what is normal and what isn't normal because everybody out there has different quirks whether they put you in a labelled box or not and everybody has some traits of something and to make people more accepting and allow for differences I find is a trait lacking in a lot of places. (Lines 3123-3128).* *Simon's mother: I get migraines and I read loads, I just constantly can relate to it because it's similar to that, with the sensory things. I just think, yeah just stop, because a lot of things I find in migraines, because things are heightened, with it, like taste and sense and things, that I pick up that the other people don't, so I feel that I can relate to it in that way, if that makes any sense? (Lines 2909 -2914).* *Tom's mother: It's sometimes hard to translate those things into a secondary environment because at primary, it's (..) the children are more accepting of the other children whereas when they start secondary, you know, (Lines 1598-1602).*	*Field-notes: Tom commented on the word 'Autism' negatively preferring 'Communication and Interaction' issues labelling. Simon asked the question 'So you want to do a study on us?' to which I replied 'No, I want to do a study with you' which received a more positive response (Lines 3161-3165).* *Simon's mother also commented on her own sensory sensitivities. (Lines 3604-3605).* *Vince was very accommodating and happy for me to see him early. He was also willing for the family and staff to see his profile. He remembered that we were both roots. (Lines 3535-3537).* *Field-notes: Discussion established that Adi can be embarrassed about being seen as different. As a result, he would not use a move it cushion or laptop in class. (Lines 3636-3638).* *Field-notes: When we discussed the possibility of an exit card/ask an adult to leave, Adi's response was he would rarely do it because he was 'worried people would think I'm trying to skip a lesson'. (Line numbers 3937-3939).*

4.1.2.5 Summary of main theme 'Does it do exactly what it says on the tin?'

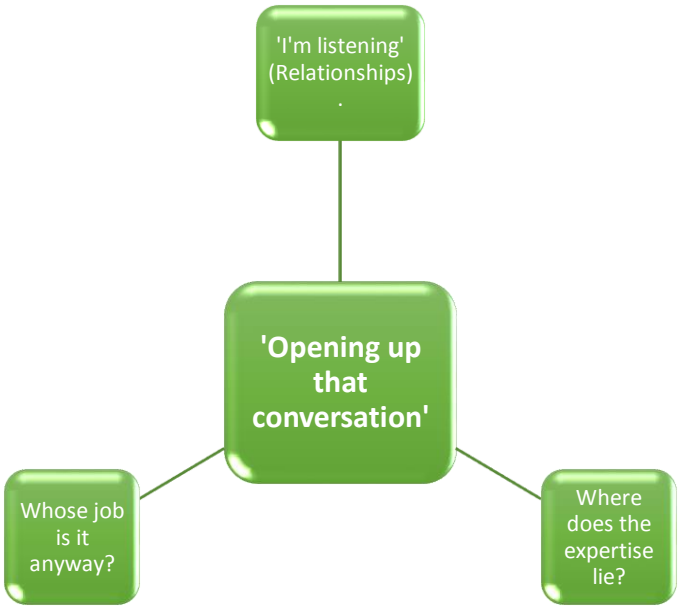
The results discussed so far, providing tentative evidence supporting the main tenets of the Sensory Intelligence programme theory, suggests promising 'shoots of growth' with respect to the empowerment of the children, in particular, despite implementation challenges within a 'cramped' environment. It also suggests that some of the parents of the children in this study may also have their own sensory challenges, and

although they already have some experience of developing strategies to help themselves as well as the autistic child, the programme provides deeper insight, understanding and strategies, compared to what has been available to them in the past. The field-notes also suggested the possibility that the programme enhanced tolerance of others.

Although the ARB staff were more reserved in their perception of the programme, they had also noticed increased awareness and empowerment in some of the children, resulting in the decision to use the sensory profiling in outreach work, which impacted positively on both one CYP with autism and his mainstream secondary school teachers. They were also considering ways in which strategies could be incorporated into the ARB schedule to better meet the children's sensory needs.

It is cautiously suggested, therefore, that promising signs are emerging in this study, of the Sensory Intelligence programme matching its programme theory, particularly with respect to raised awareness and understanding facilitating personal empowerment. The programme may be worthy of more detailed empirical investigation, as a result.

4.1.3 Main theme B: 'Opening up that conversation'.



The phrase 'Opening up that conversation' was taken from a parent's remark. It relates to situations enabling dialogue to discuss the topic matter. A key enabling element appears to be perceived safety in a relationship, in the knowledge that the person will listen respectfully, which requires a positive relationship. Another is the opportunity to meet. The

sub-theme ‘I’m listening’ (Relationships) was provided to capture the essence of active listening and a sense of safety in dialogue that was key to many.

The other two themes relate to topics emerging from discussion with the participants and observations from field-notes. The first regards responsibility for providing what is required for the successful implementation of the programme. Here there was some divergence between the views of the parents and staff. This sub-theme is labelled ‘Whose job is it anyway?’ to capture such tension.

The final sub- theme ‘Where does the expertise lie?’ was chosen by the researcher after noting a range of knowledgeable insights provided by several of the participants with respect to sensory-based issues. Some of these insights could be considered relatively ‘untapped potential’ when focusing on ways forward, which is the subject matter of the third main theme ‘It would be better if...’.

4.1.3.1 Sub-theme: ‘I’m listening’ (Relationships).

The researcher would argue that the willingness of the children to engage in the programme right through to completion; to ask her to be the go-between between them and their parents or school staff, on occasion, and to tell her things they had never told anyone before, was tentative evidence of a positive relationship. Tom’s persistent comment of ‘I’m sorry, don’t get mad at me’ (Line 3772) also alerted the researcher to the potential influence of relationships for the study.

The closeness of the parent-child relationship was clear in the parent interviews despite teenagers with autism not being renowned for being vocal, even at home. The project appeared to have acted as a prompt to ‘open up conversations’, in this respect. The parents also commented on the value of ‘get togethers’ with the researcher which appears to have helped develop a researcher-parent relationship. Parental comments also revealed some tensions, however, which may serve to impact on parent-school relationships. Illustrative quotes are provided in Table 36.

Table 36

Illustrative Quotes for Sub-theme 'I'm listening' (Relationships):

Children	Parents	Staff	Field-notes
Peter: Once I'm angry, I'm angry. I can't help it. It's like I can't help myself Dad and (sister's name) (loud voice). Please don't show that to my parents. *Researcher: I won't show it to your parents. Don't worry it is all confidential.* *Peter: Yeah but wait, but yeah, please, please do. (Lines 237-242).* *Vince: Yes, I talked to mum about it.* *Researcher: What sort of things did you do at home?* *Vince: We were discussing the sensory needs and things and how we get them at home.* *Researcher: And did you find that support helpful?* *Vince: Um (..) Yea. (Lines 97-101)*	*Tom's mother: I think it was nice when we met up and saw you and you gave us some explanation with it as well. That was good (Lines 1223-1225).* *Simon's mother: Well it has just opened up (.) it's just opened up that conversation, hasn't it, for him. Just exploring a little bit for him and I think (.) and the fact that we've got this (file) now he can look back on it. It's always something for him to look at and look at it again and, you know, and reference. (|Lines 2971-2975).* *…and the fact that we both, you know, know about it, is nice as we can always talk about it together, when he wants to, yes so, it's been a good thing. (Lines 2979-2980).* *Vince's mother: …little things have dropped out in conversation (Line 3030).*	*Staff 1: … I'd say that it's helped with certain students when in terms of they know they can talk about their sensory needs and things that they might have needed. (Lines 493-497).* Staff 3*: If anything, Tom's been more difficult for the last three weeks so he's (.) he's not open to (.) I mean he's really oppositional. If you ask him, or suggest he does something (.) he will do everything else in the room other than that one thing so it is not something we can encourage him to do and whether he's choosing to do anything and whether you know he's telling you he's doing something or not I don't know but certainly nothing we are aware of and he has been quite difficult for the last two or three weeks, I'd say. He's been quite agitated. (Lines 619-630).*	*Simon indicated that he tended to assume that people would not understand him, and therefore had been reluctant to talk about his sensory needs in the past. (Lines 3704-3706).* *Adi indicated that he already 'braced' himself for aversive events. Further discussion established that Adi would 'stay quiet' when it was too noisy. He indicated that the noise seemed to get louder and he would 'notice everything' and commented 'everything feels weird for me even though it doesn't change'. He would not do anything other than go very quiet and look down, particularly in hallways and on stairs, until it settled down, because he didn't want to do anything, 'just act normal'. He added 'I haven't told anyone about this before-maybe I should'. (Lines 3927-3936).* *Field-notes: Tom managed to agree to provide a profile only after I explained the reason for doing so, in detail, to him. I was told that he had pathological defiance syndrome and will automatically refuse to do what he's told. (Lines 3358-3361).*

4.1.3.2 Sub-theme: Whose job is it anyway?

The sub-theme labelled 'Whose job is it anyway?' was chosen to capture some divergence between the views of the parents and staff regarding respective responsibility for providing what is required for the successful implementation of the programme. The field-notes identified the ARB staff's initial position that they wanted the children to develop self-help strategies, and if this was not possible, rely on sparse occupational therapy input, on the grounds that they had insufficient resources to support the children on the programme.

> *The logistics of providing adult supervision was discussed. Staff did not consider that they had enough resources to support the children, on the programme very much, and therefore the importance of the children developing self-help strategies was considered paramount. For those children unable to develop self-help strategies, there was a preference for direct occupational therapy intervention. This was difficult to access, however, and only one child (Tom) met the criteria for OT involvement. (Lines 3183-3191).*

Whilst Tom met the criteria for OT involvement and had been provided with a 'sensory diet' to be followed in school, he reported, nevertheless, that this was rarely followed. The member of staff assigned to do this was on long-term sick leave.

Within the context of limited resources and to aid independence, there was consensus that, ideally responsibility should to be that of the child, particularly as he matured. It was acknowledged, nevertheless, by both staff and parents that the child was likely to benefit from some adult support. Whether the support should be provided by home or school was the source of some tension. The ARB staff emphasised the role of the child and the family, but also acknowledged, that within a secondary school environment, an ARB was more conducive to support the child than mainstream, which was considered 'almost impossible'.

Whilst the parents hoped that their children would be able to take responsibility for developing their own 'sensory intelligence' to cope in the wider world, particularly post-school, there was a consensus that this was not wholly realistic without prompts from adults. Who the adults should be was linked to the environment where the prompts would be needed. Parents considered that as the school environment was 'sensory challenging' and their children spent so much time in school, it was critical to provide suitable support in that environment to ensure that the child felt safe and secure, in order to be able to take

advantage of the learning opportunities available to them. One parent also felt that her child would engage better if it happened at school as she was 'struggling' to engage with him, at home, as he matured.

Table 37

Illustrative Quotes for Sub-theme 'whose job is it anyway?':

Parents	Staff
Simon's mother:…thinking ahead as he wants to go to college to be (.) yeah that's something he'll be around new people, so that people who probably won't, might not understand his needs, so more onus is on Simon again to be able to, yeah, you know, deal with this himself. So, yeah, like again the more that Simon understands and can recognise his own sensory needs, then he can help himself really, and that goes for all of us, doesn't it, but yes, so the onus is on Simon, really. (Lines 2313-2320) *Tom's mother: I think it's really important that it is supported at school, I think that is its key in that it was conducted in a school environment and I think that is really, really important because that is where our lad is spending most of his days so (..) some of the situations, the fluorescent lighting and things, like that, you know, he is actually in that environment so I think that is key that it should be shared throughout school (Lines 1237-1246).* *Tom's mother: Yeah. I don't know how often they're actually (.). He'll need a prompt a lot of the time, to use these things, you know, it's this awareness about it.* *Tom's father: That's why I'm asking where does this go from now (.).* *Tom's mother: A prompt so (.).* *Tom's father: About the awareness of the staff (.) just that he might need that to get into the habit, because he might have highlighted, oh that will be useful and that will be useful, but he won't necessarily remember and initiate it at the right point in the school day.(Lines 1763-1775).*	*Staff 1: But that is when he needs to be the one to take the responsibility to recognise, in himself, that he needs to have that time because no matter how much we say to him like maybe you need to (.) you need to think about doing that or (.) (Lines 958-967).* *Staff 3: I would say it's very important for parents to be on board in understanding them and allowing them to facilitate them. (..) we need the parents to buy the resources. We need them to buy the trampoline and we need them to buy the (..). They are facilitating it so if they are not really on-board, they're not going to facilitate those strategies. They're not going to buy the equipment. They're not going to (..). They have to want, at a deep level, to accept that it is actually really important for it to happen for their child. Our pupils are not going to be able to facilitate or access these things without the parents supporting them.* *Researcher: Providing the equipment for here or providing it at home?* *Staff 3: At home. (Lines 673-687).* *Staff 3: Here but not in the mainstream school. I think we've got the luxury and the (..) the luxury of time with them and the individual contact so it is possible to facilitate the strategies. I think parents get too busy and too stressed and could forget to do it at home. And I think it's going to be almost impossible in mainstream so I think the only place it is going to work is in a really small unit like this where you have got the capacity to, and the time to think about it and implement it. (Lines 692-700).*

4.1.3.3 Sub-theme: Where does the expertise lie?

The third sub-theme 'Where does the expertise lie?' establishes that the ARB staff may be at a disadvantage because they do not know the children well from a sensory perspective. At the same time, the evidence suggests a substantially untapped

knowledgebase of both the parents and the children which could have a role to play in facilitating the successful implementation of the programme in the ARB. Sources of evidence came from both the field-notes and parental interviews.

The field-notes established that staff were prevented from getting to know the children well because 'key workers' were no longer allocated to individual children; they were short-staffed and there was no formal mechanism in place to share knowledge of the child. Staff relied on informal chats at lunch and break times. The researcher was also informed that the Teaching Assistants did not attend staff meetings because they were not paid to do so. Having conversations with the parents and children, on the other hand, revealed a level of expertise which could be very useful in facilitating the implementation of the programme by working more as a team.

The parental interviews confirmed concern that staff do not know the children well and are limited in their ability to consider their sensory needs, as a result. At the same time, the parents show considerable insight, which is not surprising given their long-term relationships with their own children and being alert to sensory processing issues throughout the child's lifespan. Some parents themselves having sensory processing issues further enhanced this understanding. A key thread, therefore, was the importance of parental involvement.

Other important threads include a comparison between what was available to their child in primary education, which is no longer available following secondary transfer, in conjunction with the sensory-challenging environments of the ARB itself, as well as the mainstream secondary school, which bring pertinent systemic issues into the dialogue.

Table 38

Illustrative Quotes for Sub-theme 'Where does the expertise lie'?

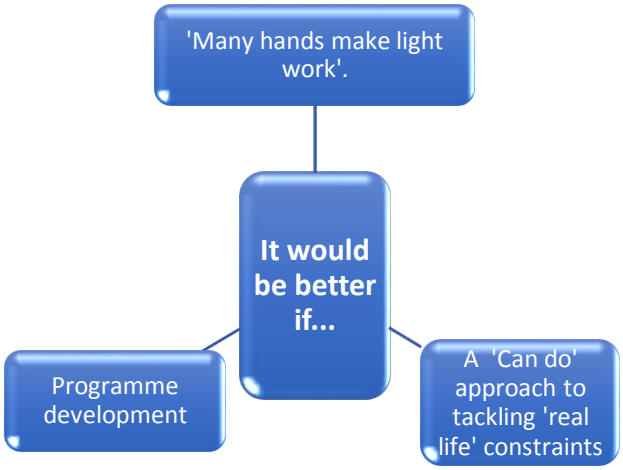
Parents	Field-notes
Tom's mother: Remove Tom from the class, and let him, you know, take him for a walk, or bounce on a trampoline, you know, and teach him Maths whilst he's doing it. If he's getting that good feedback and that's an amazing thing, that. That's something I've picked up. He will learn. *Trying to get him to talk about his feelings, for a form, which was going in with his EHCP, you know, consider your child's feelings, well for a child who doesn't like to talk about it. Well I tried sitting down at the table, it wasn't working but, I've got to do this blooming form, you know, and they want it back and it's important his views are heard. So, what did I do? In desperation I sat down with him. He was playing the Mario game and that brings him down, it is not on-line gaming, it is important for him, at the end of the day when he is overloaded. So you think he'd had enough and I'm sat there going 'So how do you feel about this in general… do you like this? and keep it specific and reword it if it is not appropriate, and it flowed, it poured out of him and I wrote it down word for word and I wasn't interrupting him or stopping him from doing what he wanted to do but I discovered that he had an ability to do both whereas I'd have been constantly (.) you know he was doing something that kept him on the level he was (.) the questions weren't distracting, he could manage both. He could bounce on the trampoline and that would keep his system okay and you could teach him times tables and he would shout them out.* *Researcher: Really?* *Mother: Yeah. That surprised me. I thought I was pushing it. So, I always think so many things we discover are not from being clever but accidental and then you see research or programmes like yours, which involve your child in it as well, which is so important, that involvement. (Lines 1640-1676).*	*During discussion of Take 5, Take a break, Peter reported that he already pictured a relaxing image in his mind, and that he worked better with music in his ears – decorating his room and doing homework. (Lines 3321-3324).* *Tom proved to be very observant and picked up errors regarding typos and was the only person who asked why I was using green paper. (Lines 3361-3363).* *Simon's mother commented that he needed to listen to music in the car journey and that if there was no music, they needed to consider alternatives. She felt that he had some insight but 'the window was so short' regarding his reactions. She also commented on the importance of environment and staff awareness. (Lines 3594-3598).* *Simon commented on the way in the corridor being a particular problem in the mainstream school environments. (Lines 3774-3775).* *He (Tom) also talked about what was available for a sensory diet in primary school – hippos, fiddle sticks, raisins, etc. in a box. He indicated that he would hide under the table and brought in a rug to sit on. Tom commented that it was more difficult in secondary school because they have to move rooms. (Lines 3867- 3871).* *Adi's mother later attended the coffee and cake session and told me that Adi was diagnosed with SPD at the age of 5 (well before diagnoses of ASD and ADHD) and followed a sensory diet, prescribed by an OT, at home, which included a swiss ball and walking slowly. She had also tried putting water bottles in his backpack to weigh him down. (Lines 3920-3926).* *Adi did not think he could self-regulate 'usually' saying 'Mum might calm me down – don't know what she does but she is 'magic'. He recalled having a weighted blanket on the bed, but not anymore and agreed the possibility of a heavy backpack might be helpful. (Lines 3940-3944).*

4.1.3.4 Summary of main theme 'Opening up that conversation'.

The main theme 'Opening up that conversation' and the three sub-themes paint a picture of the importance of a respectful relationship to enable dialogue as a critical starting point for discussion. Through dialogue it then emerged that communication channels between staff, the parents and the children would benefit from time for further development.

Initial discussions highlighted untapped potential in the parents' and children's experiences of sensory challenges and solutions, including reflections on the transition from primary to secondary education. Whilst there was some divergence in opinion regarding respective responsibility, a consensus emerged that the involvement of the child, the staff and the parents were critical for complementary reasons. This will be explored further in the sub-theme 'Many hands make light work' in the next section.

4.1.4 Main theme C: 'It would be better if…'



The process-oriented approach of the study facilitated the establishment of a range of 'Ah buts.' as constructive criticism of the implementation of the programme. The main theme 'It would be better if...' was chosen to encapsulate such process issues and practical ways forward suggested by the participants. This included the need to fine-tune the programme itself to better meet the needs of adolescents with autism, in conjunction with consideration of systemic issues in a secondary school environment that need to be addressed.

Suggestions for the fine tuning of the programme was provided under the subheading of 'Programme Development'; evidence of a willingness to move forward in

dealing with some of the challenges of a mainstream secondary school and ARB was provided under the sub-theme of 'A 'Can do' approach to tackling 'real life' constraints', whilst systemic issues are highlighted under the sub-theme 'Many hands make light work'. The latter phrase originates from a proverb dating back to the 1300s. It encapsulates the importance of teamwork and co-operation, especially in the face of a daunting task, and acknowledges that people may be able to do things more quickly and easily when working as a team.

4.1.4.1 Sub-theme: programme development.

In order to maintain programme fidelity, the lessons followed the underlying tenets of programme theory, using the original materials as much as possible. As these materials were designed for adults, some simplification was conducted, particularly with respect to underlying biological mechanisms to meet the needs of younger participants. It was also considered important to incorporate some 'fun' elements to enable the children to maintain motivation. This included sensory investigations and the use of balloons for deep breathing.

The child interviews suggested that the 'fun' elements were much appreciated but could ideally be increased further, with the extension of practical work such as sensory investigations mentioned by more than one child. There was also a comment from a sensory-aware child (Tom) that the programme tended to say the same thing in different ways, causing it to 'go on a bit' suggesting the need to differentiate based on starting knowledgebase.

Two of the children also referred to communication difficulties related to autism; the first by Tom, commenting that he found thinking of examples difficult and the second by Peter, who suggested a practical way of expressing emotions (using balloons). The field-notes added further information relating to potential communication issues for Tom, as he reported a tendency to 'drift off halfway through' listening to a sentence when his parents were talking to him if he was not interested and he reported he was doing the same to the researcher. The development of more autism-friendly communication channels appears to be an important consideration for the future development of the intervention programme with this population, in conjunction with differentiation based on prior knowledge, needs and age.

Peter also commented that seeing how other people used strategies to calm themselves would be helpful, suggesting the benefit of working more as a group, or in the case of children who were not 'group-ready', providing such information by other means such as more opportunities for adult disclosure, in conjunction with the use of social stories and/or video clips.

The parental comments were predominantly positive, though Peter's mother felt that her son, (who has speech and language difficulties) needed more differentiated material to fully understand.

Parental comments were largely based on the provision of the book at the beginning of the study and discussion with their children as due to a process issue, outlined in the next section, parents did not receive much of the lesson summaries until towards the end of intervention, and were therefore less familiar with the content than the children or the teachers. One parental suggestion, nevertheless, was to include special interests and another was to share activities with the children.

Other comments regarded the suitability of the programme for that age group, which was overwhelmingly affirmative, though some parents considered it could be adapted for much younger children and one wished they had been given access much earlier, such as the time of diagnosis. There was also consensus that the programme should be available to the wider school community to enhance understanding of the autistic population and for mainstream teachers to meet both their needs and those of children with sensory processing issues without a diagnostic label. This clearly has staff-training implications and is also a systemic issue, as a result.

Staff feedback revolved around several different themes. The first was a perceived challenge of getting parents on-board, providing evidence that staff were not fully cogent of the importance afforded sensory processing by the parents and their depth of understanding due to their own as well as their child's sensory challenges.

Staff did have access to the material used in lessons, as it was provided in a master file, regularly updated as the lessons progressed. This enabled staff to provide constructive feedback on the amount of information the boys were expected to take in, (which caused Peter difficulties, in particular), and to suggest the use of social stories and more visual materials as part of programme development.

Staff 1's view that as 'none of our guys really get on that well' the use of smaller groupings, would have been better, had been superseded by events. Her additional comment that having an external person might have contributed to pupil discomfort was not supported by other sources of evidence, though clearly needs due consideration in future programme development.

Table 39

Illustrative Comments for 'Programme Development'

Children	Parents	Staff
Simon: Maybe encourage like (..) maybe like (…) teach the programme maybe in a more fun way. *Researcher: Can you expand on that?* *Simon: Like (.) Maybe do some more of the sensory challenges, perhaps or something like that. (Lines 38-43)* *Vince…it could be less wordy in some parts, yes.* *Researcher: Can you expand on that? So, where it is 'wordy in parts' what would you put in its place?* *Vince: I found it alright but some of the other students found it a bit complicated. Make it a bit more practical? (Lines 104-108).* *Tom: Well I told you I didn't like trying to think of examples of the things, of the things which made me go a bit 'erk' on bad days (laughs). (Lines 171 - 173).* *Peter: Yeah it could, yeah it could be a lesson in your programme. You could get the child to write feelings on the balloon like I did, see? So yellow means happiness, blue means sadness, red means anger, green means disgust and purple means fear, just like that (pointing at the balloons). (lines 366-371).* *Adi... I found all the stuff like the sensory (.) having to do the smell and stuff like that, I think we could do more about that to find out about the senses. I think that would be fun. (Lines 457-460).*	*Peter's mother: I'm not sure, well, Peter didn't understand, not all of it, and I'm not sure how, maybe there may have been different ways, it's difficult to know if there were different ways to introduce it to him or whether it is just where he is at the moment. Does that make sense? (Lines 2217-2221).* *Tom's mother: so yeah, I think it is useful and good timing, maybe at the start of secondary, that sort of age. Probably more so than primary, maybe.* *Researcher: Okay.* *Mother. Because there is that greater self-awareness isn't there? (Lines 1549-1555).* *Simon's mother: Oh, definitely from the age that you've picked, from secondary age. Most definitely. I think the sooner they can stop and think and try and think about their behaviours and have some influence, the sooner they do that the better, so definitely. I think it needs to be before adulthood, most definitely, doesn't it? From 12? (Lines 2863-2870).* *Vince's mother: So maybe a little bit of it filtering out to normal school, normal mainstream, helping teachers pick off those children that stand out with different needs that are never going to get a diagnosis. I think that would be useful. (Lines 3128-3132).*	*Staff 3: You would have to persuade them that it is worth doing. So, I think when they came to your initial (..). This is what we are doing they were all coming very sceptical, they don't know what they're coming to (..) they're not sure they will agree to it, it needs to be presented in a way that makes them want to do it, not just see it as an extra box I've got to tick and it's something else I've got to do in my already completely overstressed life (..) seeing the parent of a disabled child is maxed out (..) so stressed (..). If it is presented as one more thing you need to be doing for your child, I think it will be hard to get them on board. (Lines 714-725).* *Staff 1: I think for parents to be able to see, being given this profile, and for this student that these strategies worked, being able to see it in black and white, they might say oh, okay, if it works for them maybe it might work for my son or daughter. Lines 733-737).* *Staff 4: I think like that (information pack) could be improved graphically so that it is more colourful maybe, imagery kind of explaining things as well so that it's, yeah, not a lot of written information. I know that there are diagrams and stuff in there, but, yeah, maybe a slicker kind of pack for the pupils. (Lines 766-771).* *Staff 2: … I was thinking of something like social stories (..) like animated so they can visually see, you know what I mean? (Lines 789-792).*

Another staff comment suggested a misunderstanding of the sensory intelligence programme theory, possibly due to insufficient time to look at the book provided. It also suggests that staff training should be an integral aspect of pre-implementation planning.

Staff 3: I think some of the strategies need to be more dynamic and need to be more different from, because you can look through a list that says eat crunchy snacks or bounce on the trampoline and they'll all think I'm doing that anyway. Even the parents will think that this is all stuff I am already doing so I think there needs to be something that is actually (..) it needs to be more stark and there needs to be more contrast. This is something new and dynamic and we are going to try these things rather than just all the stuff you're doing anyway, that's just been formalised and put in lists. They are all doing this sort of thing naturally. They naturally chew, they naturally go outside, they are doing that so there needs to be another way of saying this is something completely different that we are going to try. (Lines 774-788).

4.1.4.2 Sub-theme: 'Many hands make light work'.

The possibility of contributions provided by the children, parents and school staff as complementary was touched upon during discussion of the subtheme 'Whose job is it anyway'. The current theme of 'Many hands make light work' is focused on future developments and includes a wider systemic perspective covering the importance of teamwork between primary-secondary schools, parents-teachers, teachers-children working together and the involvement of senior managers. One of the parents provided a particularly cogent argument for sensory profiling to be done as part of transition from primary to secondary school:

Tom's mother: It's hard to carry on things that you've used for primary to secondary. Apart from the distance in location, it's sort of all of the tools that you've had to help with your child's sensory issues, disappears because it is not appropriate and it's no good saying well it's in his EHCP so you have these things, they're not relevant, they're not appropriate and they can probably cause more problems but then your child is then left with (.) apart from it being a big scary school from a friendly small primary , the things he has relied on have gone, you know, and there isn't a substitute and there are hundreds of children going down a corridor and they're pushed to be brave and the headphones and little twiddle things and the little toys I have bought him and stuff, you know, the schools are going we don't like fidget things, you can't have them and they don't make the allowances for the fact that it is more than just a game or something he can play with. Which brings me back to the other question, the time element, and definitely, they should do sensory assessments before children go to secondary school because it is a huge change, massive, you know. I mean I talk about autism because that is what our son has but I think for any children going from primary to secondary, apart from it not being familiar, you are bombarded with things. You don't get the same teacher all the time. All that familiarity goes, and it is really hard for them. And for the parents too, you know. I think any tools that can help your youngsters settle in, and that they can manage transition and, you know, it is all about transport and everything else but I think things that help your child feel safe and secure and then they are ready to learn, because if they are not, it is all a waste of time, really. (Lines 1605-1639).

The ARB staff also considered the potential benefits of having sensory profiles on transition, which would necessitate liaison with primary school staff. They went on to highlight the importance of parental input and liaison to gauge whether strategies are working both at home and at school, and for parents to prepare their children for the more sensory challenging school environment. Staff also acknowledged that they themselves will sometimes need to work with the child, particularly if the child lacks self-awareness.

Staff 1: Yeah I think if going on with what Staff 4 said about at school it's difficult because we're sometimes making them (.) not making them (.) helping them do things ((loud laugh)) they don't always want to do so it is difficult for us to know whether these strategies are always working whilst the tasks we are asking them to do might not be working. Whilst at home they may be using those strategies, doing things that they need to do, so yes, I would say input from home, from parents, is good because then you know from both sides of it. (Lines 634 -643).

Staff 2: And we are also in constant contact with the parents, so we can gauge whether it's working at home and main school, as they don't have that constant contact (..).
Staff 1: Yes, what is causing that sensory overload. So, we can say (..) at this point we can say they're going to need to use that strategy. (Lines 701 -706).

Staff 4…for the ones that slip through the system that haven't been assessed, haven't had OT support, that is very useful for them to arrive with that basic knowledge that this is their sensory profile so therefore we are starting from an informed place rather than having to slowly, slowly get to know them by default. Oh, if we take them to that it will trigger them, you know. That is really quite useful to have it written down. (Lines 811-819).

Staff 3: I think it has raised our awareness in that if (.). We just don't have time for it. The ideal thing today would have been, where we knew Tom was on a wobbly day was to do his sensory diet, that would have been great, calmed him down and then sent him down to a lesson. But then he would be yelled at for being late, so it is, isn't it about how do we fit it in practically?
Staff 1: Whilst also including the students in inclusion work? Yeah.
Staff 4: Which kind of comes back full circle to the idea of using these things for preparation and it being important, that, yeah, those skills are practised at home, as well.
Staff 2, Staff 3 and Staff 1: ((in overlap)) Yeah.
Staff 4: Before they come into school and the evenings, I mean before they come to school and also the, actually we use them for recovery, as well, so if someone is having a really stressful time that they have some time and space up here for recovery. I mean we do have that option of pulling pupils out of lessons and we do use it and they can use their strategies then to help themselves so (.). (Lines 936-957).

Parental comments were extensive on the importance of teamwork. All of them felt that links between school and family could have been better to enable them to support the programme at home suggesting effective communication is a vital mechanism. One parent added that when she eventually got access to the folder (at the coffee and cake session towards the end of the intervention) she made immediate use of it to the benefit of both her son and the family as a whole, suggesting that the lack of earlier parental involvement was a major lost opportunity for the study.

Other parental comments reinforced the importance of opportunities for communication between teachers and parents, contrasting this with primary school. Parents also valued the involvement of an outside source, such as the researcher, in raising staff awareness and providing practical solutions.

One parent felt that doing the exercises at school but sharing the information with home provided additional insight as ‘they don’t often tell you’, thus contributing towards the ‘bigger picture’, which was helpful. Another parent noticed the potential of the programme to help generalisation of strategies from school to home when her son, for the first time ever, settled down to do homework without a meltdown.

The importance of staff being able and willing to facilitate the children’s use of strategies, if only to provide prompts was another theme, with the suggestion that this would require something to be written down, as a communication aid, to enhance staff awareness.

Parents were more vocal than staff about wider systemic issues which they felt could usefully be addressed, such as increasing mainstream teacher awareness and the funding of resources. This suggests that the mainstream school and local authority should also, usefully, be invited to participate as part of the ‘team’.

One parent added that as face-to-face contact is important, ARB staff could have usefully been given non-contact time to participate in the study more easily, as part of their own ‘teacher training’.

Another parent worked in another school full-time, however, and this caused difficulty coming to any ‘get-togethers’ arranged during school hours, suggesting some flexibility in timing could also be beneficial in the future.

Table 40

Illustrative Quotes for Sub-theme 'Many hands make light work' from the parents:

Tom's father: I would like to say I wasn't really drawn into the programme because (..) um (..) there was no prompt on a day to day to link in with family life coming home and except the few times he talked about it (..) you know (..) you are sort of so busy getting through the day that (..) um (..) you need something to start a conversation at mealtime or something. *Tom's mother: Yeah.* *Tom's father: about it and I think the (..) lack of a prompt on a, at the end of the day to engage with it um maybe would have sucked me in a bit more whereas I've been stood back from it really. (Lines 1306-1318).* *Peter's mother: I think what they are taught, from Peter's point of view and from my knowledge of autism, I think when um Peter learns things he learns in that context and then he won't or he rarely moves it into a different situation so if he'd learned this at school, he would have managed these things, at school, but wouldn't have necessarily brought it home and managed it at home, although, like as we have just discussed, there have been a couple of occasions when he has, but I feel that if I'd have been more aware of this earlier on, I think it would have had a bigger impact on Peter and us as a family, earlier on. (Lines 2202-2212).* *Tom's father: If it diffuses (.) a potential meltdown, you know, and there is a list of three things that can diffuse a meltdown and, you know, all the staff at (ARB) should be aware of that so, you know, if something is brewing, say Tom why don't you go to the kitchen and make yourself a honey and lemon drink, you know, and that. Unless they're all aware of that then it won't happen, you know. (Lines 1886-1893).* *Simon's mother… I think, ideally, in an ideal world, any face-to-face contact is better isn't it if you can, so that would be like face-to-face meetings, which we've done some of in the programme, but again it is difficult because it's about people's time, which is limited, um, which is more about, I suppose it's the teachers time is limited because they're there with the pupils, you know, during the day hours, that is what is difficult. But then I think they could be better, in all fairness for them, is the school could have been probably. It's difficult isn't it, because they know their pupils but whether, it feels like outside agencies could also have been more supportive like the 0 -25 team. And the school itself, because, other staff could have come in and offered more supervision to release them, you know, why not? It's like any training that is offered, isn't it, I don't know? (Lines 2847-2860).* *Tom's mother….so, I guess it is sort of teacher training.* *Researcher: Mainstream teacher training, you are talking about?* *Mother: Definitely, yeah. I would change the world if I could, but you know, it has to spread out and it's no good just the people who deal with these situations, the ones who already have an understanding in the (ARB). It has to go out to the wider school, in an ideal world. (Lines 1980-1988).*

4.1.4.3 Sub-theme: A 'can do' approach to tackling 'real-life' constraints.

Process issues were clear in the current study, which in conjunction with wider systemic considerations serve to limit the scope of any team effort to make maximum use of the programme. The final sub-theme 'A 'can do' approach to tackling 'real-life' constraints' explores willingness to tackle some of these issues as suggested by the participants.

The parents considered staff concern was unfounded, that the reference folder of lesson overviews and exercises would not be returned if it went home weekly, as they had systems in place to ensure that it would. The provision of the folder would have enabled them to take a more active part in the intervention. This suggests that pre-intervention discussion with the parents, on this type of practical issue, would have been beneficial to help strengthen home-school links.

The field-notes noted that staff were able to commission extra rooms when necessary; that the suggestion of a 'sensory toolkit' was positively received and that staff were already making use of sensory profiling in outreach work. Staff 4 was also hopeful that a lack of current funding for sensory-based INSET for mainstream staff would be revisited with the appointment of a new head teacher.

Table 41

Illustrative Quotes for the Sub-theme: A 'can do' approach to 'real-life' restraints from parents and field-notes.

Parents	Field-notes
Simon's mother: If the folder came home, oh yeah, for my son it would have worked, though I appreciate the concerns of the unit, what if the folders don't get back so I do appreciate the concerns of the unit. I do appreciate that, but I would have felt confident that (.) how is it not coming back, you know, in a taxi, it would have come home. I would have made sure it would have come back. It would've worked for us, so then would there be concerns if they had different systems for each family? I know that the handouts would have gone in the bag (Lines 2364-2372). *Peter's mother: Okay, you know Peter's would have come back because when things that go to school, we tend to keep everything in their bags, so they don't get mislaid. We get them out, use them and then put them back in their bags (.). Anything that needs to go because, you know, we all are forgetful, and it's a hectic house, um so Peter's would have gone backwards and forwards. There would have been the odd occasion, may be, but (.). (Lines 2184-2190).*	*Staff 3 arranged to use the meeting room because she considered the base was too busy and noisy. (Lines 3629 -3631).* *We discussed the possibility of a sensory toolkit, particularly blowing up a balloon, which he thought might be fun. Peter said, 'Can you talk to teachers about that?'. I spoke to Staff 4 who agreed. (Lines 3897-3900).* *Staff 4 commented that the approach was already having an influence on his outreach work with a Year 10 pupil. He added that he had tried sensory-based INSET for mainstream staff in the past. He was supposed to be allocated a set amount of time each year for this, but the time-allocation had been cut to zero. The appointment of a new head teacher in September was deemed an important step forward... (Lines 3971-3977).*

Staff also intended to use the sensory profiling with all new entrants, if the child did not already have one. They had started discussing the practicalities of using the ARB to meet the sensory needs of their children whilst in mainstream. It was notable that a staff response to Staff 4's concerns about the school timetable and difficult transitions was to 'build upon' what they are already doing to incorporate these challenges, also evidencing a 'can do' attitude.

Table 41

Illustrative Quotes for the Sub-theme: A 'can do' approach to 'real-life' restraints from staff:

Staff 4…and I think if we don't already have profiles for our pupils, I personally think we will use that when they come into school, certainly at the start of school perhaps, throughout. Um and that then informs things that we might be able to do for them to help calm them or give them work breaks or (.) yeah, definitely. (Lines 825-830). *Staff 4: That's exactly, for me, that's exactly what I'm talking about but then it's the practicalities in a school timetable because actually, our pupils have a free lesson block where technically they are in a mainstream lessons with just a changeover between and actually that's potentially quite difficult for pupils with sensory sensitivity because it may be that all of the things that they are sensitive to, they're experiencing between lessons, walking down the corridor, the busyness, lots of faces, lots of (..).* *Staff 3: Changing for PE.* *Staff 4: Um so it's those transitions but yeah (..) It's difficult isn't it because we don't have those blocks between lessons where we could do things so it's really about using the times and spaces we do have, practically, with those pupils.* *Researcher: Are there any changes that you are likely to make to achieve that?* *Staff 4: ((Laughs)) It's actually the whole school timetable.* *Staff 1: It's more about building on what we are doing already and making sure that students are aware that they have such and such lessons then so now is the time you need to be getting yourself ready for that. Like getting changed for PE, we've got it that they have got changed two lessons before PE so that they are ready when it comes to the PE lesson, they are ready to just go into it. Just building on that and making sure that students are getting themselves ready in terms of mentally and physically. (Lines 877-906)* *Staff 4: Well it is not unique, but the fact that we are based in a mainstream school and our work is about including these pupils in mainstream school means that, you know, there is (.) quite a large element of compliance in terms of, you know, being a part of the mainstream school.* *Researcher: Can you elaborate on that? Are you talking about barriers, is that right?* *Staff 4: Well, I guess the big one for us is being to raise awareness within the mainstream school and staffing in the mainstream school. I don't think that is about to change their timetables and allow everyone sensory breaks during lessons but certainly being able to increase the teaching staffs' awareness may, and probably would, get some of them to think about, um, how they present their lessons, how they conduct themselves in the classroom; what their classrooms are like, and when they put a video on what volume they have that video on etc. etc.* *Staff 1: And talking whilst that video is on.* *Staff 4: Yeah so (.) I think that's (.) A big thing for us is raising awareness. (Lines 911-931).*

4.1.4.4 Summary of main theme 'It would be better if…'.

The participants shared suggestions for the further development of the programme itself, the value of working as a team, and process issues which needed to be addressed to facilitate co-operation. The latter emphasised the importance of including mainstream school staff and senior managers, such as the head teacher and Local Authority as part of the 'team'. The main theme ended on a positive note with affirmative 'can do' responses from both staff and parents for the development of the 'Sensory Intelligence' programme for this population. The 'can dos' were limited in scope and outweighed by 'ah buts', nevertheless, suggesting a considerable role for further EP involvement.

