School of Psychology
Ysgol Seicoleg

The Five Minute Speech Sample (FMSS) in Developmental Research: A Systematic Review of the Link between FMSS-Expressed Emotion and Later Child Psychopathology, and an Empirical Study Investigating the Validity of the FMSS-Coherence in a Sample at Risk for the Development of Significant Emotional and Behavioural Problems

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Charlotte Jug

Supervised by: Christopher Hobson and Katherine Shelton

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Declaration Statements

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Preface

Early life experiences in the context of the parent-child relationship have been shown to influence a child's emotional and behavioural development. The development of emotional and behavioural difficulties in childhood are often termed as "internalizing" and "externalizing" problems respectively, and research shows children exhibiting such difficulties are at a greater risk of developing psychological difficulties, which can persist across the lifespan (e.g. Campbell, Shaw & Gilliom, 2000). Psychological difficulties can have a significant negative impact on a person's quality of life, their relationships, and their ability to function in society. It is therefore important to identify risk factors for the development of childhood emotional and behavioural difficulties, so that preventative interventions can be developed and implemented. Two such risk factors identified in developmental research have been "expressed emotion" and "narrative coherence".

"Expressed emotion" describes the levels of criticism, hostility and emotional overinvolvement expressed in the speech and tone of caregivers. Although expressed emotion originated in adult psychiatry, it has been extensively investigated as a risk factor for child psychopathology. "Narrative coherence" is a concept that stems from attachment theory, and describes how flexible, authentic, balanced and consistent a parent's spoken narrative is about their child (Oppenheim, 2006). Research has identified narrative coherence as a potential predictor of disrupted parent-child relationships, with negative consequences on child social and behavioural adjustment (Sher-Censor, 2015).

The Five Minute Speech Sample (FMSS) is a method that can be used to measure both expressed emotion (FMSS-EE; Magaña et al., 1986) and narrative coherence (FMSS-Coherence; Sher-Censor & Yates, 2010) . The FMSS requires parents to speak about their child and their relationship with their child for five minutes. The speech is then transcribed, and can be coded using different protocols to calculate the level of expressed emotion or narrative coherence in their speech. Given the brief time involved in administering and coding the FMSS, and therefore its cost-effective nature, it

has great utility in the research of the development of child psychopathology and potentially in clinical practice.

The systematic review summarises and assesses the quality of the evidence-base for the predictive impact of maternal FMSS-EE on child emotional and behavioural development. The review focuses solely on studies that investigate the impact of maternal FMSS-EE on child development over time. Five out of eleven studies identified by this review provide evidence for the predictive impact of maternal FMSS-EE on child psychopathology, after controlling for the impact of other influential factors, such as family socio-economic status, for example. However, the predictive impact of maternal FMSS-EE appeared to reduce in studies that controlled for the potential impact of maternal psychopathology on child development. The review identified the negative components of maternal FMSS-EE, such as criticism, as a potential risk factor for the development of child emotional and behavioural difficulties. The research and clinical implications in terms of potential preventative interventions are discussed, in light of these findings.

The empirical study investigates the validity of the FMSS-Coherence method, as a relatively recently developed, attachment-informed, dichotomous measure of coherence. It is the first study to use the measure in an 'at-risk' sample of children referred by teachers, due to concerns about their emotional and behavioural development. Through investigation of the relationship between parental FMSS-Coherence and a range of other established measures of the quality of the family environment, child social-behavioural adjustment and child cognitive empathy, this study provides partial evidence for the validity of FMSS-Coherence in this sample. The prevalence of "coherent" parents was observed to be lower in the at-risk sample, in comparison to community samples used in previous research. An association was found between parental FMSS-Coherence and parent-reported family environment and parent-reported parenting quality, whereby coherent parents were more likely to report a cohesive home environment and less hostility in their parenting. The children of coherent parents had less parent-reported (but not teacher-reported) social and behavioural developmental difficulties.

Furthermore, children of coherent parents had superior child cognitive empathy ability, reflected in their increased ability to recognise fear and low intensity emotions. In light of these findings, the direction of future research is discussed in order to build upon the evidence-base for the FMSS-Coherence measure. Avenues for clinical applicability are explored.

Longitudinal Studies Examining the Impact of Maternal Expressed Emotion Measured by the Five Minute Speech Sample on Offspring Emotional and Behavioural Development: A Systematic Review

Charlotte Jug

South Wales Doctoral Programme in Clinical Psychology, Cardiff University

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Abstract

Previous research identifies parental "expressed emotion" (EE) as a potential risk factor for the development of childhood emotional and behavioural difficulties. EE represents the criticism, hostility and emotional overinvolvement in parents' speech and vocal tone. No existing systematic review has evaluated the quality of the evidence-base for the predictive relationship between maternal EE measured by the Five Minute Speech Sample (FMSS-EE) and child emotional and behavioural development over time. Three electronic databases were systematically searched, using variations of the search terms "expressed emotion" and "maternal". Studies were restricted to a longitudinal design investigating child or adolescent samples, with no clinical diagnoses. Studies that did not have a maternal FMSS-EE measure and studies involving a therapeutic intervention were excluded. Of the 1,562 articles identified, 11 studies met criteria for inclusion. Five studies provided evidence that high maternal FMSS-EE predict deteriorating child emotional and behavioural difficulties over time when controlling for confounding variables; all had high Critical Appraisal Skills Programme quality ratings. When maternal psychopathology was controlled, studies were less likely to report this significant predictive relationship. There was stronger evidence for maternal criticism as a risk factor for child psychopathology. The reviewed evidence provides partial evidence for maternal FMSS-EE having longitudinal predictive associations with child emotional and behavioural development. The review also highlighted the importance of using multiple FMSS-EE assessments to capture a more accurate measure of EE. The results of this review can be used to inform the development of preventative interventions in clinical practice, alongside consideration of maternal psychopathology.