4.1.5 Interconnection between themes.

In this exploration of participants' perceptions of the viability of the Sensory Intelligence programme in a particular ARB attached to a mainstream secondary school, three main themes and 10 sub-themes were generated, and presented visually in the Thematic Map in Table 31. Each have been discussed in isolation as distinct themes, but as previously stated, they are not wholly independent and relationships between subthemes exist. Suggested relationships are presented as thin blue lines in the Thematic Map provided.

The inclusive nature of the programme ('no labels') possibly influenced participants' willingness to 'open up that conversation', which reciprocally impacted on their ability to increase awareness, understanding and the development of practical strategies, via social exchanges. The sources of knowledge ('Where does the expertise lie?') and respective responsibility ('Whose job is it anyway?) both significantly impact upon awareness of process issues, which are critical, to facilitate programme development, teamwork and a 'can do' approach to overcome real life constraints. Underlying all of the connections are also the dual importance of awareness ('I didn't know that before') of sensory issues and relationships ('I'm listening) as starting points for implementing change at all levels (child, family, ARB staff, mainstream staff, senior managers and local authority).

4.1.6 What are the sensory-perceptual profiles of children attending a secondary school ARB?

The pupils completed the Adolescent Adult Sensory Profiles (AASP) and the Sensory Matrix Profiles themselves whilst the parents were asked to complete the Sensory

Profile Checklist Revised (SPCR). Some parents did not return completed SPCRs by the end of the study. One parent commented that with over 200 questions it was a very time-consuming process, which may have been a contributory factor. In these cases, staff completed the forms, to the best of their knowledge, on behalf of the children. It was not, therefore, possible to answer research question 2 in a fully informed way, based on the data that was gathered.

The results are summarised in Table 42.

Table 42

Summary of the Children's Sensory Profiles.

Participant	AASP profile	SPCR profile	Sensory Matrix Profile
Vince	Sensory Sensitivity + Sensory Avoiding + Sensation Seeking –	Fluctuation	Sensation Avoiding Fluctuating profile
Simon	Sensation Avoiding +	Fragmented perception Delayed perception Peripheral perception Fluctuation	Sensation Seeking Fluctuating profile
Peter	Low Registration + Sensory Sensitivity + Sensory Avoiding +	Gestalt perception Fragmented perception Delayed perception Distorted perception Mono-processing Peripheral perception Fluctuation	Low registration Fluctuating profile
Tom	Low Registration + Sensation Seeking – Sensory Sensitivity + Sensation Avoiding ++	Gestalt perception Delayed perception Mono-processing Peripheral perception Fluctuation	Sensation Avoiding Fluctuating profile
Adi	Sensory Sensitivity ++ Sensation Avoiding + Low Registration +	Gestalt perception	Low Registration Fluctuating profile

The AASP scoring criteria is provided in Table 24 ranging from ++ to --, two standard deviations from the mean, denoting 'more than', 'much more than', 'less than' or 'much less than' typical performance.

None of the children's results depicted 'typical' functioning supporting previous research suggesting that up to 95% of the autistic population presents atypical sensory processing. Adi and Tom displayed 'much more than' scores on one quadrant each (Sensory Sensitivity and Sensory Avoiding respectively) whilst the remaining scores were in the 'more than' range (one standard deviation from typical) representing relatively mild deviations from the mean, nevertheless.

Peter, Tom and Adi presented very mixed profiles consisting of a range of high and low thresholds and active and passive responses. Vince and Simon presented more low

threshold profiles, with Simon having an active response (Sensation Avoiding) whilst Vince showed evidence of both active and passive responses.

As the Sensory Matrix is based on the AASP but expands on questioning in each modality (5 high and 5 low threshold questions in each section), it is more informative for intervention planning purposes and facilitates identification of fluctuating profiles. The Sensory Matrix also provides an overall score placing the child in a dominant category represented by the tree analogy introduced in Chapter 3. With respect to the latter, Vince and Tom were deemed active low threshold 'Sensation Avoiding' overall (roots), whilst Adi and Peter were deemed passive high threshold 'Low Registration' overall (trunks), and Simon was deemed active high threshold 'Sensation Seeking' overall (leaves), providing evidence of considerable heterogeneity within the sample. This is supporting the available literature that the identification of unique patterns of sensory processing associated with autism is proving elusive (Lane, Molley, & Bishop, 2015; DeBoth & Reynolds, 2017; Uljarevic et al., 2017).

The SPCR was completed by the parents or staff to ascertain if there were any additional sensory-perceptual issues which might compromise the intervention. The results indicate that Simon, Peter and Tom present a wide range of such 'differences' whilst Vince and Adi did not, again suggesting a significant heterogeneity within the sample. Insufficient data was available, however, to consider whether such differences could compromise the intervention, however.

A consistent, but tentative finding, nevertheless, for all five of the children using the Sensory Matrix was evidence of a fluctuating profile and for four of the five children using the SPCR. Adi's mother did not return a completed SPCR necessitating that the staff did so on her behalf. Lack of evidence of a fluctuating profile on Adi's SPCR, in contrast to his self-completed Sensory Matrix, may be a consequence of staff not knowing him very well, particularly as he was a new entrant to the ARB. The evidence, at least from self-report measures, suggests that all the children experience fluctuating profiles.

The possible presence of fluctuating profiles in all five cases is significant and adds tentative support to the view of researchers such as Lane et al. (2010) that fluctuating profiles may be a key issue in autism. There is very limited evidence in the literature outlining the implications of fluctuating profiles, however. Adi's comment about sensory overwhelm lends support for Haigh's (2017) premise, nevertheless, that greater trial-to-

trial variability reducing the stability of sensory information, may be a key issue, which impacts upon further sensory processing and impairs the individual's ability to interact with the environment. Gerrard & Rugg (2009) and Haigh (2017) link this with a decrease in capacity to generalise.

Other implications of fluctuating profiles, which are beyond the remit of the current study, include a possible interplay with 'Insistence on Sameness' (Uljarevic et al., 2017; Wigham et al., 2014), 'Restricted and Repetitive Behaviours' and anxiety (Wigham et al., 2014), the latter of which would go beyond the dominant explanation of anxiety in autism as 'thinking errors' requiring cognitive behaviour therapy (Greig & MacKay, 2005; Lickel, MacLean Jr., Blakeley-Smith, & Hepburn, 2012).

In the meantime, the heterogeneity found in the sensory profiles of these children support McKay, Greig & Connolly's (2017) call for more detailed assessment of the individual profiles and Howe & Stagg's (2016) advice that a 'one size fits all' approach is inappropriate when dealing with sensory challenges, placing the emphasis on schools to work with individual child profiles. The positive feedback from the participants in the current study, under the main theme 'I didn't know that before' suggest that the Sensory Matrix from the Sensory Intelligence programme can be considered a user-friendly self-report tool able to provide sufficiently detailed individual profiles to assist intervention planning.

4.1.7 Summary of chapter 4.

Chapter 4 was designed to provide a holistic overview of the results of this exploratory study and to explore the sensory profiles of the children. It outlined and discussed the main themes and subthemes from the perspectives of the participants, regarding the implementation of the Sensory Intelligence programme in a specific context using Thematic Analysis. It also acknowledged relationships between themes. These themes and relationships between themes, in conjunction with the sensory profiles generated for each pupil, will be used to answer the specific research questions in Chapter 5. Chapter 5 will also consider the strengths and limitations of the study, explore existing research in relation to the research findings, and the implications of the results for educational psychology professional practice.

Chapter 5: Discussion and Conclusion

5.1 Overview of Chapter 5

In this chapter the holistic results and the children's sensory profiles provided in Chapter 4 will be considered to answer the remaining research questions of this study. The existing research will also be explored in relation to the research findings. The strengths and limitations of the study are then examined. This is followed by a consideration of the practical implications of the study for educational psychology professional practice, areas for further research and reflections on the research process for the researcher. The chapter will conclude with a consideration of the study's unique contribution to the discipline.

5.2 Key Findings in Relation to the Research Questions

5.2.1 What C-M-O configurations are required for the successful implementation of the 'Sensory Intelligence' programme in an Autism Resource Base attached to a mainstream secondary school?

Although the sensory intelligence approach is considered suitable for adults and young people with autism (personal communication with Lombard), Lombard (2007;2015) does not specify the nuances involved in applying the programme to an autistic adolescent population nor in implementing it in an ARB attached to a mainstream secondary school. The conjectured CMO for the programme was formulated by combining the programme theory provided in Table 22 with the core components indicated in Table 23. It is presented in Table 43.

Table 43

Conjectured CMO:

CONTEXT	• The Sensory Intelligence programme, incorporating the 10 core components', when provided to participants over the age of 12 years enables them to:
MECHANISMS	• achieve conscious awareness of their sensory preferences, through the use of the Sensory Matrix, • resulting in increased understanding of their behaviour and that of others, • this understanding and the implementation of strategies provided, such as 'sensory snacks', 'sensory diets' and sensory ergonomics, enable them to consciously influence their sensory modulation.
OUTCOME	• Consciously influencing sensory modulation can enhance health and well-being.

The empirical data generated from the case study provides feedback on nuances and some of the challenges experienced implementing this programme in a ‘real-life’ context. This, in conjunction with the interrogation of the literature, allows consideration of a revised or ‘re-conjectured CMO’ to suggest ways forward for more successful implementation in the future. Such re-conjectured CMOs are also designed to be tested by subsequent empirical data as part of the ‘fine-tuning’ process.

Weiss (1997) indicated that it is important to distinguish between implementation theory and programme theory mechanisms. The former is concerned with structural or systemic issues, whilst the latter focuses on participants’ responses to the programme itself. With respect to the latter, Weiss suggests that ‘The mechanism of change is not the program service per se but the response that the activities generate’. (p.46). This study is concerned with both implementation theory and programme theory mechanisms and their implications for the successful implementation of the Sensory Intelligence approach in a specific context. It is considered prudent to consider both aspects separately for ease of explanation, however.

In terms of implementation theory considerable ‘real-life’ challenges were apparent which appear to have significantly influenced the ability of this study to fully establish potential benefits of the Sensory Intelligence programme. This is not considered unusual as similar difficulties were alluded to by researchers such as Blackwell et al. (2014) and Drmic, Aljunied, & Reaven (2017). Researchers, such as Wood et al. (2015), Macdonald et

al. (2017), Kasari & Smith (2013) and Fixson et al. (2013) have also commented on restrictions working within schools challenging implementation of evidence-based interventions. Odam et al. (2014) also warns about a 'perfect storm of complexity' due to the complicated logistic nature of secondary schools.

In the case of the current study these challenges contributed towards deviations to the intended study which are highlighted in appendix 19. The researcher was able to ensure that all key tenets of the programme were shared with the children and that extensive resources were provided for future reference, nevertheless.

'Essential elements' (White et al., 2010) likely to be pertinent in the 'Sensory Intelligence' intervention, such as the following, were lacking as a result of limited parental and staff involvement, neverthless:

- Parent and family involvement and the opportunity to practice new skills at home.
- Regular practice- learning and repeated practice of new skills in contexts that approximate as closely as possible, the situations and environments in which the adolescent needs to use the skills.
- Modelling new skills.

As children with autism may have difficulty generalising behaviours taught in one setting or with one person (Lovannone et al., 2003) a collaborative partnership with the family had been considered an intrinsic aspect of the intervention to promote generalisation between home-school. There was slight evidence of generalisation for Peter, with regards to homework, which was encouraging.

Lack of time for staff involvement also reduced:

- Access to 'insider knowledge' of the children to help incorporate the child's own interests into activities and to set realistic goals.
- Facilitation of the delivery of the programme in an engaging, fun and autism-friendly manner.
- The sustainability of the intervention after the researcher left (Kasar & Smith, 2013).

In order to minimise difficulties, the empirical literature (for example, Fixsen et al., 2010; 2013) emphasises the importance of investing in implementation capacity (Fixsen et al., 2013), namely extensive pre-intervention planning.

Detailed pre-intervention planning is considered a very time-consuming but necessary exercise, as opposed to "letting it happen" or "helping it happen" which characterises many of the past and current approaches. Odam et al. (2014) adds that an enabling context needs to be 'created and nurtured'. The researcher now appreciates that the pre-intervention planning for the current study, was not sufficient for reliable production of intended outcomes in practice (Fixsen, 2013).

Fixsen et al. (2010; 2013) suggests four implementation stages, each having different functions. Stage one is exploration in which time is spent determining need and capacity, which includes identifying whether staff had the interest, time, and expertise required and engaging with senior management. Lieber et al. (2009) found that staff 'buy in' was a key indicator that differentiated quality of implementation. The researcher wrote to the Head-teacher of the school who passed the letter onto the Head of Unit. All subsequent planning was conducted between the researcher and Head of Unit which meant that no senior managers were involved. This was clearly a mistake, and although the Head-teacher was leaving the school at the end of that term, it would have been prudent to establish a communication link and facilitate an interest in the programme.

Stage two is installation in which communication protocols are established and school personnel participate in any necessary training and planning. Communication protocols were not sufficiently established in the run up to the commencement of the study as the new Head of Unit was busy getting settled into his new management role. As meetings were postponed or cancelled, most communication also took place by email, which added to delay.

The original agreement was for a member of staff to co-present each session with the researcher. This would have formed a significant part of the staff training, in an apprenticeship role, provided there was also time available for session planning and formative assessment, at the end of each session. Due to staff sickness and the children not being 'group ready', and therefore requiring 1:1 or small group sessions, no staff were available to jointly present sessions and therefore there was no staff training element. Without staff awareness of the programme theory, they were not easily able to reinforce

the key tenets of the programme with the children. In addition, the building had not benefitted from an environmental audit prior to the commencement of the intervention nor during the study, which added to the sensory challenges faced by the children during the sessions which included the presence of bright displays on the walls, the telephone remaining in one of the classrooms and another classroom being used as the main entrance to the building.

Stage three is initial implementation where it is considered vital to develop an implementation action plan with timelines, respective roles and responsibilities and a clear strategy for using data for decision-making, including the modification of strategy if necessary. Liaison by email was insufficiently detailed to provide a clear implementation action plan; respective roles and responsibilities were changed, from what had been previously agreed, due to unavailability of staff and this had implications for ongoing formative assessment protocols. Summative assessment was also limited as a result of a change of ARB policy half-way through the term regarding the collection of behaviour logs and Autism Education Trust progression framework data, neither of which were subsequently available to the researcher at the end of the study.

According to Fixson et al. (2013), only after stages one to three of the implementation stages have been completed should the final stage of full implementation be considered appropriate. The consequences of insufficient pre-intervention planning suggest that it would have been prudent to have set aside a whole academic year for pre-planning purposes and to delay the start of the programme start until the following September. The researcher did not have this time-scale available, however, due to the time-limited nature of a Top Up Doctorate. The considerable process issues resulted in a reconfigured CMO, which is presented below:

A refined programme theory, targeting implementation theory, is presented as re-conjectured CMO 1 in Table 44.

Table 44

Re-conjectured CMO 1:

CONTEXT	• Children over the age of 12 years, attending an ARB attached to a mainstream secondary school are capable of fully benefiting from the Sensory Intelligence programme provided the following mechanisms are put in place:
MECHANISMS	• Liaison with the Senior Management Team to access funding to release staff for training purposes, to provide non-contact time and possibly some administrative support, during the intervention. • An environmental audit of the building is conducted and there is access to additional accommodation as required. • Staff training on sensory profiles, environmental adaptations and self-regulation is provided prior to the start of the intervention. • All necessary resources and suitable accommodation are made available at the start of the study. • Time and opportunity are available to facilitate trust and relationships with all participants involved. • Respective roles and responsibilities are clearly understood, which includes mainstream staff and family involvement. • Opportunities are afforded to practice new skills at home, in the ARB and in mainstream classes.
OUTCOMES	• An enabling context is ‘created and nurtured’ to facilitate the children’s ability to: • achieve conscious awareness of their sensory preferences, through the use of the Sensory Matrix, • increase understanding of their behaviour and that of others, • implement strategies provided such as 'sensory snacks', 'sensory diets' and sensory ergonomics to enable them to consciously influence their sensory modulation.

The testing of reconfigured CMO 1 would enable the researcher to explore the hypothesis that pre-implementation planning is vital for the development of an ‘enabling context’ to fully evaluate the Sensory Intelligence programme in the ARB and to ascertain outcomes more easily.

Whilst failure to give due regard to pre-implementation planning undermined the development of an enabling context, data generated from the case study through

observation and interviews with the children, parents and ARB staff, and subjected to thematic analysis, is available to partially test the conjectured programme theory. Taken as a whole, the analyses of themes provide the opportunity for more specific consideration of mechanism thinking which plays a key role in the evaluation of the programme theory. Whilst there are naturally numerous mechanisms and outcomes in play, the researcher has pragmatically chosen to highlight only the most robust tentative mechanisms and outcomes, at this point, as the purpose of the study is to ascertain whether the programme is worthy of more systematic research with this population.

Dalkin et al. (2015) warn that attempts to distinguish which aspects within an implementation process contribute mechanistically and which contribute contextually is a key realist researcher's quandary. Their suggested way forward, adopted by this researcher, is to consider both reasoning and resources to be mechanisms.

When the resources associated with the Sensory Intelligence programme (book, lessons, reference file, exercise equipment etc.) are introduced into the context of the ARB, there is an interaction between them which influence the reasoning of the participants towards the programme. Any alterations in their behaviour are then considered to be outcomes. The main themes revolved around the importance of relationships ('I'm listening'), previous knowledge and understanding of sensory processing ('Where does the expertise lie?'), respective responsibility ('Whose job is it anyway?') and suggested ways forward ('A 'can do' approach to 'real-life' challenges') though systemic issues are the focus of re-conjectured CMO-1.

A re-conjectured CMO 2 focusing on programme theory is presented in Table 45:

Table 45

Re-conjectured CMO 2

CONTEXT	• Children over the age of 12 years, attending an ARB attached to a mainstream secondary school are provided with the sensory intelligence programme. The parents and teachers are provided with the associated reference materials.
MECHANISMS	• The children are engaged when information is presented by activities which are fun and accessible to them (requiring autism-friendly approaches). • Children share sensory experiences with trusted adults and problem-solve together. • Provided they have access to the materials, parents' prior knowledge and experience of sensory issues enable them to incorporate aspects of the programme into their interactions with their children and other members of their family. • When staff have time to access and discuss the materials, they consider respective responsibilities and what aspects of the programme are manageable in their working environment.
OUTCOMES	• The children become more aware and understanding of their own and others' sensory preferences. • The children feel empowered to manage their own sensory needs more easily using some of the strategies provided. • The children become more tolerant of others. • Some parents have increased understanding of their own and family's sensory needs. • Parents suggest the need for school staff to receive training to meet the sensory needs of their children more easily. • Parents share considerable knowledge and expertise which could assist staff in meeting the needs of the children more easily. • Staff consider the benefits of using sensory profiling in their work and raising the awareness of mainstream staff.

A reconfigured C-M-O is not designed to confirm any hypothesis, but rather to afford new ways of thinking to open fresh avenues for further empirical enquiry (Emmel et al., 2018). The re-configured C-M-O 2 is designed to contribute to what realists' call 'the theory of the middle range' (Pawson, 2018). These are bundles of hypotheses that can be

tested empirically. They are referred to as ‘middle range’ because they are abstract enough from one instance, such as the ARB in the current study, to test in other situations.

The tentative evidence of awareness-raising, understanding and empowerment, supporting the sensory intelligence programme theory, despite real-life challenges reducing intended exposure to the programme suggests that the material is both robust and relatively easily accessible to adults and children with autism over the age of 12 years. This indicates that the programme may have the potential of being provided as a short, low-cost intervention package.

The links between the research findings and the existing literature will now be discussed within the context of the remaining secondary research questions.

5.2.2 What are the potential benefits and limitations of the ‘Sensory Intelligence’ approach for this population?

Due to process issues highlighted above and detailed in Appendix 19, the Sensory Intelligence programme was not explored to the extent intended. The tentative results available, nevertheless, are encouraging, suggesting several benefits of the programme for this particular group of high-functioning autistic adolescents, their families and school staff.

The inclusive ethos that sensory processing differences are a normal aspect of neurodiversity is a strengths-based approach that ignores the dominant discourse of autism as a disability/disorder. Googley and Runswick-Cole (2012), for example, consider four different ‘disability’ accounts of autism, and warn against dominant discourses which threaten to ‘pathologize’ and separate disabled children from their families, peers and the wider community.

The sensory intelligence approach instead considers individual sensory profiles to be an asset in the right context, which is reinforced by consideration of the ‘right niche’ regarding suitable careers. This ethos was clearly welcomed by the children given evidence of a stigma attached to their diagnoses, and a fear of being perceived as ‘different’. One example of the latter was Adi’s reluctance to make use of ‘reasonable adjustments’ in mainstream classrooms.

The inclusive ethos **facilitated the children’s willingness to engage with the programme and to talk about their sensory experiences, some for the first time,**

because in the past they assumed that because they were ‘different’ no-one would understand. This sentiment was evidenced by comments made by both Simon and Vince, whilst Adi shared sensory experiences he had never spoken of before. According to Ashburner, Bennett, Rodgers & ZivaIti (2013) first-hand accounts of intensely personal sensory experiences are rare within the literature and it is important to find ways in which students ‘voices’ can be heard more easily. MacCobb et al. (2014) added, in their study using the Alert Programme, that not labelling anything ‘good’ or ‘bad’ was a major benefit of their programme as well, which helped enhance self-efficacy in owning and regulating behavioural responses as a first step towards self-management.

Although the parents of the children with autism in this study generally proved to be well versed in sensory issues and solutions as a result of bringing up their own child, **the activities also provided a vehicle for pupils to share information that was not previously known to parents**, **facilitating deeper insight**. This was also a consequence found in the BOOST-A programme reported by Hatfield, Falkmer, Falkmer & Ciccarelli (2018).

In some cases, parents of autistic children can also have their own sensory challenges (Uljarevic, Prior, & Leekham, 2014; Glod, Riby, Honey, and Rodgers, 2017) and in this case **some parents were willing to share this information within the inclusive ethos of the programme.** This helped them consider their own needs and those of the whole family, some of whom may also have sensory challenges without an autism diagnosis (Dean et al., 2016). It also **facilitated dialogue regarding child-advocacy, joint-problem-solving and teamwork to address individual needs in the school context.** Several parents added that the programme offered many more strategies than anything available elsewhere, suggesting considerable practical benefit.

The study further suggests that **high-functioning autistic adolescents can understand the key tenets of the programme** without the need for extensive modification of the content. This level of awareness supports the programme theory that it promotes better understanding of themselves and that of others and appears to provide motivation to use strategies for positive change. It was ‘empowering’ for the children, in this respect. This ‘empowerment’ will be discussed further in section 5.1.5.

Whilst The Alert Programme (Williams & Shellenberger, 1994) has reported similar engagement and understanding for non-autistic middle-school pupils (Salls &

Bucey, 2003; Cobb et al. 2014), and both programmes share many features, including the analogy of engine speeds ('How does your engine run'), what is unique about the sensory intelligence programme is the **Sensory Matrix**. As an expanded version of the AASP, it **provides individual sensory profiles,** including the presence of fluctuating profiles, in sufficient detail to help inform an individualised sensory intervention. Lombard (personal communication September 2017) considers that this tool, which is also available on-line as an e-profile, is the most detailed currently available. Whilst it has yet to be standardised, the profile data used in conjunction with extensive intervention strategies provided by Lombard (2015) has considerable potential for the provision of individualised intervention, which have been advocated by many researchers, including Dunn, et al. (2012). Individuals' awareness of how their sensory experiences might be different from others is also deemed important for the development of conscious coping strategies (Smith & Sharp, 2013).

The inclusive nature of the programme also encourages the sharing of profiles, should the student agree, and this sharing of profiles appears to **facilitate better understanding of others and to promote positive relationships which may enhance autistic adolescents' tolerance** of others. As such this may have positive implications for social interaction. Social Perspective-Taking interventions for students with high functioning autism tend to focus specifically on Theory of Mind via one to one, group or virtual reality approaches, which have shown some success but generalisation across contexts remains elusive (Southall & Campbell, 2015). The use of the Sensory Intelligence approach at home and at school may, therefore, be extremely valuable and worthy of further investigation, in this regard.

The positivity of the results, despite significant process issues, suggests that the key tenets of the programme can be taught relatively quickly to both the children and their parents and has the potential to be **a cost-effective approach**, as a result (The final E in EMMIE). In the current study, none of the children had the full 8 x 45 minutes sessions over 8 weeks. Some of the sessions had to be doubled up and compressed due to child absence for sickness/upset, timetable clashes and/or inclement weather (snow). Circa 75% of the intended amount of exposure was achieved suggesting 6 sessions would suffice to focus on the key tenets of the programme per se. This could, ideally be followed by a period of practice/consolidation and the inclusion of follow-up sessions later in the term, for fine-tuning purposes as well as embeddedness into the ethos and fabric of the school, as

recommended by implementation science theorists such as Kelly (2012a). This low-cost effectiveness strand supports Rogers et al. (2014) view that participants (in their case parents) may learn to provide intervention strategies with fidelity with as little as 8 hours training. Staff training and engagement would be additional to this, however.

Whilst the parents and children were very positive about the programme with more than one parent commenting that there was 'nothing to dislike about it', limitations were apparent with respect to the **child's ability to use his 'sensory intelligence' independently without prompts** from adults and more control over his environment. The latter was particularly problematic in both the ARB and mainstream school. Barnes et al. (2008), using The Alert Programme, with younger non-autistic children, for example, noted that the staff use of prompts helped them to become more aware of the classroom sensory environments and to anticipate environmental sensory triggers more easily, so consequential negative reactions could be avoided. Use of the programme strategies throughout the school day also increased the amount of practice and generalization for those children. The importance of embedding learning into daily routines and making support available was also emphasised by Edgington, Hill, & Pellicano (2016). Much of this was absent in the current study, other than 'Take 5, Take a Break' posters on display in the ARB classrooms between researcher visits as a reminder for the children.

Increased staff awareness of the benefits of sensory profiles, towards the end of the intervention, was promising, nevertheless. This led to discussion of respective responsibilities within the school environment and between home-school and a commitment to use sensory profiling with all new entrants which is likely to be beneficial. This suggests the importance of **raising the awareness of staff, at all levels, to facilitate systemic change**. The pre-intervention planning outlined in the configured CMO 1 above, therefore needs to be an integral part of the intervention to tackle common process issues in 'real-world' secondary school contexts.

The importance of developing positive relationships with trusted adults, in order to share sensory experiences, was also clearly evidenced in the thematic analysis. The literature suggests that the experience of a 'secure base' is important to afford the child the opportunity to feel safe in exploring and learning new skills (Grantham & Primrose, 2017). This links with Maslow's (1970) hierarchical theory of motivation, in which basic needs,

such as physiological and security needs must be satisfied before willingness to learn (motivation) can occur.

MacCobb et al. (2014) commented on the importance of positive relationships for the success of the Alert Programme and Edgington, Hill, & Pellicano (2016) did the same in their study using CBT. The literature also acknowledges the important of relationships in secondary school nurture studies, suggesting that staff characteristics are crucial, in order to establish and maintain relationships based on respect and equality (Garner & Thomas, 2011; Kourmoulaki, 2013; Grantham & Primrose, 2017). Verschueren & Koomen (2012) highlight the importance of teacher sensitivity to children's needs, as a central proximal determinant of relationship quality. This suggests that staff also sharing their own sensory profiles, and the strategies they use for self-regulation, could be an important way forward provided they were willing to do so. The children certainly appreciated the researcher's choice to disclose such information during the study. It would be unethical to oblige staff to do this, however.

Relatedness is also considered to increase intrinsic motivation and the presence of a responsive and supportive person can facilitate increased engagement in the intervention (Ryan and Deci, 2000). Garner and Thomas (2011) acknowledge this can be problematic in secondary schools as they tend to have a more individualistic, subject-defined focus involving more impersonal interactions with teachers. The provision of a 'safe' place, allocated time and consistent staffing does suggest that ARBs attached to mainstream secondary schools are in a better position to develop the required relationships, however. Sabol & Pianta (2012) add that recent work on targeted professional development using a relational perspective demonstrates some success in improving teacher-child relationships, which has been shown, in some cases, to improve children's outcomes, suggesting the benefit of in-service training for staff (Hughes, 2012).

School culture, is nevertheless, an added consideration. This was noted as an important factor by MacCobb, Fitzgerald, & Lanigan-O'Keeffe (2014) in their comparison of two middle schools. It was also highlighted by Grantham & Primrose (2017) in their study of the effectiveness of nurture groups in the secondary school context and emphasised by Implementation Science frameworks, which Kelly & Perkins (2012) argue are key for EPs to facilitate effective interventions in schools.

According to Glover & Law (2004) school culture is the sum of all the aspirations, relationships and practices within a school. Prosser (1999) describes this as a 'black hole or fertile garden'. den Brok, Brekelmans, & Wubbels (2004) consider that a positive culture consists of a positive and empathic environment, in which staff know and care about pupils, and share their vision of the goals of the organisation and the means of achieving these goals. The best results are likely to be achieved in a 'fertile garden' school which upholds compatible beliefs and values to that of the programme theory particularly as willingness of secondary schools to consider new interventions which are not a 'quick fix' and require systemic change is likely to be a significant barrier to the uptake of this programme. It will also be important for further research to be conducted to strengthen the available evidence-base to support it in order to interest schools in trialling this approach.

5.2.3 Which sensory-perceptual profiles, if any, might benefit most from the 'Sensory Intelligence' approach?

It is not possible to answer this research question in an informed way based on the data that was gathered. The study is also limited in its ability to address this research question with only two low threshold and three high threshold children involved. There were noticeable differences between the two groups, nevertheless, which may tentatively offer insights worthy of empirical investigation with larger samples.

Vivanti et al. (2014) emphasised the importance of analysing the profiles of 'responders' and 'non-responders' in such intervention studies. Preliminary findings suggest that despite a significant heterogeneity within the sample all the children appeared to benefit from the programme, as did members of their families, providing evidence of a universal appeal. The three boys with a 'short fuse' (Simon, Peter and Adi) are all presenting high threshold profiles, however, and appear to have a 'short window' of awareness before having a 'meltdown'. Staff felt that Simon, for example, needed a lot more support over a prolonged period of time, compared with the other children. High threshold children are likely to need focussed support to notice their responses to sensory stimuli and to actively plan a reaction to help reduce externalising behaviour (Dean et al., 2018).

Low threshold children such as Vince and Tom, on the other hand, appeared to understand the programme more quickly, with Tom complaining that 'it appears to say the same thing in lots of different ways.' This supports Baron-Cohen & Lombardo's, (2017)

argument that heightened sensory processing may mean more information is available to enhance attention to detail. This would suggest that low threshold children may require less over-learning and prompting than high threshold children (de Villiers, Lionetti, and Pluess, 2018).

The literature also suggests the possibility of 'Vantage Sensitivity', which stipulates that some individuals disproportionately benefit from supportive conditions if they are also presenting Sensory Processing Sensitivity (de Villiers, Lionetti, & Pluess, 2018; Klingenberg & Rutten, 2018). de Villiers, Lionetti, and Pluess, (2018) argue that enhanced ability to register and process external stimuli is a key factor, due to low sensory thresholds, which were evidenced in both Vince and Tom. The possibility of Sensory Processing Sensitivity in an autistic population has yet to be investigated, however. In the current study it was decided it would be unethical to ask the children to complete the Highly Sensitive Child questionnaire, particularly as the ethos of sensory intelligence is that of 'no labels' and there was insufficient time to explain yet another diagnostic label. Vantage Sensitivity remains a framework with potentially significant relevance to heterogeneity in response to interventions, and particularly with respect to sensory-based interventions, nevertheless.

5.2.4 What is the impact on the students of the Sensory Intelligence approach?

This research question could only be tentatively answered, given the limitations of the data. The original intention of the study was to provide descriptive statistics based on a comparison of behaviour logs and Autism Progression Framework data for the term prior to and during the intervention to facilitate a response to this research question. Due to a change of ARB policy during the intervention term staff ceased to collect such data for progression purposes on the grounds that it was too time-consuming. As a result, such data was not available at the end of the study. This resulted in a lack of explicit measurements of participant-level outcomes in educational contexts. A consideration of all the potential effects on the children, when using the sensory intelligence programme, is also hampered by the process issues described above.

Very tentative results are available on effects reported by the participants, nevertheless, taken from the field-notes and interview data. These were collated within case study pen pictures of each child in the form of 'noticings' (Braun & Clarke, 2013)

which are included in Appendix 18. These ‘noticings’ can be placed into seven categories, three of which support the sensory intelligence programme theory; increased awareness, understanding and use of strategies, with the addition of openness to learn, willingness to talk about sensory issues, tolerance of others and negative reactions. All of these have been captured in the themes generated in Chapter 4.

The children were willing to talk about sensory preferences and to think of both techniques and environmental adaptations which may be beneficial. These include use of smells, music and movement to control arousal level. This supports Edgington, Hill, & Pellicano (2016) and MacCobb, Fitzgerald & Lanigan-O’Keeffe. (2014) who both highlighted the ability of adolescents to develop their self-awareness of sensory processing, understand its impact on behaviour and on relationships with others, and report some success regulating arousal level using a variety of strategies. The one report of negative reactions, in the current study, related to Simon’s ‘meltdown, but this meltdown only occurred when he heard staff talking about his ‘failed’ efforts to concentrate using music, and was not, therefore, a direct result of the intervention. MacCobb et al. (2014) emphasised the importance of experimenting with and exploring different strategies to find the ‘just right’ level of arousal appropriate to the task in hand. In Simon’s case there was also the possibility of additional executive functioning difficulties, however.

There was evidence of some self-consciousness about using some of the strategies in mainstream school classrooms. This was demonstrated, for instance, by Adi who explained that he did not want to use a word-processor or an exit card in class, for fear of being seen as ‘different’. Such self-consciousness in this age group was also reported by both MacCobb et al. (2014) and Cullen-Powell, Barlow & Bahn, (2005) suggesting the need to consider discreet options, where necessary.

Tentative suggestions of improved self-awareness, problem-solving and self-regulation ability suggest that the sensory intelligence approach may be empowering for the children. There are many interpretations of the term ‘empowerment’, based on different understandings of the topic. In the current context, however, the understanding presented by Aujoulat, d’Hoore, & Deccache, (2007) is adopted. This is based on a humanistic philosophy which views human beings to have the right and ability to choose for themselves. Self-determination is a strong guiding principle and the process is viewed as a way of gaining more power over one’s life. Possible consequences of empowerment could

include behaviour change, enhanced control, personal satisfaction and responsibility leading towards enhanced quality of life, an enhanced capacity to cope with negative feelings, and/or a transformation of self in relation with one's environment. As a result of the empowerment process, the person's self-efficacy, assertiveness, self-awareness and sense of autonomy are enhanced. It has close links with Self-Determination Theory (Ryan & Deci, 2002) and Self-Efficacy Theory (Bandura, 1988). An empowering relationship implies that school professionals give away some control, however, to facilitate self-determination, hence the need for staff involvement in an enabling ethos.

5.2.5 What is the impact of parental involvement?

This research question could also only be tentatively answered, given the limitations of the data. One of the most pertinent findings of this study, nevertheless, was the level of expertise of the parents with relation to sensory needs of their children. This parental expertise appears to be an invaluable aid in establishing strategies which work for their children, and in 'opening up that conversation' regarding systemic issues in both the ARB and wider mainstream secondary school environment. This contributed to challenging the stance that 'everyone thinks it's someone else's job' (Hatfield et al., 2018) amid a call for teamwork.

Parental expertise in facilitating optimal conditions to match the child's unique sensory profile with the task and the environment appears to be an under-researched area in the literature but was viewed a considerable asset in the current study. Pfeifer et al. (2017) reported that parents of autistic children often intuitively incorporate strategies to accommodate sensory preferences of their children at home. All six of the main strategies adopted by the parents in their study are also embedded in the sensory intelligence approach and other programmes such as SCERTS (Prizant et al., 2003).

These are:

- Maintaining or establishing routines. Children demonstrate less intense or problematic behaviours when the daily activity is embedded into a routine.
- Allowing the child to have more control and choice in the environment.
- Preparation & anticipatory planning.
- Ensuring the presence of certain sensory factors that support and enable participation.

- Adapting the sensory factors of the activity or environment.
- Implementing sensory strategies by increasing or decreasing stimuli based on the child's needs and sensory response to the environment.

Because the sensory intelligence approach includes the active involvement of the children themselves, there was additional tentative evidence of joint problem-solving and generalisation from home-school. Learning generalisation to new situations, such as homework, was also evidenced in the Alert programme (MacCobb et al., 2014).

Whilst working in partnership to support the child at home was limited by lack of access to materials due to an administrative oversight, the overwhelmingly positive comments of the parents ('It's brilliant', 'There is nothing to dislike about it' and 'I would have liked access to it much earlier') was a major endorsement of the programme content from participants who already had a considerable level of expertise. The interview data indicates that Peter's mother made effective use of the material as soon as it was belatedly provided. The field notes also noted that Adi's mother was friendly and knowledgeable about sensory issues prior to the incidence where her son was given a fixed-term exclusion. Her lack of engagement in the follow-up interview was explained by staff as being due to stress rather than anything related to the programme, but her perspective remains unknown as it was deemed unethical to pursue her, at the time.

Whilst the content of the programme appeared to complement what many of the parents were already doing, there was also evidence of it enhancing parental competence in the case of Peter's mother, in particular, as she began to understand her capacity to find solutions for situations she had not previously fully understood. This is consistent with other studies of parent empowerment using a partnership approach (for example, Dunn et al., 2012).

5.2.6 Can this intervention be delivered effectively to children in Years 7 – 11 who attend an ARB?

It is not possible to answer this question in an informed way based on the data gathered. The tentative evidence available suggested that all the participants considered that the Sensory Intelligence programme was a viable option for children of that age group attending an ARB, with the exception of one child with speech and language difficulties, as that age group were considered able to comprehend the main tenets of the programme theory and to have sufficient self-awareness to benefit. There were potential individual

differences in the speed at which they could benefit, however, which may be related to their sensory profile, as discussed in section 5.2.4. All the children also indicated that they would recommend the programme for children in other ARBs because it was ‘interesting’ and ‘useful’.

The initial perspective of the staff was that ‘effective’ delivery should result in the children being able to incorporate the basic tenets of the programme independently because staff did not have sufficient time to support them. This appears unlikely, however, and the parents, who knew their children best, indicated that they would require prompts from the adults around them, at least initially. MacCobb et al. (2014) also reported that some of the pupils in their study required prompts. A stepped approach may be required, as a result, starting with prompting from adults, which is reduced as and when the child is able to take increasing responsibility for their self-regulation.

The parents also felt that the programme would only be truly effective if it was embedded into the daily routine of school which would require enhanced staff awareness and an enabling context, suggesting the need for systemic change. Blackwell et al. (2014), in their study of the Alert programme with a much younger cohort of autistic children emphasised the importance of activities and experiences becoming embedded into the daily routine of the classrooms. MacCobb et al. (2014) added that debriefing and session planning with teachers helped support the teachers in integrating learning from the programme into regular classwork and routines, suggesting the need to negotiate staff availability. They further indicated the importance of raising wider school awareness, for which they provided a two-hour presentation on sensory processing and a brief overview of the programme. Whilst parents and ARB staff were also provided with such a presentation in the current study, this could also usefully be made available to key mainstream school staff, including the Head Teacher. Effective delivery would, therefore, suggest the importance of investing in implementation capacity (Fixsen et al., 2013), by including the senior management team, mainstream teachers and ARB teachers, working co-operatively with parents and providing the time and resources required. Some of the mechanisms with which this could be achieved are discussed in the next section.

5.2.7 What do the participants suggest could be improvements to the 'Sensory Intelligence' intervention programme?

It was not possible to answer this research question in an informed way based on the data that was gathered. Feedback on how the programme could be further developed to meet the needs of this population was, however, provided by the children, their parents and the school staff. These comments generated a main theme of 'It would be better if…' comprising of the three subthemes discussed in chapter 4. Two of the subthemes; 'Many hands make light work', and 'A 'can do' approach to tackling 'real life' constraints' are systemic in nature. The third sub-theme 'Programme development' relates more to the fine-tuning of the programme to better meet the needs of autistic adolescents, given that the original approach (Lombard, 2007) was designed for adults. This demarcation aligns with the two discrete categories discussed by Weiss (1997) who distinguishes between implementation theory and programme theory mechanisms.

The parents were the most vocal with respect to systemic issues and argued for the need to raise ARB staff and mainstream staff awareness of sensory issues, in conjunction with using transition from primary school to secondary school to better prepare both the children and the receiving teachers to meet their sensory needs. It was felt that their children could not learn to their best ability if sensory needs were neglected and lack of staff awareness was a barrier.

Comparisons between primary and secondary school provision were made, with the view that relationships and resourcing were better developed in the primary sector, with the implication being that primary colleagues' experience was an untapped resource. The ARB staff also considered that the involvement of primary school staff in providing sensory profiles prior to transfer would be particularly helpful.

Fortuna (2014) indicates that there is a paucity of formal research into the difficulties faced by children with autism when transitioning from primary to secondary school, despite sensory difficulties making the secondary school environment particularly challenging for this population (Tobin et al., 2012). Tobin et al. (2012) highlighted school concerns regarding a lack of practical advice and support regarding appropriate strategies, despite research demonstrating the importance of acknowledging parental expertise and incorporating parents' own strategies into school-based practice. The evidence suggests that parents are still predominantly left out of educational discussion-making. Children's

insights into their own sensory needs could also be given more ‘voice’ as part of the process. This could include feedback to secondary school staff on ‘what works for me’ and ‘what I find helpful’ based on experiences in primary school as well as at home.

Tobin et al. (2012) indicated that one of the parents, in their study, prepared an A4 sheet with a picture of her son, his strengths and difficulties and a list of useful strategies, which she distributed to all of the staff who would be in contact with him, before he started at the secondary school. At a post-transition interview, it was apparent that the strategy had been unsuccessful as the teachers still did not understand his needs or use the strategies provided, however. It was considered that poor communication stemmed from a lack of understanding of autism. The researchers further indicated that the Head Teacher’s knowledge of autism and attitude towards inclusion were significant factors. West, Ainscow, & Stanford (2005) also contend that the ethos of the school is defined by the Head Teacher. Makin, Hill, & Pellicano (2017) add that system-level changes are required in the way that local authorities manage the transition process to improve children and families’ experiences. They argue that very little is still known about the child, school and system-level factors that may be important for a successful transition. Makin, Hill, & Pellicano report predominantly negative experiences, in their study, which was attributed to lack of primary school preparation and communication between schools.

The UK-based Systemic Transition in Education Programme for Autism Spectrum Disorder (STEP-ASD), introduced in Chapter 2, is designed to modify the school environment before, during and after transition to improve the fit between the child with autism and their educational environment, and has reported promising results as a result of increased staff awareness (Mandy et al., 2016). The researcher would argue that such a framework is a very useful one for EPs to adopt, possibly in co-operation with their clinical and occupational therapy colleagues. The unique contribution of the educational psychologist would be in-depth knowledge and understanding of school systems to help facilitate effective uptake of such a ‘low intensity’ intervention, particularly as Mandy et al. (2016) reported ‘full’ implementation of STEP-ASD in only 20% of their secondary schools.

In contrast with the STEP-ASD approach, the sensory intelligence intervention is designed to facilitate empowerment of the pupils themselves, as well as staff, by disseminating the programme theory over a finite number of lessons and providing the

children with their own strategy pack for reference purposes. The researcher would envisage, in consultation with parents, primary school staff and the Head of the ARB, that during Year 6 prior to secondary transfer, there would be the development of a pupil sensory profile within a 'Transition Management Plan', and the provision of suitable strategies for mainstream secondary school teachers to enhance the 'enabling context' of the receiving school. The provision of the 'Sensory Intelligence' programme, as an easily accessible approach to teach self-regulation strategies and environmental adaptations, could then be provided to the child during Year 7, once they have had the chance to settle into their new school and the opportunity to develop a positive relationship with the member of staff delivering the programme.

The question of who should provide the programme resulted in different responses from the staff and the parents. Staff shared concern that a person not known to the children could contribute towards 'overload', whilst the parents appreciated the involvement of an outside professional to raise staff awareness and to provide practical solutions. Provided the staff are given the time and opportunity to familiarise themselves with the programme theory and content, the researcher cannot see any reason why a member of the ARB staff could not deliver the programme. An EP, attached to the school, could provide a consultative role and be involved in plan, do, review discussions with parents and staff, nevertheless.

ARB teacher training sessions, as discussed in Question One above as part of the pre-intervention planning, provided by the consultant EP, are considered vital to gain initial investment and ownership in conjunction with preparing them for their respective roles and responsibilities (Blackwell et al., 2014). Regular feedback sessions with these teachers are also critical to offer them a space to contribute to the direction of the intervention, using their own expertise working with children with autism and their knowledge and insights regarding the individual children. In the current study, this would have also helped the fine tuning of programme. Opportunities for collaboration and growth were lost as a result of teacher unavailability during the delivery of the programme.

Working as a team, with the parents and EP, would also facilitate goal targeting based on individual needs with adults providing much needed prompts. According to Ryan & Deci (2000) achievement of goals provides a sense of progress and increases feelings of competency, which enhances self-determination. This, the researcher would suggest, might

assist the adolescent in reducing the use of what is commonly referred to as ‘maladaptive coping strategies’ (Dunn, 2014). Autonomy is a critical precursor to self-determination and can only occur when adolescents are provided with suitable choices, and their needs are acknowledged hence the need for a system-wide response in an ‘enabling’ environment.

Under the theme ‘Programme development’, the staff, children and parents provided very useful suggestions to fine tune the programme content to better meet the needs of adolescents with autism. To maintain programme fidelity the researcher had retained as much of the original material as possible, taken from Lombard (2007) and Lombard (2015). This material was designed for adults and contained copious lists of strategies, which was appreciated by the adults involved but considered ‘too wordy’ by some of the children. Some simplification of the materials was incorporated but feedback suggested that this could be further developed, particularly for children with subtle receptive and/or expressive language difficulties.

Murin, Hellriegel, & Mandy (2016) suggest the following strategies would be helpful to address autistic language-based difficulties:

- Shorter spoken sentences.
- Simplification of vocabulary.
- Slowing down rate of speech.
- Providing one part of an instruction, at a time.
- Check for understanding.
- Repeat spoken directions.
- Allow plenty of silence and pause after each instruction to provide extra time for processing language.
- Provide supplementary written instructions.
- Use handouts with step-by-step instructions.
- Use diagrams, flowcharts and other pictures to illustrate new ideas.

Some of the children also had difficulties of thinking of examples (Tom) and expressing emotions (Peter) suggesting the need for visual prompts and/or forms of communication other than language. Peter suggested using different coloured balloons to demonstrate feelings whilst Tom might benefit from access to photographs or diary entries, as reminders. ARB staff also emphasised the benefit of using more pictures in the pack,

given the children's visual strengths. Hatfield et al. (2018) utilized cartoon animations and visuals to engage autistic adolescents, to good effect, in their BOOST-A intervention.

Preliminary results also suggested the need to differentiate lessons based on prior knowledge and sensory profiles, with the possibility that low threshold children may learn more quickly and need less overlearning than high threshold children.

The children asked for more 'fun' activities in the form of sensory investigations, and a parent suggested that parents could usefully be invited to join them in group sensory activities, which could be arranged, provided due regard is given for those parents who work during school hours.

Autism-specific approaches such as the use of social stories and incorporation of special interests were also suggested. 'Social Stories' (Gray, 2004) is a technique which can be used to explain socially appropriate or desirable behaviour in a consistent visual form. It is predominantly used to explain social cues and appropriate responses in a specific situation but has also been used successfully to help improve self-regulation in younger children (aged 3 – 5) with autism (Thompson & Johnson, 2013). Social Stories could easily be incorporated, in the programme, to model different sensory profiles and effective strategies for children who are not 'group ready' to share experiences with peers, and as supplementary material for those who are, to widen their awareness and understanding of individual differences to promote tolerance of others. Thompson & Johnson (2013) recommend that after reading the Social Story, the interventionist and child discuss the story and practice relevant strategies. They also found some generalisation across contexts which were attributable to this approach.

Winter-Messiers et al. (2007) conducted interviews about special interests with 23 participants with Asperger Syndrome, aged 7 – 21 years, and received survey responses from 18 of their parents. They report that special interests are 'passions that capture the mind, heart, time, and attention of individuals with AS, providing the lens through which they view the world' (p70). They add that these special interests enable them to achieve quite extraordinary levels of performance in certain areas, supporting a strengths-based model of autism, which is congruent with the Sensory Intelligence approach. Winter-Messiers et al. (2007) also found higher level ability in communication skills when the child was talking about their special interest. They suggest that incorporating a pupil's special interest into school, home and community activities may result in positive changes

in attitude, motivation, skills, engagement, compliance, and the general well-being of the child. It would also help enhance a positive relationship with the professional because of this interest in something very personal to the child, suggesting that the inclusion of special interests in the Sensory Intelligence programme could be very beneficial.

Based on participant feedback and the available literature, the researcher has summarised recommended changes in Table 46:

Table 46

Proposed Changes to the Sensory Intelligence Intervention based on the Recommendations of the Participants and Available Literature:

Improvement	Justification	Action required
The development of a sensory profile with practical strategies as part of a 'Transition Management Plan' in Year 6.	To incorporate the expertise of the primary school staff, the parents, the child and other professionals in conjunction with the secondary school expertise of the Head of the ARB. This would result in the provision of suitable information and strategies for mainstream secondary teachers and ARB staff to make reasonable adjustments following secondary transfer. This would facilitate an 'enabling context' for the child.	Involvement of primary school staff, parents, child and ARB Head of Unit in Year 6 with monitoring in Year 7. Mainstream staff would be provided with a transition pack of strategies. The Head of the ARB would be responsible for monitoring inclusive practices. The family and EP would be involved in subsequent plan, do, review meetings.
Pre-implementation planning for the provision of the Sensory Intelligence programme for the Year 7 children joining the ARB. Year 7 children with autism not attending the ARB could also be invited to participate.	The targeting of structural or systemic issues which may need to be addressed to facilitate the success of the transition of new pupils that considers and addresses their sensory differences.	Involvement of senior managers, ideally including the Head Teacher, as well as parents, the child and staff, in the decision-making process to ensure that suitable resources, accommodations and ARB staff non-contact time is available (Stage 1 of Fixsen et al. (2010:2013) implementation stages.)
Communication protocols are established, and school personnel and parents participate in training to understand the core components of the sensory intelligence approach.	To ensure that all participants work as a team and as such are fully aware of their respective roles and responsibilities during the implementation of the programme	The provision of presentations and discussions of the programme theory with staff and parents with agreement of respective roles and responsibilities (Stages 2-3 of Fixen et al. (2010:2013) implementation stages. An important element is a formative evaluation framework to help fine-tune the programme as it progresses.

CONTINUATION: Table 46

Proposed Changes to the Sensory Intelligence Intervention based on the Recommendations of the Participants and Available Literature:

Improvement	Justification	Action required
Time and opportunity are made available to facilitate trust and relationships between the programme implementers and the children involved.	A key mechanism in the success of the programme is positive relationships with the children to enable them to feel safe and secure and willing to engage with the programme, share sensory experiences with trusted adults and problem-solve together.	The programme implementer needs enough time to get to know and develop positive relationships with the children, suggesting that the programme could usefully be conducted in the Spring Term of Year 7, once the children have settled into the school.
The resources associated with the Sensory Intelligence programme are 'autism friendly' and differentiated to child ability and skills.	Adaptations are required, having regard for the age and presenting strengths and difficulties of the children involved, to enable them to fully benefit from the programme.	The programme content requires ample inclusion of practical investigations, visual aids, social stories and reference to personal interests to facilitate engagement. Presentation, content and resources will also need to be suitably differentiated to have due regard for prior knowledge, receptive and expressive language difficulties, and individual sensory profiles.
Parental involvement is encouraged via inclusion in some of the practical activities with the children; the provision of summaries of the lessons in a timely manner, and involvement in formative and summative assessment.	Provided they have access to the materials, parents can support the key tenets of the programme at home, thus enhancing consolidation and generalisation. They are also able to share their considerable expertise with other participants in the fine-tuning of the programme.	Strong home-school links and positive relationships with parents are required. This will necessitate regular meetings and may require some administrative support to ensure that material is sent home on a weekly basis.

CONTINUATION: Table 46

Proposed Changes to the Sensory Intelligence Intervention based on the Recommendations of the Participants and Available Literature:

Improvement	Justification	Action required
Programme fidelity is monitored by assessing the presence or absence of the core components on a session-by-session basis.	Whilst inclusion of the key tenets of the programme is critical for the success of the intervention, over-prescription of activities would undermine the unique needs of the participants and context involved.	Any manualisation would emphasise the key tenets or 'core components' of the programme and provide guidelines with a checklist after each lesson. At the same time, however, it would allow flexibility in decision-making regarding the way in which the key tenets are presented in the light of the programme implementer's knowledge of the child and the context(s) in which the intervention is taking place.

5.3 Summary of the main findings of the study.

The use of a process-orientated framework for the collection of data provided much insight into the challenges of working in a 'real-life' context, such as a school environment. The rich descriptions provided by the participants highlighting some of the benefits and limitations of the Sensory Intelligence approach in such a context, resulting in not only practical suggestions for the further development of the programme, but also the importance of pre-implementation planning. Particular regard is clearly warranted for investigating the 'readiness' of an institution to participate, as opposed to 'letting it happen' organically. This provides considerable support for the importance of the Implementation Science evidence-base for Educational Psychology when considering future intervention studies.

Notwithstanding the resultant limitations of the data to fully answer the research questions, the study also provided some supportive evidence that adolescents with autism present individual differences in sensory preferences, which may have implications for their ability to thrive in a school environment. Their sensory experiences are, therefore, considered a legitimate area for consideration when exploring CYPs needs. Tentative evidence was also provided suggesting that adolescents with autism can engage in exploration of their own sensory experiences and be motivated to do so, resulting in the

potential of established sensory modulation approaches being adopted to enable them to access learning opportunities more easily. Raising the awareness of staff, via the provision of individual sensory profiles, was also deemed important to enable them to consider the implications of these profiles for educational attainment and to meet the CYP's needs more easily. Transitions from primary to secondary school environments was highlighted as a particularly challenging phase for children with autism, suggesting opportunities for multi-disciplinary work between Educational Psychologists, Clinical Psychologists and Occupational Therapists.

As a low-cost, low intensity intervention approach, which was deemed 'definitely viable' in an ARB attached to a mainstream secondary school by all participants, the results of the study further suggest that the Sensory Intelligence programme is worthy of further empirical investigation.

5.4 Strengths and limitations of the study

A major limitation of the study is that the researcher worked alone designing, implementing the study and evaluating the results which makes it much more liable to researcher bias than studies involving teams of researchers. Efforts were made to minimise such bias, however, via the use of reflective notetaking as well as field notes throughout the entire process, the contents of which were discussed on a regular basis in peer-supervision sessions with an experienced EP completely independent of the study, and through challenge from the researcher's supervisor throughout.

The establishment of open research questions, asking for constructive feedback from the participants to further develop the programme, also encouraged a full exploration of both strengths and limitations of the approach. The researcher also reflected carefully upon the interview transcripts to ensure that there was no undue influence on the participants' responses, which included using their own words when probing for clarification rather than assuming knowledge of what they meant. The checking and double-checking of emergent themes against the transcripts and extensive use of quotations within the results section was also designed to ensure that the views of the participants took priority and that this was clearly grounded in the data. An evidence trail has also been provided to allow readers to judge the extent of any researcher bias for themselves.

Kelly (2012b), amongst others, questions what is meant by ‘evidence-base’ in implementation work. Whilst acknowledging that effectiveness research using highly controlled experimental designs still has its place, she argues that this approach has proved weak and insufficient to guaranteeing transfer and effectiveness to real-world contexts. Whilst more challenging, the collection of an evidence base about barriers to completing interventions in real, less controlled contexts is, on the other hand, considered a critical way forward. With respect to the second source of an evidence base, namely barriers to completing interventions in real, less controlled contexts, the researcher would argue that this study has considerable strengths. Whilst many previous studies have underreported process issues (Drmie, Aljunied, & Reaven, 2017), this study represents a ‘warts and all’ consideration of what transpired in a secondary school context and provides practical suggestions for ways forward.

The nature of the research questions focusing on process as well as product in order to provide practical suggestions for future programme development necessitated a complex range of approaches which proved to be extremely stretching for a novice researcher, nevertheless In retrospect, it was considered overly ambitious and that more research experience, over time, would have enhanced the quality of the study. The saying ‘Jack of all trades but master of none’ came to mind in this regard. Slight reassurance was taken from the Realist position that the availability of insights, referred to as ‘nuggets’ by Pawson (2006), takes precedence over method in programme development, nevertheless.

The approaches incorporated a Realist methodology, Case Study, Process and Product elements from the Input, Context, Process and Product Evaluation, Semi-structured interviews, a Focus Group, Thematic Analysis and the use of standardised and non-standardised sensory profiling scales (Sensory Profile Checklist Revised, Adolescent-Adult Sensory Profile and The Sensory Matrix) in addition to the provision of the Sensory Intelligence programme. All of these approaches proved to have strengths and limitations in the study which are summarised in Table 47.

Table 47

Strengths and Limitations of the Approaches Incorporated in the Study.

Approach	Strengths	Limitations
A Realist methodology.	• EMMIE and C-M-O frameworks are theory-driven to test hypotheses. • They provide practical suggestions for fine-tuning programme development which can be subject to further theory- testing.	• Dilemmas clarifying contexts versus mechanisms. • The complex nature of the frameworks suggests the need for training and experience to make most effective use of both.
Case Study.	• Considered best approach to explore interaction of structures, events, actions and context to identify and explicate causal mechanisms. • Can be undertaken by a single researcher. • Can embrace unanticipated events and uncontrolled variables. • Provides a rich description of a 'reality' recognising the complexity of embeddedness of social truths including tensions between the viewpoints held by participants. • Provides triangulation of data. • Provides 'a step in action' for formative evaluation and future directions. • Provides a more publicly accessible form than other kinds of research report. • Capable of serving multiple audiences. • Allow readers to judge the implications of the study for themselves.	• Not generalizable to other contexts. • Small number of participants (5 children, 5 parents, 4 members of staff and one researcher). • Potential for bias as the researcher was also a participant.

CONTINUATION: Table 47

Strengths and Limitations of the Approaches Incorporated in the Study.

Approach	Strengths	Limitations
Process and Product elements from Input, Context, Process and Product (CIPP) Evaluation Framework.	• Practical framework to incorporate specific mechanisms and points to collect formative as well as summative data for evaluation purposes. • Facilitates further development of the programme. • Differentiates between intervention strategy and implementation issues. • Considers the full range of accomplishments including unintended outcomes. • Incorporates 'marginalised' voices of adolescents with autism and their parents. • Opportunity to share 'expertise' in-situ to bridge the research-practice gap. • Dismantles unequal power relations. • Assists 'buy-in' to the programme. • Provides 'contextual fit'. • Can influence school culture by transforming perspectives and changing practices. • Can give pupils agency. • Participation and the need for action creates knowledge that is useful and meaningful. • Can lead to greater awareness of participants' own resources leading to greater self-reliance.	• Only effective if sufficient pre-implementation planning is put in place to allow sufficient formative and summative data to be collected. • Collaborative elements need sufficient time and space for rapport-building between researcher and participants. • It also provides ethical responsibility for further action as it is committed to equity, social justice and empowerment.
Semi-structured interviews.	• Allows themes to be generated by the interviewee. • Opportunity to talk in depth and detail. • Meanings can be clarified. • Facilitates participants' ability to express individual experience in own terms. • Linked to research questions to ensure data was relevant and valid.	• Dependent on the skill of the interviewer and articulacy of the respondent. • Need for more support mechanisms to facilitate autistic pupil voice. • May want to 'please' the researcher rather than provide authentic responses.

CONTINUATION: Table 47

Strengths and Limitations of the Approaches Incorporated in the Study.

Approach	Strengths	Limitations
Focus group.	• More naturistic than interviews. • Facilitate interactive discussion and new thinking by sharing perspectives. • Minimising investment of staff time.	• Group dynamics undermining intimacy. • Group conformity in response. • Interruptions to the session.
Thematic Analysis.	• Theoretically flexible approach allowing analysis of a diverse range of data. • Provides clear guidance to conduct analysis systematically and rigorously. • Provides a purposeful approach in order to systematize and enhance the traceability and verification of the analysis (audit trial). • Works well within PAR approach. • Theory-based minimising any overwhelm of data. • Identifies major (and minor) themes systematically which are grounded in the data. • Produces qualitative data suited to informing programme development.	• Time-consuming and challenging for a novice researcher. • Research experience is required to fully develop 'analytical sensitivity'. • Can be subject to researcher bias hence the need for vigilance.
Sensory Profile Checklist Revised. .	• Detailed consideration of sensory and perceptual issues. • Designed for autistic population. • Able to identify fluctuating profiles.	• Not standardised. • 234 questions deemed onerous and off-putting for some parents. • Staff did not know the children well enough to complete the instrument.
Adolescent-Adult Sensory Profile.	• Standardised sensory profiling. • Self-report measure.	• Not designed for an autistic population. • Not able to identify fluctuating profiles. • Insufficient information to inform intervention programme.
The Sensory Matrix	• Able to identify fluctuating profiles. • Sufficient information to inform intervention programme.	• Not standardised. • Not designed for an autistic population.
Sensory Intelligence programme	• Core components understandable for the majority of pupils aged 12+. • Positive perceptions of parents. • Low cost and low intensity programme.	• Effectiveness undermined if insufficient pre-implementation planning is put in place.

When considering what the researcher would have liked to do differently, a major weakness of the current study was insufficient pre-implementation planning which undermined a clear understanding of respective roles and responsibilities and access to resources such as staff non-contact time, quiet rooms and exercise equipment. This resulted

in some deviations from the intended design of the study and limited involvement of staff and parents. The pupils were also provided with the core elements of the programme in less than ideal conditions. The importance of pre-intervention planning has been acknowledged as a critical way forward, as a result.

A lack of experience interviewing adolescents with autism and insufficient time to develop relationships with the children also resulted in minimal responses in their interviews despite the use of their programme reviews as prompts. Whilst qualitative research with ASC youth remains an emerging field and only a limited evidence-base exists on practical interviewing strategies with adolescents with autism, it was noted that Humphery & Lewis (2008) were able to capture more data in their study. They report prolonged time in the field enhancing the development of relationships, the use of diaries and pupil drawings to stimulate discussion, all of which would be worthy of consideration in future studies. The researcher also considered the potential benefits of a follow up email to ensure that the children had sufficient time to process information and, without the distraction of one to one interaction, the possibility of expressing themselves more easily in writing rather than orally.

The focus group approach with staff minimised demands on their time and provided the opportunity for interactive discussion and new thinking by sharing perspectives. Group dynamics resulted in two of the participants being far more vocal than the others, however, despite the researcher encouraging the quieter members of the group to contribute. In retrospect, the researcher would have preferred to follow up the focus group with individual staff interviews, but this would have required school investment in non-contact time to do so, which would ideally be part of pre-intervention planning.

Given that the research was purposely process-orientated to inform programme development, a lack of staff feedback due to their limited involvement, had significant implications for both the findings and outcomes of the study. Opportunities were lost, for example, in considering the challenges of implementation for both the individual teacher and organisation in more depth. Teachers' knowledge of individual pupils and a more detailed awareness of the depth and scope of the programme content (due to collaborative working) could also have facilitated teacher-led adaptations, rather than the general suggestions provided. Such 'ownership' had the potential to enhance staff 'buy-in' beyond that of using sensory profiling for assessment purposes. This, in turn, had the potential for

aiding the sustainment of a teacher-led programme beyond the end of the study. Increased staff awareness could have also facilitated discussion, leading to increased understanding of the implications of the classroom sensory environment for pupil participation and of the use of necessary prompts to pupils to aid their progression towards self-management.

Within the four families interviewed only one father participated. Positive encouragement of fathers' participation as part of the pre-intervention planning would be recommended in any future study. A lack of 'voice' from the other fathers in conjunction with the loss of the fifth family, due to reported stress, may have provided an imbalanced response.

The development of themes for the Thematic Analysis was an extremely time-consuming exercise as it took three attempts, returning to the raw data of circa 30,000 words and comparing it to the developing themes each time, to make sure that all conclusions were firmly ground in the data (Lincoln & Guba, 1985). The researcher followed the advice of King (2004) that as it is possible to go on modifying and refining themes 'forever', and that one of the most difficult decisions to make is when to stop, the decision to do so should be when all sections of text relevant to the research questions have been included. As a solo researcher an opportunity to consult with outside experts would have been welcome, nevertheless, to ensure that nothing pertinent was missed. Discussion with an educational psychologist independent with the study and the researcher's supervisor was also helpful, in this respect. It is fully appreciated, nevertheless, that 'analytical sensitivity' (Braun & Clarke, 2013) takes time and experience to develop fully.

Due to the various design issues outlined above, an EMMIE E-effect score of 0 would be warranted for the current study as the overall effect of the intervention remains unclear due to insufficient consideration of validity elements. As this study is designed to be an exploratory study, more concerned with process issues, however, objective effect size was not a key consideration.

With respect to the Mechanism element of EMMIE the programme theory was tested against the data generated in the study and, with the aid of already established literature on intervention issues, revised C-M-O configurations were provided to offer practical 'ways forward', which can be subject to further theory-testing and 'fine tuning' in the (critical) Realist tradition of learning from mistakes/insights. As it is not yet possible to

provide precise predictions from programme theory without further testing, an EMMIE - Mechanism score of 2 is more appropriate than 3, based on criteria specified in Table 6.

With respect to EMMIE-Moderator/Context narrative statements of qualifying contextual issues were highlighted but these were post hoc rather than theory-based pre-specifications of expected moderators and mediators relevant to the activation of mediators or mechanisms, thus qualifying for a Q score of 2 rather than 3. EMMIE-I was stronger in the current study due to systematic efforts to elicit and record process issues in relation to the study. There was not, however, a detailed evidence-based account of expected levels of fidelity to program policy or treatment plan, resulting in an EMMIE-I of 2 rather than 3.

Economic cost of interventions is an important consideration increasingly being highlighted in the empirical literature (Oosterhoff, Bosma, van Schayck & Joore, 2018.) The Sensory Intelligence programme has been judged to be a relatively low cost and low intensity approach in the current study. There remain unanswered questions, however, regarding the relative roles of the EP and teaching staff which prevent precise costings. If the EP provides a consultative and evaluative role whilst teaching staff deliver the programme, the cost would be substantially less than if the EP delivers the programme, for example. The cost of training for staff to deliver the programme and to be provided with non-contact time to attend training, evaluation sessions and supervision should be calculated at the pre-implementation stage, which was lacking in the current study. This would warrant an EMMIE-E of 2 rather than 3 as a result. EMMIE-Q Scoring for the pilot study as a whole is summarised in Table 48.

Table 48

EMMIE-Q Scoring for the Sensory Intelligence Study

EMMIE-Q	**EFFECT** **0** Insufficient consideration of Validity elements	**MECHANISM** 2 Detailed articulation of theory based on interrogation of relevant literature and/or elicited from practice.	**MODERATOR** **2** Tests of the effects of moderators or of mechanisms defined post hoc using variables that are at hand.	**IMPLEMENTATION** **2** Systematic efforts to document implementation issues.	**ECONOMIC** 2 Direct or explicit and indirect and implicit costs (and/or benefits) estimated.

According to Johnson et al. (2015) the use of the EMMIE framework is not only considered beneficial in helping practitioners and other researchers to assess the confidence they should place in the conclusions provided. In explicitly noting the absence of any evidence for each dimension of EMMIE, it also assists planning for future studies, which will be considered in section 5.5 below. Awareness of crucial aspects of evidence-based implementation practice is vital to avoid a 'letting it happen' approach which is likely to contribute towards fragmented and unsustainable interventions that are difficult to evaluate (Kelly, 2012).

5.5 Implications for EP Professional Practice

This study has highlighted the implications of atypical sensory processing including modulation for academic achievement, future life skills and mental health, which include highly negative prognoses, particularly but not exclusively for the autistic population (Gouze et al., 2012). Up to 95% of the autistic population have been reported to exhibit atypical sensory processing (Tomchek & Dunn, 2007) and 15-20% of the 'neurotypical' population may have Sensory Processing Sensitivity with associated sensory sensitivities (Aron & Aron, 1997) suggesting that sensory issues may have impact on a much larger proportion of the population than previously thought. Interest in sensory modulation is also emerging across disciplines (Gouze, et al., 2012) due to its wide range of applications, including wellness promotion and mental health (Lombard, 2015).

Atypical sensory processing has been linked with impairments to adaptive behaviours such as anxiety, depression and conduct disorder and subjective well-being (Engel-Yeger et al., 2018). Many would argue that the attainment of well-being should represent a fundamental aim in its own right for schools (Seliman & Csikszentmihalyi, 2000). Improved mental health and non-cognitive assets also have significant implications for longer-term economic and societal benefits (Heckman & Masterou, 2007) at a time when EPs have taken responsibility for the educational needs of children and young people up to the age of 25, and in the light of a poor prognosis for adults with autism (McKay, Greig, & Connolly, 2017; Taylor & Seltzer, 2011). Development of adaptive rather than maladaptive strategies when faced with sensory challenges is the key.

Both the BPS (2017) Practice Guidelines and the HCPC (2015) Standards of Proficiency for Practitioner Psychologists highlight the importance of EPs keeping abreast of advances in the evidence base, which is considered essential for maintaining and

enhancing professionalism and competence. HCPC (2015) also specify that EPs need to understand factors that lead to underachievement, disaffection and social exclusion amongst vulnerable groups. The researcher would argue that atypical sensory processing is such a factor for autistic pupils and a minority of the wider population, and thus warrants serious consideration by the profession.

Educational psychologists' professional standards of proficiency also demand that they practice safely and effectively within their scope of practice and the legal and ethical boundaries of their profession (HCPC, 2015). Sensory Integration Theory including Ayer's Sensory Integration (Pollock, 2009) involves intensive, direct intervention on a 1:1 basis using specialised equipment and is deemed to be the exclusive responsibility of occupational therapists specially trained in ASI. It would, therefore, be highly unethical for EPs to breach such ethical and professional boundaries by participating in ASI work. The field of sensory modulation and associated sensory-based intervention, on the other hand, is open to a much wider range of professionals. Brown and Dunn (2002), for example, specified that the intended users of the AASP included teachers, psychologists, speech and language therapists, career counsellors and physicians. This is on the grounds that when professionals understand sensory processing preferences, they are in a better position to create environments that promote participation and reduce stress (Brown, Karim & Steuter, 2020). The HCPC (2015) standards state that all psychologists should be able to gather appropriate information, including the selection and use of appropriate assessment techniques in the light of new developments and understanding.

Joseph (2008) argues that the facilitation of well-being, health & strengths should be considered an essential part of the EP's role. The recent review of clinical and educational psychology training arrangements (NCTL, 2016) further highlighted the importance of EPs developing appropriate transferable skills to build their understanding of children and young people up to the age of 25 years, beyond the domain of education, to include health, social care and both psychological and mental health. This is further emphasised in joint policy initiatives originating from Every Child Matters (2003); the focus on educating the 'whole' child rather than merely raising academic achievement highlighted by the Social & Emotional Aspects of Learning (DfES, 2005) and in the HCPC (2015) standards. The latter clearly states that EPs should 'be able to develop and apply effective interventions to promote psychological well-being, social, emotional and behavioural development and to raise educational standards' (p 24) The empirical

literature reviewed in this study strongly suggests that sensory processing could be an integral factor across all domains, and as such a legitimate and pertinent area for educational psychology.

Cross-disciplinary communication is also considered important, as the field is still at an emergent stage of conceptual development (Edgington, Hill, & Pellicano, 2016). Reich & Reich (2006) add that 'interdisciplinarity' is necessary for achieving complex understandings, as phenomena are not spliced neatly into disciplines. This is particularly apparent in the case of sensory modulation, as a 'biopsychosocial' phenomenon, and when attempting to bridge the research-practice divide to provide interventions in real-life contexts, such as schools. The HCPC (2015) standards of proficiency indicate that EPs should 'be able to work with key partners to support the design, implementation, conduct, evaluation & dissemination of research activities and to support evidence-based research' (p 24).

Reich & Reich (2006) argue that interactions across disciplines can promote critical reflection and expand ways of thinking about a phenomenon, adding new ideas and challenging 'taken-for-granted' assumptions. For the researcher, consideration and use of approaches from other disciplines, namely that of C-M-O and EMMIE frameworks and implementation stages from Implementation Science have provided important insights for potentially fruitful ways forward in autism intervention work. Educational psychology also has much to offer due to its expertise in working with school systems as well as individual children, small groups, parents and teachers, in reducing barriers to achieving academic potential, and in the wider remit of supporting CYPs' well-being and mental health. There is clearly considerable scope for inter-disciplinary work, particularly with Occupational Therapists, Clinical Psychologists and Implementation Scientists in the light of the findings, whilst maintaining recognition of professional boundaries. Some opportunities will be discussed further below.

Atypical sensory processing has yet to be given serious consideration by the EP profession, however, as measured by the dearth of publications in professional journals, to date. It is clearly very important, therefore, to raise professional awareness and 'open up a conversation' about its implications for our profession and for inter-discliplinary research.

A useful starting point would be dissemination of the results of this study to EP colleagues via publication in one of the professional journals, Continuing Professional

Development, or both. The researcher would also suggest that a special interest group of EPs could be formed to develop expertise in this area and to encourage and support the inclusion of a module on sensory issues within Educational Psychology Initial Training.

At an individual level, assessment could usefully take into consideration sensory preferences as part of a broader assessment framework. Not only are sensory issues potential barriers to academic achievement in school environments, non-cognitive development, skills and assets of children including their mental health are increasingly being valued as part of the wider school curriculum under the broad heading of child well-being (Hobbs & Ford, 2012).

Although the Sensory Matrix has yet to be standardised on any population, its strength lies in its philosophy of avoiding labels, ability to identify fluctuating profiles and to inform intervention strategies. It has practical benefits for the child, the family and school staff as a result. This study has also indicated that children aged 12 + may be able to understand the core components and take some responsibility for their sensory needs.

Within the context of successful transfer to secondary school for pupils with autism our clinical colleagues have taken the lead in developing the STEP-ASD approach that has much to commend it (Mandy et al., 2016). They report uptake of only 20% of the secondary schools in their study, however, suggesting that organisational level issues have yet to be fully appreciated. The researcher argues that EPs are better placed than their clinical colleagues to work with schools systemically. There is also considerable scope to further develop the sensory assessment and intervention guidance in STEP-ASD and the researcher suggests that the Sensory Intelligence approach could, usefully, be given serious consideration. This programme could be organised and supervised by EPs with or without OT support. The researcher has provided a framework for this development in section 5.2.8, with work with pupils starting in Year 7 when the pupils have had time to settle into their new schools and develop relationships with key staff who may deliver the programme under the guidance of the school EP.

Systemically, this study has clearly shown the importance of pre-intervention planning, which has its roots in Implementation Science. This is an emerging area, with the first academic journal article published as recently as 2006. It has arisen through the study of failure of interventions in natural contexts (Kelly, 2012). It draws together very disparate fields to combine what has been learned from experience of failure and the

implications of this to bridge the research-practice divide and establish what is required to ensure successful transfer and application of an intervention in real-life contexts. Whilst this field remains in its infancy, it has already made significant strides into investigating relevant, contextual processes in applied contexts.

Kelly (2012b) suggested that there is considerable overlap between EP professional practice and Implementation Science's evidence base because of a shared focus on issues about the processes involved in creating changes effectively in real-life contexts and a growing understanding that process evaluation is crucial to effective change. She added that the development of a critical realist epistemology in educational psychology has also proved central to understanding, defining, focusing and measuring the processes which govern change in school contexts. Kelly (2012b) considered that much of the evidence-base from Implementation Science is directly transferrable to schools, representing a 'new era' for EPs where the perennial questions of 'how' and 'why' will have clearer answers.

As EPs are increasingly becoming involved in the implementation of interventions (Stoiber, 2002) it is also important to explore frameworks to assist in implementation planning and development. The CIPP evaluation framework (Stufflebeam & Coryn, 2014), EMMIE (Johnson et al., 2015) and C-M-O configurations (Pawson & Tilley, 1997) are all worthy of consideration, to guide implementation work as the mechanisms will be specific to the contextual dynamics of the particular school. The researcher would strongly recommend access to formal training in the use of all three, however, as they are complex and challenging for the novice researcher.

Mitra (2012) further indicates that in an environment in which schools are expected to pay attention to several initiatives at once, adopting new initiatives can fall by the wayside even if they can see the value, as evidenced in this study, to a certain extent. Mitra (2009) indicates, however, that outsourcing technical assistance has been demonstrated to be one of the strongest common threads among sustainable youth-adult partnerships. The researcher would suggest that EPs could consider becoming specialists in the development of skilled organisational consultation and experience, over time, to offer systemic support for school-based interventions. This level of expertise could then be used for a wide range of programmes.

Measures of 'readiness' are likely to be central. The study of attitudes towards innovation is still in its infancy, however (Aarons, Green, & Miller, 2012). Within the

remit of EPs specialising in intervention support, would necessarily be further research in this area in conjunction with helping to develop readiness, where it is limited through a range of services to develop awareness, confidence and competence of practitioners. The identification of key individuals in the change process and their active involvement in all stages, as suggested by Fixsen et al. (2005) is also likely to be a central tenet of this approach. Blasé et al. (2012) suggests that understanding the stages of implementation will allow EPs to contribute productively by matching their contributions to the stage at hand and anticipating what work is needed ahead. Sustainability, both financial and programmatic, also requires ongoing attention to both (Blase et al., 2012). Starting with assessing the needs of the individual child, followed by assessing the worth and feasibility of programmes and practices to meet those needs and becoming key members of an implementation team, would enable EPs to be influential at multiple levels of the system, in this respect.

5.6 Future Research

One recommendation for future research regarding school-based sensory interventions for adolescents with ASC would be to discuss the further development of this programme with its author, Anne-Marie Lombard. Such studies are important for investigating the feasibility of an intervention and to be forewarned of process issues which will need to be addressed, but they are only a first step. Feedback from the participants and consideration of the importance of pre-intervention planning, at a systemic level, provides important practical strategies for ways forward to enable future implementation planning to be placed on a firmer footing. The researcher would also be particularly interested in incorporating the Sensory Intelligence approach with the STEP-ASD secondary transfer framework discussed in Chapter 2, with coaching the pupil directly targeted for the Spring Term of Year 7, given that it is designed for children from the age of 12, or as soon as the child is deemed cognitively able to benefit.