Key words: Expressed Emotion, Five Minute Speech Sample, maternal, Child Development, longitudinal

Longitudinal Studies Examining the Impact of Maternal Expressed Emotion Measured by the Five Minute Speech Sample on Offspring Emotional and Behavioural Development: A Systematic Review

Research shows that children with emotional and behavioural problems (often characterised as "internalizing" or "externalizing" problems respectively) are at risk of maladjustment later in life (Campbell et al., 2000). Experiencing these difficulties can significantly negatively impact adult functioning and society. For example, childhood emotional and behavioural problems have been associated with occupational and psychosocial difficulties in adulthood (Hammerton et al., 2019; Ogundele, 2018). The development and outcome of child psychopathology has been widely studied to identify risk factors and inform preventative practices. One risk factor of interest is parental "expressed emotion" (EE)

EE is a term originating from adult psychiatry and denotes attitudes of criticism, hostility and emotional overinvolvement (EOI; Brown & Rutter, 1966). EE is considered a measure of the patient-relative relationship, which captures interactions between the attitudes of relatives towards patients and patient characteristics (Hooley & Parker, 2006). Brown and Rutter (1966) found patients with schizophrenia had higher relapse risk if exposed to high-EE from caregivers at home. Criticism describes the dislike or disapproval of behaviour, whereas hostility reflects more general dislike or rejection of the cared-for. EOI describes the level of overprotection or extreme distress expressed in relation to the cared-for. Researchers have characterized EE as an environmental stressor, which alongside genetic vulnerability can potentially lead to relapse of psychosis (Hooley & Hiller, 2000). Several cross-lifespan reviews have examined EE's role in the development of other specific disorders including eating disorders (Duclos et al., 2012), psychosis (Izon et al., 2018), and autism (Romero-Gonzalez et al., 2018). These reviews conclude that EE is associated with worsened patient outcomes,

poorer treatment compliance in eating disorders, higher levels of symptoms in psychosis, and increased behavioural problems in autism.

EE has been investigated as a potential correlate of child psychopathology, across various psychiatric conditions spanning childhood and adolescence (Peris & Miklowitz, 2015). However, little research explores the mechanisms of effect by which EE impacts child psychopathology. Peris and Miklowitz (2015) argue that EE is a form of "toxic family stress" that represents a parental maladaptive response to child psychopathology, but can also become a source of sustained stress for children, which when combined with genetic vulnerabilities, may contribute to psychopathology. Indeed, research demonstrates that experiences at home influence child development, and in the absence of supportive caregivers, exposure to sustained stress can negatively affect brain development and leave children hypervigilant to threat (Lupien et al., 2009; Shonkoff, 2011).

Links are also made between EE and attachment theory, as high-EE reflects insensitive parenting styles associated with insecure attachments in parent-child relationships (Holmes, 1993). Cross-sectional research has found associations between adolescent insecure attachment and negative parental EE (Scott et al., 2011) and longitudinal research has demonstrated a significant relationship between maternal EE and insecure attachment in children, with maternal high-EE most associated with disorganised attachment (Jacobsen et al., 2000).

Further research is needed to establish the causality between maternal EE and child psychopathology, which is likely bidirectional. For example, Coercion Theory (Reid et al., 2002) describes the process whereby caregivers reinforce child negative behaviour, which in turn evokes parental negativity. For example, a child exhibiting emotional and behavioural difficulties may be more likely to evoke parental criticism, hostility or emotional overinvolvement, and a parent exhibiting high-EE may be more likely to have a child that develops emotional and behavioural difficulties. This highlights the challenge in establishing causality in the relationship between parental EE and child behaviour, which is likely to be reciprocal in nature. Parental psychopathology is also likely to impact

a parent's ability to manage their emotional response to child behaviour, and influence the EE and attitudes towards their children independent of child behaviour. However, much EE research does not focus on such bidirectional family processes (Boger et al., 2008).

EE can be assessed multiple ways. The Camberwell Family interview (CFI; Rutter & Brown, 1966), became a well-established assessment tool for investigating EE. The CFI is a semi-structured, one-to-two hour interview. Transcriptions are coded for levels of criticism, hostility, warmth, positive remarks and EOI. As CFI administration and scoring is costly and time consuming, alternative measures have been developed. The Five Minute Speech Sample coded for EE (FMSS-EE; Magaña et al., 1986) is an alternative, brief method of assessing EE. Parents speak for five minutes (usually uninterrupted) about their child and their relationship with their child. The speech is transcribed and coded for levels of criticism and EOI in parents' speech and vocal tone.

A difficulty that EE assessments face is establishing whether observed EE is representative of parents' general attitudes toward their children, and how much could be explained by confounding variables such as parental psychopathology, or other life stressors impacting their emotional state. For example, one study supported the validity of criticism but not EOI as measured by the FMSS when compared with observed parent-child interactions (McCarty et al., 2004). Other research has criticised the small sample of communication used by the FMSS means that classification of high EE can depend on the presence of a single comment (Scott & Campbell, 2000), questioning how accurately this reflects parental attitudes. When compared with the CFI, some research shows the FMSS-EE under-identifies high-EE (Hooley & Parker, 2006), whilst research in mothers of children with behaviour problems show it may over-identify high-EE (Calam & Peters, 2006). Calam & Peters (2006) highlight that normative data is needed across different child ages, cultures and socio-economic status to improve the validity of measurements of EE.

The FMSS-EE is widely used in developmental research due to its low-cost and practicality in administration and coding time (Sher-Censor, 2015). Given its reliance on spontaneous speech, it is

likely less prone to social desirability bias than questionnaire measures. Therefore, the FMSS-EE has potential as an informative non-questionnaire outcome measure of changes in the parent-child relationship following interventions in both clinical and research settings. However, more research is required to establish whether FMSS-EE is a causal indicator of worsening psychopathology in children.

A weakness of past research involving FMSS-EE is that it predominantly consists of cross-sectional studies, which can identify associations between EE and child psychopathology, but cannot imply causation. Therefore, it is unclear whether parental high-EE results from having children with temperamental problems, or if parental high-EE causes worsening emotional and behavioural problems longitudinally. It is acknowledged that future research should focus on longitudinal studies to understand relationships between environmental stressors at home, such as EE, and the development of child psychopathology (Narayan et al., 2015). Identifying a modifiable risk factor of child psychopathology could inform the development of preventative interventions within clinical practice. There is no existing systematic review summarising evidence from only longitudinal studies examining the impact of parental EE (measured by the FMSS-EE or CFI) on childhood and adolescent outcomes. Such a review could inform causal theories of the development of child psychopathology, because existing psychopathology and confounding variables can be controlled at baseline.