The perceived benefits of the programme as reported by the participants, outlined above, are wide-ranging and promising despite the ‘real-life’ challenges involved in providing the intervention, but these benefits remain tentative perceptions which have yet to be supported by more objective measures. The researcher would, therefore, envisage the use of some such measures, for example, the Strengths and Difficulties Questionnaire (Goodman, 2007) or The Resiliency Scales for Children and Adolescents (Prince-Embury,

2007) pre and post intervention in a future study with adequate pre-intervention planning to investigate such perceived benefits more empirically.

Little is known about the implications of mixed reactivity (fluctuating profiles), resulting in the presence of low and high threshold symptoms in the same modality, which were evident in all 5 of the children in this study and this would warrant further investigation empirically.

Limited research has been conducted on interviewing adolescents with ASC as qualitative research with this population remains an emerging field and more needs to be known about approaches that maximise their participation.

Interrogation of the literature also suggests that sensory modulation issues impact upon a wider range of the population than previously thought, including up to 15-20% of the population who may identify with the personality trait Sensory Processing Sensitivity (SPS). The researcher is motivated; therefore, to conduct qualitative research interviewing adults with SPS to gain perceptions of their school experiences to consider whether there may be an argument for 'reasonable adjustments' and/or sensory-based intervention programmes for this more substantial group.

With further developments in cellular research, due to technological advances, the researcher would also suggest investigation into any potential overlap between Autism and Sensory Processing Sensitivity. Such an enquiry may bring new perspectives to the 'enigma' of autism, which continues to puzzle even the most experienced of researchers in this field.

5.7 Unique Contribution to the Field

This is the first study, to the researcher's knowledge, that has systematically interrogated the empirical evidence-base to ascertain the quality and availability of sensory-based interventions for adolescents with autism, attending an ARB attached to a mainstream secondary school. This has confirmed a paucity of programmes available. It is also unique in its adoption of the EMMIE framework to evaluate the evidence base supporting what interventions are available and to attempt to bridge the theory-practice divide by investigating the Sensory Intelligence programme in such a context. A process-orientated approach, incorporating the Process and Product elements of the CIPP evaluation model in conjunction with the Realist EMMIE framework and use of C-M-O

configurations is also unique within the field of Educational Psychology. This approach has enabled the researcher, with the support of the other participants using a collaborative approach, to tell a 'warts and all' story of the intervention attempt in a 'real-life' context, which is rare in Educational Psychology literature. The nuggets of information gleaned from the study has, however, also provided the researcher with new insights, which in combination with the established literature, enables her to offer practical ways forward, which is also relatively unique in this specialised area of focus.

5.8 Reflexive Summary

The 'photograph' analogy of research provided by Drake and Heath, (2011) with respect to the problems of positioning and authorship of the text proved to be invaluable to the researcher. Just as in a photograph, what is in the picture, what is not in the picture and whether it is recognisable to the reader depends on the choices made by the photographer.

The researcher became acutely aware of the self as an integral element within the research process. This influenced the creation of the research 'story' via the choice of topic, research questions, the methodological approach, the methods and the analysis of the data. This highlights one of the benefits of Top-up Doctorates for experienced EPs. The choice of 'picture' was influenced by personal experience as a person identifying as having Sensory Processing Sensitivity in conjunction with extensive practitioner awareness and experience dealing with sensory modulation issues, and the implications these may have on educational achievement and mental health. The resulting 'image' was specifically designed to be shared with educational psychology colleagues and to produce new knowledge for the benefit of professional practice. This new knowledge incorporated evaluation of the 'Sensory Intelligence' programme, as a low cost and low intensity programme, in conjunction with the use of CIPP and Realist frameworks (C-M-O configurations and EMMIE). The purpose was to provide viable practical suggestions for the 'fine-tuning' of the programme in conjunction with suitable frameworks for bridging the research-practice divide systemically.

Schon (1987) questions what counts as valid knowledge. The starting point for the researcher was to bring professional knowledge and experience into the academic arena to ask for it to be recognised, as sensory-processing issues has yet to have a discernible influence on EP professional practice. However, on the doctorial journey an integration of both professional and academic knowledge has occurred. The researcher was not aware of

Implementation Science, the existence of Sensory Processing Sensitivity or of the Realist approach until interrogating the literature. This brought to light the influence of dominant paradigms (Kuhn, 1972) and the potential hidden bias of narrative literature reviews in professional journals (Gough, 2007). Deeper understanding, resulting from such an integration of professional and academic knowledge, has changed the researcher's perspective significantly, and has already influenced professional practice, with an increased emphasis on working systemically to foster effective change.

Harida & Yukawa (2012) consider that critical reflection involves examination of both personal and professional belief systems, thus focussing attention both inwardly at your own practice and outwardly at the social conditions in which these practices are situated. For the researcher, values of equity and social justice were central to the study, with the aim to help to transform perspectives and change practice. The collaborative approach embedded within CIPP was considered particularly powerful in enabling marginalised voices to be heard, facilitating knowledge exchange rather than mere knowledge transfer (Harida & Yukama, 2012). The dialectic interactions supporting the identification of problems as well as solutions, by people holding first-hand experiences of sensory modulation issues was central to the collaborative approach (Walter, 2009). It became clear that the parents of the children with autism in this study had much to offer following years of intuitively incorporating strategies to meet the sensory needs of their offspring, and in some cases, their own sensory needs. Self-disclosure of sensory preferences by the children also contributed towards rich descriptions emanating from the study. The researcher would agree with Milton & Bracher (2013) that the inclusion of people with autism as equal participants is important to help guard against 'deterministic designs and interpretations' (p64) and act as the starting point for service provision via emancipation, enablement and agency for their community.

Vivanti et al. (2014) argued that autism research needs to be more theory-driven and the importance of focus on mechanisms to address predictors of intervention response was also highlighted by Kelly (2012a). Having experimented with Realist C-M-O configurations and evaluated the available evidence-base, as well as her own study, using the EMMIE-Q framework, the researcher was able to use resulting insights to offer specific practical suggestions for future theory-testing. There is clearly no 'quick fix' but a process-orientated approach to intervention, supported by a growing evidence-base from

Implementation Science, appears to have much to commend it and the researcher considers that the frameworks used in the current study may be viable as part of an EP 'tool-kit'.

The researcher considers that the current study is a beginning rather than end point for work in this area and hopes that, at the very least, it will 'start a conversation' with her professional colleagues, sowing the seeds for future developments in this emerging field over time. It is also hoped that the participants, having already started their own conversations, will continue to reflect and act on their raised awareness, understanding and access to practical strategies provided.

The impact of undertaking doctoral level research has, however, afforded the researcher much more than the learning outcomes for the participants and the opportunity to share the results with colleagues. This includes consideration of a variety of research design and strategies, and whilst the researcher appreciates, in retrospect, that she might have been over-ambitious in the wide choice of approaches used, these have provided invaluable experience including appreciation that developing capability in research methods comes with research experience and access to training. Of particular benefit has been the development of an epistemological understanding of theorising from a (critical) Realist perspective and how this relates to analysis.

The researcher now has a deeper understanding of both professional practices and processes to be able to consider the challenges of developing interventions in 'real life' settings from an informed rather than naïve perspective. She also now more fully appreciates what Drake and Heath (2011) meant when they said that whilst the practice setting can be the source of reflection, it cannot be the arena in which theorising takes place. That is clearly the remit of academia with the evidence-base to support it.

5.9 Concluding Comments

Almost two decades ago Weisz (2000) argued that there was an urgent need to conduct research in 'authentic' settings, embedding them in contexts where the intervention is likely to be implemented, to help bridge the research-practice divide. This is particularly pertinent regarding school-based sensory interventions for autistic adolescents given the links between atypical sensory modulation, academic achievement, mental health and future life chances. There remains a paucity of studies in the literature despite the seriousness of potential prognoses, nevertheless.

Progress has been slow as research in a school environment is ‘not for the faint hearted’ (Parsons & Kasari, 2013) due to a lack of control of many aspects of the school day despite the considerable benefits of collaboration with participants to ensure a ‘good fit’. One of the problems for EPs, amongst other professionals, has been the lack of ‘tools’ or frameworks to support intervention work. The current study has drawn upon the evidence bases from the emerging Implementation Science and Realist approaches, which share a critical realist epistemology, to use potential tools such as CIPP, C-M-O configurations and EMMIE, to some good effect. This enabled a process-orientated evaluation of a low-cost, low-intensity sensory-based intervention which is considered viable for children with autism aged for 12 years.

A full cost-benefit analysis has yet to be conducted and a lack of pre-implementation planning undermined the intended design of the study, minimising parental and staff involvement. There was a very positive response from the participants and tentative evidence of potential benefit for the children and their families, particularly in terms of empowerment via self-efficacy, and tolerance of others in conjunction with increasing understanding of behaviour for parents and school staff, nevertheless. Awareness of staff, at all levels, was considered facilitative of systemic change including an acceptance of sensory processing differences as a normal aspect of neurodiversity. The insights gleamed from this study has also provided practical and viable suggestions for ways forward.

The Sensory Intelligence programme theory highlights the importance of raising conscious awareness to enhance understanding and to provide strategies to support effective change. The researcher hopes that this study might contribute to such a process with regards to the topic of sensory modulation for the benefit of EP colleagues, and that, in some small way, will be the beginning of a ripple effect.

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Appendices

Appendix 1: Gate Keeper Letter (Head teacher)

Address and date

Dear *** (Head teacher)

Re: 'Sensory Intelligence'. An Exploratory CIPP Programme Evaluation in a Secondary School Autism Resource Base

I am a practicing educational psychologist enrolled at the School of Psychology, Cardiff University on a post-qualification Doctorate in Educational Psychology. I am proposing to complete a research project that will evaluate the 'Sensory Intelligence' programme.

The Sensory Intelligence approach explains why people respond to sensory input in different ways. It also provides strategies to help them control their arousal level by modulating their senses to adapt to their environment/other people or change their environment to fit their sensory preferences.

The Sensory Intelligence approach purports that it '*will help you to function more effectively and give you greater understanding and adaptability within your relationships, both at home and at work (school)'.*

The proposed study is designed to find out what value this approach has for pupils attending a secondary school Autism Resource Base.

I am writing to enquire whether you would be happy, in principle, for staff, parents and pupils to participate and to ask your permission to enable me to contact the Autism Resource Base attached to your school. I would then provide an information sheet to ARB staff and parents to explain the nature of the research, followed by a short presentation of up to 30 minutes for the adults, and 20 minutes for the children which will include an invitation to give informed consent to participate.

I would then deliver the programme over 8 lessons; one a week, in small groups of 2 – 4 pupils, with due regard to best practice working with children and young people with autism. To facilitate parental involvement, I would provide a home-

school folder, outlining the content of each lesson and the strategies I would like the pupils to practice, at home.

There would be an interim meeting of circa 30 minutes, with parents and ARB staff, halfway through the programme, to evaluate the programme so far, and to make any necessary adjustments. This will be followed by short interviews with the children (up to 20 minutes), their parents (up to 30 minutes) and a Focus group of Autism Resource Base staff (up to 30 minutes), at the end of the study.

In addition to the writing of a thesis, the research may be used to inform academic publications and training courses. I would, of course, be happy to share the results of the study with you, in due course. No identifying information about participants or the school will be revealed in written form or any other form of communication.

Thank you for considering my request. Please contact me if you have any questions or if you require further information.

Yours sincerely

Linda Falkner

Linda Falkner	Andrea Higgins	Secretary of the Ethics Committee
School of Psychology	School of Psychology	School of Psychology
Tower Building	Tower Building	Tower Building
Cardiff University	Cardiff University	Cardiff University
CF10 3AT	CF10 3AT	CF10 3AT
	02920879003	02920874007
Email FalknerLM@cardiff.ac.uk	HigginsA2@cardiff.ac.uk	psychethics@cardiff.ac.uk

Appendix 2: Gatekeeper Letter to Head of Autism Resource Base

Address and date

Dear *** (subject/form teacher)

Re: 'Sensory Intelligence'. An Exploratory CIPP Programme Evaluation in a Secondary School Autism Resource Base

I have gained the permission of xxx Head teacher to contact you regarding my proposed research project. I am a practicing educational psychologist enrolled at the School of Psychology, Cardiff University, to complete a post-qualification Doctorate in Educational Psychology. For my research I am carrying out an evaluation of the 'Sensory Intelligence' programme.

The Sensory Intelligence approach explains why people respond to sensory input in different ways. It also provides strategies to help them control their arousal level by modulating their senses to adapt to their environment/other people or change their environment to fit their sensory preferences.

The Sensory Intelligence approach purports that it '*will help you to function more effectively and give you greater understanding and adaptability within your relationships, both at home and at work/school'.*

The proposed study is designed to find out if this approach has any value for pupils attending a secondary school Autism Resource Base.

I am writing to enquire whether you would be willing to allow me permission to ask if any of the pupils, parents and/or staff would be willing to participate in this research project.

If you grant permission, the intention would be to provide an information sheet and invite parents and ARB staff to a presentation, outlining the programme, lasting approximately 30 minutes, at the end of which they would be given consent forms, should they wish to participate. I would also deliver a shorter presentation to the pupils lasting approximately 20 minutes, which will be followed by the provision of pupil consent forms. All consent forms would be collected confidently by asking participants to fold them and deposit them in a box provided.

The programme would be delivered over 8 x 45-minute lessons, once a week, in small groups of 2 -4 (Year 7-9 and Year 10- 11) with due regard to best practice working with children and young people with autism. To facilitate parental involvement, I would provide a home-school file, outlining the content of each lesson and the strategies, based on individual sensory profiles, I would like the pupils to practice, at home. I would also invite the parents and staff to a 30-minute review meeting half-way through the course to provide evaluative feedback and suggestions for the further development of the programme.

In the final session, the pupils would be asked to provide a programme review using their own choice of media. This would be followed by short interviews with the pupils (up to 20 minutes), interviews with their parents via telephone or home visit (circa 30 minutes) and a Focus group of Autism Resource Base staff, taking approximately 30 minutes.

I may also request information from behaviour logs and Autism Education Trust Progression Framework checklists, if appropriate, to provide supplementary evidence to support what was said in the interviews.

In addition to the writing of a thesis, the research may be used to inform academic publications and training courses. I would, of course, be happy to share the results of the study with you, in due course. No identifying information about participants or the school will be revealed in written form or any other form of communication.

Thank you for considering my request. Please let me know if you have any questions or if you require further information.

Yours sincerely

Linda Falkner

Linda Falkner	Andrea Higgins	Secretary of the Ethics Committee
School of Psychology	School of Psychology	School of Psychology
Tower Building	Tower Building	Tower Building
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Email FalknerLM@cardiff.ac.uk	HigginsA2@cardiff.ac.uk	psychethics@cardiff.ac.uk

Appendix 3: Information Sheet – Parents/carers and Resource Base Staff

Address and date

e-mail: psychenquiries@cardiff.ac.uk

Dear xxxxx

Invitation to participate in a research study

You are being invited to participate in a research study involving pupils in the Autism Resource Base. This information sheet is provided to explain why the research is being carried out and what is involved, to help you decide whether or not to consent to take part. Please take time to read this information carefully and discuss it with others if you wish. Please also feel free to ask the researcher if you have any questions.

The researcher

My name is Linda Falkner and I am a practicing educational psychologist enrolled at the School of Psychology, Cardiff University, to complete a post-qualification Doctorate in Educational Psychology, under the supervision of Andrea Higgins, Research Supervisor.

What is the purpose of the study?

The purpose of the study is to evaluate whether the 'Sensory Intelligence' programme is of any value to pupils in the Autism Resource Base.

The Sensory Intelligence approach explains why people respond to sensory input in different ways. It also provides strategies to help them control their arousal level by modulating their senses to adapt to their environment/other people or change their environment to fit their sensory preferences.

The Sensory Intelligence approach purports that it '*will help you to function more effectively and give you greater understanding and adaptability within your relationships, both at home and at work/school'.*

Who would be involved?

We are hoping to involve the pupils, their parents and resource base staff and will ask for all their views about the programme and any improvements than can be made.

What the research involves.

Parents and teaching staff will be invited to a short presentation (about 30 minutes) outlining the Sensory Intelligence approach where they will be able to ask any questions. Participants will also be given a book of the Sensory Intelligence book (written for the general public) for reference purposes. This presentation is planned to take place in December 2017.

The pupils will also be given a shorter presentation outlining the programme and asking them if they wish to participate in the project. Those who do will subsequently be asked to complete a sensory profile (Adolescent and Adult Sensory Profile questionnaire) and teaching staff (in consultation with parents) to complete the more in-depth Sensory Profile Checklist Revised to establish the sensory profiles of the children. This information will enable the researcher to provide individualised strategies, based on each pupil's sensory profiles, to practice at home and at school. It will also help the researcher investigate whether pupils with certain profiles may benefit more or less from the approach.

The Sensory Intelligence approach will be taught to the pupils, by the researcher with a member of staff, in small groups of 2 -4, over eight x 45-minute weekly lessons during the normal school timetable. This is planned to take place in January and February 2018. A home-school file will be provided to summarise the content of each lesson and the strategies that the pupil is being asked to practice, both at home, and at school. Parental encouragement would be very helpful to enable the pupil to practice new skills, at home, and to help generalise these skills across different contexts.

As the purpose of the research is to further develop as well as evaluate the programme, an interim meeting (up to 30 minutes), following session four, will be arranged with parents and resource base staff invited to attend, to review what is

going well and what improvements might be warranted, which will be incorporated in the remaining four sessions.

In the final session, the pupils will be asked to produce a review of the programme using a choice of media. This review would then be used as a concrete aid in a subsequent short interview with the pupil (up to 20 minutes). Parents would also be invited to give feedback in a short interview either over the telephone, or if they prefer via a home visit (up to 30 minutes). Resource base staff would also be invited to attend a short Focus Group (circa 30 minutes) to provide feedback.

What are the risk and benefits?

We do not think that participation will involve any disadvantages or risks to any of the participants. The findings of this research study will provide important insights into sensory processing issues for children and young people with autism and add to the available literature on fruitful ways forward in developing suitable intervention approaches to meet their sensory needs. No individual or school will be made identifiable at any point. You, or your child, may refuse to answer any questions or withdraw from the study, at any point, without giving a reason.

What will happen to my information?

All information will be kept confidentially and securely, and the information will only be accessible to the researcher. Video and/or audio recordings will be kept confidentially and securely for 14 days, after which it will be transcribed. Following transcription, it will be anonymised, and the researcher will delete the original electronic recording. All other data will be kept by Cardiff University indefinitely. No identifying information about participants will be revealed in written form or any other form of communication.

The anonymised data may be used, by the researcher for academic publication and/or training purposes.

Up to the point in which the data is anonymised, you can withdraw your participation at any time without giving a reason. Any personal information shared within the focus group will be held confidential by verbal agreement by the other

participants. However, the university cannot guarantee confidentiality within this context.

Please feel free to contact me, my supervisor or the Ethics Committee at Cardiff University for further information.

Yours sincerely

Linda Falkner

Linda Falkner	Andrea Higgins	Secretary of the Ethics Committee
School of Psychology	School of Psychology	School of Psychology
Tower Building	Tower Building	Tower Building
Cardiff University	Cardiff University	Cardiff University
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Email FalknerLM@cardiff.ac.uk	HigginsA2@cardiff.ac.uk	psychethics@cardiff.ac.uk

Appendix 4: Written Consent Forms

School of Psychology, Cardiff University

Parent/Carer Consent form

Re: 'Sensory Intelligence'. An Exploratory CIPP Programme Evaluation in a Secondary School Autism Resource Base

I understand that this project is to help evaluate the value of the 'Sensory Intelligence' approach for pupils attending an Autism Resource Base.

I understand that my child's participation in this project will involve the completion of a sensory profile (Adolescent and Adult Sensory Profile); attendance for one lesson a week over eight weeks within the normal school timetable; the production of a review of the programme (choice of media) during the final lesson and an invitation to participate in a short interview which will be audio-taped but anonymised. I understand that my child does not have to answer all of the questions in the questionnaire or the interview if he or she does not want to.

I understand that my child will be provided with a home-school file, which will outline the content of the lessons and the individualised strategies he/she has been asked to practice, both at home and at school. I also understand that parental help and encouragement are important aspects of the study, to help enhance practice and the generalisation of skills across different contexts (home as well as school).

I understand that participation in this study is entirely voluntary and that I and my child can withdraw from the study at any time without giving a reason.

I understand that school staff will be asked to complete a more detailed Sensory Profile Checklist Revised on my child and might ask for my help answering some of the questions.

I understand I will be invited to an interim meeting half-way through the programme, for about 30 minutes, to provide feedback on what is working and what would help further develop the programme.

I understand that I will also be invited to participate in a short interview with Linda Falkner, of no longer than 30 minutes, either over the telephone or via a home visit, to comment on the value of the programme, and I understand that the interview will be audio-recorded but anonymised when transcribed.

I understand that I am free to ask any questions at any time. I am also free to discuss any concerns with Andrea Higgins who is supervising this research.

I understand that all information will be kept confidentially and securely, and the information will only be accessible to the researcher. Video and/or audio

recordings will be kept confidentially and securely for 14 days, after which it will be transcribed. Following transcription, it will be anonymised, and the researcher will delete the original electronic recording. All other data will be kept by Cardiff University indefinitely. No identifying information about participants will be revealed in written form or any other form of communication.

I understand that I can ask for the information I provide to be deleted/destroyed at any time up until the data it has been anonymised and I can have access to the information up until the data has been anonymised.

I understand that Linda Falkner might also use the anonymised information to publish the results in an academic paper and for training purposes.

I also understand that at the end of the study I will be provided with additional information and feedback about the purpose of the study.

I, _____(NAME) consent to participate in the study. I also provide consent for my child (NAME) to be asked to consent to participate in the study conducted by Linda Falkner School of Psychology, Cardiff University with the supervision of Andrea Higgins.

Signed: Date:

Please fold this consent form in half and post it in the box provided.

Appendix 5: Pupil Information and Consent Form

(This document has a Flesch Reading Ease score of 77.1 with a Flesch- Kincaid Grade level of 5.7 (age 10-11). It will also be read out to the pupil).

School of Psychology, Cardiff University

Sensory study

This study is to help find out if the sensory programme is useful for pupils attending a Resource Base.

The researcher's name is Linda Falkner.

About the study:

Staff within your base will ask you and the other children taking part to answer some questions, on a questionnaire, about what you like and don't like doing with your senses (seeing, hearing, tasting, smelling, touching and moving). Anything you don't understand can be explained to you. This will take about 15 minutes.

Then there will be eight lessons, which will take place in your classroom, with a member of staff present. These lessons will look at the senses in more detail. There will be one lesson a week explaining the sensory programme and asking you to practice some of what you learn at home and at school.

To help you to practice, you will be given a home-school file containing notes on the lessons and the strategies that might be helpful to you. Your parents will be asked to help you at home.

During the last lesson, you will be asked to review the lessons in any way you choose.

The researcher will then come back to talk to you about your review and what you thought about the lessons. This could be on your own or with a member of staff present. This talk will be for only about 20 minutes. It will be recorded so that the researcher can remember what was said. After about two

weeks, the recording will be typed up to help the researcher, and the audio version will be deleted.

You will be given time to ask questions to the researcher if you want to.

The researcher will also talk to your parents about the lessons and how useful they thought they were.

This research hopes to find out if the sensory programme was useful and how to improve the lessons.

Important things to remember:

- It is voluntary to take part (you don't have to).
- You will not get into any trouble for not taking part.
- Everything you say or write will be kept private unless it is something harmful to you or other people.
- You will not be asked to put your name on the questionnaire, and you will be given a pretend name in the finished study.
- You can choose not to answer any questions you are not happy with.
- You can ask questions about the research at any time. Your teacher can help with this.
- You can stop taking part without giving a reason.
- You can stop your information being used. Just tell a teacher.
- If you do not want to take part, tick the 'no' box.
- If you want to complain about the research, please go to a teacher.

Pupil Consent Form

PRIVATE INFORMATION

Sensory study

I understand that:

- Taking part is voluntary, I do not have to take part if I don't want to.
- I do not have to answer questions or do a review if I do not want to.
- I may stop taking part in the study at any time without giving a reason.
- If I do not want to take part, I can tick the 'no' box.
- I understand that I can ask questions about the research at any time.
- I understand that the information I give will be kept private unless it is harmful to me or someone else.

Name_____
Date_____

Tick one:

☐ YES. I would like to take part in the sensory study.

☐ NO. I do not want to take part.

Please fold up this paper and put it in the box.

Appendix 6: Staff Consent Form

School of Psychology, Cardiff University

Staff Consent form

Re: 'Sensory Intelligence'. An Exploratory CIPP Programme Evaluation in a Secondary School Autism Resource Base

I understand that this project is to help evaluate the effectiveness of the 'Sensory Intelligence' approach for pupils attending an Autism Resource Base.

I understand that I will be asked to complete a Sensory Profile Checklist - Revised on children participating in this research. When consenting to participate in the programme, the parents have been asked to support with this task, as necessary.

I understand that I will be invited to an interim meeting, with parents, halfway through the programme, for about 30 minutes, to evaluate any benefits so far and to suggest improvements to the programme.

I understand that I will be invited to participate in a Focus group of 6 – 8 staff to evaluate the programme. This will last approximately 30 minutes and will be videotaped to aid data analysis. Any personal information shared within the focus group will be held confidential by verbal agreement of all the other participants. The university cannot guarantee the confidentiality or anonymity of this source of data, however, so you should not say anything that you would not want broadcast beyond the group.

I understand that all information will be kept confidentially and securely, and the information will only be accessible to the researcher. Video and/or audio recordings will be kept confidentially and securely for 14 days, after which it will be transcribed. Following transcription, it will be anonymised, and the researcher will delete the original electronic recording. All other data will be kept by Cardiff University indefinitely. No identifying information about participants will be revealed in written form or any other form of communication.

I understand that I can ask for the information I provide to be deleted/destroyed at any time up until the data it has been anonymised and I can have access to the information up until the data has been anonymised.

I understand that Linda Falkner might also use the anonymised information to publish the results in an academic paper and for training purposes.

I also understand that at the end of the study I will be provided with additional information and feedback about the purpose of the study.

I understand that I am free to ask any questions at any time. I am also free to discuss any concerns with Andrea Higgins who is supervising this research.

I, _____(NAME) consent to participate in the study conducted by Linda Falkner, School of Psychology, Cardiff University with the supervision of Andrea Higgins.

Signed: Date:

Appendix 7: PowerPoint Presentation Slides (Parents)

'Sensory intelligence'

Proposed to be the 'intelligent' use of sensory awareness to aid self-regulation

1

Introduction

- My name is Linda Falkner
- I am an experienced Educational Psychologist.
- I am conducting research as part of my part-time Doctorate in Educational Psychology at Cardiff University.
- I have three children, one of whom presents autistic behaviour but did not meet the criteria for a diagnosis.
- My contact details are falknerL1@cardiff.ac.uk
- The research is titled: Sensory Intelligence. An Exploratory CIPP Programme Evaluation in a Secondary School Autism Resource Base.

2

Purpose of this meeting

- To introduce the concept of 'Sensory Intelligence'.
- To explain the nature of the research and what is involved.
- To invite you to participate in the research.
- To gain parental consent to invite the children to participate.
- To answer any questions you may have.

3

Overview of research collaboration

4

History within Occupational Therapy

- Sensory Integration Theory – Ayers (1979) – 'sensory processing disorder', 'sensory processing dysfunction', 'sensory defensiveness' – all dis-order labels.
- Sensory Processing Differences – Lombard (2007), Dunn (2014) – a 'neurodiversity' model.

5

Dr Anne Marie Lombard

- South African Occupational Therapist.
- Self-employed so needs to keep up to date with research.
- PhD research in a call centre to find out why some employees thrived and others became very stressed and would leave.
- Discovered up to 80% of the population have sensory differences – impacts on careers.
- Author of 'Sensory Intelligence'.
- Offices in South Africa and UK (London area).

6

Individual differences

- Why do some people complain of scratchy clothes/labels ?
- Why do some people like to walk in barefoot?
- Why do some people have trouble finding things in a cluttered drawer?
- Why do some people want to turn the TV or music up/down?
- Why are some people always tripping over?

7

Sensory tree

Dr Lombard has used the analogy of a tree to help explain individual profiles.

Conceptions of 'high' and 'low' thresholds are supported by Occupational Therapy research evidence highlighting both genetic and environmental influences (for example, Engel-Yeger, 2011).

There is also supportive evidence in Personality research (Aron & Aron, 1997) and Neuroscience (Davies, Chang & Gavin; 2010).

8

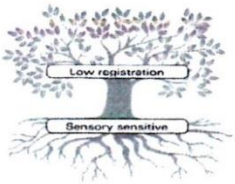
Sensation seekers

9

Sensation avoiders

10

Low registrators and sensory sensitives



11

Arousal Level

High thresholds	Low thresholds
• Need it louder, brighter, faster.	• Need it quieter, calmer, slower.
• Bright colours	• Pastel colours
• Looking for excitement, change.	• Prefer structure and routines- no surprises.
• Career choices?	• Career choices?

12

Career choices

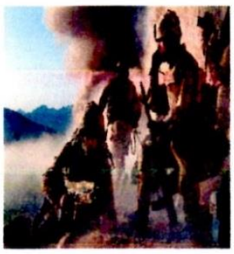
- Dr Lombard has a particular interest in occupations as her PhD research focussed on Call Centres in South Africa.
- She talks about the importance of matching careers with sensory profiles so that the employment (activities and environment) are in tune with the sensory needs of the individual to support well-being and performance, and to reduce stress.
- Environmental studies have also investigated person-environment match (see for instance, Davis, Leach & Clegg, 2011).

13

Office work

14

Uniformed work



15

Outdoor work

16

Goodness of fit in careers

Low registration Best fit job descriptions: • Call centre agents • Stock traders (especially when working on a trading floor) • Flea-market sellers • Preschool teachers • Open-plan office workers • Estate agents • Cabin crew	**Sensation seeking** Best-fit job descriptions • Tour guides • Formula-one racers • Pre-school teachers • Entrepreneurs • Open-plan office workers • Actors, dancers • Journalists • Any job with travelling assignments • Sales and marketing • Police and rescue personnel
Sensory sensitivity Best fit job descriptions: • Computer programmers • High school teachers • Artists • Therapists, counsellors, psychologists • Strategists • Human resource staff • Systems analysts • Researchers	**Sensation avoiding** Best fit job descriptions. • Lawyers • Advocates • Accountants • Writers • Farmers • Systems analysts and developers • Librarians

17

Goodness of fit in environments

Sensation seekers/leaves:

- Unpredictability; variety; novelty; multisensory; crowd; people; large group; activities; intense and frequent sensory input; surprise element; open plan offices; public transport; etc.

Sensation avoiders/deep roots:

- predictability; structure; sameness; quiet and contain spaces; routine; small groups or individual contact; gentle sensory input; closed office spaces etc.

Low registrators/branches:

- intensifying sensory input-louder, brighter, harder, tighter; multisensory input; intense and frequent sensory input; open plan offices; public transport; etc.

Sensory sensitivities/roots:

- decreased sensory input-softer, calmer, gentler, multisensory input; predictable and structured sensory input; quiet and calming spaces and situations; small groups of people; etc

18

19

Sensory Intelligence

- Discover (Knowledge) – Acknowledge (Insight) – Adapt (Power)

Discover (Knowledge)	Acknowledge (Insight)	Adapt (Power for change)
• Your sensory profile • The constant, unconscious interaction between your brain and the environment • Individuals differ and are uniquely wired • Judging and labels are wrong	• Sensory processing has an unconscious yet fundamental impact on attention, emotion and behaviour. • These functions are fundamental to support relationships, teamwork, conflict, diversity, change management, leadership styles, performance and wellness. • How does it relate to you? • How does this relate to others?	• Getting back to basics and adapt our way of thinking, doing and leading • Re-engage with self and others • Self-regulation • Sensory diets • Sensory ergonomics

22

7 senses

20

Visual sense

Important functions

- Communicating.
- Reading.
- Driving/riding a bike.
- Watching TV or movies
- Using computers.
- Learning.

How to rest the visual system

- Close your eyes
- Practice visualisation techniques
- Watch fish in a fish tank or lava lamp.
- Take five, take a break.

23

The hidden senses

Proprioceptive

- Body sense.
- Balance, planning and fluent movement.
- Information from receptors in the muscles and joints.

Vestibular

- The gravity sense in your ear.
- The body's GPS – tells us where we are in space.
- Relies on movement of the head and gravity process through chemical reactions in the inner ear.

21

Hearing

Important functions

- Communication with others.
- Listening to instructions.
- Talking on the phone.
- Radio-TV.
- Music.
- Attending classes.

How to rest the auditory system

- Listening to calming music.
- Put on headphones and keep the volume down.
- Move to a quiet space.
- Use earplugs.
- Take five, take a break.

24

Touch

Important functions

- Dressing
- Eating
- Bathing and grooming.
- Warning us of danger.

How to rest the touch system

- Remove a touch irritation.
- Have a deep massage.
- Have a heavy quilt or blanket.
- Have a big bear hug not a light kiss.
- Take five, take a break.

25

Smell and taste

Important functions

- To enjoy food.
- It also affects our interaction with others around us.
- Warning of danger.

How to rest the smell/taste systems.

- Avoid areas or people with strong smells
- Create the smell that suits your system.
- Use aromatherapy.
- Open windows and/or doors.
- Eat the foods you enjoy.

26

Movement (vestibular and proprioceptive senses).

Important functions

- Sitting on a chair
- Moving/walking between objects.
- Driving a car/riding a bike.
- Exercise/dancing
- Using the stairs
- Finding a new place

How to rest the movement system

- Smooth, rhythmic movement.
- Get to a quiet spot and be still.
- Get some sleep.
- Take five, take a break.

27

Movement (vestibular and proprioceptive senses) 2

Avoid through activities

- Maintain routines, consistency and predictability.
- Familiarity of people, settings and experiences is safer and more manageable (such as going to the same restaurant).
- Use regular breaks and time out.
- Spend time alone.
- Plan ahead.
- Avoid crowds, traffic, congested area.

28

Sensory processing and Autism

Ben-Sasson et al (2009):

- Between 5% - 16% of general population have 'atypical' sensory processing.
- But it may be up to 90% in people with Autism.
- This can include hyper-sensitivity, hypo-sensitivity, fluctuations between the two, and sensory overload, leading to shut-down
- The influence of this on quality of life needs more research.
- It has, however, been linked with behaviour difficulties, poor academic achievement, an avoidant coping style and mental health issues.

29

Sensory Intelligence approach

- Sensory profiling
- Sensory 'diets'
- Sensory 'snacks'
- Sensory ergonomics.
- Avoid or self-regulate through movement.
- Sensory intelligent relationships.
- Sensory overload, stress and shutdown
- Levels of sensory processing from comfortable – shutdown and how to manage this.
- Unavoidable situations – anticipation, planning and preparation (APP)
- Time and Organisational Management
- Take five, take a break.

30

Sensory diet possibilities

- **Movement 'foods'** -Weight training; Running; road running, trail running; Contact sport: Rugby, wrestling, karate, boxing; Scuba diving; Swimming; Surfing; Water skiing; Gardening; Rowing; Walking; Dancing; Rollercoaster rides; Skydiving, parachuting; Flying aeroplanes; Adventure clubs; Hiking; Beach volleyball; Roller blading; Rock climbing; Fishing; Cricket; Tennis; Gym: aerobics, weight training; Biking: road racing, mountain biking.

31

- **Tactile 'foods'** - Social clubs; Massage; Sitting on a bean bag chair; Playing a musical instrument; Gardening; Pottery; Sculpting.
- **Visual 'foods'** - Reading; T V; Decorating; Arts; Quilt making; Needlework and embroidery; Visiting museums, art galleries, flea markets, festivals.
- **Sound 'foods'** -Music; Playing a musical instrument; Drumming; Concerts.
- **Smell/taste 'foods'** - Cooking; Attending cooking classes and demonstrations; Aromatherapy; Food festivals.
- **Combination 'foods'** –Breathing; Progressive and other relaxation techniques; Yoga; Pilates; the Alexander Techniques; Meditation, etc.

32

Take five, take a break

How does your engine run approach (Williams & Shellenberger, 1996)– too high, too low or just right.

Five primary self-regulation strategies are to:

- Put something in your mouth.
- Move.
- Touch
- Look
- Listen

(Work out preferred self-regulatory preferences)

33

Take five, take a break time element.

- The five second break (perhaps once every 20 to 40 minutes).
- The five minute break (perhaps between lessons).
- The 55 minute break (perhaps at lunchtime).

This is considered to help you maintain the best state of arousal, manage your stress and prevent sensory overload, to improve health and well-being.

34

Sensory 'mindfulness'

Use the following techniques as a quick and easy way to get out of your mind and be present in the moment.

- Pause and take a few slow breaths.
- Look around you- what can you see? Notice the small details.
- Close your eyes – what can you smell?
- Listen carefully – what can you hear?
- What can you feel – can you feel 5 or more things against the surface of your body?

35

This study

- Aims to explore whether the 'Sensory Intelligence' approach is of value to pupils in a secondary school Autism Resource Base .
- It also looks at the benefit of parental involvement and whether is it feasible for staff to include the programme in the curriculum.
- There are no preconceived hypothesises about its value.
- The aim is to ask the pupils, their parents and staff for their views following the presentation of the programme to the children over 8 x 45 minute lessons in the Spring Term.
- All contributions are voluntary, confidential and will be anonymised before publication of the study.

36

Step 1

The provision of 'informed consent'.

Then to help establish whether children with different sensory profiles benefit more or less from this approach I will ask:

- The children to complete a profile (Adolescent and Adult Sensory Profile); this is in addition to the one in the book.
- Staff to complete a more detailed profile (Sensory Profile Checklist Revised) which includes potential perceptual processing issues as well. Staff might need to ask parents about some of the questions on this form.

37

Step 2

First 4 lessons:

- 1. Profiles and introduction.
- 2. The 7 senses and general strategies. Individual sensory profiling.
- 3. The Brain hierarchy IQ, EQ and Sensory IQ.
- 4 Sensory intelligent relationships – getting on with other people.

The pupils will be given a home-school file providing an outline of each lesson and strategies they have been asked to practice. Please encourage your children to discuss what they have learned and to practice techniques at home.

I will then invite parents and staff to a short meeting after session 4 to discuss how it is going and to consider any improvements that might be made to the delivery of the programme.

38

Step 3

The second block of 4 x 45 minute lessons will be delivered having regard for the comments made.

These will cover:

- 5. Sensory overload, stress and shutdown.
- 6. Sensory processing by different profiles. Take five, take a break.
- 7. Unavoidable situations –anticipation, planning and preparation (APP). Time and organisational management.
- 8. Over- view and review of programme (choice of media) by the pupil(s).

39

Step 4

- **Pupils** will be invited to be interviewed (up to 20 minutes)to discuss their thoughts about 'Sensory Intelligence', using their review as a concrete aid to facilitate discussion.
- **Parents** will be invited to share their views either via the telephone or a home visit (up to 30 minutes).
- Unit **staff** will be invited to share their views via a Focus group of 6 -8 members of staff (up to 30 minutes).
- Supplementary evidence might be sought using school assessment material.
- All of that information will be analysed for themes for the report. Themes will be supported by anonymised quotes.

40

What is 'Informed consent'.

41

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43

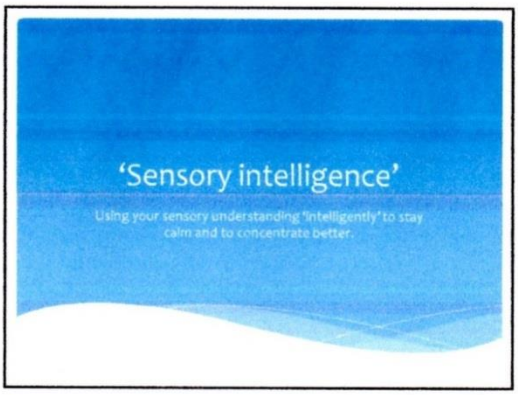
Any questions?

44

Thank you very much for coming

45

Appendix 8: PowerPoint Presentation Slides (Children)



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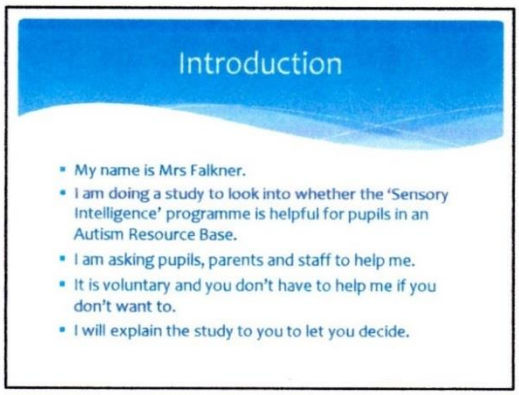

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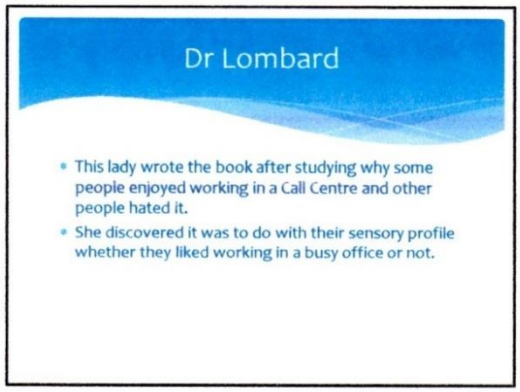

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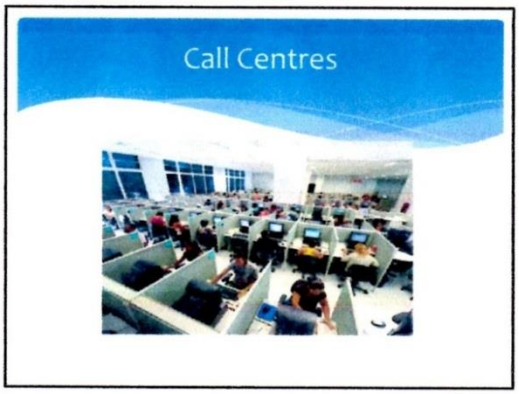

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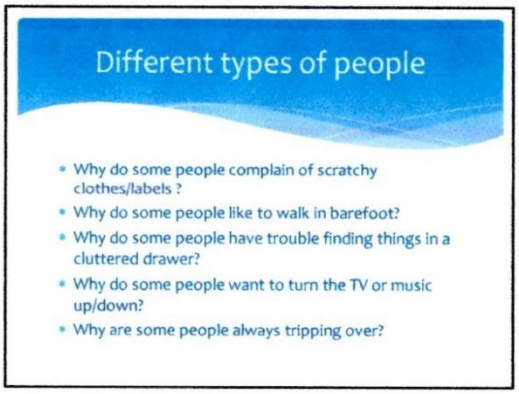

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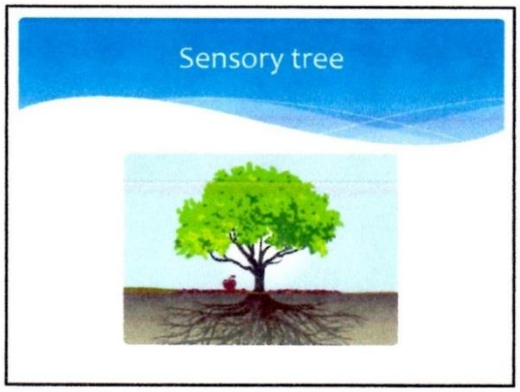


6

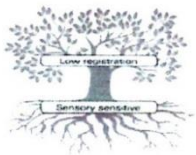
Sensation seekers

7

Sensation avoiders

8

Low registrators and sensory sensitives



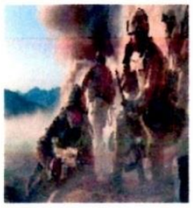
9

Arousal levels

High threshold (Leaves and branches)	Low threshold (surface roots and deep roots)
• Need it louder, brighter, faster. • Bright colours • Looking for excitement, change. • Career choices?	• Need it quieter, calmer, slower. • Pastel colours • Prefer structure and routines- no surprises. • Career choices?

10

Uniformed work



11

Outdoor work

12

Finding the right career

Low registration
Best fit job descriptions:
- Call centre agents
- Stock traders (especially when working on a trading floor)
- Flea market sellers
- Preschool teachers
- Open plan office workers
- Estate agents
- Cabin crew

Sensation seeking
Best fit job descriptions:
- Star gazers
- Formula-one racers
- Pre-school teachers
- Entrepreneurs
- Open plan office workers
- Actors, dancers
- Journalists
- Any job with travelling arrangements
- Sales and marketing
- Police and rescue personnel

Sensory sensitivity
Best fit job descriptions:
- Computer programmers
- High school teachers
- Artists
- Therapists, counsellors, psychologists
- Strategists
- Human resource staff
- Systems analysts
- Researchers

Sensation avoiding
Best fit job descriptions:
- Lawyers
- Advocates
- Accountants
- Writers
- Farmers
- Systems analysts and developers
- Librarians

13

Being in the right environment helps too!

Sensation seekers/leaves:
Unpredictability; variety; novelty; multisensory; crowds; people; large groups; activities; surprises; open plan offices; public transport; etc.

Sensation avoiders/deep roots:
predictability; structure; sameness; quiet and contained spaces; routine; small groups or individual contact; gentle sensory input; closed office spaces etc.

Low registrators/branches:
intensifying sensory input-louder, brighter, harder, tighter; intense and frequent sensory input; open plan offices; public transport; etc.

Sensory sensitivities/roots:
decreased sensory input-softer, calmer, gentler, multisensory input; predictable and structured sensory input; quiet and calming spaces and situations; small groups of people; etc

14

Primary classrooms

15

The 7 senses

16

The hidden senses

Proprioceptive
- Body sense.
- Balance, planning and fluent movement.
- Information from receptors in the muscles and joints.

Vestibular
- The gravity sense in your ear.
- The body's GPS – tells us where we are in space.
- Relies on movement of the head and gravity process through chemical reactions in the inner ear.

17

Sensory Intelligence

Three stages
1) Discover your own sensory profile.
2) Understand what it means for you and your relationships with other people.
3) Use this information to 'intelligently' change things for the better.

18

This study

I want help to find out if teaching the 'Sensory Intelligence' approach is helpful to pupils attending this resource base.

I want help to make sure the way it is taught is interesting and enjoyable.

I also want help to make improvements to it.

19

What is involved

- I am asking for pupils, parents and teaching staff to be involved.
- I would teach the 'Sensory Intelligence' approach for one lesson a week for 8 weeks, with a member of staff to help me. The groups would be 2 – 4 pupils only (Years 7 – 9 and Years 10 – 11).
- At the end of each lesson. I would ask you to tell me what you thought of the lesson.

20

Home-school file

- I would give you strategies to practice at home and at school.
- A home-school file will include a summary of the lesson and the strategies so that you can take it home, practice at home, and let your family help you.

21

Reviewing the programme

- In lesson 8, I would ask you to provide a review of the 'Sensory Intelligence' programme (your choice of how you do it).
- I would also like to interview you, on your own, for about 20 minutes, to talk about your review and what you thought about the lessons and strategies. A member of staff can be present if you want them to be there.
- You don't have to answer any questions you don't want to.

22

What is informed consent?

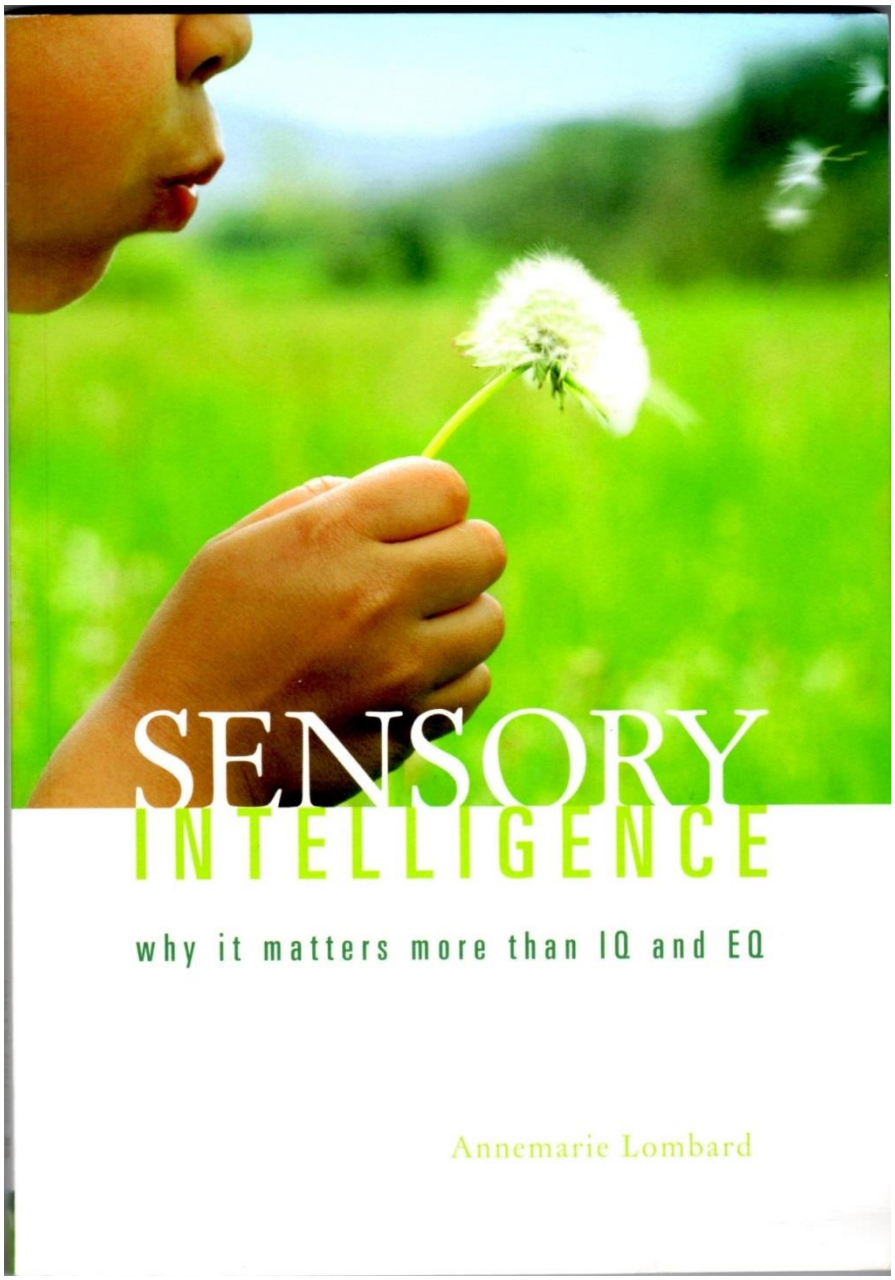
23

Any questions?

24

25

Appendix 9: Sample Pages from 'Sensory Intelligence. Why it is more important that EQ or IQ'. (Lombard, 2007)



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To our Heavenly Father
Thank you for leading me so clearly to my purpose in life.
and then granting me the strength to fulfil it.

Introduction

His eyes are wide open, his pupils dilated. He is nervously looking from side to side. I can see he is agitated, moving around on the spot. For a moment I am surprised. What is happening? Why is he acting like this? I can see no real threat in our immediate vicinity. At then it hit me: he is in a grocery shop, squeezed between the isle and two women, one pushing her trolley up against him and the other reaching over him for the cereal box on the shelf behind him. She touched him while doing so, further exacerbating his anxiety. He is clenching the handle of the shopping trolley and our little two-year-old boy sitting in the front, sensing his dad's anxiety, starts to cry. His anxiety at being closed in is now aggravated by the shrill screams of a young child. I make the connection and move in to the rescue. I push aside the shopping trolley to create an escape route. He gives a huge sigh of relief when passing me hurriedly to get out of the corner created very unconsciously by two other shoppers.

This is an excellent example of an automatic fear response evoked in a person by the casual touch of two strangers, while being trapped in a confined space. What for me would pass without the slightest response or reaction, triggered severe discomfort and anxiety in my husband. We tend to think that everyone senses and experiences the world in exactly the same way. But our senses are unique and make each of us different in the way we experience normal day-to-day input from our surroundings. Learning to see the world through the eyes of my sensory sensitive husband has been an interesting and enriching journey. It has helped me look at life differently, encouraging me to make a bigger effort to notice small details, and to stop judging others. A few years back our shopping-centre experience would probably have left me feeling merely irritated by his 'irrational' response. Now I know better.

I have worked with children for many years using sensory integration therapy. By facilitating their development of new skills I helped them integrate their senses in order to improve their interaction, learning and behaviour. But when I started looking at the sensory processing of adults, I discovered a whole new world. Whereas with children I had to trust my clinical observations, testing and reasoning to try to figure out what was going on, the situation is quite

different with adults. Every person who has allowed me to join his or her sensory journey has given me tremendous insight into the fact that each person's experience the world through his or her senses is unique and different.

Some of us (like me) crave sensory input. We thrive in a busy, active environment where a lot is going on or many people are involved. We have so-called high thresholds. The brain experiences these inputs as enjoyable and can tolerate multiple sensory input at any given time.

Others, however, do not enjoy a busy, noisy environment and crave the quiet, order and tranquillity that life so often withholds from us. They have so-called low thresholds and quickly feeling overwhelmed and irritated by too much going on around them. They would much rather stay at home and watch a movie on TV, read a book, or just spend some quiet time alone than go out clubbing or having dinner in a busy restaurant.

Now, if we further explore how people with different thresholds relate to each other at home and at work, it becomes a fascinating dynamic to suddenly understand your spouse, child, colleague or employer. Low threshold versus high threshold individuals operate in completely opposite ways. They have different needs; they often approach tasks differently and where there is diversity, there is bound to be conflict. Understanding family and work dynamics from this almost primitive, sensory level has been an 'aha' experience for so many people that I stopped counting long ago.

This book explores the concept of sensory intelligence. It is strongly rooted in the sensory integration theory developed in the 1960s and mostly applied to children with developmental or learning difficulties. But the intricate process of processing and modulating the senses in order to produce correct behaviours and responses remains part of us in our adult environment too. In this book I will explain how we are different with regard to thresholds and how we respond to the environment on a very subliminal, yet primitive level. Even an elementary understanding of sensory intelligence will shed new light on your likes, dislikes, oddities, behaviours and irritations.

Sensory thresholds are part of our genetic make-up, but an insight into and awareness of our sensory needs and preferences can lead us to making the necessary changes in our surroundings. This will help you cope with life more easily, more effectively and give you greater understanding within your relationships, both at home and at work. Your sensory preferences are part of who you are. There is no right or wrong; it is simply how you are wired.

I hope this book will facilitate much discussion, dialogue and further research into this powerful but underestimated field. I also hope and pray that it will open the eyes and ears of many to see and hear and experience how special and unique we have been created.

Your senses are your gateway to your world. Use them well!

The process of self-regulation

What is self-regulation and why is it necessary? We can say that self-regulation is the process by which we change our levels of arousal and alertness to be appropriate for the task at hand. It is often an unconscious process. Have you ever observed people in church during the sermon or at a conference or meeting where they have to stay focused and attentive, while sitting still? If you watch carefully you will notice some of the following behaviours: doodling with their pens on the paper, twirling their hair, biting their pens, scratching their faces (and sometimes picking their noses), tapping their feet, etc. These are all methods that the body unconsciously uses to stay focused and alert, but are often referred to as habits. Have you ever wondered why we are offered peppermints at conferences? Because the smell and taste of peppermint alerts the brain. Combine that with a chewing or sucking action and the brain kicks into a full alert state, optimal for concentration and focus. A German company building large trucks is investigating the possibility of using vibrating seatbelts and releasing a minty smell in the cabin – all efforts to maintain an optimal state of arousal for the truck drivers who have to stay awake and alert for hours on end. They will be able to drive for longer in a more alert and awake state, reducing safety risks.

SENSORY HABITS

When we consider how the brain processes information and reacts to sensory input, it makes us think about habits in a different way. The brain has an automatic drive to reach balance or homeostasis. In other words, trying to self-regulate or calm or alert the system could potentially be an automatic response of the brain to achieve balance. If you are in the habit of doodling on a piece of paper while talking on the phone, this could merely be your brain's way of ensuring that you stay alert and focused. On this basis we can assume that similar habits are employed to meet a sensory need.

When we investigate why, how and when habits occur, this becomes the first step towards knowing what to do in situations that require self-regulation. For example, if you have a tendency to rub your fingers, (I know, it is a strange habit, but most of them are), asking why and when you do this, you may discover that it is when you feel anxious or stressed, or before an important event.

Looking at how you do it, may indicate that by rubbing your fingers you are using deep touch pressure, a sensory input that is known to calm the brain. Our sensory habits can therefore indicate whether we are stressed, tired, anxious or bored. Knowing what is happening between ourselves and the situation can help us manage these situations more effectively.

Permission to reproduce these pages has been granted by the author.

Appendix 10: Debrief Form (Adults)

Re: 'Sensory Intelligence'. An Exploratory CIPP Programme Evaluation in a Secondary School Autism Resource Base

Thank you very much for participating in this study. The research aimed to explore the value of the 'Sensory Intelligence' approach for pupils attending an Autism Resource Base and to consider ways of further developing the programme to meet their needs.

The feedback and suggestions from the pupils, staff and parents, via reviews, interviews and a Focus group, will be subject to detailed analysis which will generate several over-arching and sub-themes. These different perspectives will be invaluable for the further development of the programme and to encourage future research. It will also aid educational psychologists and other education professionals, to help support children and young people with Sensory Processing issues to achieve their full academic potential and to safeguard their well-being.

All information will be held confidentially and securely, and the information will only be accessible to the researcher. Video and/or audio recordings will be kept confidentially and securely for 14 days, after which it will be transcribed. Following transcription, it will be anonymised, and the researcher will delete the original electronic recording. All other data will be kept by Cardiff University indefinitely. No identifying information about participants will be revealed in written form or any other form of communication.

Although confidentiality of the recorded data can be assured by the researcher, confidentiality of information held by other participants cannot be guaranteed.

The anonymised information might also be used in an academic paper and for training purposes.

You can ask for the information you provide to be deleted/destroyed at any time up until the data it has been anonymised and you can have access to the information up until the data has been anonymised.

If you would like further information on this research project or are interested in the outcomes, please feel free to contact me directly. For any other concerns please contact Andrea Higgins, research supervisor, or the Ethics Committee, at the School of Psychology, Cardiff University.

Finally, if you feel the need to talk to someone, after the completion of the study, you might like to contact The National Autistic Society Autism Helpline (www.autism.org.uk telephone number 020 78332299).

Yours faithfully

Linda Falkner

Linda Falkner	Andrea Higgins	Secretary of the Ethics Committee
School of Psychology	School of Psychology	School of Psychology
Tower Building	Tower Building	Tower Building
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CF10 3AT	CF10 3AT	CF10 3AT
	Tel: 02920879003	Tel: 02920874007
Email FalknerLM@cardiff.ac.uk	HigginsA2@cardiff.ac.uk	psychethics@cardiff.ac.uk

Appendix 11: Debrief Form (Children)

(This document has a Flesch Reading Ease score of 70.6 with a Flesch- Kincaid Grade level of 6 (age 10-11). It will also be read out to the pupils).

Dear xxxx

Sensory study

Thank you very much for helping with this study. It aimed to explore the value of the 'Sensory Intelligence' approach.

The feedback and suggestions from all of you, the staff and your parents, is very important and will now be used to consider whether the programme is worth doing and whether there are any improvements to be made. It might also help encourage more research and more Resource Bases to consider using the programme.

Important things to remember:

- Everything you have said or written will be kept private unless there is any concern for your safety or the safety of others.
- You can stop your information being used. Just tell a teacher.
- If you want to complain about the research, please go to a teacher.

If you feel the need to talk to someone, please tell a teacher or your parents. You might also like to contact The National Autistic Society Autism Helpline (www.autism.org.uk, telephone number 020 78332299).

Thank you again for your help. It was great working with you.

Yours sincerely

Linda Falkner

Linda Falkner	Andrea Higgins	Secretary of the Ethics Committee
School of Psychology	School of Psychology	School of Psychology
Tower Building	Tower Building	Tower Building
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Appendix 12: Semi-structured Interview Schedule - Parents

Preamble:

Thank you for agreeing to be interviewed. Can I check that you are happy for me to record the interview on the understanding that I will give you a pseudonym (different name) on transcription of the data so that I can quote some of the things you have said anonymously? If there is anything you would prefer not to be included, please let me know, and I will arrange for it to be excluded.

Opening question:

I am interested in your views about the 'sensory intelligence' programme which has been used with the children in the ARB. Has this approach helped? How?

Subsequent questions:

Was there anything you disliked about the programme? What and why?

Have you noticed any changes in your child that you would attribute to the programme?

How much were you able to support the programme, at home?

Were there any difficulties/barriers to supporting the programme at home?

Was there anything more we could have done to help you?

What sort of comments did your child make about the programme?

Do you think parental involvement is important?

Do you think the programme is suitable for a child of that age?

Is there anything else you would like to add?

Requests for further information:

Please give me a concrete example.

Can you expand on that?

Have you noticed anything else?

Why do you think that?

How do you think that could be achieved?

What changes would need to be made to make this possible.

Appendix 13: Semi-structured Interview Schedule – Children

Preamble:

Thank you for agreeing to be interviewed. Can I check that you are happy for me to record the interview on the understanding that I will give you a different name so that if I quote some of the things you have said it will be anonymous? If there is anything you would prefer not to be included, please let me know.

Everything you say is confidential unless there is something that causes me concern about your safety or the safety of other people. Is that okay? Do you have any questions?

Opening question:

I am interested in your views about the 'sensory intelligence' programme and thought we could start by discussing what you produced in your programme review. Can you tell me more about……..?

Subsequent questions:

Has the programme helped? How?

Was there anything you didn't like about the programme? What and why?

Did you have any help from home?

What sort of help?

Did you find support from home helpful?

Can you think of any ways the programme could be improved?

Would you recommend the programme for pupils, your age, in other ARBs? Why?

Is there anything else you would like to add?

Requests for further information:

Please give me a concrete example.

Can you expand on that?

Have you noticed anything else?

What do you think would help?

Why do you think that?

How do you think that could be achieved?

What changes would need to be made to make this possible?

Appendix 14: Focus Group Schedule

Preamble:

Thank you for agreeing to be interviewed as part of a Focus group. Can I check that you are all happy for me to video the Focus group? The video is used mainly to help identify the speaker for transcription purposes, after which it will be deleted. You will all be given a pseudonym in the transcription to enable me to quote some of the things you have said anonymously. If there is anything you would prefer not to be included, please let me know, and it can be withdrawn from the data. You are also welcome to withdraw from the Focus group at any time without giving a reason.

We need to start by agreeing that anything said by members of the group remains confidential to the group. Do we all agree? Please be advised that confidentiality of the recorded data will be guaranteed by me, as it will be stored securely, for 14 days, and then deleted after transcription. I cannot guarantee the confidentiality of information you share with each other, however. You should not say anything that you would not want broadcast beyond the group, as a result.

Opening question:

I am interested in your views about the 'sensory intelligence' programme which has been used with the children in the ARB. Has the programme helped? How?

Subsequent questions:

Was there anything you disliked about the programme? What and why?

Have you noticed any changes in the children that you would attribute to the programme?

Do you think parental involvement is important?

Do you think the sensory intelligence approach is viable in an ARB?

How do you think the programme could be improved?

What aspects of the programme, if any, would you like to be incorporated in the ARB's service delivery, and to whom?

If so, how would you suggest this should be incorporated?

Is there anything else you would like to add?

Requests for further information:

Please give me a concrete example.

Can you expand on that?

Have you noticed anything else?

What do you think would help?

Why do you think that?

How do you think that could be achieved?

What changes would need to be made to make this possible?

Appendix 15: Outline of 8-week Sensory Intelligence Intervention

	Main activities	Purpose
Session 1: Overview and introduction to the senses.	• Introduce topic – individual differences – sensory challenges (spot the leopard, tuning fork, binoculars). • Explore the 7 senses. • Provide general strategies – to rest each system. • Link to what strategies they are already using. • Completion of AASP • Review lesson	To establish rapport and to start the process of conscious awareness of sensory processes and individual differences. Awareness of the importance of each sense. Provision of some general strategies to practice. Group discussion -foster a sense of collaborative group dynamics and sense of self-efficacy. To establish sensory profiles. Formative assessment feedback
Session 2: Sensory Intelligence profiling.	• Review previous learning. • Discuss use of techniques at home and at school. • Demonstrate Sensory Intelligence profiling. Assist pupils in doing their own. • Explain the implications of the profile (using my profile as an example). • Link to best-fit careers. • Review lesson	Consolidation Enhance Mastery and Self-Efficacy. Increasing conscious awareness of sensory preferences and their implications. Foster discussion. Formative assessment feedback
Session 3: The Brain Hierarchy, IQ, EQ and Sensory IQ.	• Review previous learning. • Discuss use of techniques at home and at school. • Explain different brain mechanisms and how they interact. • Importance of movement. • Review lesson	Consolidation. Enhance Mastery and Self-Efficacy. Introduction to concept of embodied cognition. Enhanced sense of self-efficacy. Formative assessment feedback

	Main activities	Purpose
Session 4 Sensory intelligent relationships	• Review previous learning. • Discuss use of techniques at home and at school. • Consider relationships from a sensory perspective – using some role play to aid understanding and explore strategies to help. • Review lesson	Consolidation. Enhance Mastery and Self-Efficacy. Considering concept of individual needs and self-in-relation-to others. Encourage tolerance, understanding and conflict resolution. Formative assessment feedback
Session 5 Sensory overload, stress and shutdown	• Review previous learning. • Discuss use of techniques at home and at school. • Levels of sensory processing. Share examples of escalation from Level 1 (comfort) – Level 5 (shutdown) and the importance of maintaining optimal state of function. • Review lesson	Consolidation. Enhance Mastery and Self-Efficacy. Introduction to arousal theory and reinforcing strategies for sensory regulation Formative assessment feedback.
Session 6 Sensory processing by different profiles.	• Review previous learning. • Discuss use of techniques at home and at school. • More detailed examination of strategies based on sensory profiles. • Review lesson	Consolidation. Enhance Mastery and Self-Efficacy. Comparison of current strategies with additional options aimed to enhance self-efficacy and motivation to try out new strategies. Formative assessment feedback.

	Main activities	Purpose
Session 7 Unavoidable situations – anticipation, planning and preparation (APP). Time and organisational management.	• Review previous learning. • Discuss use of techniques at home and at school. • Introduce three stages before the event (aware, orientate, organise). • Introduce three stages during the event (contact, action, completion). • Introduce three stages after the event (withdraw, depart, rest). • Consider the importance of time and organisational management. • Review lesson	Consolidation. Enhance Mastery and Self-Efficacy. Demonstrate interplay between thoughts, feelings and behaviour. Increase available strategies and enhance self-efficacy. Formative assessment feedback.
Session 8 Overview and review of programme (choice of media) by the pupils.	• Review previous learning. • Discuss use of techniques at home and at school • Recap the topics covered. • Answer any questions. • Ask the children to provide a review of the programme – individual, pairs or group. • Review lesson	Consolidation. Enhance Mastery and Self-Efficacy. Evidence of learning and what was pertinent to them to add to the data base and to use as a concrete aid during the interview. Formative assessment feedback.

Appendix 16: CIPP Process and Product Evaluation Checklist

PROCESS EVALUATION

1. Monitor, observe, and maintain a record of progress on programme implementation.
2. In collaboration with staff, maintain a record of programme events and any problems.
3. Periodically interview beneficiaries and staff to obtain their assessments of the programme's progress.
4. Present and discuss process evaluation findings in feedback and process evaluation report.
5. Use the process evaluation findings to coordinate and strengthen staff activities.
6. Use the process evaluation findings to strengthen the programme design.
7. Use the process evaluation findings to help maintain a record of the programme's progress.
8. Use the process evaluation findings to report on the programme's progress.

PRODUCT EVALUATION

IMPACT (to assess a programme's reach to the target audience)

1. Periodically interview stakeholders to learn their perspectives on how the programme is influencing the community.
2. Determine the extent to which the programme reached an appropriate group of beneficiaries.
3. Use the impact evaluation findings to judge the extent to which the programme is serving or did serve the right beneficiaries.
4. Use the impact evaluation findings to judge the extent to which the programme addressed or is addressing important community issues.

EFFECTIVENESS (to assess the quality and significance of outcomes).

1. Interview key stakeholders to determine their assessments of the programme's positive and negative outcomes.
2. Access documentation needed to identify and confirm the range, depth, quality, and significance of the programmes' effects on beneficiaries.

3. Use a goal-free evaluation method to ascertain what the programme did and to identify its full range of effects – positive and negative, intended and unintended.
4. Use the effectiveness evaluation findings to gauge the programme's positive and negative effects on the community.
5. Use the effectiveness evaluation to sort out and judge important side effects.
6. Use the effectiveness evaluation findings to examine whether programme plans, and activities need to be changed.
7. Use the effectiveness evaluation findings to make a bottom-line assessment of the programme's success.
8. Contrast with similar programmes elsewhere to make a bottom-line assessment of the programme's significance.

SUSTAINABILITY (to assess the extent to which a programme's contribution are institutionalised successfully and continued over time).

1. Interview staff to obtain their judgments about what programme successes should be sustained.
2. Interview programme beneficiaries to identify their judgments about what programme successes should and could be sustained.
3. Use the sustainability evaluation findings to determine whether staff and beneficiaries favour programme continuation.
4. Use the sustainability findings to assess whether there is a continuing need/demand and compelling case for sustaining the programme.

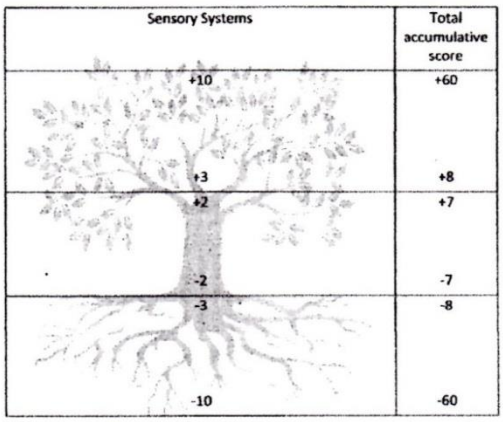
Appendix 17: Sensory Matrix Summary Score Sheet

My Sensory Profile

Scores	Smell/ Taste	Visual	Touch	Auditory	Movement	Activity (Multi-sensory)
+10						
+9						
+8						
+7						
+6						
+5						
+4						
+3						
+2						
+1						
0						
-1						
-2						
-3						
-4						
-5						
-6						
-7						
-8						
-9						
-10						

Accumulative Matrix Score:

Score Range	-60 to -22	-21 to -8	-7 to +7	+8 to +21	+22 to +60
Your Score					



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Appendix 18: Children's Case Study 'Pen Pictures'

VINCE

Sensory profile:

AASP – Sensation Avoiding +
Sensory Sensitivity +
Sensation Seeking -
SM – Sensation Avoiding,
Fluctuating profile.
SPCR- Fluctuation

Vince's interview:

- Friendly and open to learn. Particularly interested in finding out more about how people 'up here' think.
- 'Found useful techniques' including ways to calm himself (smells and exercise).
- Liked influence on staff -might get more resources, not enough exercise yet.
- Willing to give constructive feedback.
- Found the programme 'alright' but thought others might find it complicated.
- Would recommend to others because of 'interesting things to learn about'.
- Took the file home to discuss with his mother which he found helpful.

Mother's interview:

- Vince is a reluctant communicator and as a teenager does not want any help.
- The programme facilitated his communication and awareness, however, and she thinks he is also more tolerant of others.
- Delivery at school important due to parent- teenager relationship.
- Comments provided in the file were deemed very helpful as they provide more insight for parents, because 'they often don't tell you'.
- Although there is nothing new to her, the programme had a confirmatory role.
- She would have wanted the programme at diagnosis or earlier because she had to learn without support, now 'over the worst of it'.
- Considers the programme 'fantastic', very informative and helpful, and particularly useful in highlighting individual differences which should increase tolerance for others, commenting 'no size fits all'.
- Would recommend 'rolling it out' to all schools to increase tolerance of ASC pupils and to facilitate teacher awareness, particularly towards those who may never get a formal diagnosis.
- It would also have a role in ASC children- animal interaction and adult studies.
- She had noted that the ARB teachers were already using 'bits and pieces of it'.
- She was appreciative of the opportunity saying, 'Thank **you** very much, it has been brilliant'.

Staff interview (Focus group):

- Reluctant communicator about feelings but now talking about sensory issues.
- Timetabling demands of mainstream limit time available to work with ARB pupils flexibly.
- Staff emphasise skills need to be practiced at home.

Field notes:

- Proved to be one of the most sensitive CYP who found 'silly' behaviour of peers distracting.
- Always engaged well and remembered that I was a 'root' like him.
- Happy to talk about relationships.
- He indicated that he had particular trouble sitting in front of a computer screen for two hours at a stretch.
- He worried about study skills and deadlines in particular.
- Executive functioning issues were evident but not an area of focus.
- Was often absent due to a difficult relationship with Simon, who tended to 'lean on him', and limited staff support.
- His mother suggested that there should be an ARB attached to every secondary school.

SIMON

Sensory profile:
AASP – Sensation Avoiding +
SM – Sensation Seeking, Fluctuating profile.
SPCR- Fragmented perception, delayed perception, peripheral perception, fluctuation.

Simon's interview:

- Openness to learn.
- Positive about programme content and quality.
- Liked 'handy techniques'.
- Liked influence on staff -not enough exercise yet.
- Willing to give constructive feedback.
- Would recommend to others if 'unsure about their senses'.

Mother's interview:

- Concern about environment of ARB (size, limited resources, difficult group dynamics, and staff awareness of sensory issues).
- Exasperated by educational systems ('I feel for the children').
- Considers the programme fills a gap (shortage of programmes available).
- Positive regard for programme 'brilliant', 'nothing to dislike'.
- Considers that the programme encourages dialogue 'Opening up that conversation' (We all have profiles).
- Empathy for Simon as she also has sensory issues.
- Both gained insight and understanding, and Simon is calmer, as a result.
- Evidence to support this calmness was an incidence when he was attacked by another pupil.
- Hopes that the programme helps enhance staff understanding.
- Likes 'more strategies' particularly focussing on individual interests (cooking).
- Suggests wider school/Local Authority facilitate staff awareness by providing non-contact time for training.
- Has already discussed the book with a friend who wants to borrow it.

Staff interview (Focus group):

- Programme has enhanced insight for the staff, parents and all the children **except Simon.**
- Simon considered to have a short fuse going from 1 – 10 quickly but says he is angry before he is. Able to verbalise.
- Consider nothing would work with him unless staff experimented over a long period of time.
- Considered that the programme contributed to a 'meltdown' as Simon was unable to focus on work for more than 5 minutes.
- Acknowledged that he was prone to 'not good concentration days' when no kind of strategy would be effective particularly as he did not want to learn what they were teaching him.
- Self-consciousness is also an issue because he does not want to work with an adult or be seen as different.
- Timetabling demands of mainstream limit time available to work with ARB pupils flexibly.
- Staff emphasise skills need to be practiced at home.

Fieldnotes:

- Simon asked, 'So you want to do a study on us?' to which I replied 'No, I want to do a study with you' which received a more positive response.
- He appeared cognitively able to understand the concepts and reported 'It's more interesting than lessons'.
- He was very friendly and remembered when I was coming, also disappointed that I was seeing another child, at one point.
- Could be tired and lethargic throughout the day (picked up by taxi 7.45 am).
- After discussing the importance of movement, Simon was seen walking around the bench the next day.
- Needs to listen to music on car journey to school.
- Had commented to his mother 'I don't say anything because they don't understand'. Told me that he assumed people would not understand him, and so had been reluctant to talk about his sensory needs in the past. Reported that walking in the corridor between lessons and settling down to study were problems.
- Added that he was upset by loud people in lessons, clucking, people chatting, bigger classes, people making noises and acting silly, distracting him and problems sitting still.
- Executive functioning issues were evident but not an area of focus.
- Simon's meltdown was in response to hearing staff talking about him in the office.
- Very self-conscious and worries about people perceiving him as different.

TOM

Sensory profile:

AASP – Low Registration +
Sensation Seeking –
Sensory Sensitivity +
Sensation Avoiding ++
SM – Low registration, fluctuating profile.
SPCR- Gestalt perception, delayed perception, mono-processing, peripheral perception, fluctuation.

Tom's interview:

- Found the profiling, links to careers and practical sensory investigations interesting.
- Finds it difficult to reflect on and articulate examples (Making his head go 'erk').
- Says he already knew a lot of it.
- Thought it was repetitive '- 'Lots of different ways of saying the same thing'.
- Acknowledged that others might need such repetition, but not sure.
- Discussed it with his parents at home which might have been helpful in an indirect way.
- Would recommend profiling for other children the same age.

Mother and father's interview:

- Despite good knowledge of sensory processing, it gave them a deeper understanding, 'an explanation'.
- 'Quite specific' which helped make sense of behaviour.
- Programme deemed valuable because it was 'geared round the child' and very practical (different from OT approach).
- Nothing to dislike about the programme, but suggested inclusion of specific interests.
- 'It is really important for Tom to be in charge' (both in interaction and sensory experience).
- Did not receive some of the information from the school and did not have the file. (Tom had left it at school). They would have benefitted from weekly provision of materials to act as prompts, ('to start a conversation') particularly as the programme was considered to bridge an important gap between home-school (generalisation).
- Tom explained his sensory profile to them in great depth, nevertheless.
- Felt it was really important to be conducted in a school environment, where most of sensory challenges are experienced.
- 'It's what happens next in school that's the important thing'; need to raise staff awareness in the ARB and mainstream. 'It's funny how it is never talked about'.
- Suggest it should be part of teacher training and transition planning from primary-secondary school.
- Noted huge differences between primary and secondary school attitudes and resourcing with regards to sensory needs.
- Parental involvement considered vital 'as you work as part of a team'. They had considerable insight into 'what works' for Tom.
- Constructive comments can be taken as criticism by staff, 'which is not what we want'.
- Tom can be seen as 'playing up' or 'naughty', 'which he is, but (they are) not seeing that he is overwhelmed'.
- Suggested 'bite-size' prompt cards for staff in the wider school.
- Suggested more parent-child involvement in school, such as the sensory investigations (working together to enhance insight).
- Provision of a copy of the book was helpful for 'dipping in'.
- Programme considered ideal for secondary-aged pupils due to increased self-awareness.
- 'All schools should be looking at this because it helps our children learn'.

Staff interview (Focus group):

- Tom arrived with his own OT report and knew what he needed.
- Tom has the intellectual ability to understand 'what you are doing' and has/would get more out of it.
- Tom has been difficult, agitated and oppositional for the past two-three weeks and will do 'everything else in the room other than that one thing', so they have not noticed any impact of the programme on him.
- Mrs Green said 'The ideal thing today would have been, where we knew Tom was on a wobbly day was to do his sensory diet, that would have been great, calmed him down and then sent him down to a lesson. But then he would be yelled at for being I ate so it is, isn't it about how do we fit it in practically?'
- Staff emphasise skills need to be practiced at home.