As the FMSS-EE by its brevity has potential clinical applicability compared to the CFI, and given developmental research often involves only mothers, we conducted a systematic review focusing on prospective studies investigating maternal FMSS-EE only. This review has the following aims:

1. To systematically summarise the evidence and assess the quality of studies that longitudinally investigate the effects of maternal FMSS-EE on child emotional and behavioural development.
2. To establish the predictive validity of maternal FMSS-EE in relation to its association with child emotional and behavioural development over time.

Methods

Search Strategy

This review was informed by PRISMA guidelines for systematic reviews (Shamseer et al., 2015). The published protocol can be found on PROSPERO. A systematic search of published articles between 1960 and February 17th 2020 was conducted across three electronic databases (PsycInfo, Web of Science and Scopus). Search terms were limited to variations of two key words ("expressed emotion" and "maternal") to ensure all relevant papers were identified (Appendix B). The following search terms were mapped to subject headings and keyword terms located in the title, abstract, or key concepts: "expressed emotion" AND "mother" OR "mothers" OR "maternal" OR "parent" OR "parental". Parental terms ensured the search identified papers including maternal FMSS-EE within parent measures of FMSS-EE.

Inclusion and Exclusion Criteria

Titles and abstracts of studies identified from the search were screened against inclusion and exclusion criteria (Appendix C). Studies longitudinally investigating the relationship between maternal EE and child emotional or behavioural outcomes were considered for inclusion. No restrictions were placed on child emotional or behavioural outcome types. Studies focusing on children or adolescents in specific diagnostic groups or clinical samples were excluded, to increase homogeneity between papers and increase the probability of drawing clearer conclusions. Studies not measuring and reporting maternal EE using the FMSS were excluded. Studies where the FMSS or outcome measures were obtained in adulthood were also excluded, to focus the review on research in childhood and adolescence. Studies where participants received a therapeutic intervention were excluded, as this may alter maternal EE over time. Studies using self-report measures of maternal EE were excluded as observational measures have more evidential and intuitive validity. Further studies were excluded because maternal EE was combined with paternal EE and so could not be extracted independently. Studies focusing only on the EE construct EOI were excluded, as EOI does not include the essential

negative components of the EE construct, and parental EOI has not been found to be singularly associated with child psychopathology (Sher-Censor, 2015). Studies published in languages other than English were excluded. Studies meeting the inclusion criteria were retained for full-text evaluation, and reference lists were reviewed for relevant papers.

Search Results

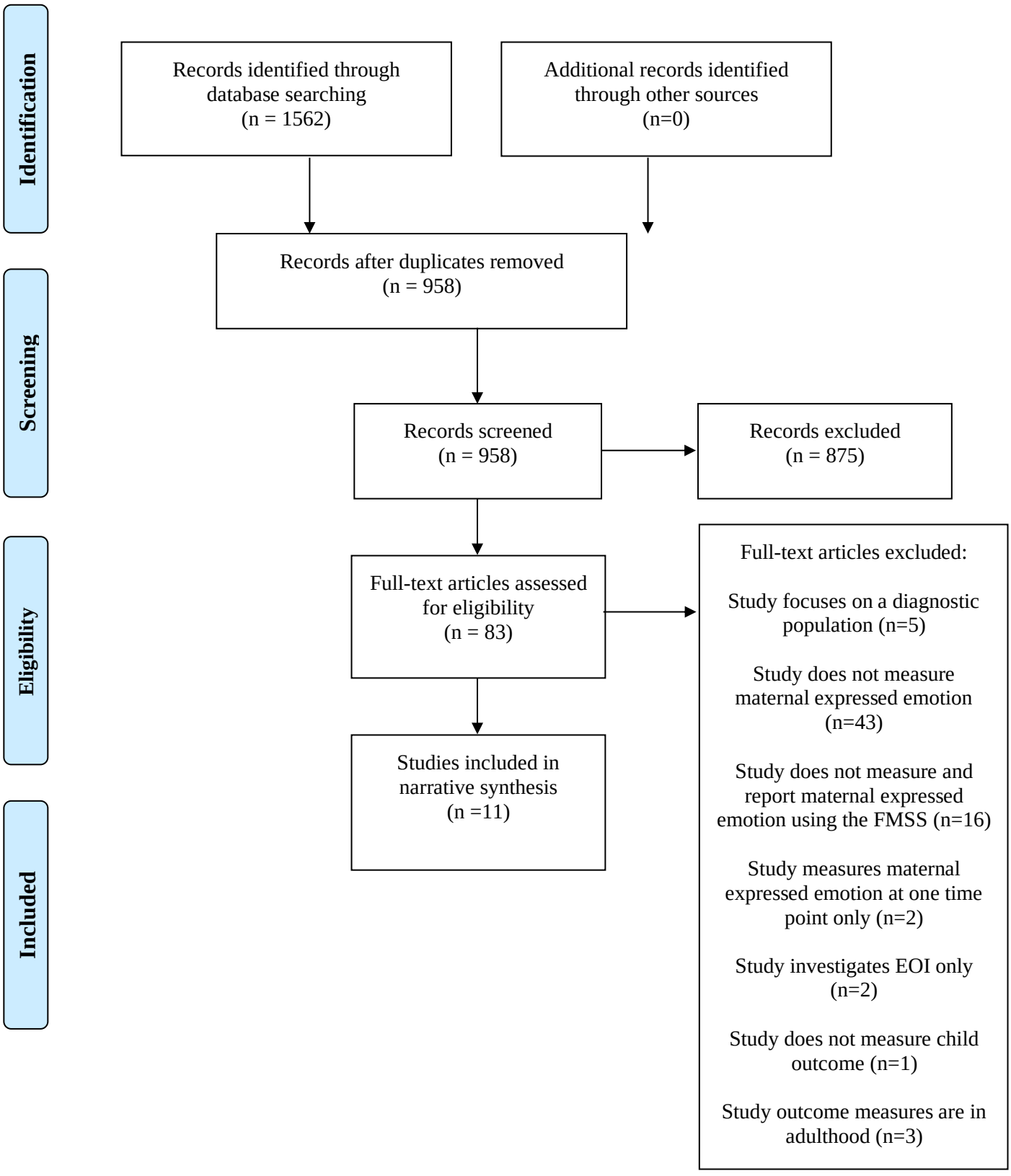
Search results from electronic databases were exported to the reference management software EndNote, and following removal of duplicates, 958 articles were remained. Titles and abstracts were reviewed according to inclusion and exclusion criteria, reducing the number of articles to 83. Articles where titles and abstracts were insufficient to accurately review against the inclusion and exclusion criteria were kept for full-text evaluation. Full-text evaluations reduced the number of articles to 11. No additional publication was identified through examination of the reference lists. Forty-three studies were excluded because they lacked a maternal EE measure. Seventeen studies were excluded because they did not measure and report maternal EE using the FMSS. Five studies were excluded as they focused on a specific diagnostic population (e.g. youth with anorexia nervosa). Two studies were excluded because they only measured maternal FMSS-EE at follow up. Two studies were excluded as they only investigated the EE component EOI. One study was excluded because outcome measures were obtained in adulthood. After applying inclusion and exclusion criteria, 11 studies remained. A PRISMA flow diagram reporting details of this process is shown in Figure 1.