Field notes:

- During the presentation Tom objected to the word 'Autism' with respect to the Resource Base, preferring 'Communication and Interaction issues'.
- He would say 'Please don't get mad at me' whenever he considered he had made a mistake.
- Tom indicated that the mornings were okay, but he became increasingly tired as the day progressed and was then okay when he got home.
- Whilst enjoying the sensory investigations, Tom declined to participate in the smelling activity.
- He switched off before the end of a group session suggesting overload and went and lay on a large cushion in the calm room, with his eyes closed commenting 'They don't understand'.
- Tom agreed to provide a profile only after I explained the reason for doing so in detail to him.
- Tom indicated that he could not decide between yes/no responses to the sensory profile questions and preferred the graded responses of the AASP.
- Tom had a 'Sensory Diet' programme from the Occupational Therapy Service but staff had not persisted in following it due to lack of time. Tom did not recall much about it other than some exercises using a swiss ball (which was available). He considered the exercises needed two people so he could not do them alone.
- Tom's TA was on long-term sick leave due to stress. His parents indicated that he had little input from other staff.
- Prior to session 2, Tom had been promised that Ms Jade would play a game with him in his next session in the unit and he insisted on doing so before engaging with me. The session was then cut short because he had to go to a Mathematics lesson.
- Tom appreciated a 5-minute warning before starting a session.
- In session 4 he said he was 'a bit spaced out' but engaged for the entire session.
- He was very pedantic so 'add spice to food' was changed to 'lemon and honey drink'.
- He was happy to share his sensory profile with his parents but less sure about sharing it with staff.
- Tom also wanted me to get permission for him from staff to bring in lemon and honey drinks rather than ask himself.
- Mr Black attended the start of Session 5 but left half-way through it. Tom was able to explain the quiz, tree, job descriptions and amygdala to him.
- Mr Black commented on Tom's tendency to chew his tie and the importance of developing alternative strategies.
- Tom reported that he tended to drift off half-way through listening to a sentence when his parents were talking to him if he was not interested and said he was doing it to me during one of the sessions.
- Tom talked about what was available to him in primary school – hippos, fiddle sticks, raisins etc in a box. He added that he would hide under the table and brought in a rug to sit on.
- He commented that it was more difficult in secondary school because they have to move rooms.
- I noted three girls often came to the unit at lunchtime to see Tom. They also used the trampoline and rocker.
- I was told that the 'tea and cake' session was the first one in the 2 – 3 years Tom had been attending the unit and his parents were pleased for the opportunity for parents to get together.

PETER

Sensory profile:
AASP – Low Registration +
Sensory Sensitivity +
Sensory Avoiding +
SM – Low Registration, Fluctuating profile.
SPCR- Gestalt perception, fragmented perception, delayed perception, peripheral perception, distorted perception, mono-processing, peripheral perception, fluctuation.

Peter's interview:

- Appreciated the opportunity to express his true feelings.
- Had a sense of hopelessness regarding his anger management.
- Pleased that the researcher acted as 'go-between' with his parents because 'I don't have the courage'.
- Programme is filling a gap for anger management.
- Thinks role-models of anger management would be helpful.
- Willing to provide constructive feedback.
- Relationship with researcher. 'Enjoyed it. I'm going to miss you...'

Mother's interview:

- Programme helped Peter articulate what was upsetting him and to link cause-effect.
- He will now ask for help rather than 'react, react'.
- It enhanced his insight and ability to cross the home-school divide and volunteer to do homework at home (This is very new as homework was the 'biggest meltdown').
- It raised her awareness of her own sensory challenges and helped the entire family. 'We've all got our little things'.
- They problem-solve together now.
- Peter can also find his own solutions, which is a very new development.
- Peter told her he did not understand 'what she said' suggesting the need for further differentiation.
- She considers the programme suitable for Year 6 pupils and 'with a bit of fiddling' even for 5-year olds.
- Has a professional interest in it as she works in a primary school.
- Was unable to attend parent meetings as she works.
- Would have liked the materials earlier to have a bigger impact on Peter and the family.
- Reported that 'Peter is very much, if he's not interested, he will say what you want to hear or he won't talk to you', so was a challenging subject for such a programme.
- She was appreciative, saying 'Thank you for doing it. It has been very interesting'.

Staff interview (Focus group):

- Peter is talking a lot about his sensory needs and using some of the strategies.
- Listening to music when on the computer really helps.
- He is also taking the initiative and saying what he needs. (in the past relied on adults).
- He struggled with large chunks of information, at a time, so would benefit from a more differentiated approach.
- The ARB provides the place to calm down. Peter will walk around in circles, flap his hands and talk to himself there. However, in mainstream this is not possible as 'the chances are that other pupils would say something'.
- Timetabling demands of mainstream limit time available to work with ARB pupils flexibly.
- Staff emphasise skills need to be practiced at home.

Field notes:

- Peter was originally reluctant to give consent on the grounds that he had no interest in the programme and he stayed in the toilet during much of the initial presentation.
- Peter has speech and language difficulties; he is easily frustrated when trying to communicate and will growl and tap his head.
- Peter was unreceptive until I mentioned movement as an important strategy. He indicated that he was very knowledgeable, but people treated him like a child.
- Peter was upset that staff had moved their office into the bigger room because they were now able to observe him walking around the bench. He stopped doing so as a result,
- He also missed 'walk and talk' sessions. Staff indicated that these had stopped due to the winter weather and insufficient time.
- He indicated that he already pictured a relaxing image in his mind and worked better with music on.
- Peter was unable to complete the AASP un-aided and sat with his head in his hands. A member of staff indicated that he was being rude.
- Peter was concerned about his relationship with his father and sister and wanted his profile done so that they would understand him better.
- He was concerned about his anger 'taking over' but also said he used anger to communicate how he felt. 'There are things that people need to know that I don't like- someone annoying me too much'.
- Peter struggled to understand his influence on others but also had a strong sense of right and wrong.
- He was reluctant to consider stages/plans suggesting executive functioning difficulties.

ADI

Sensory profile:

AASP – Sensory Sensitivity ++
Sensation Avoiding +
Low Registration +
SM – Sensation avoiding, fluctuating profile.
SPCR- Gestalt perception.

Adi's interview:

- He found the programme fun and interesting, particularly about the brain, his profile and the link between stress and illness.
- Some elements took a while to understand, but he 'got it 'eventually.
- He would like more fun elements.
- He would recommend it to others but could not explain why.
- There was no parental involvement in the programme.

Mother's interview: Arranged but not conducted. (Communication channels lost following Adi's altercation with Simon).

Staff interview (Focus group):

- Adi is considered to be high functioning.
- He has always been quite articulate and naturally uses his own strategies to a certain extent.
- On a good day he can 'hold it all in' and then explode at home.
- Staff would like the time to incorporate strategies to reduce explosions at home.
- There is concern that Adi does not recognise the need for breaks, and he needs to learn to self-regulate better.
- Staff indicate 'He cannot say that I'm about to explode, he just starts saying 'I don't know, I don't know, I don't know', which is a bit alarming'.
- Timetabling demands of mainstream limit time available to work with ARB pupils flexibly.
- Staff emphasise skills need to be practiced at home.

Field notes:

- He was particularly engaged about the amygdala and wanted to discuss the Manchester bombings.
- He indicated that he tended to wobble his leg discreetly in class.
- He would not use a 'move-it' cushion or laptop in class as he was embarrassed as being seen as different.
- Adi confirmed that he was over-aroused when he got home. Discussion highlighted his medication as a potential contributory factor, but he also had a 30-minute taxi journey home and was upset about difficulty making friends in the ARB.
- Adi wanted staff to check his sensory profile to ensure accuracy.
- He took his file home and forgot to bring it back, resulting in the provision of loose bits of paper.
- Adi highlighted both high and low threshold sensory ergonomic suggestions, providing further evidence of a fluctuating profile.
- Adi was quite over-aroused following a tasting session in mainstream. He rolled on a swiss ball whilst talking to me.
- Adi's mother attended the 'tea and cakes' get-together. She indicated that he was diagnosed with SPD at the age of 5, well before subsequent diagnoses of ADHD and ASC and was following a sensory diet at home prescribed by an OT, which included a swiss ball and walking slowly. She also tried putting water bottles in his back park to weight him down.
- Adi indicated that he already 'braced' himself for aversive events by 'staying quiet' when it was too noisy, adding that the noise seemed to get louder and he would 'notice everything' and he commented' Everything feels weird for me even though it doesn't change'. At such times, he would stay quiet and look down, particularly in hallways and on stairs until it settled down, because he didn't want to do anything other than 'act normal'. Adi added 'I haven't told anyone about this before- maybe I should'.
- When we discussed the possibility of an exit card/ask an adult to leave, Adi's response was that he would rarely do it because he was 'worried people would think I'm trying to skip a lesson'.
- Adi did not think he could 'usually' self-regulate 'saying 'Mum might calm me down- don't know what she does but she is 'magic'.

Appendix 19: Deviations from the Intended Design of the Study

Following gatekeeper permission, the respective involvement of the participants was designed be as summarised in Table 21 which is reproduced here.

Parents/carers	**Staff**	**Children**
Provision of an information sheet outlining the study.	Provision of an information sheet outlining the study.	
A 30-minute presentation with staff	A 30-minute presentation with parents	A 20-minute presentation and information sheet.
Informed consent	Informed consent	Informed consent
Assistance to staff completing the Sensory Profile Checklist Revised.	Completion of the Sensory Profile Checklist Revised.	Completion of Adolescent-Adult Sensory Profile and Sensory Matrix.
*Supporting the child via a home-school file**	*Involvement in lessons. Ongoing formative feedback after each lesson**	8 x 45-minute lessons and formative feedback after each lesson.
Interim meeting after lesson 4 to evaluate programme so far (staff and parents).	*Interim meeting after lesson 4 to evaluate programme so far (staff and parents) **	Review in Lesson 8 (choice of media)
Interview (up to 30 minutes) – telephone or home visit	Focus group of staff (up to 30 minutes).	Interview of up to 20 minutes
	*Provision of behaviour logs and Autism Education Trust Progression data to ascertain trends**	*Opportunity to present findings in a video presentation to the wider school**
Debrief	Debrief	Debrief

**Did not occur.*

As a result of 'real-life' challenges in a school environment some of these activities did not occur (recorded in italics).The intention was to co-deliver 45-minute lessons to Key Stage 3 and Key Stage 4 pupils in small groups, with a member of staff on Mondays over eight weeks (four before half-term and four after half term). An unexpected opportunity presented to the ARB by an outside body, was to access counselling sessions on Mondays that term, which resulted in some timetabling changes. A lack of pupil 'group readiness' also caused difficulties delivering the programme to groups of 2 – 4 pupils, resulting in mainly 1:1 provision following session 2.

Given the resulting increase in sessions, and the long-term sickness of one member of staff, it was not deemed possible to provide a member of staff to jointly deliver the lessons with the researcher. The researcher delivered lessons 2 - 8 alone, as a result. Staff were unavailable to attend the formative assessment meeting for parents and staff. In addition, the opportunity for the children to present findings in a video presentation to the wider school was not considered viable prior to the completion of the study.

By delaying the commencement of the study to the Spring Term 2018 rather than Autumn Term 2017, due to staff management changes, the two Year 11 pupils were also anxious to complete

coursework in preparation for their forthcoming GCSEs, and this resulted in additional rearrangement of sessions.

The parents were invited to encourage their children to practice strategies, at home. This was due to be facilitated by the provision of a home-school file, on a weekly basis, which included outlines of the lesson content and strategies deemed helpful for the child's individual sensory profile. As staff advised that the home-school file should not go home with the child on the grounds that it would not be returned to school, it was agreed for the information to be placed in individual reference files, which remained in school, with the same information emailed to parents on a weekly basis. Under data protection rules, it was necessary for the researcher to provide the information to the Head of Unit to be forwarded on to parents. Due to other more pressing priorities, this did not take place weekly, with the majority of parents not receiving any of the materials prior to week six. They were unable to consolidate practice of strategies on a weekly basis at home, as a result.

In addition, the behaviour logs and Autism Education Trust Progression Frameworks trend data was not available at the end of the study as there had been a change of ARB policy regarding collection of pupil data during the intervention term. The researcher was informed that the arrangements were too time-consuming for staff and that the Autism Education Trust materials are now used for planning purposes only.

No exercise or playground equipment was available for the children to use as part of their self-regulation. As the majority of the children arrived by taxi and stayed in the ARB at break-time and lunchtimes, lack of exercise opportunities was considered a major resource issue. As a result, the researcher provided a rocker, a wobble board and a mini trampoline in week four, which were all positively received by the children

Edgington, Hill & Pellicono (2016) emphasised the importance of a quiet 'safe' environment. The intention was to provide the programme in quiet, relatively distraction free ARB classrooms. The move of staff from one of the smaller classrooms to the largest room in week 1 without being able to move the telephone straight away resulted in the telephone sometimes ringing during a session and a member of staff having to enter the room to answer it. During such times, the session was put on hold. As the second classroom's door was used as the main entrance into the resource base with the main door remaining locked, people would also occasionally enter and leave the building through that classroom during sessions, which could be distracting to both researcher and child.

As the office now housed the only available interactive white board, there were also occasions when the researcher and pupil were asked to move into another room after a session had started, so that a member of staff had access to a white board to work with another pupil. Bright displays, at

eye level, also remained on the walls of both classrooms during the intervention, which could also be visually distracting for some pupils.

Due to timetabling changes, a school closure due to snow and pupil absence for other reasons, such as sickness or upset, some sessions also had to be amalgamated.

Appendix 20: Example of The Recording of 'Noticings' (Stage 1)

'Noticings'

Interview transcripts

Simon. 3 minutes 38 seconds

Researcher: I'm interested in your views about the sensory intelligence programme. I thought we could start by discussing what you produced in your program review. Can you tell me more about the idea that it was interesting?

Simon: Well, I thought, you know, I thought that learning about the cortex and the other thing, what was it?

interesting - biology

Researcher: The amydgula?

Simon: Yea, the amydgula, was quite interesting, as I didn't know about that before, and the whole leaves and the roots system was actually quite well produced and well thought out. It was consistent pretty much.

new information

well - thought out analogy

Researcher: Now, you also mentioned that you found some calming techniques. Did you actually find any for yourself?

need reminders?

Simon: Um, ((pause)) I can't really think of any off my head but I think there are some techniques that might help, (...) come in handy.

'handy' techniques - empowerment.

Researcher: And you also said something here about Honeymede being encouraged to exercise, can you elaborate on that?

Programme influencing staff.

Simon: Yea, things like the balance board and the trampoline and them thinking about getting another exercise bike is good (..) encouraging Honeymede to exercise more.

Importance of exercise

Researcher: Was there anything you didn't like about the programme?

Simon: I feel that it wouldn't really help that much with getting a job, and that, you know, I didn't really find out anything new about myself.

false expectations?

self-awareness

Researcher: And did you have any help from home?

Simon: Not really.

lack of parental involvement

Researcher: Can you think of any ways in which the programme can be improved?

Simon: Um (long pause) um. Maybe encourage like (..) maybe like (...) teach the programme maybe in a more fun way.

need for 'fun'

Researcher: Can you expand on that?

Simon: Like (.) Maybe do some more of the sensory challenges, perhaps or something like that.

more practical activities

Researcher: Okay, thank you, yes and anything else?

1

Appendix 21: Example of Coding (Stage 2)

CODES

936 Mrs Green: I think it has raised our awareness in that if
937 (.). We just don't have time for it. The ideal thing today
938 would have been, where we knew Tom was on a wobbly
939 day was to do his sensory diet, that would have been
940 great, calmed him down and then sent him down to a
941 lesson. But then he would be yelled at for being late so
942 it is, isn't it about how do we fit it in practically?
943 Ms Jade: Whilst also including the students in inclusion
944 work? Yeah.
945 Mr Black: Which kind of comes back full-circle to the
946 idea of using these things for preparation and it being
947 important, that, yeah those skills are practised at home,
948 as well.
949 Mrs Pink, Mrs Green and Ms Jade: ((in overlap)) Yeah.
950 Mr Black: Before they come into school and the
951 evenings, I mean before they come to school and also
952 the, actually we use them for recovery, as well, so if
953 someone is having a really stressful time that they have
954 some time and space up here for recovery. I mean we
955 do have that option of pulling pupils out of lessons and
956 we do use it and they can use their strategies then to
957 help themselves so (.).
958 Mrs Green: We've got pupils like Adi that can generally,
959 on a good day, hold it all in and then explode at home
960 and I think if he had a couple of breaks or something (.).
961 If he had some downtime would he be less likely to
962 explode at home?
963 Ms Jade: But that is when he needs to be the one to
964 take the responsibility to recognise, in himself, that he
965 needs to have that time because no matter how much
966 we say to him like maybe you need to (.) you need to
967 think about doing that or (.)
968 Mrs Green: But we can feel it, can't we, but he cannot
969 self-regulate and I have just put that on his progression
970 framework. He cannot say that I'm about to explode, he
971 just starts saying *'I don't know I don't know I don't*
972 *know'*, and that to me is a bit like this is alarming. Okay I
973 know what's happening (.). So we can see it coming, he
974 can't whereas the older ones, the ones you already
975 know, Simon says I'm angry before he is. Although it is 0
976 to 10 he can still (.) he can verbalise it so that's a big
977 part of it then the age difference of the pupils you have
978 been dealing with about what stage is the best time to
979 be learning to be more aware, self-aware.

New knowledge about

ARB responsibility

systemic responsibility

parental responsibility

ARB responsibility

child responsibility

using techniques positively

– can do ?

child's responsibility

Depth of knowledge of children

Developmental stages (age)

Appendix 22: Evidence Trail: Quotes to Themes

Main Theme 1: 'Does it do exactly what it says on the tin'.

'It does exactly what it says on the tin' is a common idiomatic phrase originating from a 1994 advertising campaign in the UK. It means that something lives up to expectations and does precisely what it claims or is supposed to do. In the case of 'Sensory Intelligence' the question relates to the programme theory which states that, in an inclusive context, awareness leads to understanding and understanding provides opportunities to implement positive change.

Sub-theme: 'I didn't know that before'.

Codes

- **Something new**
- **Positive impressions**
- **Evidence of awareness**

Researcher: Can you tell me more about the idea that it was interesting?
Simon: Well, I thought, you know, I thought that learning about the cortex and the other thing, what was it?
Researcher: The amygdala?
Simon: Yea, the amygdala, was quite interesting, as I didn't know about that before, and the whole leaves and the roots system was actually quite well produced and well thought out. It was consistent pretty much. (Lines 6.15).

Vince: Um (..) it was interesting getting to know how different people think up here and whether they were leaves or roots, (…) yea (…) and calming techniques. (Lines 73-75).

Vince: Yes, it was nice knowing whether we were roots or leaves, and what our sensory needs were, and things. Also what sort of jobs we fit into ((long pause)) (Lines 82-84).
Researcher: Okay. Is there anything you didn't like about the programme?
Vince: Um, I thought it was alright (Lines 92-94).

Researcher. Why would you recommend it for pupils your age?
Vince: Interesting things to learn about. (Lines 114-116).

Tom: Um (..) I liked the jobs selection thingy, if that helps. It's saying what jobs you can do based on the sensory profile, yes. (Lines 140-142).
Tom: I told you I liked doing the quiz and getting to find out about the best fit jobs and I liked the beginning about spotting the leopard and smelling things and stuff, that's it. (Lines 148-151).

Tom: Well I already said I think the profile thing might be helpful (..) yea, I think the profile thing might have been helpful about the careers but I'm not sure about anything else because I mean I knew a bit about the amygdala and (..) (Lines 160- 163).
Adi: Um interesting stuff about the brain (..) the amygdala, and how it can go (..) how it can make you sick if you are stressed and stuff.
Researcher: Alright. Good. Anything else about that?
Adi: I found it all interesting really.
Researcher: All of it?
Adi: Mostly, Yeah. (Lines 418-424).

Researcher: Oh okay. And you said it was fun when you got to sniff the stuff. Was there anything else you thought was fun?

Adi: The balloons. (Lines 425-428).

Researcher: Has the programme helped?
Adi: On what kind (..) like?
Researcher: In any way at all? Do you think it has been helpful at all?
Adi: I think it has, yeah (.) because I have figured out, you know, the sensory programme. That's another thing that I actually found really fun.
Researcher: What?
Adi: The sensory programme.
Researcher: Can you tell me a bit more?
Adi: The sensory programme. You know the profiles.
Researcher: Oh, the profiles, right, okay. And was there anything you didn't like about the programme?
Adi: No (.) not anything really. (Lines 440-451).

Researcher…Has the programme helped? ((long pause)) Anyone like to make a comment?
Staff 1: Yes and no. I'd say that it's helped with certain students when in terms of they know they can talk about their sensory needs and things that they might have needed. But I would say that for some students it has not been (.) overwhelmingly helpful. (Lines 493-497).

Staff 3…. somebody like Tom probably does understand what you are doing so has (.) would get more out of it. Mark, it's about his parents have probably learnt something from it and we have, but I think for Mark it has probably gone over his head (Lines 513-516).

Staff 3: Yes, so it is hard to say whether he (Mark) directly benefited but indirectly he would have benefited (Lines 522-523).

Staff 4: So Vince. It's had an impact on Vince. And he talks about kinda things being a sensory thing. Vince is very closed though. He doesn't really talk about his feelings or, you know, how things are affecting him, but you know. He will say and has said things like 'I suppose the reason why I don't like it in busy corridors is because of my sensory needs because I don't like the noise'. So, there's a bit of, you know, as a bare minimum, this raising of awareness of himself so, (.) yeah.

Staff 1: Yes, I'd say all of them are more aware of their own needs now. (Lines 570-580).

Staff 2: Simon is the exception to what Staff 4 is saying because I don't think that anything would work unless we experimented over a long period of time over the music and (..). (Lines 581-584).

Staff 3: I think it has raised our awareness in that if (.). We just don't have time for it. (Lines 936-937).

Tom's mother….and I like the fact that it is geared around him whereas we've done lots of sensory profiling, in the past with an occupational therapist. It was all done really without our son's involvement and this felt different and any anything that can help him have a better understanding of, of his needs is really, really, valuable (Lines 1089-1096).

Researcher. Was there anything you disliked about the programme?
Tom's mother: Don't think so, there wasn't anything (.) no (.) no. (Lines 1217-1220).

Tom's mother…at home, no, there was interesting bits and bobs that I picked up and they stay with you, those things so we don't necessarily enact out scenarios or that sort of things, but we remember it and (..). (Lines 1246-1250).

Peter's mother: From my point of view it's been interesting um (.) too, I mean I'm interested in this thing generally but, from my own personal point of view it has been interesting to be able to support us all as a family. To say well actually that is his trigger, that is your trigger, how are we going to get around it, do you know what I mean, and it's helped me recognise those things? (Lines2008-2013).

Peter's mother; I suppose I do things automatically that I don't realise. Until I actually broke it down using this, I didn't realise why I was doing it. (Lines 2018-2020).

Researcher: Was there anything you disliked about the programme?
Peter's mother: Anything I disliked? Um no I don't think so. There's nothing I didn't like about it, I think, you know, it makes a lot of sense and I understand it (Lines 2213-2217).

Peter's mother: You know I really like the programme, the idea of the programme. Um recently we have been looking at the emotional intelligence at school, but actually having seen this I think it makes sense to do this before the emotional bit because some of the emotional bit comes as a reaction to this, does that make sense?
Researcher: Yes, that is right. Yes.
Peter's mother: Though I think, maybe, in some ways it makes sense to have this, I mean obviously, they all link, don't they? Everything links. But I think sometimes this, this is the base I think, if that makes sense. (Lines 2245-2251).

Peter's mother: Yeah. Because I think with some (.), there's always emotion with everything. There's always emotion but I think emotional reactions to things, actually, can be different if you change the environment, you're in. So, I think this, the sensory side of it, is almost, you know, if you had your pyramid, it would be your base. (Lines 2265-2266).

Simon's mother: Has it helped um? Most definitely, I think for me and for my son, um, definitely I feel it's been more insightful, I think I've gained more insight into Simon's sensory needs, more than I had before, definitely, um (.) because I thought, I don't think I thought I knew it all, but I thought, oh yeah, I know about sensory needs, but I have gained more, definitely gained more insight. That's the overall word I would like to use. And it has given us more ideas of strategies. Even just the basics like thinking about foods, um, and forward planning, so you just, I don't know, when you have busy lives you just keep going, and like it makes you stop and think, um (.).
Researcher: Can you give me any concrete examples?
Mother: Yeah like, well yeah, like I said the basics of food, which is something you can do at home very easily and for me, with Simon's age, it's nice that there are strategies he can do for himself, because I am not always there for him. (Lines 2278-2293).

Simon's mother; I just see it as a positive. I think the programme, just learning more about himself, is very positive. (Lines 2300-2302).

Researcher: Did you get a chance to look at the book?
Simon's mother: Yes. I've read, I haven't read all of it. I definitely looked at, at least half of it and it's fascinating and I've got a friend who wants to borrow it after me.
Researcher: Was there anything in particular about the book?
Simon's mother: I just think what comes up a lot in it is 'just take a break', just comes up all the time doesn't it? So I think whatever you're doing, it's like, for me, having a brain freeze and if you don't know, if you stop, just stop and think, so you stop and think what is going on, I guess. Because sometimes you don't know do you? ((laughs)). Our lives can be a bit like that (.) now. (Lines 2898-2904).

Simon's mother: The programme itself, I think is great. Thank you for taking the time to do it because, I'd like to think that in time, it will be talked about a lot more. No, thank you, for giving the time to do it. I'm sure its very time consuming for you. It's very fascinating. It's very interesting. It's very positive. (Lines 2942-2946).

Simon's mother: There isn't any negatives. I think it's very (.) I think it can only be positive because, for me, I would like to think that the more that we understand an individual's sensory like intelligence, we're just going to sort of support them on their journey.. (Lines 2950-2953).

Simon's mother: ……. hopefully, I'd like to think you've put some insight and understanding with school staff, because that benefits the children. I like to think with the families and I think I've gained, I say I'd like to think I've had an awareness of sensory needs, but I think I have gained

more insight and I can ask Simon, I think he has. (Lines 2968-2971).

Researcher: So, you say there's nothing you dislike about it at all?
Simon's mother: No, there is nothing to dislike. (Lines 2982-2983).

Vince's mother: I think it's helped me to (.) for Vince to clarify particular points (.) because he doesn't like talking about things. I can pick things up as I'm going along. Vince hasn't told me if it has benefitted him, but I am sure it probably has made him think a little bit more about (.) why and what makes him who he is (.). So, I found it helpful and I'm sure the teachers probably found it helpful dealing with all of the different things that go on in Honeymede. I'm not sure about how (.). It might be too much for some people. I find it very interesting, you know, so it means a lot to me. But I don't know how useful it is for other people. (Lines 2989- 2997).

Vince's mother: I do a lot with animal behaviour and um (.) a lot of it is quite similar, a crossover. There is a massive crossover and how the over humanisation of animals now is becoming an issue, you know, and um, what people need to get out of the pet, is a massive area of interest and I have been looking at, um, autism for children and what they get out of having pets.
Researcher: Yes?
Vince's mother: Some pets are really good for autistic children and I'm actually looking at what the pets get out of it and how some pets struggle, you know they have to be a special kind of pet to put up with being squeezed and all the hugging, and that is quite interesting.(Lines 3000-3011).

Vince's mother: …. he liked the idea of the visual thing of the tree and that sort of struck a chord with him, um (.) and little things about (.), um (.) sensory things about working alone, you know, (Lines 3027-3030).

Vince's mother: Yes, it's really, really interesting. I think he will have taken on board more that he is letting on. He doesn't like working; he doesn't like filling in forms and things, but I think little bits have, will have filtered into him. And, I as a parent find it very, very interesting. (Lines 3038-3042).

Vince's mother: These things are fantastic and able to help people out there, and that's fantastic. (Lines 3088-3089).

Researcher: Was there anything you disliked about the programme?
Vince's mother: Um (.) No I don't think there's anything to dislike about it at all. I think it is very informative and very useful. No, there is nothing to dislike at all.
Vince's mother: Good luck with it all.
Researcher: Well thank you very much.
*Mother: Thank **you** very much, it has been brilliant. (Lines 3128-3140).*

Field-notes: The practical sensory investigations were well received bar the smelling exercise for Tom who declined. (Lines 3235-3236).

Field-notes: All children had been engaged with the sensory investigations and 4 (Adi, Vince, Simon and Tom) appeared cognitively able to understand the concepts. (Lines 3269-3271).

Field-notes: Simon commented that the session more interesting than lessons! Adi was keen to attend too (Lines 3331-3332).

Field-notes: Adi was very engaged, particularly about the amygdala... (Line 3427).

Field-notes: Staff 4 commented that the approach was already having an influence on his outreach work with a Year 10 pupil. (Lines 3971-3972)

Sub-theme: 'It makes sense of behaviour'.

Codes

- **Increased understanding of self/others.**
- **Mutual understanding.**

Staff 4: I think we use, we already have used, in outreach, the sensory profiling questionnaires from the book and it's helped pupils to understand why they are finding things difficult or why they might be finding things difficult in school, which has been really good (Lines 820-824).

Staff 4….and what the sensory profiling did for him (outreach child) was explain things to him and it just made sense of things and made sense of some of the things he does and it made sense of some of the inappropriate things he does in lessons, and gets into trouble for, and just knowing (..). The other thing that was really important was that the teachers who were working with him, knowing that information about him and them being aware of it suddenly changed their perception of him from being a naughty boy who causes trouble to being someone who has particular issues and particular problems which can be solved, and him knowing that they are aware of those things just made a massive difference,… (Lines 1047-1059).

Tom's mother: He spoke about the colour things and about why he liked colours which, which I was obviously aware of, but I hadn't realised the significance of why and what it meant. So, it gave me a better understanding. I remember one day he came home, and he said 'I don't like moving my head. I don't like things that involve moving my head'. We always knew, well we had read the reports, which we didn't fully understand all of them, to be honest about proprioception and things like that but I knew he had difficulties in big spaces and he didn't like swings and things like that and he said 'I like to have my head still' and I hadn't realised it was the actual movement of his head that was causing problems with some activities and if his head could be still (..).
Father: Yes, like on the slide (.).
Mother: No. But he could go fishing and things like that. So, it was quite specific, some of it, which helped make sense of behaviour. (Lines 1099-1117).

Tom's mother…. I think a lot of it is sort of (.) a lot of it we knew but we knew on a level that we didn't even think about it. A lot of the things that we were reading, we go 'Oh yeah we do that' but it gave a depth that we didn't have before. It gave us an explanation. (Lines 1229-1234).

Tom's mother: Don't know if this is right or not, but when I looked at it, and the tree and that, and read bits about it, and in the book, looking up some of the bits, as well, to make sure I understood it. So being a root on some of those things, it seemed to be indicating that he had quite a good awareness, he could, he was quite aware of how he was going and how he was feeling and was able to tell you as opposed to a leaf person who might be oblivious or less sensitive to all the influences and things which I thought was quite good in using the sensory issues to be able to help because he does have a knowledge, but it's funny, isn't it, how it is never talked about really. (Lines 1496-1508).

Tom's mother. Um, I think it explained a lot. I think it (..) was really looking at everything and finding solutions. (Lines 1558-1559).

Peter's mother: And he's been quite precise about certain things, so I think it's helped him to begin to realise that it's not a random reaction. There are some things that are doing it. (Lines 2005-2007).

Peter's mother: I've had a read through, and had a look at mine and I'm thinking actually I'm quite surprised with some of mine because I tend to (.) um, I suppose I do things automatically that I don't realise until I actually broke it down using this, I didn't realise why I was doing it. Does that make sense?
Researcher: It does, yes.

Peter's mother: Um, you know it's like when my granddaughter came the other day. She was playing and my daughter came in and turned the TV on and my granddaughter was here, and she had a musical toy on, um Jodie, my younger daughter had come down and started to play with my granddaughter and I was sat here and all of a sudden I got up and I said 'I can't stay in here' and just went. And I've done that regularly for years and I've always thought 'Cor, I'm so grumpy!'. But actually, I've broken it down and I do it in other situations as well and it's just too much noise, too much different noise. I can cope with loud but if it is too many different, you know, things like that, and this has helped me to recognise things in myself so (.). (Lines 2016-2034).

Peter's mother: …the teatime is horrendous. That's a really awful thing and I can understand (.) I can see now exactly why Peter struggles with eating sometimes because he now associates food with the chaos, that is it, and that is going to help unpick that, I think, over time. Yeah. (Lines 2042-2046).
Simon's mother: Yes, I think Simon is receptive to talking to people, and understanding his behaviour, so yeah, so I think he is receptive to listening.
Researcher: Is that more receptive than in the past or the same?
Simon's mother: Yes. More receptive now. (Lines 2305-2309).

Simon's mother: ...So yes, it's just that I've read the book ….and, oh it's just, yeah, it's just all your senses (.). But I've, um, but sensory it's my world, feels like that's what it's been all about. (Lines 2933-2939).

Vince's mother: He hasn't really discussed it. I think maybe it has helped him within Honeymede. He is very good and they have said, in Honeymede that he is a very calming influence, and I wonder if that is that it has helped him look at his peers, look at the group in a different way and be more understanding and he seems to have got a grip of other people (.) quite well, so yeah, maybe in that (.) in that respect, he is thinking more about other people.
Researcher: Do you think you have noticed that more in the past term?
Vince's mother: Yes, I think I have, yes. He'll come back and say, you know, Mark didn't like this or Mark didn't like that and um (.) yeah, I think it made him think a bit more about it, rather than just think Mark was annoying ((laughs)). (Lines 3045-3058).

Field-notes: Three boys were playing a game together and staff commented on how that was a pleasing sign of progress. All three had been together on two of the sensory intelligence sessions, which might have contributed towards this. Discussion of tolerance of people with other profiles could also be a contributory factor, whilst the lack of access to the internet reduced their options. (Lines 3415-3421).

Field-notes: Staff 4 attended the start of the session with Tom as arranged but left halfway through. Tom was able to tell him about the quiz, tree, job descriptions and showed some interest in the amygdala. (Lines 3607-3610).

Sub-theme: Practical strategies for positive change.

Codes:

- **Using techniques.**
- **Providing strategies.**
- **Filling a gap.**

Simon… I think there are some techniques that might help, (…) come in handy. (Lines 20-21).

Vince: Yea, I was (.)um (.)smells I have found out have been good for me an (.) exercise. (Lines 78-79).

Miss Jade: But listening to music really helped with Peter when he's doing computer work.

Having music in the background he's just flying when he is listening to that. (Lines 554-556).

Again Peter is the one I work with most and I would say that he is more vocal about when he is finding something sensory overwhelming and he will say I need to go outside whereas before it was always I would say you need to go outside and just have a five-minute break or can you go outside and do star jumps whereas now he is a lot more vocal about saying it himself now when he needs a minute. (Lines 560-567).

Staff 3: I think if he (Adi) had a couple of breaks or something (.) if he had some downtime would he be less likely to explode at home? (Lines 958- 962).

Tom's mother: It explained it in a more practical way and gave you things you could do, whereas occupational therapy reports, brilliant as they are, just sort of document how things are and give them a name, whereas the book had some (..) it seems to relate better to us as a family (Lines 1377-1382).

Tom's mother: He does jiggle a lot in his piano lesson actually. We are always telling him to stop swinging your legs.
Tom's father: Perhaps he should go on the trampoline first.
Tom's mother: And he's moving his arms.
Researcher: Yes, that sort of thing. Going on the trampoline first.
Tom's mother: Yeah, parking further away will probably be the practical option so we walk or jog to the chip shop. Maybe jogging's more movement or something. (Lines 1830- 1840).

Researcher: When he comes downstairs saying what can I do about it, have you found any of this helpful?
Peter's mother: Yes, Yes because you know I've gone back and I've said um you know that this is what you talked about, what you said upsets you or this is what you do and don't like, and then we kind of go through well what's the situation now, what of these things can we do now, what's available now? (Lines 2059-2065).

Peter's mother: School is school. Home is home, never the twain shall meet. But there was a lot of discussion around Honeymede about homework because I said (.) you know we need to catch up this, otherwise you're going to get left behind. So, they had a discussion with him about doing some at home, and I said we will do one piece a day. Okay so you carry on doing what you do at Honeymede, and we'll just do one a day. And last night, um, he came down and he brought it down by himself. Always before it has always been a bit of a battle, but last night he came down with the, you know, the laptop, so we sat with the laptop. He said, 'Is it too late to do it?'. I said, 'No that's fine'. He says 'I thought about doing it in there, I can't because..., I'd do it in there but I can't because...' so he'd obviously, broken all of that down to put himself in a position where the home work, the whole thing, was frustrating him, having to do the homework, you could see he was edgy but he managed to break down things and sort things out so that he found himself, readied himself and found himself somewhere comfortable to do it.
Researcher: And do you think that's new?
Peter's mother. Yes. Very new.
Researcher: Do you think it could be due to this programme?
Peter's mother: It could very well be to do with that. It is very new because homework, up until a week or two ago, homework and home did not happen. You know there has been a few times when I have tried, you know, and I try every so often with homework or I might just try to do revision with him, and it is his biggest meltdown, at the moment, is he doesn't do school work at home.
Researcher: When you looked at... I can't do it here because... I can't do it there because.... was that talking about sensory things?
Peter's mother: Yes, about distractions. It was sensory things yes.
Researcher: And he found solutions, did he?
Mother: Yes, he found his own solutions. He went round and said 'I can't do in my bedroom because I know I'm going to want to play my game, so, you know, I bring it downstairs'. He said. 'I can't do it in the dining room because the dogs are in and out of the dog flap and that's annoying me, and I can't do it in that room, in there because it's cold. So, can I bring it in here and sit with you? And I said, 'That's fine'.

Researcher: And is that the first time he's done that?
Peter's mother: Yes. It's the first time he's done any homework, without any fuss. (Lines 2081-2124).

Researcher: When I gave you the file, a couple of weeks ago (.).
Peter's mother: Yes.
Researcher: Did anything happen after that?
Peter's mother: I've looked through it. I've used what Peter has said, here, like as we have just said, and I bring Peter back to it. Um the tea table is getting better. We haven't done the sensory profile but that is one big thing I've put my foot down and said no. It stops and it stops now, and this is your trigger, this is your trigger, yeah, we deal with it.
Researcher: Okay.
Peter's mother: So ((laughs)). (Lines 2158-2168).

Simon's mother: I think yeah, and I think, yeah over the past few months he is probably a bit calmer... (Lines 2311-2312).

Simon's mother: ... I think what's a shame is that a lot of (.), I don't know if you've found, with the families that you're with, when a family get a diagnosis, usually before 12 don't they? And that's it's really, they are left to get on with it. There aren't a lot of programmes, or there's not much available unless parents go away and read about it, but I just think it's nice (.)
(Lines 2872-2877).

Field-notes: Opportunities to incorporate movement into routines were discussed with Simon in the light of his impending examinations. He was seen taking exercise the next day (walking around the bench). (Lines 3467-3470).

During discussion of Take 5, Take a break, Peter reported that he already pictured a relaxing image in his mind, and that he worked better with music in his ears – decorating his room and doing homework. We discussed the possibility of having headphones in the unit and downloading songs from YouTube. (Lines 3321-3324).

Subtheme: We are all individuals: we all have our things.

Codes:

- **Self-disclosure.**
- **Individual differences/diversity.**

Staff 3: And actually, most pupils except Mark would not want to do anything that differentiated them from anybody else. They are self-conscious as teenage boys and don't want to look special.
Staff 4: Yeah. (Lines 865-869).

Tom's mother: And it's very hard for them to understand autism, let alone sensory issues until you've had a child that has autism, you know. It is all very well, it's this and that, it isn't obvious… (Lines 1924-1927).

Tom's mother… but just sometimes if the teacher even knew he had one (a tag), I am sure a lot don't, and they could say 'Do you want to use your tag Tom?'. He wouldn't use it as a skiving off thing, you know, he would (.) and then the other children, in the class, are aware, little things really, (Lines 1949-1954).

Tom's mother: ... But if the teacher, in the classroom, knew, and not just for our son, but, you know, for some sensory information and they could translate it across everybody. (Lines 1957-1690).

Peter's mother: But actually, I've broken it down and I do it in other situations as well and it's just too much noise, too much different noise. I can cope with loud but if it is too many different, you

know, things like that, and this has helped me to recognise things in myself so (.). (Lines 2030-2034).

Peter's mother: Yes. I would like to do the whole family because it's obvious, since looking through this and having a discussion with you and things, it is obvious that we've all got our little things… (Lines 2039-2041).

Simon's mother: A lot of them, in their teenage years, feel very different and they're going to that unit, feeling very different to their mainstream peers and hate being there, so they go from that space to feeling very different. So, they go from that battle, to their sensory needs' battles, in that unit, where they feel safe and secure in the bubble because the staff know them, but don't have the space. (Lines 2439-2445).

Simon's mother: he kept saying 'I hate being over in the mainstream school, I hate it, I hate feeling different', (Lines 2675-2677).

Simon's mother: it's not about you've got autism, it's about being an individual isn't it? It's just about understanding you individually, it's not about I'm autistic and this means this and this, and there's no handbook really for that, it's about understanding the child and making it individual to them and their family (.). That child might like curry and a family probably never eat curry. It's just making it individual, isn't it, and what can you do for that child or do you ever go on holiday and if the family don't like the sea and the child loves the sea, it's just how open you are about that conversation or what the child can do for themselves? (Lines 2881-2890).

Simon's mother: I get migraines and I read loads, I just constantly can relate to it because it's similar to that, with the sensory things. I just think, yeah just stop, because a lot of things I find in migraines, because things are heightened, with it, like taste and sense and things, that I pick up that the other people don't, so I feel that I can relate to it in that way, if that makes any sense?
Researcher: Is that during a migraine or anyway?
Simon's mother: Oh, during it, definitely. It's very weird how I can relate because I am, and I think it helps me relate because of Simon, because a lot of what I love to do, I can be like a go-getter and so, the noises of things and then, if I have a migraine, it stops me doing all of those things, so I feel like I have to sort of take a step back (.).
Researcher: Right, yes.
Simon's mother: And then I got that heightened sense of smell and I smell something or I see something or, I feel like I've got all these super senses, ((laughs)), I don't know, just a difference, a heightened sense of (.). Oh I can go into a busy school and, I think, oh my god get me out of here, yeah, it's getting, you know, and someone else is like it's fine, and it's just, I know, definitely a heightened awareness of different senses. (Lines 2909-2929).

Simon's mother: ...So yes, it's just that I've read the book ….and, oh it's just, yeah, it's just all your senses (.). But I've, um, but sensory it's my world, feels like that's what it's been all about. (Lines 2933-2939).

Simon's mother: We've all got our profiles and the more we understand them and work together, say within a family, and the more that we support each other and accept them and not, you know, work alongside them we will work in harmony. It is fine, isn't it, we're all individuals, and accept them so if we are black, white or (.) and that's when I mean if someone doesn't like a smell, are we then going to say here smell this (.)? That's what I've realised with a migraine, no if Simon doesn't like something like tapping, why am I going to start tapping? You know, it's just, but we can do that as a parent to a child. I just think its brilliant... (Lines 2956-2965).

Vince's mother: … There is no one size fits all and people's expectations about what people should be, how they should be and how animals should be, is a whole minefield. Maybe another paper, another time ((laughs)). (Lines3011-3014).

Vince's mother: But that is what he is like. He won't discuss things and he particularly doesn't like talking about autism or his diagnosis, he finds that very difficult. (Lines 3031-3033).

Vince's mother: …..whatever normal is, I think people have lost sight of what is normal and what

isn't normal because everybody out there has different quirks whether they put you in a labelled box or not and everybody has some traits of something and to make people more accepting and allow for differences I find is a trait lacking in a lot of places (Lines 3123-3128).

Field-notes: Tom commented on the word 'Autism' negatively preferring 'Communication and Interaction' issues labelling. Simon asked the question 'So you want to do a study on us' to which I replied 'No I want to do a study with you' which received a more positive response. (Lines 3161-3165).

Field-notes: Vince was very accommodating and happy for me to see him early. He was also willing for the family and staff to see his profile. He remembered that we were both roots. (Lines 3535-3537).

Field-notes: Simon's mother also commented on her own sensory sensitivities. (Lines 3604-3605).

Field-notes: Discussion established that Adi can be embarrassed about being seen as different. As a result, he would not use a move it cushion or laptop in class. (Lines 3636-3638).

Field-notes: When we discussed the possibility of an exit card/ask an adult to leave, Adi's response was he would rarely do it because he was 'worried people would think I'm trying to skip a lesson'. (Line numbers 3937-3939).

Main Theme 2: 'Opening up that conversation'

The phrase 'Opening up that conversation' was taken from a parent's remark. It relates to situations enabling dialogue to discuss the topic matter. A key enabling element appears to be perceived safety in a relationship, in the knowledge that the person will listen respectfully, which requires a positive relationship.

Sub-theme: 'I'm listening' (relationships)

Codes

- **Enabling dialogue**
- **Opportunities to meet.**
- **Listening/not listening**

Vince: Yes, I talked to mum about it.
Researcher: What sort of things did you do at home?
Vince: We were discussing the sensory needs and things and how we get them at home.
Researcher: And did you find that support helpful?
Vince: Um (..) Yea. (Lines 97-101)

Peter: Yes, expressing my feelings and you telling my parents how I really feel. That's mostly what I really wanted to do in these lessons. I wanted to tell my parents how I really felt. I don't have the courage to do it. (Lines 258-262).

Peter: Once I'm angry, I'm angry. I can't help it. It's like I can't help myself Dad and (sister's name) (loud voice). Please don't show that to my parents.
Researcher: I won't show it to your parents. Don't worry it is all confidential.
Peter: Yeah but wait, but yeah, please, please do. (Lines 237-242).

Staff 1: … I'd say that it's helped with certain students when in terms of they know they can talk about their sensory needs and things that they might have needed. (Lines 493-497).

Staff 1: Again, Peter is the one I work with most and I would say that he is more vocal about when he is finding something sensory overwhelming (Lines 560-562).

Staff 4: So, Vince. It's had an impact on Vince. And he talks about kinda things being a sensory thing. Vince is very closed though. He doesn't really talk about his feelings or, you know, how things are affecting him, but you know. He will say and has said things like 'I suppose the reason why I don't like it in busy corridors is because of my sensory needs because I don't like the noise'. So, there's a bit of, you know, as a bare minimum, this raising of awareness of himself so, (.) yeah. (Lines 570-578).

Staff 3*: If anything, Tom's been more difficult for the last three weeks so he's (.) he's not open to (.) I mean he's really oppositional. If you ask him, or suggest he does something (.) he will do everything else in the room other than that one thing so it is not something we can encourage him to do and whether he's choosing to do anything and whether you know he's telling you he's doing something or not I don't know but certainly nothing we are aware of and he has been quite difficult for the last two or three weeks, I'd say. He's been quite agitated. (Lines 619-630).*

Researcher: Do you think parental involvement is important (..) for the programme?
Staff 4: Yes ((all laugh)).
Staff 1: Yeah I think if going on with what Staff 4 said about at school it's difficult because we're sometimes making them (.) not making them (.) helping them do things ((loud laugh)) they don't always want to do so it is difficult for us to know whether these strategies are always working whilst the tasks we are asking them to do might not be working. Whilst at home they may be using those strategies, doing things that they need to do, so yes, I would say input from home, from parents, is good because then you know from both sides of it. (Lines 631-643).

Staff 1: But I think as soon as they come to secondary school to start talking about it. (Lines 1011-1012).

Tom's mother: Yes, I think it helped an awful lot. I think for the first time, that Tom is talking about sensory issues and he's told us bits about it, and he's come back from school about things that he has done (Lines 1086-1089).

Tom's Mother: Yes, I did see something about that, yeah. Is that in the folder then, the completed ones? I would have been interested to see what had been written (Lines 1162-1164).

Tom's mother…It would be nice, I think, if it had come home weekly because it would have also prompted us, you know, when you go through the bag, a conversation. (Lines 1199-1202).

Tom's mother: I think it was nice when we met up and saw you and you gave us some explanation with it as well. That was good (Lines 1223-1225).

Tom's mother: it's funny, isn't it, how it is never talked about really.
Researcher: Well that is one of things about doing the research (..).
Mother: Yeah, but it just isn't. (Lines 1507-1511).

Tom's mother:…(.) it sounds silly to say it, it hasn't occurred to me that he was always jiggling but it was just what he does, but he does and the woman in the chip shop said 'Oh you've not brought Tom with you, oh the one who's always moving, always jumping up and down', so there was more of an awareness from people that got used to him coming in there. But this had caused us problems, because he bumped in, and I'm still not sure how to replace, we can't really replace this movement or adapt it or, that would be very useful, because the very thing that keeps him on a level or calms him, it actually draws an awful lot of attention to him so if we could use it in a more subtle way, do you remember ? We said that was something that we could, maybe look at. I don't know if anything (.).
Researcher: I think we talked about him doing something before he got to the chip shop.

Mother: Yes, he has a piano lesson before, so he goes straight for food.
Researcher: We thought about walking further to the chip shop (.).
Mother: Parking further away and to do the walk before he gets there. (Lines 1801-1824).

Tom's mother: Unless they're all aware of that then it won't happen, you know. It will be naughty and a bad point on his thing and he says I got the point for being late because I was too scared to go down the corridor on my own so I hid, and we put these things out to staff, by email and, sometimes I think it is seen as a (.) can be interpreted as a criticism. 'Well, we can't be there all the time' and things, which is not what we want, which is for them to know that it is still an issue. (Lines 1894-1901).

Researcher: Do you think the approach has helped at all?
Peter's mother: Um, Yes I think it has um Peter, since doing this over the last few weeks with you, Peter has been making odd comments about 'This is what's upsetting me' and 'Stop doing that, it's upsetting me'. (Lines 1999-2003).

Peter's mother: he's voicing things more and he's checking in to see (.). I suppose yes, in a way, because he is checking in to say 'What will help, what can I do to stop this? I have this feeling, what can I do to stop it?' Whereas before it was all react, react. There was no discussion. He wouldn't even come down and say this is what I'm feeling so (.) I think since having that discussion he's learnt to (.) he may not be able to put things together but he is learning that where there's an action there's a reaction, sort of thing, so (.). (Lines 2050-2058).

Simon's mother: Yes, I think Simon is receptive to talking to people, and understanding his behaviour, so yeah, so I think he is receptive to listening.
Researcher: Is that more receptive than in the past or the same?
Mother: Yes. More receptive now. (Lines 2305-2309).

Researcher: Yes, okay. How much were you able to support the programme at home?
Simon's mother: Um, it just opens a communication, …
Simon's mother: I would then put any information in Simon's room. So it was talked about minimally but I suppose if I've got an awareness of it, and I knew that Simon had an awareness of it because I knew it was taking place, it felt like it was kind of like, the tones were there, if that makes sense? (Lines 2330-2334).

Researcher: So, did Simon make any comments about the programme?
Simon's mother: No.
Researcher: He didn't mention it?
Simon's mother: He may have mentioned it once, but said very, very little.
Researcher: Okay.
Simon's mother: But he didn't say anything negative. Didn't really say anything positive um (.) but in saying that he'd had a kind of um, tricky time anyway, because he's having a phase at school anyway, where he is finding (.) because it is sort of leading up to GCSE's, he is finding school quite repetitive. Not very motivated about school, at the moment so I suppose for him, it's a tricky time. (Lines 2388-2401).

Simon's mother: As a parent I think it's nice that you've gone in, because it is a very small unit and the fact that you are addressing sensory needs, I think is a very important thing because, I know the staff, some of the staff have identified the size of the unit. I think that is a key component so I guess, I don't know if that comes up in the study, if you want that as part of the interview, but I think that it is a key thing for the staff as well as the pupils.(Lines 2405-2411).

Simon's mother: That's what I would like to think, with you going in there, I hoped that the outcome of this study, I'd like to think, because they know I'm quite, I'll say my thing, if it's things like, you know, like I've said before, they know I will say, 'Hang on a minute that's not right' also but I try to keep the peace because they're working with Simon and I don't want it to be a negative impact on him, and them think 'Oh God that's, Simon's got that bliming mother that keeps going on', but um, I don't get that, why would they have moved? I don't get it. If they're supporting the pupils in class, I don't get, I know they need to have a room, but I don't know why they need to have a big space. I don't get it. I've observed it but I don't get it. ((Laughs)). Do you?

(Lines 2711-2722).

Simon's mother: They said that Adi had had a bad week and explained what happened, which helped, because I know Simon wouldn't just kick off. All that Simon did was push him away and locked himself in the toilet. (Lines 2745-2747).

Simon's mother: Staff 4 said 'Oh, he's not trying to work, at the moment. He could just do his work at home'. And I kept saying he won't work at home, so then I've got emails, he's going to have a Maths exam, email here's some English, ((signs)). Then Mrs Silver came here and said to Simon 'If I book you a room, after Easter, can you work in a room?' And Simon said, 'Yes, Yes, I can do that, when I'm in my room, I just can't focus'. So, she was like more focussed, saying Simon you need to come back and that's what I wanted to hear, and that's what Simon needed. (Lines 2755-2764).

Simon's mother: But listen to Simon not just us, because I don't like to (.) he's getting older, and I'd like to give him the opportunity to speak before me. I don't want to talk for him. He's got his voice... (Lines 2841-2844).

Simon's mother: …..It's just making it individual, isn't it, and what can you do for that child or do you ever go on holiday and if the family don't like the sea and the child loves the sea, it's just how open you are about that conversation or what the child can do for themselves? (Lines 2886-2890).

Simon's mother: Well it has just opened up (.) it's just opened up that conversation, hasn't it, for him. Just exploring a little bit for him and I think (.) and the fact that we've got this (file) now he can look back on it. It's always something for him to look at and look at it again and, you know, and reference. (Lines 2971-2975).

Simon's mother: …. and the fact that we both, you know, know about it, is nice as we can always talk about it together, when he wants to, yes so, it's been a good thing. (Lines 2979-2981)

Vince's mother: …little things have dropped out in conversation (Line 3030).

Researcher: Do you think parental involvement is important?
Vince's mother: Parental involvement with the programme?
Researcher: Yes.
Vince's mother: Absolutely!
Researcher: Can you elaborate on that at all?
Vince's mother: I think it gives a clear indication, and you know these things filtering home, that Vince has filled out independently, away from us, gives you more information than they will perhaps tell you at home, so, um, little things like what the questionnaires are saying, about what things annoy him like pen clicking, and all of those things (.) these are little things that we probably didn't know but you managed to capture in the questionnaires. So, I think it's good to have the folder at home and read what they've written. That's helpful because they don't often tell you. (Lines 3090-3104).

Field-notes: Tom's sensory profile suggests overload. He went and lay on a large cushion, in another room, with his eyes closed commenting that 'they' don't understand. (Lines 3241-3243).

Field-notes: Tom managed to agree to provide a profile only after I explained the reason for doing so, in detail, to him. I was told that he had pathological defiance syndrome and will automatically refuse to do what he's told. (Lines 3358-3361).

Field-notes: Peter was willing to talk to me and gave good eye contact for the whole session. He talked about his father and sister teasing him and expressed the view that he was more interested in having a profile done in order for his family to understand him better rather than to try out the strategies suggested. (Lines 3368-3373).

Field-notes: Vince was very good and in the session talking about relationships he willingly filled in some of the questions on the questionnaire, and revealed that he had particular trouble sitting

in front of computer screen for two hours at a stretch, which gave the opportunity to talk about 'take five take a break' as an option every 20 minutes or so.(Lines 3393-3397).

Field-notes: Tom was happy to share his profile with his mother, because he thought she would be very interested but less sure about sharing it with staff. (Lines 3506-3508).

Field-notes: Peter was willing to complete the sensory questionnaire because he wanted his family to understand him better (Lines 3510-3511).

Field-notes: Tom's mother commented on his difficulties jiggling up and down in the chip shop which caused a negative reaction from someone in the queue. He attended a piano lesson for 45 minutes and was then driven to the chip shop- I suggested some ideas regarding movement such as parking the car further away from the shop before entering it. I also discussed the possibility of Tom pressing his hands together for deep pressure when in the queue. (Lines 3586-3593).

Field-notes: we discussed the chip shop and the fact that Tom got excited about having cheesy chips and could not keep still in the queue. It was agreed to try to walk further to the chip shop and to try using calming music by ear plugs in the chip shop/pressing his hands together when in the queue. (Lines 3613-3617).

Field-notes: Peter did not remember much but was keen for the sensory profile to be provided to his family and school staff in order to enable them to understand him better as he said he tries to tell them but they don't listen.(Lines 3688-3691).

Field-notes: Data included Simon being upset by loud people in lessons, clucking and people chatting, bigger classes, people making noises and acting silly distracting him and problems sitting still. (Lines 3700-3703).

Field-notes: Simon indicated that he had a tendency to assume that people would not understand him, and therefore had been reluctant to talk about his sensory needs in the past. (Lines 3704-3706).

Field-notes: Tom further indicated that the mornings were okay, but he was increasingly tired as the day progressed and then okay when he got home. Simon commented on the way in the corridor being a particular problem in the mainstream school environments. Tom continues to say 'I'm sorry don't get mad at me 'whenever he perceived himself to make a mistake. He reported that he particularly enjoyed honey and lemon and we discussed the possibility of having it within school to use at break and lunchtimes as a sensory snack. Interestingly, in line with the other boys, he wanted me to suggest it to Staff 4, rather than to do so himself. Staff 4's response was that it was fine provided Tom made his own drinks. (Lines 3772-3783).

Field-notes: Peter returned to the base after having a meltdown in English. He knocked on the staffroom door asking for help with anger management. Peter was concerned about 'anger taking over' and becoming 'a really bad guy', adding that he could not think about calm stuff when angry. No staff were available, so I took him to the Calm room. Peter reported that he had a meltdown because he couldn't think straight, didn't understand and could not do the work. Peter indicated that he had permission to leave the classroom when necessary, but discussion established difficulty identifying physiological signs of moving from Level 2 to 3-5. This information was shared with Staff 1. Peter also commented that he sometimes wanted to show his anger so that people knew that he was upset about something (as a form of communication). He said, 'There are things that people need to know that I don't like – someone annoying me too much/irritating me'. (Lines 3877-3892).

Field-notes: We discussed the possibility of a sensory toolkit, particularly blowing up a balloon, which he thought might be fun. Peter said, 'Can you talk to teachers about that?'. I spoke to Staff 4 who agreed. (Lines 3897-3900).

Field-notes: Adi indicated that he already 'braced' himself for aversive events. Further discussion established that Adi would 'stay quiet' when it was too noisy. He indicated that the noise seemed

to get louder and he would 'notice everything' and commented 'everything feels weird for me even though it doesn't change'. He would not do anything other than go very quiet and look down, particularly in hallways and on stairs, until it settled down, because he didn't want to do anything, 'just act normal'. He added 'I haven't told anyone about this before- maybe I should'. (Lines 3927-3936).

Subtheme: 'Where does the expertise lie?

Codes

- **Knowledgeable insights/lack of insights.**
- **Prior knowledgebase.**
- **Depth of knowledge of the children.**
- **Primary school practices.**

Simon… you know, I didn't really find out anything new about myself. (Lines 32-33).

Tom: …but I'm not sure about anything else because I mean I knew a bit about the amygdala and (..) (Lines 162- 163).

Staff 1: No, I really, really, don't work that much with them at all. (Lines 616-617).

Researcher: And you also said something here about Honeymede being encouraged to exercise, can you elaborate on that?
Simon: Yea, things like the balance board and the trampoline and them thinking about getting another exercise bike is good (..) encouraging Honeymede to exercise more. (Lines 22-28).

Researcher: And you mention that Honeymede has been encouraged to exercise. Can you say more about that?
Vince: We got a new trampoline and maybe a new exercise bike so ((long pause)). (Lines 85-89).

Staff 3: But we can feel it, can't we, but he (Adi) cannot self-regulate and I have just put that on his progression framework. He cannot say that I'm about to explode, he just starts saying 'I don't know I don't know I don't know', and that to me is a bit like this is alarming. Okay I know what's happening (.). So, we can see it coming, he can't... (Lines 968-974).

Staff 3: Yeah so, it's about whether the professional is being very aware about the needs and some of them are obviously much easier to access that others. (Lines 989-991).

Staff 3: But then Tom arrives with a whole level because he had individual OT. He arrived saying this is my sensory profile, this is my sensory programme, this is what I need, because of his intellectual ability he already arrived with his own level of awareness, so it is about intellectual ability and it's not about age. It's not about a year, it's not about academic performance, it's about who they are. (Lines 1018-1025).

Tom's mother: I think a lot of it is sort of (.) a lot of it we knew but we knew on a level that we didn't even think about it. A lot of the things that we were reading, we go 'Oh yeah we do that' but it gave a depth that we didn't have before. It gave us an explanation. (Lines 1229-1234).

Tom's father: I think one thing is whether it is passive or active stimulation, whether he is in control of it. So, hugging or something is initiated by him…Whilst if it is out of your control, then, you are much more likely to avoid it. (Lines 1523-1528).

Tom's mother: It's very hard in secondary because a lot of the things we have used for primary no longer apply like this little wedge thing which the OT gave him (..) yeah, this one, which is always on his chair, his seat wedge. He loves that and we discovered it on an earlier assessment when he was younger that he was fidgeting throughout and they gave him one to sit

on and he immediately found it good to focus, and to concentrate on what he was doing, and it was brilliant through primary, and he uses it at home, he sits on his chair and he likes it. He will use it for homework. It's sometimes hard to translate those things into a secondary environment because at primary, it's (..) the children are more accepting of the other children whereas when they start secondary, you know, and I actually (.).
Tom's father: Yeah.
Tom's mother: It's hard to carry on things that you've used for primary to secondary. Apart from the distance in location, it's sort of all of the tools that you've had to help with your child's sensory issues, disappears because it is not appropriate and it's no good saying well it's in his EHCP so you have these things, they're not relevant, they're not appropriate and they can probably cause more problems but then your child is then left with (.) apart from it being a big scary school from a friendly small primary , the things he has relied on have gone, you know, and there isn't a substitute and there are hundreds of children going down a corridor and they're pushed to be brave and the headphones and little twiddle things and the little toys I have bought him and stuff, you know, the schools are going we don't like fidget things, you can't have them and they don't make the allowances for the fact that it is more than just a game or something he can play with. (Lines 1587-1623).

Tom's mother: …. You know, we've have learnt that. Remove Tom from the class, and let him, you know, take him for a walk, or bounce on a trampoline, you know, and teach him Maths whilst he's doing it. If he's getting that good feedback and that's an amazing thing, that. That's something I've picked up. He will learn.
Tom's mother: Trying to get him to talk about his feelings, for a form, which was going in with his EHCP, you know, consider your child's feelings, well for a child who doesn't like to talk about it. Well I tried sitting down at the table, it wasn't working but, I've got to do this blooming form, you know, and they want it back and it's important his views are heard. So, what did I do? In desperation I sat down with him. He was playing the Mario game and that brings him down, it is not on-line gaming, it is important for him, at the end of the day when he is overloaded. So you think he'd had enough and I'm sat there going 'So how do you feel about this in general… do you like this? and keep it specific and reword it if it is not appropriate, and it flowed, it poured out of him and I wrote it down word for word and I wasn't interrupting him or stopping him from doing what he wanted to do but I discovered that he had an ability to do both whereas I'd have been constantly (.) you know he was doing something that kept him on the level he was (.) the questions weren't distracting, he could manage both. He could bounce on the trampoline and that would keep his system okay and you could teach him times tables and he would shout them out.
Researcher: Really?
Tom's mother: Yeah. That surprised me. I thought I was pushing it. So, I always think so many things we discover are not from being clever but accidental… (Lines 1639-1673).

Tom's mother: … I think naughtiness a lot of the time, you know, especially, at first I think until the teacher gets to know them better, but again, it is this transition period, isn't it when they haven't been taught for long or (.)?(Lines1901-1906).

Tom's mother: But for the first couple of years in primary, in secondary, sorry, I don't know if this is true of all of them, they're swopping so there's no familiarity and it's almost like he doesn't like that teacher because (.) that is so important that the teacher is, with every child, isn't it? That teacher interpreted the behaviour as him playing up, which he is, but not seeing that he is overwhelmed…. (Lines 1909-1916).
Simon's mother: ((Laughs)). I mean when I visited the unit, that was the thing that struck me, to start with. It's definitely, I think, too small; it doesn't meet their needs. I think they clearly need space to study and space out of study, um, just for any of us to meet our sensory needs, I mean it just feels very confined, I find, very confined, because when I did the tour to see it and these are children that, in particular, they know they are arriving there with sensory needs, well additional needs and sensory needs but if you're sitting there and you don't want someone around you. You know they've got heightened sensory needs and there's not much, you know, it feels like they are on top of each other, so it is very hard for children who might need to work individually, so they are, kind of, having to work and tolerate a lot of differences around them and that could be with adults and staff so I feel that they are having to tolerate that all throughout their school day so I think all the pupils, not just Simon, are having to deal with a lot, and I think

to get to even to their first break, a lot of them must already feel like (.) wow and I know that they're not all having to work in that unit throughout the day.
Researcher: No.
Simon's mother: But then they're going from (.), I think they're having to deal with a lot in that space and then they have to go to the mainstream where, I know in particular for Simon, he's expressed from the beginning, he's found that incredibly, incredibly difficult. (Lines 2415-2439).

Simon's mother: And then they have nowhere to go and deal with their movement issues or the issues if they need to go off and let off some steam and the garden space is limited and there is no safe, nowhere to go to a bit of safe space. It's just very limited, very limited.
Researcher: Umm.
Mother: One-time he was sent to the kitchen, when he was already cross, and they knew he was cross when he was sent to the kitchen and I said that's not a safe space. The other day when he was cross, Simon locked himself in the toilet, but that (.) that he'd properly felt was the only place he could go. (Lines 2445-2455).

Simon's mother: But it's hard for them because the staff say they've got all these children in a small space, but you are like what. (.). They probably could split them up and this is what I don't understand, don't tell them I said this, why have they put the staffroom in the biggest classroom? Ohhh. Why have they done that? Why?
Researcher: I don't know but it was noted.
Mother: Why? I know that if happy staff make happy pupils, but I don't get why they've done that, or whose decision that is. It's made me quite cross. Simon is leaving. That's why Mrs Silver came here. Mrs Silver came here, which was lovely, because Simon has just been off for a week because, you know, Adi got stressed with Simon and Simon, he defended himself, and I praised him, well done for not whacking the kid back then they're like oh no Simon is not learning, he needs to be at home but he doesn't work at home, so he sits doing nothing, so he said to Mrs Silver, 'I'm distracted in my room. I can't learn at home'. He's about to do his exams, he should be there learning, um, he's got nowhere there to go though. (Lines 2684-2700).

Simon's mother: But, that is what I don't get, they're small enough as it was, and then they've taken over the biggest classroom, what's that about, right next to (.) it feels like, I don't know what the pupils have got left. I don't get that. (Lines 2705-2709).

Simon's mother: …. he is bright. He wants to do well, and he once said a month or two ago, he did say they won't understand. (Lines 2792-2793).

Simon's mother: And it makes a mockery of the process really, they sit there and they look at the paperwork then they, and it's like what, it's meant to be about Simon (.) , and Simon's old enough to express himself and he'll say, 'You know, this is what I want to do, this is what I like' and he starting to, yes, and he's been there long enough for them to know him and it's still frustrating when they'd be saying, I hate being there, and he has to go there, and the teachers haven't got to know Simon. Oh no, they don't really know Simon... (Lines 2809 -2817).

Researcher: Do you think parental involvement is important?
Simon's mother: Oh my god, yeah. Well we know, like yourself, you're a parent, aren't you?
Researcher: Yes.
Simon's mother: We know our children, and I think, more than ever because (.) I know, I don't know, ((sighs)) some of us they might think we're a bit nuts, I don't know, I just, I don't know, I just think I know Simon inside out, I like to think I do, I just live and breathe him for so long that, you know them don't you? And yeah, they, you can't not, isn't it? Yes. (Lines 2832-2841).

Vince's mother: I was aware of different things we were trying already to, um (.) not particularly. I know from experience what he doesn't like and what he does like, but being a teenager now he is, very much, um not shut down but a little bit, you know, he doesn't, he doesn't want help (.). (Lines 3061-3066).

Field-notes: Following the provision of informed consent from the remaining children, staff arranged for 4 of them to be provided with session 1 in the final lesson of today. The staff had moved from their smaller office to the largest classroom and the session took place in the old

office – clutter and two telephones remained with the latter ringing on several occasions. The room was also over-crowded when occupied by two adults and four children. The other adult (Staff 3) left. (Lines 3227-3234).

Field-notes: Staff 3 indicated that the staff did not know the children well enough to complete the SPCR and preferred that the parents complete the forms first and staff to fill in the gaps instead. (Lines 3272-3275).

Field-notes: Peter was tired (says got up early to download YouTube) and unreceptive until we discussed movement as an important strategy. Peter reported that he was very knowledgeable, but people treated him like a child. He was upset that staff had moved their office because they were able to observe him walking around the bench outside, and he had stopped doing it because he did not want them to look at him doing so. He indicated that he could walk up and down inside but preferred doing so outside. (Lines 3308-3316).

Field-notes: During discussion of Take 5, Take a break, Peter reported that he already pictured a relaxing image in his mind, and that he worked better with music in his ears – decorating his room and doing homework. (Lines 3321-3324).

Field-notes: He (Tom) proved to be very observant and picked up errors regarding typos and was the only person who asked why I was using green paper. (Lines 3361-3363).

Field-notes: I was told that the children no longer have key workers but some staff were more familiar with certain children than others – When asked how they were able to fill in progress charts, I was told that they talked about the children at lunch times and breaks. (Lines 3471-3475).

Field-notes: When at primary school, however, Mark benefited from movement breaks, heavy lifting, climbing wall and carrying bottles of water. They confirmed that he definitely needed a twiddle toy... (Lines 3575-3578).

Field-notes: Simon's mother commented that he needed to listen to music in the car journey and that if there was no music, they needed to consider alternatives. She felt that he had some insight but 'the window was so short' regarding his reactions. She also commented on the importance of environment and staff awareness, commenting on the incident where he was sent into the kitchen to calm down because there was nowhere else to go in the building. (Lines 3594-3601).

Field-notes: When we discussed Anticipation, Preparation and Planning for holidays, Tom indicated that there was already a lot of preparation and his mother put together a timetable, which was helpful.
He also talked about what was available for a sensory diet in primary school – hippos, fiddle sticks, raisins, etc in a box. He indicated that he would hide under the table and brought in a rug to sit on. Tom commented that it was more difficult in secondary school because they have to move rooms. (Lines 3863-3871).

Field-notes: Adi's mother later attended the coffee and cake session and told me that Adi was diagnosed with SPD at the age of 5 (well before diagnoses of ASD and ADHD) and followed a sensory diet, prescribed by an OT, at home, which included a swiss ball and walking slowly. She had also tried putting water bottles in his backpack to weight him down. (Lines 3920-3926).

Field-notes: Adi did not think he could self-regulate 'usually' saying 'Mum might calm me down – don't know what she does but she is 'magic'. (Lines 3940-3942).

Subtheme: Whose job is it anyway?

Codes

- **They need to learn (child's responsibility).**
- **It's up to the parents.**
- **Staff should be doing it.**
- **We need to work together.**
- **Other professionals' responsibility (primary school/OT).**

Staff 4: Yeah, I actually think if they're (..) like think about, you know, their different perceptions of home and school, you know all of our pupils are more relaxed at home than they are at school. And actually if (..) they're even more relaxed at home it's going to enable them cope more when they're in a stressful situation. And if we are describing school as a stressful situation, which it is for some of them then (..). And actually the more useful their downtime, and their time away from school is, in terms of keeping them calm and having them in the right place when they do come into school would be better and that is what the sensory stuff is supposed to do, isn't it? Kind of help people prepare for (..) more difficult situations, I guess. (Lines 651-664).

Researcher: The question was about the importance of parental involvement.
Staff 3: Parental involvement in implementing the strategies or understanding them?
Researcher: Both.
Staff 3: I would say it's very important for parents to be on board in understanding them and allowing them to facilitate them. (..) we need the parents to buy the resources. We need them to buy the trampoline and we need them to buy the (..). They are facilitating it so if they are not really on-board, they're not going to facilitate those strategies. They're not going to buy the equipment. They're not going to (..). They have to want, at a deep level, to accept that it is actually really important for it to happen for their child. Our pupils are not going to be able to facilitate or access these things without the parents supporting them.
Researcher: Providing the equipment for here or providing it at home?
Staff 3: At home. (Lines 673-687).

Researcher: Do you think that the sensory intelligence approach is viable in an ARB?
Staff 3: Here but not in the mainstream school. I think we've got the luxury and the (..) the luxury of time with them and the individual contact so it is possible to facilitate the strategies. I think parents get too busy and too stressed and could forget to do it at home. And I think it's going to be almost impossible in mainstream so I think the only place it is going to work is in a really small unit like this where you have got the capacity to, and the time to think about it and implement it. (Lines 690-700).

Staff 2: And we are also in constant contact with the parents, so we can gauge whether it's working at home and main school, as they don't have that constant contact (..). (Lines 701-704).

Staff 1: Yes, what is causing that sensory overload. So, we can say (..) at this point we can say they're going to need to use that strategy.
Staff 2: Yeah.
Staff 4: Yeah, it's definitely viable (for the ARB).
Researcher: What changes would need to be made to make that possible?
No response. ((Long pause)). (Lines 705-712).

Staff 3: I think it has raised our awareness in that if (.). We just don't have time for it. The ideal thing today would have been, where we knew Tom was on a wobbly day was to do his sensory diet, that would have been great, calmed him down and then sent him down to a lesson. But then he would be yelled at for being late, so it is, isn't it about how do we fit it in practically?
Staff 1: Whilst also including the students in inclusion work? Yeah. (Lines937-944).

Staff 4: Which kind of comes back full circle to the idea of using these things for preparation and it being important, that, yeah, those skills are practised at home, as well.
Staff 2, Staff 3 and Staff 1: ((in overlap)) Yeah.

Staff 4: Before they come into school and the evenings, I mean before they come to school (Lines 945-951).

Staff 1: But that is when he (Adi)needs to be the one to take the responsibility to recognise, in himself, that he needs to have that time because no matter how much we say to him like maybe you need to (.) you need to think about doing that or (.) (Lines 963-967).

Tom's mother: I think it's really important that it is supported at school, I think that is its key in that it was conducted in a school environment and I think that is really, really important because that is where our lad is spending most of his days so (..) some of the situations, the fluorescent lighting and things, like that, you know, he is actually in that environment so I think that is key that it should be shared throughout school.. (Lines 1238-1246).

Simon's mother: Because I want him to be able to, hopefully, cope for himself. So that when I'm not there for him he can de-stress, take a break for himself, so that he can get more insight for himself because I think I realised he can't always help getting into the states he gets into. So that hopefully he can use those methods to relax, or get into the right environment, and um (.) (Lines 2295-2300).

Simon's mother: and um, yeah, thinking ahead as he wants to go to college to be (.) yeah that's something he'll be around new people, so that people who probably won't, might not understand his needs, so more onus is on Simon again to be able to, yeah, you know, deal with this himself. So, yeah, like again the more that Simon understands and can recognise his own sensory needs, then he can help himself really, and that goes for all of us, doesn't it, but yes, so the onus is on Simon, really. (Lines 2312-2320).

Simon's mother: (.) I'd like to think that, I'd like to think the study has made some of the staff realise the importance of the study because I'm sure within the staff (.) all the children they realise, like even you look at that tree and the difference of all the children, their needs are, even when you've only got eight children. (Lines 2492-2497).

Field-notes: The logistics of providing adult supervision was discussed. Staff did not consider that they had sufficient resources to support the children, on the programme very much, and therefore the importance of the children developing self-help strategies was considered paramount (by Staff 4). For those children unable to develop self-help strategies, there was a preference for direct occupational therapy intervention. This was difficult to access, however, and only one child (Tom) met the criteria for OT involvement. (Lines 3183-3191).

Field-notes: I was told, by Staff 3 that Tom had an OT –supervised programme but staff had not persisted in following it due to lack of time. Tom did not recall much about it other than some exercises with a swiss ball. He added that he could not do the exercises alone as it needed two people. (I was later informed that Tom's TA was on long term sick leave for stress). (Lines 3299-3304).
Field-notes: Peter added that he also missed 'walk and talk' sessions he did in Year 7/8, which were very helpful. Staff 3 reported that she had instigated these but stopped due to lack of time and she was not keen to do them in cold/wet weather. (Lines 3316-3320).

Field-notes: Tom indicated that he had a sensory diet book, but he was not asked to do the activities that often, which were mainly exercises with the Swiss ball. When I asked if he could do them on his own, he felt that he might need more than one person. (Lines 3767-3771).

Main Theme 3: It would be better if….

The theme 'It would be better if…' was chosen to encapsulate process issues and practical ways forward suggested by the participants.

Subtheme: Programme development

Codes:

- **Selling it to others.**
- **Staff training needs.**
- **'Hands on' practical activities.**
- **Making it fun.**
- **Using visual aids.**
- **Stress of external professional involvement.**
- **Differentiation based on prior knowledge/needs/age.**
- **Timing.**
- **ASC specific modifications**
- **Importance of role-models.**

Researcher: Can you think of any ways in which the programme can be improved?
Simon: Um (long pause) um. Maybe encourage like (..) maybe like (…) teach the programme maybe in a more fun way.
Researcher: Can you expand on that?
Simon: Like (.) Maybe do some more of the sensory challenges, perhaps or something like that. (Lines 36-43).

Simon: Maybe actually test out the other senses, <u>really</u> test them out, (..) sounds at one time and smelling, and that was about it.
Researcher: There was also the 'Spot the leopard', as well, wasn't there?
Simon: Yea, I was thinking about fun ways of carrying on with the sensory tests. (Lines 45-51).

Researcher… do you think this programme would be useful for other pupils, your age, in other resource bases?
Simon: If they were unsure about their senses, then sure. (Lines 58-62).

Researcher: Can you think of any ways the programme could be improved?
Vince: Um, it could be less wordy in some parts, yes.
Researcher: Can you expand on that? So, where it is 'wordy in parts' what would you put in its place?
Vince: I found it alright but some of the other students found it a bit complicated. Make it a bit more practical? (Lines 102-108).

Researcher: Okay. So, in terms of changes it would possibly be to make it less wordy and more practical?
Vince: Yea. (lines 119-121).

Researcher: you said it was interesting to know which sensory profile you are but that thinking of all of the examples of all the things made you go 'erk'? Can you tell me more about 'thinking of examples making you go 'erk'?
Tom: Well, (yawn) sorry its just when you say things like 'can you think of any examples of what you could do in this scenario or can you think of any scenarios like this or (..) something like that (..)
Researcher: And that makes your head go 'erk'?
Tom: Yes, sometimes. (Lines 125-135).

Tom: (..) I thought all the things like the example with the car was other ways of putting stuff.
Researcher: Yes.
Tom: Making it easier to understand the basic concept of, (..) for me at least. (Lines 164-168).

Researcher: Was there anything you didn't like about the programme?

Tom: Well I told you I didn't like trying to think of examples of the things, of the things which made me go a bit 'erk' on bad days (laughs).
Researcher: What about anything else, apart from that?
Tom: Um ((long pause)), no, it's okay, except I do think, I do think it went on a bit because it seemed to be saying the same thing in lots of different ways. (Lines 169-177).

Researcher: If you were running the programme, what would you change?
Tom: Okay. Well, I told that I think it says the same thing in different ways a bit too much, but I don't know if it would take other people longer to accept that sort of information or maybe they wouldn't realise that it was a similar thing or something. But I'm not sure it is best to just rely on that. (Lines 191-198).

Researcher: Okay. And would you recommend, or do you think the programme would be useful for pupils your age in other resource bases?
Tom: I think that it might be useful to get them to do the quiz and find out what their sensory thing is but (..) I would not say that the spotting the leopard and the smelling thing, at the beginning, really helpful explicitly so (..) I'm not sure.(Lines 191-206).

Researcher: Well…Did it help?
Peter: Um, …….um…in what way do you mean?
Researcher: Well I'm trying to get you to tell me rather than me to put words in your mouth.
Peter: Please. (Lines 223-227).