Narrative Synthesis

This systematic review uses narrative synthesis to consider the data across the identified studies. Table 1 summarises key methodological features of each study. Table 2 summarises results from the studies pertinent to the reviews aims.

Figure 1

PRISMA Flow Diagram of Inclusion and Exclusion Procedure



Quality Assessment

Quality was systematically assessed using the Critical Appraisal Skills Programme (CASP, 2018) checklist for cohort studies (Appendix D), with results shown in Table 3. The CASP appraisal tool covers 12 quality domains, most requiring a response of "yes", "no", or "cannot tell". Ten quality domains accompanied by relevant prompts are included in Table 3, as two domains are open questions requiring narrative responses addressed elsewhere in this review. The percentage of "yes" responses was calculated for each study, in order to compare quality between studies and determine what weight can be given to results from the synthesis. To assess inter-rater reliability, 36% of the studies were rated by the author and a postgraduate level psychologist, which reached 81.25% concordance.

To further assess the quality of studies, the significant predictive relationships found between maternal FMSS-EE and child emotional and behavioural outcomes have been extracted and are reported in Table 2, alongside key limitations of each study.

Results

Quality of Studies

Quality ratings ranged from 50 to 87.5. All studies addressed a clearly focused issue, with clear aims and rationale. Common causes of lower quality ratings included using subjective measures to assess maternal psychopathology and child outcomes, lack of clarity regarding when measures were obtained and from whom, and lack of clarity regarding the validity of newly developed EE codes. Typically, child emotional and behavioural outcomes were based on two informants, with only 3 studies using researchers as informants to minimise bias. Many studies neglected the confounding variables of paternal psychopathology. The majority of studies acknowledged their limitations.

Table 1

Methodological Characteristics of Studies

Study	Location	Design	Participant details	Maternal Age at Baseline (Years)	Child/ Adolescent Age at Baseline (Years)	FMSS-EE Variables and Measurement	Child Outcome Measures	Informants on child outcomes
Baker et al. (2000)	Los Angeles, USA*	Prospective cohort study	112 families Parents well educated, middle-upper SES, 75% of children Caucasian	Mean:37.3 Range: not reported	Mean: 4.6 Range: 3.5-5.9	Criticism; EOI; expanded EE components positive affect and worry; measured at T1 only	Mothers completed CBCL at T1 and T2, teachers completed CBCL-Teacher Report Form at T1	Mothers Teachers
Burkhouse et al. (2012)	New York, USA*	Prospective cohort study	100 mother-child dyads, 88% of mothers Caucasian, 45% graduated from college, median family income $50,000-$55,000	Mean: 38.56 Range: 26-53	Mean: 9.97 Range: 8-12	Criticism; measured at multiple time-points	Mothers and children completed the KSADS-PL at T1, the depression section of this measure was repeated at T4, child completed CDI at T1 and recompleted at short term follow ups T2, T3 and T4, but not at final follow up T5	Children Mothers
Caspi et al. (2004)	England, UK	Prospective cohort study	E-Risk Study: 622 mothers and monozygotic twin pairs from 2 consecutive birth cohorts, two thirds representative of general population, one third high risk (first childbirth between 15-20 years)	Mean: not reported Range: two thirds had age range 15-48, one third had age range 15-20	Mean:5 Range: not reported	Number of positive comments; number of negative comments; negativity; warmth; measured at T1 only	Mothers completed CBCL at T1 and T2, teachers completed CBCL-Teacher Report Form at T1 and T2	Mothers Teachers
Davis et al. (2020)	New York, USA	Prospective cohort study	206 mother-infant dyads, living at or below federal poverty level, 62% black, 36% white, 3% other	Mean: depressed group 24.1, non-depressed group 25.1 Range: not reported	Mean: not reported Estimated average: 1 Range: not reported	Criticism; critical comments; positive comments; ratio of positive to negative comments; "Beck rating" for extent of negativity; positive representation of child; initial statement; relationship; measured at T1 and T2	Mothers and two research assistants (following multiple observations) completed the PANAS-C at T1 and T2	Mothers 2 Research assistants

Study	Location	Design	Participant details	Maternal Age at Baseline (Years)	Child/ Adolescent Age at Baseline (Years)	FMSS-EE Variables and Measurement	Child Outcome Measures	Informants on child outcomes
Freed & Tompson, (2011)	Boston, USA	Prospective cohort study	160 mother and child dyads, median family income of $80,000, 31% had received public assistance, mothers had between 9 and 23 years of education, majority of sample white (124 mothers)	Mean: 43.42 Range: 29-55	Mean: 11.16 Range: 8-14	Criticism; EOI; measured at T1 only	Mothers completed the CBCL at T1 and T2	Mothers
Frye & Garber, (2005)	Nashville, USA*	Prospective Cohort Study	194 mother-adolescent dyads, lower-middle to middle SES, majority of adolescent sample Caucasian (84%)	Mean: not reported Range: not reported	Mean: 11.18 Range: not reported	Criticism; measured at T1 and T2	Mothers completed CBCL at T1 and T2	Mothers
Hudson et al. (2011)	Sydney, Australia*	Prospective cohort study	202 families, majority Australian BI group: 58% middle to high income, 57% degree BUI group: 59% middle to high income, 43% of mothers had a degree	Mean: 36.36 in BI group, 36.20 in BUI Range: not reported.	Mean: 4.01 in BI group, 4.02 in BUI group Range: Not reported	Criticism; EOI; measured at T1 only; not described as EE, only as separate constructs	Mothers completed the STSC and PAS at T1 and T2, both parents completed ADIS-PIV at T1 and T2, researchers observed BI during laboratory tasks at T1	Parents Researcher
Peris & Baker, (2000)	Los Angeles, USA*	Prospective cohort study	91 families, 72% Caucasian, parents well-educated, of middle to upper SES	Mean: 37 Range: not reported	Mean: 4.5 Range: not reported	Criticism; EOI: measured at T1 and T2, not T3	Mothers completed the CBCL at T2 and the DISC at T3 grade. Teachers completed the CBCL-Teacher Report Form at T2	Mothers Teachers
Psychogiou et al. (2017)	Exeter, UK	Prospective cohort study	Fathers in Focus: 160 families, 95% white British, 31% of mothers had a degree, 29% a postgraduate degree	Mean: 36 Range: not reported	Mean: 3.9 Range: not reported	Initial statement; warmth; frequency of positive and critical comments; measured at T1 and T2	Mothers and fathers completed the age appropriate version of the CBCL at T1 and T2	Mother Father

Study	Location	Design	Participant details	Maternal Age at Baseline (Years)	Child/ Adolescent Age at Baseline (Years)	FMSS-EE Variables and Measurement	Child Outcome Measures	Informants on child outcomes
Rapee, (2014)	Sydney, Australia	Prospective cohort study	119 mother-child dyads, 84% of families Australian, 9% European, 7% Asian	Mean: not reported Range: not reported	Mean: 3.8 Range: 3-4.6	Criticism; EOI; measured at T1 only	Researcher completed 4 laboratory tasks to assess inhibition at T1, both parents completed the TABC-R at T1, at T2 the ADIS-PIV parent and child versions were completed	Researcher Parents Child
St. John-Seed & Weiss, (2005)	California, USA	Prospective cohort study	83 mother-infant dyads, 45 % Caucasian, 23% Hispanic, 25% African American, 7% other, 35% had an annual family income below $12,000, formal years of education had a mean of 13 years.	Mean: 29.48 Range: 16-44	Mean: not reported Estimated average: 0.5 Range: Not reported	Negativity (hostility and criticism); positive EE (positive remarks and warmth); EOI; measured at T1 only	Mothers complete the RITQ at T1 and the CBCL/2-3 at T2	Mothers

Note. SES=socioeconomic status, BI = behavioural inhibition, BUI = behaviour uninhibition, T = time, FMSS-EE = Five Minute Speech Sample coded for expressed emotion, EE = expressed emotion, EOI = emotional overinvolvement, CBCL = Child Behaviour Checklist, KSADS-PL = Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version, CDI = Children's Depression Inventory, PANAS-C = Positive And Negative Affect Schedule- Child Version, STSC = Short Temperament Scale for Children, PAS = Preschool Anxiety Scale, ADIS-PIV = Anxiety Disorders Interview Schedule for DSM-IV Parent Version, TABC-R = Temperament Assessment Battery for Children Revised, DISC = Diagnostic Interview Schedule for Children, RITQ = Revised Infant Temperament Questionnaire.

*Not explicitly stated, based on author location.

Table 2

Results, Analysis and Limitations of Studies

Study	Covariates	Data analysis	Relationship Between Baseline Maternal FMSS-EE and Longitudinal Child Outcomes Without Controlling for Covariates	Relationship Between Baseline Maternal FMSS-EE and Longitudinal Child Outcomes After Controlling for Covariates	Main Limitations
Baker et al. (2000)	Child age; child IQ; child gender; ; child behaviour; race; birth position; maternal EE; expanded EE; maternal age; maternal education; marital status; marital adjustment; SES; family impact; parenting daily hassles; parental depressive symptoms; parental psychopathology symptoms	MANCOVA; ANCOVA; correlation; stepwise regression; hierarchical regression	Only critical remarks were significantly related to CBCL externalizing score, the expanded EE codes 'positive affect' and 'worry' were significantly related to CBCL externalizing score	After controlling for maternal stress, neither EE nor expanded EE significantly predicted child outcomes at T2	Sample: Not diverse in SES, race or education level, limited in range and generalisability Measures: Shared method variance as measures of EE and stress were derived from mothers and child outcomes were partly maternal report, expanded EE codes need to be validity and reliability tested outside of this study Mechanisms: no objective measure of child outcomes, incomplete paternal EE measure could have captured influence of paternal parenting on child outcomes, no assessment of parental psychiatric disorder only symptoms Other: details around some measures and when they are obtained are unclear
Burkhouse et al. (2012)	Child gender; child age; child behaviour and psychopathology; maternal depression; maternal age; maternal education; maternal criticism; family income; race	Latent class growth analysis; survival analysis	Only maternal criticism latent class (and not baseline maternal criticism) significantly related to onset of children's depressive diagnoses between 6-month and 20-month follow up	Maternal criticism latent class was a significant predictor of depression onset in children after controlling for maternal depression and children's depressive symptoms during first 6-month follow up	Sample: not diverse in race, attrition rate at T2 (25% missing) Measure: measuring EE in final follow up could have helped assess causal relationship with child outcomes Mechanisms: sample size may not have provided adequate power to test for moderating effects, did not examine potential moderating variables such as child gender or age, didn't consider influence of paternal psychopathology or parenting, no measure of family structure/emotional climate, didn't examine bidirectional relations between criticism and childhood depression
Caspi et al. (2004)	Child age; child gender; child antisocial behaviour; zygosity; maternal EE; maternal age; maternal age of first childbirth	Pearson correlation; longitudinal regression analysis; hierarchical regression	All maternal EE components were significantly correlated with child antisocial behaviour at T2	After controlling for T1 child outcomes, maternal EE variables (number of negative comments and negativity) significantly predicted child outcomes at T2, after controlling for monozygotic twin differences at T1 twins receiving more maternal negativity at T1 had more behavioural problems at T2	Sample: assumption made that findings can be generalisable to non-twin populations Mechanisms: correlational design cannot infer causality with certainty, limited number of covariates detailed/analysed, EE could have been collected at T2 to strengthen causal analyses, no measurement of family structure/environment, paternal parenting or psychopathology, maternal psychopathology or other potential environmental stressors