Researcher: At the end of this programme I have got to decide whether to do it for other people; to do the same programme with other people, yes?
Peter: I quite agree with you. I think that there should be something for you when you get stressful and annoyed and that.
Researcher: Do you think other people your age would benefit from it?
Peter: Ah, ((long pause)). I'm not quite sure. It depends who they are.
Researcher: Do you think it is okay for people of your age? You're Year 9, is that right?
Peter: I think so.
Researcher: So, would it help other pupils in Year 9?
Peter: Yea, it might do.
Researcher: Why do you think it would benefit them?
Peter: Because (..) um (..) it would be in their determination, their need to express their feelings. (Lines 304-321).

Researcher: Okay. Thank you. Can you think of anything else?
Peter: Yes. How about this (pointing to balloons in the room with different faces drawn on them)? The emotions on the balloons.
Researcher: As what (..) as a good thing?
Peter: Yeah it could, yeah it could be a lesson in your programme. You could get the child to write feelings on the balloon like I did, see? So yellow means happiness, blue means sadness, red means anger, green means disgust and purple means fear, just like that (pointing at the balloons).
Researcher: How do you think that would help?
Peter. Err (..) something like this. Ask me a question about something emotional.
Researcher. How do you feel about (..) your favourite TV programme?
Peter: (Pointed at the happy face balloon).
Researcher: Okay.
Peter: Like that! You just show the emotion. You pick up the balloon and show the emotion to show what you feel about the question. You know what I am saying right?
Researcher: Yes.
Peter: Yea. That could be something you could use if you want. (Lines 360-385).

Researcher: So, is there anything else you think could be helpful in the programme?
Peter: Seeing what people do to calm themselves down. Like what calms me down is playing video games and watching my iPad Netflix and YouTube. Right now, it's (indistinct). A series. Very interesting, I mean in a good way and a comedy way.
Researcher: So, what you are saying then is that it helps knowing what other people do to calm

themselves down?
Peter.: Yeah, that could help right?
Researcher: Why would it help do you think?
Peter: Because calming down is good for you. It makes you stop and realise that what you are doing. I mean other children can do that, but unfortunately, I can't because my anger is too strong. But for other children it should be easy. (Lines 386-402).

Researcher…And you said that some bits were a bit slow and I didn't really get it. Can you tell me a bit more about that?
Adi: I don't know. Some bits I did (..) I got definitely (..)and some bits, like which were a bit slow I didn't really get for a while then I got it again.
Researcher: Can you remember any of those bits?
Adi: Not particularly. (Lines 429-436).

Researcher: And can you think of any ways the programme could be improved?
Adi: No, I found all the stuff like the sensory (.) having to do the smell and stuff like that, I think we could do more about that to find out about the senses. I think that would be fun.
Researcher: Do you think the programme would be useful for pupils your age in other resource bases?
Adi: Yes, I think so.
Researcher: You do. Why do you think it would be useful?
Adi: I don't know (..) but I think it would be. (Lines 473-479).

Staff 3: I think it's about the understanding and the different capacities of the children to understand. I'd say that Mark doesn't understand what you are doing or why you're coming at it from that angle whereas somebody like Tom probably does understand what you are doing so has (.) would get more out of it. Mark, it's about his parents have probably learnt something from it and we have, but I think for Mark it has probably gone over his head and you knew that, and we talked about that from the beginning.
Researcher: Yes, we actually withdrew him from the programme after the fourth session. So, Mark is not in the programme. (Lines 501-529).

Staff 2: And Simon, it didn't work for Simon. Not the strategies that we put in place for him for concentrating just went above his head and (.).
Staff 1: And he had breakdowns over it when we tried to use them.
Researcher: Can you give me a concrete example of a strategy that you tried to use with him?
Staff 1: Doing work for 20 minutes and then five-minute breaks.
Staff 2: Doing 20 minutes work and then a five minutes break. 20 minutes work and then another five-minute break. That didn't work because the five-minute break became 10 minutes and then 15 and also listening to music, he was then taking that beyond (.).
Staff 4: That was distracting him.
Staff 2: Yeah that was distracting him.
Staff 4: So actually, we walked in and the idea was that the music would help him to focus, yes, but actually he just sat there dancing to the music and not doing his work.
Staff 2: Yes. (Lines 524-544).

Staff 3: You would have to persuade them that it is worth doing. So, I think when they came to your initial (..). This is what we are doing they were all coming very sceptical, they don't know what they're coming to (..) they're not sure they will agree to it, it needs to be presented in a way that makes them want to do it, not just see it as an extra box I've got to tick and it's something else I've got to do in my already completely overstressed life (..) seeing the parent of a disabled child is maxed out (..) so stressed (..). If it is presented as one more thing you need to be doing for your child, I think it will be hard to get them on board.
Staff 1: I think also, as well, if parents see it as something that has worked for other people, other students are doing it (..) but this one is different, it's difficult as this is a very early stage and you're having to, kind of prove something, without being able to prove something, if that makes any sense.
Researcher: Yes.
Staff 1: I think for parents to be able to see, being given this profile, and for this student that

these strategies worked, being able to see it in black and white, they might say oh, okay, if it works for them maybe it might work for my son or daughter. (Lines 714-737).

Staff 1: I think that the delivery (.) I think that Peter really struggled with the large chunks of information, at a time, and I think, yeah as well, having an external person (..). I think they'd almost have benefited from smaller groups and 1:1 because I know they did it all in one group at the beginning, while none of our guys really get on that well. I think being in a room with all of them and then having an external person as well (..) I think they would have just been uncomfortable to have to process information. There was quite a lot of information you were expecting the boys to take in, I think. (Lines 745-756).

Staff 4: Okay. I guess like (..). They've all got a little folder and a pack, haven't they?
Researcher: Yes.
Staff 4: I think like that (information pack) could be improved graphically so that it is more colourful maybe, imagery kind of explaining things as well so that it's, yeah, not a lot of written information. I know that there are diagrams and stuff in there, but, yeah, maybe a slicker kind of pack for the pupils. (Lines 763-771).

Staff 3: I think some of the strategies need to be more dynamic and need to be more different from, because you can look through a list that says eat crunchy snacks or bounce on the trampoline and they'll all think I'm doing that anyway. Even the parents will think that this is all stuff I am already doing so I think there needs to be something that is actually (..) it needs to be more stark and there needs to be more contrast. This is something new and dynamic and we are going to try these things rather than just all the stuff you're doing anyway, that's just been formalised and put in lists. They are all doing this sort of thing naturally. They naturally chew, they naturally go outside, they are doing that so there needs to be another way of saying this is something completely different that we are going to try. (Lines 774-788).

Staff 2…I was thinking of something like social stories (..) like animated so they can visually see, you know what I mean?
Staff 3: Yeah (..). That would be brilliant using social stories. That would be a good way of presenting information.
Staff 2: Yeah. (Lines 789-795).

Staff 3: whereas the older ones, the ones you already know, Simon says I'm angry before he is. Although it is 0 to 10 he can still (.) he can verbalise it so that's a big part of it then the age difference of the pupils you have been dealing with about what stage is the best time to be learning to be more aware, self-aware.
Researcher: There are two elements here, one is that of you facilitating their awareness and the other of them being aware themselves. Are you saying that the age of the child makes a huge difference?
Staff 3: Yeah, I am and the diagnosis of the child and I think some of them are very sensitive and are not able to verbalise how sensitive they are and that, so you have to be very, very careful if they have a high level of need. (Lines 974-988).

Researcher: So, if you were incorporating the programme, with what age group would you be using it?
Staff 1: I would say 7s and 8s.
Staff 2: I would say a lower age (.).
Staff 1: Yes, then they would be getting ready for (.). That was why I was asking about primary schools, particularly Year 6.
Staff 4: Year 7 and Year 8, when they first come into school, or 7 to 8 years?
Staff 1: No Years 7 and 8s. (Lines 997-1010).

Staff 2: Age 12 would be good to start learning this whereas with Simon and Vince, they are leaving school and (.).
Staff 1: And actually, all they are thinking about are their exams and this is an extra thing. (Lines 1013-1017).

Staff 1: So maybe have it as part of the transition. (Line 1037).

Tom's mother: I tell you what might have (..) I'm sorry I may be going off on a bit of a tangent here but one thing that he told me that he really enjoyed about it was done at the beginning was the smells, they had to smell things and see what they felt about different smells, and he really enjoyed that. I don't know if all the others did as well, but our lad did.
Tom's mother: Maybe what would have been good, but I don't know how practical, because we work from home so we could be flexible, some of the things, on the more practical side, may be it might have been nice to have had, if possible, some of the parents there when that was going on so you could visually see what was happening and could share in the understanding of, I don't know, I'm assuming they might go 'Oh I don't like that.. that's weird' and some would be familiar and some wouldn't and I think children in a different environment, like in a school environment, will behave differently and give more information so may be (..) maybe I could have just been a morning or something when a few things were shared, like when we met in the room which I found good. For me, I think if we could have done a fun event in the morning and done some experiments or things with the youngsters would have been quite excited to get involved in it and the parents could have been there. That's just off the top of my head. It may not be practical (..). (Lines 1321-1354).

Researcher: Do you think that the programme is suitable for a child of Tom's age. This particular programme, is it suitable for a child in his year group?
Tom's mother: I think it would be spot on. I mean, he's 13 now and a bit, … I think it is useful and good timing, maybe at the start of secondary, that sort of age. Probably more so than primary, maybe…because there is that greater self-awareness isn't there? (Lines 1542-1555).

Tom's mother: It didn't touch at all on special interests and the power of a special interest (..) it's a separate thing maybe but how that links in, to our son's case, to sensory issues. The power of the hippopotamus, in his case, is wonderful, you know, the softness of it, the touch of it, the (..) It's just interesting. I don't know if it could have linked into it but (..) (Lines 1560-1566).

Tom's mother: …Which brings me back to the other question, the time element, and definitely, they should do sensory assessments before children go to secondary school because it is a huge change, massive, you know. I mean I talk about autism because that is what our son has but I think for any children going from primary to secondary, apart from it not being familiar, you are bombarded with things. You don't get the same teacher all the time. All that familiarity goes, and it is really hard for them. And for the parents too, you know. I think any tools that can help your youngsters settle in, and that they can manage transition and, you know, it is all about transport and everything else but I think things that help your child feel safe and secure and then they are ready to learn, because if they are not, it is all a waste of time, really. (Lines 1623-1639).

Tom's mother…so I guess it is sort of teacher training.
Researcher: Mainstream teacher training, you are talking about?
Mother: Definitely, yeah. I would change the world if I could, but you know, it has to spread out and it's no good just the people who deal with these situations, the ones who already have an understanding in the Honeymede. It has to go out to the wider school, in an ideal world. (Lines 1980-1988).

Peter's mother…and if I did ask him, ask about the day, and things like that, if I did ask him if you had been to see him or what you chatted about he was very much, um, I didn't understand what she was talking about.(Lines 2151-2153).

Researcher: ... do you think parental involvement is important?
Peter's mother: Yes, I do.
Researcher: Can you elaborate on that?
Peter's mother: I do, um, because I think what they are taught, from Peter's point of view and from my knowledge of autism, I think when um Peter learns things he learns in that context and then he won't or he rarely moves it into a different situation so if he'd learned this at school, he would have managed these things, at school, but wouldn't have necessarily brought it home and managed it at home, although, like as we have just discussed, there have been a couple of occasions when he has, but I feel that if I'd have been more aware of this earlier on, I think it

would have had a bigger impact on Peter and us as a family, earlier on. (Lines 2198-2212).

Peter's mother: ..Peter didn't understand, not all of it, and I'm not sure how, maybe there may have been different ways, it's difficult to know if there were different ways to introduce it to him or whether it is just where he is at the moment. Does that make sense? (Lines 2217-2221).

Researcher: … One of the questions is whether the programme is suitable for a child of his age.
Peter's mother: Yes, I think it is. I do think it is and I also think, to be fair, it could be adapted to much younger children.
Researcher: Right.
Peter's mother: So, I personally think, I can see (.). I work at primary, and I can see ways of introducing some of this if not all of it, um to primary school children.
Researcher: What sort of age-group?
Peter's mother: Um, particularly, I would say Key Stage two definitely, you know particularly Year 5 and 6. You know, I definitely think they, it could be adapted to them. But I think to be fair that there is some of it that, from five really, I think there is a lot of it they can access, um, you know like I say with a bit of fiddling, sort of thing. I think it could be made accessible for much younger children. (Lines 2227-2242).

Simon's mother: …there could be a trampoline there. Why not a trampoline? Why isn't there a big trampoline? There should be the school could provide a trampoline.
Researcher: Umm.
Simon's mother: With a net, that's safe, at playtime, every day. They've got some young, well a couple of Year 7s now, and I'm sure they'd be out there every day on that trampoline, at break time.
Researcher: So, you would recommend a trampoline?
Simon's mother: Yes, I would!
Researcher: Right. Any other recommendations?
Simon's mother: Can I put some more in there? ((laughs)).
Researcher: Yes.
Simon's mother: ((Loud laugh)). I'll have a 12-foot trampoline, thank you, in the garden. Arh I'll go for it. No, but there needs to be, um, they used to have a Wii console for break-time, but I think that got stopped. (Lines 2522-2537).

Simon's mother: I think they could do more with their outdoor space. They used to go out and do a little bit of gardening and I don't know if they've done that lately (Lines 2553-2555).

Simon's mother: I asked for time for Simon to do more catering and use the kitchen, but the kitchen just seems to be used for making refreshments, but I'd like to see the pupils using the kitchen. I think it comes down to staffing issues, which I get, limited staffing that lets, you know, I think let's be trusting the children are little more about (.) they do and be trusted, there's activities they can do, I mean they're teenagers, I'm sure there's things they can be doing,.. (Lines 2562-2569).

Simon's mother: Yes. A trampoline cost almost nothing and I think they could have an out-building, I'm sure, outside of the school where they could have a console in there. They need like a safe (.) and like the children's wards now because they are getting more and more children coming with, you know, mental health issues, they're now building a safe enclosure, a padded area where children go and sound off. I don't know why they don't have something like that, because when Simon went outside and he had thrown something, they rang me up to say, 'Oh Simon smashed a window, you got to come and get him'. (Lines 2619-2628).

Researcher: Do you think this particular programme is suitable for a child of his age?
Mother: Oh, most definitely. Oh, definitely from the age that you've picked, from secondary age. Most definitely. I think the sooner they can stop and think and try and think about their behaviours and have some influence, the sooner they do that the better, so definitely. I think it needs to be before adulthood, most definitely, doesn't it? From 12? (Lines 2861-2868).

Vince's mother: And I think that, going forward for adults as well (.) working with people, adult psychology and looking at how different people work, and yes very useful, very useful. (Lines

3015-3017).

Researcher: Do you think the programme is suitable for a child of his age?
Vince's mother: I do, yes, definitely, because (.) he is at an age where he can understand, um, although he doesn't like to be told, and doesn't like to listen, I think little things would have filtered in and made him more aware so I think he is probably the perfect age.(Lines 3019-3025).

Vince's mother: ... (.). I think as a younger child it would have been very useful for me but as he is now a teenager and we have gone through the worst of it, you know, kind of, you know what to avoid and what works and doesn't work. So, I wouldn't say that it has, you know, made me more aware. It was stuff I knew already, and it just sort of confirmed it all for me but certainly with younger children it would be very useful at home. (Lines 3066-3072).

Mother: Sooner, more information sooner, a lot sooner. Had we known about it before we even got the diagnosis, or at the beginning of his diagnosis, little techniques and little things and knowing where he was at, but I suppose, at that point, he probably couldn't articulate (.) where he was at, for us (.) so it is difficult, isn't it, to know what the perfect age would be. I think sooner, would have been good. I think we are struggling now. I am struggling now with Vince being not keen and (.) getting (.) this information across through Honeymede, through you, rather than it coming from me has been useful because he doesn't listen to me at home and he doesn't want to talk about it at home, so I think being in Honeymede, um, doing it has been useful, but for me at home, if it had come sooner it would have been very helpful. (Lines 3075-3088).

Researcher: Is there anything else you would like to add?
Vince's mother: No. Just thank you very much. I think it has been very useful. And I know Honeymede are already using it. I was speaking to Staff 4 today and I know that they are using bits and pieces already, so I just thank you for coming and trying it out and I hope it all, you know, gets uniformly put out to schools, and to more resource bases and more help, as much help as possible is out there for everybody and it would be (.) may be a good idea to work more on the non-autistic children and inform them, educate them more about (.) the needs of autistic people,…(Lines 3113-3123).

Vince's mother: So maybe a little bit of it filtering out to normal school, normal mainstream, helping teachers pick off those children that stand out with different needs that are never going to get a diagnosis. I think that would be useful. (Lines 3128-3132).

Field-notes: I then saw Tom who commented that he had a tendency to drift off halfway through listening to a sentence when his parents were talking to him if he was not interested, and he said he was doing it to me. (Lines 3857-3860).

Subtheme: A 'Can do' approach

Codes:

- **Willingness to take the programme forward -extra rooms, sensory toolkit, sensory profiling, INSET funding.**
- **Ah buts.**

Researcher…It's about how to...
Peter: Calm myself down.
Researcher: Yes, calm yourself down to get to level two, not to go up to level three, four or five.
Peter: Like I said, there is no way to calm me down. Once I'm angry, I'm angry. I can't help it. It's like I can't help myself Dad and (sister's name) (loud voice). (Lines232-238).

Staff 1: I would say Mark is now using his fiddle toy a lot more than he was and is less inclined, when we ask him to put it away when he needs both his hands… He is less inclined to do it and

it is almost like a green card to not complete his work (.) in my opinion. (Lines 502-507).

Staff 4: I think the thing about it is that we've got a group of pupils that (.) are (.) you know (.) at school, not all of them like school, you know it's 'square pegs in round holes' , quite a lot of our pupils. You know they don't want to be here and they don't necessarily want to do schoolwork and actually getting that balance right for them where it's like, well, this is something you have to do because it helps you in terms of you having knowledge and having an education and having, you know, some kind of life skills and things that you can use in your life and getting a balance between them being able to cope with the environment they're in, is really, really difficult, and obviously sensory needs play a massive part in that, but yeah, it is getting that balance right for them um so ((laughs)). I don't know what I'm trying to say but it's difficult because we're trying to educate, formally educate these pupils to a national curriculum whereas as individuals, to differing degrees they perhaps don't want to be formally educated, um so (.) yeah we are trying to get pupils to do things they don't actually want to do which is always difficult and more so when they have additional needs, I guess.(Lines 585-606).

Researcher: It is always difficult being the very first isn't it?
Staff 1: Yeah, well it is, yeah, and I think it is a change that will happen, so (..). (Lines 740-741).

Staff 3: I think we really like the information on a sensory profile, we actually do it in two different ways already. We've actually got a progression framework that covers their sensory profile, I don't know how much sensory is covered on yours (looking at Staff 1). But to be able to have that (..).They are coming up at EHCPs that some sensory stuff, if they've had OT involvement, is already recorded but for the ones that slip through the system that haven't been assessed, haven't had OT support, that is very useful for them to arrive with that basic knowledge that this is their sensory profile so therefore we are starting from an informed place rather than having to slowly, slowly get to know them by default. Oh, if we take them to that it will trigger them, you know. That is really quite useful to have it written down. (Lines 804-819).

Staff 4…and I think if we don't already have profiles for our pupils, I personally think we will use that when they come into school, certainly at the start of school perhaps, throughout. Um and that then informs things that we might be able to do for them to help calm them or give them work breaks or (.) yeah, definitely. (Lines 820-830).

Staff 4: I was going to say something about just practicalities of stuff because we have spoken about mainstream school, home and the ARB and how people's sensory (..) how and when people's sensory needs are met because, the issue is, if someone needs to do something in particular to help calm themselves and that actually is disruptive for a class then it can't happens then so I don't know. In my head it's kinda like, well actually there's times and spaces in school that our pupils used to self-regulate already um (.) but it's appropriate times and places. I mean that's what the resource base does for a lot of our pupils. It gives them a quiet place to go to where they can do, you know, for example, Peter will walk round in circles, flap his hands and talking about whatever it is he's interested in, at that particular time. Now if he was down in mainstream school doing that then the chances are that the other pupils would say something (.). We would provide that here (.). It's something about the practicalities of being able to do something like that down in mainstream school isn't (.). Isn't going to be a practical thing for him so I think some of it is about, for me, it's about managing time and space effectively so pupils can do the things they need to do (.) um. And an understanding that, in this kind of environment, where you've got a resource base linked to a mainstream school, that compromises also have to be made in terms of how and when we do things, which is difficult, we can't just stop the lesson and say my pupil needs to run around and shout a bit, for example, they have to sit there for that 50 minutes and participate in lessons, so (.). (Lines 833-863).

Staff 4: That's exactly, for me, that's exactly what I'm talking about but then it's the practicalities in a school timetable because actually, our pupils have a free lesson block where technically they are in a mainstream lessons with just a changeover between and actually that's potentially quite difficult for pupils with sensory sensitivity because it may be that all of the things that they are sensitive to, they're experiencing between lessons, walking down the corridor, the busyness, lots of faces, lots of (..).
Staff 3: Changing for PE.

Staff 4: Um so it's those transitions but yeah (..) It's difficult isn't it because we don't have those blocks between lessons where we could do things so it's really about using the times and spaces we do have, practically, with those pupils.
Researcher: Are there any changes that you are likely to make to achieve that?
Staff 4: ((Laughs)) It's actually the whole school timetable. (Lines 878-896).

Staff 1: It's more about building on what we are doing already and making sure that students are aware that they have such and such lessons then so now is the time you need to be getting yourself ready for that. Like getting changed for PE, we've got it that they have got changed two lessons before PE so that they are ready when it comes to the PE lesson, they are ready to just go into it. Just building on that and making sure that students are getting themselves ready in terms of mentally and physically. (Lines 897-906).

Staff 4: This might be being pragmatic, you know, what we can do realistically is use existing timetables and work around those existing timetables and what pupils need (.) you know, this is unique isn't it in terms of (.). Well it is not unique, but the fact that we are based in a mainstream school and our work is about including these pupils in mainstream school means that, you know, there is (.) quite a large element of compliance in terms of, you know, being a part of the mainstream school. (Lines 907-916).

Researcher: Can you elaborate on that? Are you talking about barriers, is that right?
Staff 4: Well, I guess the big one for us is being to raise awareness within the mainstream school and staffing in the mainstream school. I don't think that is about to change their timetables and allow everyone sensory breaks during lessons but certainly being able to increase the teaching staffs' awareness may, and probably would, get some of them to think about, um, how they present their lessons, how they conduct themselves in the classroom; what their classrooms are like, and when they put a video on what volume they have that video on etc. etc.
Staff 1: And talking whilst that video is on.
Staff 4: Yeah so (.) I think that's (.) A big thing for us is raising awareness. (Lines 917-932).

Staff 3: We've got pupils like Adi that can generally, on a good day, hold it all in and then explode at home and I think if he had a couple of breaks or something (.). If he had some downtime would he be less likely to explode at home? (Lines 958-962).

Staff 1: Because I can imagine Helen (another child) being absolutely (.). To go into a new school and already have that, that would be tremendous yes.
Staff 4: And we know as well.
All: Yeah.
Staff 4: That's like (.). Crucial. (Lines 1031-1036).

Staff 4: It kind of links with the project I'm working with a young man at Oak Community College and he was diagnosed, he is a Year 11, so he will be leaving school soon, and he was diagnosed last July, and you know, it's all very new for him and it's (..). He's struggling, you know he's really down and really down about himself and just struggling with stuff and had very little understanding of what the diagnosis actually means for him and why he finds certain things difficult and what the sensory profiling did for him was explain things to him and it just made sense of things and made sense of some of the things he does and it made sense of some of the inappropriate things he does in lessons, and gets into trouble for, and just knowing (..). The other thing that was really important was that the teachers who were working with him, knowing that information about him and them being aware of it suddenly changed their perception of him from being a naughty boy who causes trouble to being someone who has particular issues and particular problems which can be solved, and him knowing that they are aware of those things just made a massive difference, so yes I think that's, you know, for us thinking about new pupils coming in (.) if we know (.).
Staff 1: Yeah.
Staff 4: about them, we know their sensory profile and we have a bit of understanding and they know we know, that's a really good starting point.
Staff 1: Yeah. (Lines 1038- 1062).

Staff 4…so yes, I think that's, you know, for us thinking about new pupils coming in (.) if we know

(.).
Staff 1: Yeah.
Staff 4: about them, we know their sensory profile and we have a bit of understanding and they know we know, that's a really good starting point.
Staff 1: Yeah. (Lines 1059-1066).

Peter's mother: Okay, you know Peter's (file) would have come back because when things that go to school, we tend to keep everything in their bags, so they don't get mislaid. We get them out, use them and then put them back in their bags (.). Anything that needs to go because, you know, we all are forgetful, and it's a hectic house, um so Peter's would have gone backwards and forwards. There would have been the odd occasion, may be, but (.). (Lines 2184-2190).

Simon's mother: If the folder came home, oh yeah, for my son it would have worked, though I appreciate the concerns of the unit, what if the folders don't get back so I do appreciate the concerns of the unit. I do appreciate that, but I would have felt confident that (.) how is it not coming back, you know, in a taxi, it would have come home. I would have made sure it would have come back. It would've worked for us, so then would there be concerns if they had different systems for each family? I know that the handouts would have gone in the bag, but then they've got to say to parents, yeah they could have sent an e-mail about handouts going out every Friday, then we as families, we could have looked at it every weekend, for me that would have worked but we've all got our own opinions. Um, that was it I didn't know when it was coming. Yeah, I got e-mails on different days, so it was like, every (.), to me I wasn't clear on when the information was coming out. (Lines 2364-2379).

Field-notes: Staff 3 arranged to use the meeting room because she considered the base was too busy and noisy. (Lines 3629-3631).

Field-notes: Staff 4 asked for a Sensory Matrix Summary score sheet as he was using the profiling with an out-reach child in Year 10 – this was the first indication of his interest in the project and gave me the opportunity to show him the teacher file, which he could use, and the fact that stressors and de-stressors are individualised for each pupil. (Lines 3829-3834).

Field-notes: We discussed the possibility of a sensory toolkit, particularly blowing up a balloon, which he thought might be fun. Peter said, 'Can you talk to teachers about that?'. I spoke to Staff 4 who agreed. (Lines 3897-3900).

Peter's mother: Okay, you know Peter's (file) would have come back because when things that go to school, we tend to keep everything in their bags, so they don't get mislaid. We get them out, use them and then put them back in their bags (.). Anything that needs to go because, you know, we all are forgetful, and it's a hectic house, um so Peter's would have gone backwards and forwards. There would have been the odd occasion, may be, but (.). (Lines 2184-2190).

Subtheme: Many hands make light work'.

Codes:

- **Importance of teamwork.**
- **Senior management involvement.**
- **Primary-secondary school links.**
- **Home-school links.**
- **Generalisation.**
- **Teacher-child working together.**

Researcher: Did they help you at all at home, on the programme?
Peter: I (..) Not that I can remember. I think they have forgotten about it. (Lines 266-269).

Researcher: Okay. And did you have any help from home, with the programme?
Adi: Don't think so. (Lines 452-454).

Staff 4: But. You know I would add a but to that in that (.) it could be the type of music he (Simon) is listening to could have made a difference. I mean these are things that we could experiment with and also it could be that he was having 'a not good concentration day' anyway (.) and you know, there are days where, actually any kind of strategy we put in place isn't really going to have that much impact because he is not in the right place to concentrate on his work.(Lines 524-553).

Staff 2: Yes, I agree parental involvement is important.
Researcher: So, for this programme to work (…)
Staff 2: You need to have them involved.
Staff 3: Yeah
Staff 2: You need both. (Lines 645-650).

Tom's mother: …I did think there would be something coming home on a regular basis, then I noticed that it said it wasn't, so we didn't realise.
Researcher: The original plan was for the folders to come home every week.
Mother: Yeah.
Researcher. But school felt, in general terms, if it went home it might not come back, so that's why the information was sent to you by email.
Mother: Yes, that was general information, wasn't it?
Researcher. We started off with just the summaries and then after that because the files weren't going home, the materials were being sent home as well.
Mother. It was emailed each week.
Researcher. Yes, well I sent it to Staff 4, on the Friday so you would have had that the first week (showing from master file) and (.).
Mother: Yes.
Researcher: Then the second week (.) we did the sensory profiling which developed that (shown to parents). But also (.). You might have had that, that, and that (pointing to sections in the file). Did you have that?
Mother: No.
Researcher. Okay (a copy was given to them). After that, there was all of this, all the strategies. Do you recognise any of this at all?
Mother: No.
Researcher. All of that was on an email.
Father: I haven't looked at all of the emails, I have to hold up my hand and say. (Lines 1124-1155).

Researcher: So, you got most of the information?
Tom's Mother: I think so.
Researcher: But you haven't got the file?
Tom's Mother: No, I haven't seen the file. (Lines 1189-1193).

Tom's mother…It would be nice, I think, if it had come home weekly because it would have also prompted us, you know, when you go through the bag, a conversation. (Lines 1199-1202.

Tom's father: It would have been better if he had come home with something that would have been a prompt (..).
Tom's mother: It would have been really nice, I would say, for the folder to have come home. Yeah, I think the whole folder (..). And I would have looked at it and gone through it, whereas an email, I did look at all of them. I've got them printed out but, um, yes we would have discussed with him more because like most kids he doesn't want to talk about what they have been doing at school and he actually get quite cross, doesn't he, because I dig in and say' What about this

and then (.) did you do that today, and did you see so and so..' and a little bit about what goes on in school, is my sort of school stuff so I think the sharing would have been better with the folder coming back and forward. (Lines 1251-1267).

Tom's mother…., I think it's what happens next that's the important thing. What happens next in school... (Lines 1284-1286).

Researcher: Okay. Do you think parental involvement is important in this programme?
Tom's mother: I think it is vital (..) yeah, I think it's vital. Yeah.
Researcher: Can you elaborate on that?
Tom's mother: Well I just think that you work as a team then with everybody involved, especially at secondary school. It's slightly different at primary because teachers would have a quiet word with you about things but I think it's hard for everyone to work together in a mainstream or even within a resource base where children can be away and more distant from what's going on, on a day to day basis. They are not always with their peers and tutor, but they don't know them, and they don't have the parents outside the gate chatting or even in contact with others so, yeah (..). (Lines 1289-1305).

Tom's father: I would like to say I wasn't really drawn into the programme because (..) um (..) there was no prompt on a day to day to link in with family life coming home and except the few times he talked about it (..) you know (..) you are sort of so busy getting through the day that (..) um (..) you need something to start a conversation at mealtime or something.
Tom's mother: Yeah.
Tom's father: about it and I think the (..) lack of a prompt on a, at the end of the day to engage with it um maybe would have sucked me in a bit more whereas I've been stood back from it really.(Lines 1306-1318).

Tom's father: An email with a big attachment (..) I think, oh right I must look at that. I must deal with that; I'll look at it later and um whereas something more bite-sized about. 'What we did today' would more likely be a prompt, which I could have dealt with, as it came up so (..). (Lines 1349-1354).

Tom's mother; and then you see research or programmes like yours, which involve your child in it as well, which is so important, that involvement. It's no good (.) otherwise it is just isolated, no disrespect, but what experts think, and that is all well and good, but, you know, it can all be written out but how do you translate that to practical things? So, all schools should be looking at this (.) because it helps our children learn.
Tom's father: I don't know what you have done and what he has learnt being carried on afterwards, at school, to motivate him.
Researcher: I think it depends on the unit now really. They've got all of the materials, so it depends on them to carry it forward if they feel it is viable in the unit.
Tom's father: And also, Tom himself, is he motivated to pick up any of these techniques and carrying them on for himself?
Researcher: The reason he's got the file, is for reference now… (Lines 1674-1694).

Tom's father: To what extent are (.) um TAs aware of that, if at all?
Researcher: The children were told, at the very beginning, that everything was confidential unless they wanted to share.
Tom's father: Right.
Researcher: This information was given to every child and then they had the choice then of did they want to share it with anybody. And Tom wanted to share it with you. He was a little unsure about sharing it with the staff, but then he did, so the staff have got this. So, for every child, they've actually got the profile and they have got these de-stressors and stressors (showing parents). (Lines 1723-1734).

Tom's mother: Another thing was cold water. He likes very cold water and I knew he liked it cold but not quite why and, um, we try to get him something cold to drink, lots of water and that's quite hard when they go off to school, and it said it was alerting, which, you know he's often, in the day ' I don't want to drink from my water bottle because it goes warm' so little practical things, like thinking how can we keep his water cold at school, you know, so he could be taking

sips from it, because a lot of the time he brings it back full up of the same water he went with. (Lines 1750-1761).

Tom's mother: Yeah. I don't know how often they're actually (.). He'll need a prompt a lot of the time, to use these things, you know, it's this awareness about it.
Tom's father: That's why I'm asking where does this go from now (.).
Tom's mother: A prompt so (.).
Tom's father: About the awareness of the staff (.) just that he might need that to get into the habit, because he might have highlighted, oh that will be useful and that will be useful, but he won't necessarily remember and initiate it at the right point in the school day. (Lines 1763-1775).

Father: Um (.) I don't know, they are all very busy and, it's different people all the time, isn't it?
Mother: We just haven't had one very much, at the moment, she went off sick, so he's spent an awful lot on his own. He's getting points for being late to things because he won't go through the corridor because he's scared. I think it's almost, through an awareness of Honeymede but he's actually not taught an awful lot in the unit, he's attending mainstream. It's almost (.) but I think teachers are meant to have an information pack, aren't they about the child in the class? (Lines 1851-1862).

Tom's mother: You know they are not going to read everything but maybe an abbreviated geared at the teacher for that limited time and when teachers change, it can be passed over to say well, Tom will learn better, you know, he needs to be able to use this and his tutor, because essentially, its all the support he is getting is to gear him to be able to do it independently so if, I think he'll learn by the teachers, by prompts so if teachers in the classroom know, not just those who support him, those who are actually teaching him alongside everybody else that, in Tom's case it would be useful to do this, they could (.)It's meant to be differentiated, isn't it, the teaching?
Researcher: Yes.
Tom's father: If it diffuses (.) a potential meltdown, you know, and there is a list of three things that can diffuse a meltdown and, you know, all the staff at Honeymede should be aware of that so, you know, if something is brewing, say Tom why don't you go to the kitchen and make yourself a honey and lemon drink, you know, and that. Unless they're all aware of that then it won't happen, you know. (Lines 1871-1893).

Tom's mother:…so anything that ticks boxes or paraphrased, really simple to go with a child would help, to be passed on to another teacher because it might not always be that TA or that TA may not be there and by using it and maybe (.) it would prompt our son when he's on his own if the teacher had an awareness.
Researcher: So, is your vision is to have, sort of it written down on a piece of paper or card?
Tom's mother: Like Sue's (OT) little sensory cards. We have some at home and they have got them in Honeymead and it has to be really simple, just Tom needs, but really paraphrased because teachers are not going to, whatever, but you know, just simple things like he may need a break because (.). The tags, he has a tag on his belt, which we did carry forward from primary and that was a great suggestion. He often won't use it without being prompted. It is still on his trousers and they made him a more grown up one but just sometimes if the teacher even knew he had one, I am sure a lot don't, and they could say 'Do you want to use your tag Tom?'. He wouldn't use it as a skiving off thing, you know, he would (.) and then the other children, in the class, are aware, little things really, (Lines 1930-1953).

Researcher: The original idea was that the file was to come home every week. Do you think that would have helped?
Peter's mother: Ah, okay. Yes, it probably would have. It would have helped because then I would have looked through it every week. Because like I say, this sort of thing naturally interests me anyway. (Lines 2170- 2175).

Researcher: Was there anything else more that we could have done to help you with the programme?
Mother: No, I think most of the reason I wasn't involved was because there was opportunity to meet at Honeymede, and things. I wasn't there, but I work, and I was always at work on those occasions. So, I don't think there was much more that you could have done yourself really, you

know. (Lines 2184-2197).

Simon's mother…. the links could have been a bit better, it feels um (.) because when Simon gets home, he doesn't want to talk about it very much anymore, so it wasn't talked about much. (Lines2324-2326).

Simon's mother: The barrier, for me, was not receiving all of the information. I felt I was behind in getting the information, that would have been a barrier, um, yes, I was not as up to date for Simon. When you've got a child that's not got good communication skills, so you (.) yeah, the links were, there was a bit of a break in the links. It's the same as if a child has a piece of homework, and they are not coming home and saying Mum, I've got to do this, this week, and if you don't know about it, you can't really then support it. Then if two weeks later you try to say, what about this then, and you are behind with it, the child has lost interest. So, you feel like you're chasing... I felt (.) that's how it felt like, to be honest.
Researcher: Okay. So, was there anything more we could have done to help you to help him?
Simon's mother: It's difficult, I think because the unit (.) as families, we're all in different locations, so I think logistically (.) it's a difficult one to do, um (.) but I think it probably helped that (.) I think it would have been good if the handouts could have just come home with the children, because, that's just me, but we get e-mails, I get sent e-mails but I couldn't print it out, a problem printing it out until a week or two later.
Researcher: Yes.
Simon's mother: That's a delay isn't it? (Lines 2339-2361)

Simon's mother: But there is no space and even if (..) I don't understand why the school ((sighs)), it is a shame, you know, and if Simon had gone there much younger, I would have (..) I've rung the 0 -25 team before now to ask what can I do as a parent, this isn't good enough, and they say it is the school's responsibility.
Researcher: Really?
Simon's mother: Yes and the school will probably say there is no funding and I have spoken to Staff 4, in the past, and he says they're trying, that they are aware of it, but (.) um (.) I just feel for all the children.
Simon's mother: It's just amazing, you know, there is no area for them to go to. It doesn't have to be a chilled area. You know when Simon started, their break times would be in an area that they wouldn't shut the door because they couldn't trust the children and the children didn't feel they had time for themselves. They were constantly being watched. It felt to me, it felt like prison. And they just used to have board games. Simon would say 'I don't want a board game'. The conversations I've had in the past and said how do they relax? They don't really have an outdoor area and they are very limited with their peer choice aren't they, within the group that they're in? They've got boys (.) very, very, limited. Which isn't the staff's fault, but I'm saying that the resources are very limited. But space is clearly an issue so if you've got that confined space. (lines 2458-2481).

Simon's mother: You've got to offer a range of activities to meet all of those needs, and yes those children are there to be offered education, but, you know, they need (.) yes, some have got to go to the mainstream and some to Honeymede; some want to be by themselves, some might want to listen to music, some might need to go on the trampoline and, are they (.) are they being offered ? I don't know. But it is a limited space, so if you've got that limited space, I guess they can't have a big building but, if they haven't got a big building, then to me there's more need to have those other facilities to help those children cope and get through their school day.
Researcher: Umm.
Mother: So, they are not excluded and they're not in the naughty room and they're not locked in the toilet and things like that. (Lines 2503-2516).

Simon's mother: but I think like every school, with limited funding, but they're not offering for the kids, it's a shame. (Lines 2826-2828).

Researcher: So, if parental involvement is important how can that be achieved, do you think, for this sort of programme?
Simon's mother: I think, ideally, in an ideal world, any face-to-face contact is better isn't it if you

can, so that would be like face-to-face meetings, which we've done some of in the programme, but again it is difficult because it's about people's time, which is limited, um, which is more about, I suppose it's the teachers time is limited because they're there with the pupils, you know, during the day hours, that is what is difficult. But then I think they could be better, in all fairness for them, is the school could have been probably. It's difficult isn't it, because they know their pupils but whether, it feels like outside agencies could also have been more supportive like the 0 -25 team. And the school itself, because, other staff could have come in and offered more supervision to release them, you know, why not? It's like any training that is offered, isn't it, I don't know? (Lines 2847-2860).

Field-notes: Staff 4 added that he had tried sensory-based INSET for mainstream staff in the past. He was supposed to be allocated a set amount of time each year for this, but the time-allocation had been cut to zero. The appointment of a new head teacher in September was deemed an important step forward. (Lines 392-3977).