Study	Covariates	Data analysis	Relationship Between Baseline Maternal FMSS-EE and Longitudinal Child Outcomes Without Controlling for Covariates	Relationship Between Baseline Maternal FMSS-EE and Longitudinal Child Outcomes After Controlling for Covariates	Main Limitations
Davis et al. (2020)	Child EE; self EE; mother EE; child affect; maternal depression; maternal age; maternal psychopathology; maternal self-efficacy; SES; marital status; education; race; ethnicity	X^2 and t- tests; ANOVA; Tukey's HSD; Pearson's correlation; structural equation analyses	No significant relationship found between maternal EE and child T2 outcome	Not reported	Sample: developmentally appropriate modifications for EE manual (based on middle-income British sample) potentially not appropriate for high risk and low income sample, attrition rate Measures: warmth and EOI excluded from analysis due to low inter-rater reliability, modifications made to FMSS coding schemes need to be validity and reliability tested outside of this study Mechanisms: no measurement of paternal parenting or psychopathology, or family structure/environment
Freed & Tompson, (2011)	Child gender; child age; child behaviour; number of children; race; maternal age; maternal depression; maternal LOC; maternal criticism; marital status; maternal education; family income; public assistance history	One-way ANOVA; correlation; hierarchical regression	Maternal criticism was significantly correlated with child behaviour (internalizing and externalizing) at T2	After controlling for child behaviour at T1, EE was not a significant predictor of child behaviour at T2	Sample: mothers recruited from 3 sources with different environmental stressors (e.g. veterans) with no measure capturing family environment, attrition of 11 by T2, another 12 for T3 Measures: apart from EE, all other measures were self-report and subjective, risk of shared method variance as maternal report could explain relationship between variables Mechanisms: maternal depression may have distorted self-report measures, no measure of paternal parenting or psychopathology, or family emotional climate
Frye & Garber, (2005)	Child age; child gender; child behaviour; SES; race; maternal depression; maternal criticism	Correlation; additive model of non-parametric regression	T1 maternal criticism was significantly correlated to externalizing behaviour at T2	After controlling for child behaviour at T1, maternal criticism did not explain variance in behaviour at T2	Sample: attrition rates at T2 , limited power as relatively small sample Measures: child outcome was not measured objectively, risk of shared method variance which could explain relationship between variables Mechanisms: maternal depression may have distorted child outcome measure, no measure of paternal parenting or family environment/emotional climate, generally limited number of confounding variables considered
Hudson et al. (2011)	Child age; child gender; ethnicity; family income; maternal age; family structure; number of siblings; birth order; maternal education; parent-reported child BI; observed BI; child anxiety; maternal anxiety; maternal EOI and criticism; maternal overprotection; child-mother attachment	Multimethod approach using regression and path analysis	Maternal overinvolvement was significantly related to child BI at T2 and the number of child anxiety diagnoses at T2	After controlling for T1 child anxiety, maternal overinvolvement did not predict child anxiety at T2, maternal overinvolvement was a significant predictor of BI at T2, after controlling for BI and anxiety at T1	Sample: high prevalence of anxiety diagnoses in BI group potentially due to assessment timing Measures: risk of shared method variance as multiple measures provided by mother only, did not use age adapted FMSS-EE measure Mechanism: No measure of paternal parenting or psychopathology Other: not always clear who completed which measures

Study	Covariates	Data analysis	Relationship Between Baseline Maternal FMSS-EE and Longitudinal Child Outcomes Without Controlling for Covariates	Relationship Between Baseline Maternal FMSS-EE and Longitudinal Child Outcomes After Controlling for Covariates	Main Limitations
Peris & Baker, (2000)	Child age; child gender; birth order; child behaviour; child psychopathology; race; marital status; EE; parental age; parental education; SES; family impact	Correlation; continuity corrected chi-square; hierarchical multiple regression	Preschool EE status was significantly related to meeting diagnostic criteria for ADHD at T3, of the EE components, criticism was highly related but EOI was not.	After controlling for T1 child behaviour and maternal stress, T1 EE criticism was a significant predictor of ADHD symptoms and diagnosis at T3	Sample: not representative of population, sample differed for three sets of analyses because of attrition and missing data, follow-up therefore not compete enough, relatively small sample Measures: no EE measure at T3, FMSS-EE was not age-adapted Mechanisms: no measure of maternal psychopathology, no measure of paternal parenting or psychopathology
Psychogiou et al. (2017)	Child age; child gender; EE; child behaviour; parental depression; parental age; parental education; marital status; nationality; race	Bivariate correlations; linear regression; multivariate regression analysis	Mother's critical comments at T1 was significantly related to children's internalizing and externalizing problems at T2, mother's positive comments at T1 was significantly related to internalizing problems only at T2	For mothers, positive and critical comments at T1 did not predict child outcomes at T2	Sample: attrition rate, well-educated white British parents limit generalisability Measures: risk of shared method variance as parents self-reported on child outcomes and depressive symptoms, no independent objective measure of child outcomes or parental depression Mechanisms: no measure of environmental stressors/SES, family structure as covariates
Rapee, (2014)	Child age; child gender; child temperament; child psychopathology; ethnicity; maternal anxiousness; maternal stress; maternal EE	Chi square; bivariate correlations; structural equation model	There was no significant relationship between maternal critical comments or maternal overinvolvement and child outcomes at T2	Not applicable	Sample: sample was not large in terms of longitudinal prediction and not sufficiently powered to detect small effects Measures: maternal anxiousness and stress was self-report only, did not use the age adapted FMSS-EE measure Mechanisms: no measure of paternal parenting or psychopathology, no measure of family structure/environmental stressors
St. John-Seed & Weiss, (2005)	Child gender; childbirth weight; child temperament; child gestational age; maternal education; maternal age; maternal EE; family structure; ethnicity; SES; family income	Correlations; multiple regression models	Not reported	Only T1 negative EE was a significant predictor of child internalizing behaviour at T2 in the regression model	Sample: was not large for longitudinal prediction Measures: risk of shared method variance as mothers reported infant temperament and behavioural problems and source of maternal EE, child outcome measures are not objective, revised FMSS needs to be further validated and reliability tested Mechanisms: no measure of maternal psychopathology, paternal parenting or psychopathology, no measure of family environmental stressors

Note. IQ = intelligence quotient, EE = Expressed emotion, SES = socio-economic status, LOC = locus of control, BI = behavioural inhibition, EOI = emotional overinvolvement, T = time, CBCL = Child Behaviour Checklist, FMSS = Five Minute Speech Sample, BI = behavioural inhibition, ADHD = Attention deficit Hyperactivity Disorder.

Table 3

CASP Quality Review for Cohort Studies

	Baker et al. (2000)	Burkhouse et al. (2012)	Caspi et al. (2004)	Davis et al. (2020)	Freed & Tompson, (2011)	Frye & Garber, (2005)	Hudson et al. (2011)	Peris & Baker, (2000)	Psychogiou et al. (2017)	Rapee, (2014)	St. John-Seed & Weiss, (2005)
1. Did the study address a clearly focused issue?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Is the population clear?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Are the risk factors studied clear?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Is it clear whether the study tried to detect a beneficial or harmful effect?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Are the outcomes clear?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2.Was the cohort recruited in an acceptable way?	Y	Y	Y	Y	Y	Y	Y	Y	Y	CT	Y
Was the cohort representative of a defined population?	N	CT	Y	Y	N	N	Y	N	N	CT	Y
Was everybody included who should have been?	Y	N	Y	Y	N	Y	N	N	Y	CT	Y
3.Was exposure accurately measured to minimise bias? EE	N	Y	Y	CT	N	Y	Y	Y	Y	N	Y
Did they use objective measures?	N	Y	Y	Y	N	Y	Y	Y	Y	N	Y
Are all measures validated?	N	Y	Y	CT	Y	Y	CT	Y	Y	Y	Y

	Baker et al. (2000)	Burkhouse et al. (2012)	Caspi et al. (2004)	Davis et al. (2020)	Freed & Tompson, (2011)	Frye & Garber, (2005)	Hudson et al. (2011)	Peris & Baker, (2000)	Psychogiou et al. (2017)	Rapee, (2014)	St. John-Seed & Weiss, (2005)
Were all subjects classified into exposure groups using the same procedure?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4.Was the outcome accurately measured to minimise bias?	N	Y	Y	Y	N	N	Y	N	N	Y	N
Did they use objective measures?	N	Y	Y	Y	N	N	Y	Y	N	Y	N
Have the measures been validated?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Were the measurement methods similar in different groups?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.Have the authors identified and taken into account all important confounding factors?	Y	N	N	N	N	N	N	N	Y	N	N
6.Was the follow up of subjects complete enough?	Y	Y	N	N	N	N	Y	N	N	Y	N
Was the follow up of subjects long enough?	Y	Y	Y	N	N	Y	Y	Y	N	Y	Y
7. Are the results precise?	Y	N	Y	Y	Y	Y	Y	N	Y	Y	N
Were confidence intervals given?	N	N	N	Y	N	N	N	N	N	N	N
8.Are the results believable?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
9.Can the results be applied at population level?	N	Y	Y	N	N	Y	N	N	N	CT	Y
10. Do the results fit with other available evidence?	Y	N	Y	CT	CT	Y	Y	Y	Y	Y	Y
Total quality score (% Y)	**66.66**	**75.00**	**87.50**	**70.83**	**50.00**	**75.00**	**79.16**	**66.66**	**70.83**	**66.66**	**75.00**

Sample Characteristics

Families

Sample sizes ranged from 91 to 622 mother-child dyads. Multiple socio-demographic variables were reported, with five studies reporting combined socioeconomic status index, four reporting family income, and one reporting public assistance history. All studies considered race, ethnicity or nationality.

Given the impact of home environments on child development previously discussed, measures reflecting quality of life at home are an important confounding factor to consider. Only six studies reported marital or relationship status, and two reported the number of children/siblings. Incidence of psychiatric history in family members other than mothers was rarely reported, with only two studies reporting paternal psychopathology and none reporting incidence of psychopathology in siblings. Measures of stress within the family environment were limited to information obtained from measures such as the FMSS or the Family Impact Questionnaire (FIQ; Donenberg & Baker, 1993), both of which relate to the stress caused by the parent-child relationship. No alternative measures of stress within the family environment were obtained to measure stress caused by other sources, such as the Stressful Life Event Questionnaire (SLEQ; Roohafza et al., 2011) for example.

Mothers

Nine studies reported mean maternal age (ranging from 16 to 55 years of age) and eight studies reported maternal education, both of which are covariates shown to predict adverse child outcomes (Duncan et al., 2018). For five studies, participants were recruited to investigate the impact of maternal depression on child outcomes, of which EE was a variable of interest. Even when mothers were from non-clinical samples, they were often screened for psychopathology such as anxiety or depressive symptoms, but self-report measures were common. Multiple variables of maternal coping were investigated. Two studies considered maternal stress, one study considered maternal self-efficacy, one

study considered locus of control and one study considered marital adjustment. Two studies reported maternal perceived impact of their child on family life.

Children

The children investigated were drawn from non-clinical samples (three studies) or were "at-risk" because of maternal psychopathology, low birth weight, or externalizing/internalizing behaviours (eight studies).

All studies reported the mean child age, ranging from 6 months to 11 years of age at baseline. Two studies investigated the impact of maternal EE in infancy, five studies in childhood, one study in adolescence and three studies spanned from childhood to adolescence. Gender was reported in ten studies and two studies reported birth order.

Maternal FMSS-EE Variables

The variability of components measured within the FMSS-EE is a clear barrier to drawing conclusions about the impact of FMSS-EE on child outcomes. The range of FMSS-EE components studied is reflected in Table 1. Of the studies reviewed, six measured EE at one time point, three measured EE at two time points, and only two studies measured EE at more than two time points. Five studies utilised the original FMSS-EE protocol (Magaña et al., 1986), which rates speech for two key components, "criticism" and "EOI". Respondents are categorised as "low-EE" unless they score highly on criticism or EOI.

Six studies made adaptations to Magaña et al. (1986) protocol, or used existing adapted versions. Baker et al. (2000) expanded FMSS-EE codes to include "positive affect" and "worry". "Positive affect" reflected parents' levels of warmth, encouragement, positive tone and the extent to which they appeared to be enjoying being a parent. "Worry" reflected how concerned or worried parents were about their child's behaviour and their levels of confusion about how to respond accordingly.

The Preschool Five Minute Speech Sample (PFMSS) was developed for measurement of EE with children aged between 34 and 39 months (Daley et al., 2003). Four components considered in the PFMSS are: initial statement; relationship; warmth and EOI. The frequency of critical and positive comments is also calculated. The PFMSS was used in three studies (Caspi et al., 2004; Davis et al., 2020; Psychogiou et al., 2017) investigating children of preschool age. However, Baker et al. (2000) and Peris and Baker (2000) did not use the PFMSS despite samples falling within preschool age, as the modified coding scheme had not yet been published. Despite investigating preschool samples in their study, Hudson et al. (2011) and Rapee (2014) did not use the developmentally adapted PFMSS, which may affect the validity and reliability of results.

Davis et al. (2020) modified the PFMSS in recognition that it was not developed for use with infants. They included a "positive representation of child" score using a strategy by Kaugars et al., (2007) and included positive comments regarding the infants' developmental milestones in the 'positive comments' component of the PFMSS. A Revised Five Minute Speech Sample (R-FMSS) was also developed by St. John-Seed and Weiss (2005) for use with infants. They adapted the original FMSS-EE (Magaña et al., 1986) by changing the language where appropriate and including the measurement of non-verbal behaviour (e.g. kissing the baby) to capture mother-infant relationships.

Two studies investigated the EE component 'criticism' only (Burkhouse et al., 2012; Frye & Garber, 2005). Burkhouse et al. (2012) argued that following their literature review, criticism has "the strongest validity among paediatric samples" (Burkhouse et al., 2012, p. 2), which echoes our own analysis showing significant associations between maternal FMSS-EE and child outcomes are more often linked with criticism/negativity than EOI.

Child/Adolescent Outcome Measures

The Child Behaviour Checklist (CBCL; Achenbach, 1991a) was a popular measure of child emotional and behavioural outcomes. Where appropriate, adapted versions were used according to child's age (e.g. CBCL/2-3; Achenbach, 1992). When mothers were the sole informant on child

outcomes (Freed & Thompson 2011; Frye & Garber, 2005; St John-Seed & Weiss, 2005), subjectivity negatively impacts result quality. Three studies supplemented information using the CBCL Teacher Report Form (Achenbach, 1991b), which can offer more objective reports of child behaviour, but this is not without bias, due to teachers' existing relationships with children. The CBCL was mostly utilised to report children's externalizing and internalizing behaviour problems as indicators of emotional and behavioural difficulties.

The next most common measure of child emotional and behavioural problems was diagnostic interview, used in four studies. This included the Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (KSADS-PL; Kaufman et al., 1997), the Anxiety Disorders Interview Schedule for DSM-IV Parent version (ADIS-P-IV; Silverman et al., 2001) and the Diagnostic Interview Schedule for Children (DISC; Costello et al., 1984). Diagnostic interviews are considered the gold standard in assessing psychopathology, as they obtain more objective measures of child emotional and behavioural difficulties by involving more impartial individuals such as trained researchers. However, this method places emphasis on capturing clinical levels of disturbance and may miss difficulties not reaching threshold for diagnosis.

Self-report measures such as the Positive And Negative Affect Schedule-Child Version (PANAS-C; Laurent et al., 1999) and Preschool Anxiety Scale (PAS; Spence et al ., 2001) were used to assess for anxiety and depression symptoms in two studies (Davis et al., 2020; Hudson et al., 2011). One study used the Children's Depression Inventory (CDI; Kovacs, 1981) to assess child depressive symptoms (Burkhouse et al., 2012).

Three studies assessed temperament as a child outcome measure. Hudson et al. (2011) used the Short Temperament Scale for Children (STSC; Sanson et al., 1994), Rapee (2014) used the Temperament Assessment Battery for Children Revised (TABC-R; Presley & Martin, 1994), and St John-Seed and Weiss (2005) used the Revised Infant Temperament Questionnaire (RITQ; Carey & McDevitt, 1978). These were used to assess child behaviour at baseline and classify children into

groups according to behavioural inhibition (BI), defined by wariness and avoidance in unfamiliar situations (Hudson et al., 2011; Rapee, 2014).

Maternal FMSS-EE and Child Outcomes

Nine of 11 studies found a significant relationship between at least one FMSS variable and child outcomes at follow-up. Seven of 11 studies analysing negative EE components found children receiving more maternal criticism developed more emotional or behavioural difficulties. Three studies found maternal criticism related to externalizing behaviour problems only (Baker et al., 2000; Caspi et al., 2004; Frye & Garber, 2005) but Caspi et al. (2004) had externalizing behaviour as the only child outcome measure. Another study found children exposed to more maternal criticism were more likely to meet diagnostic criteria for Attention Deficit Hyperactivity Disorder (ADHD) 5 years later (Peris & Baker, 2000). Two studies found children exposed to more maternal criticism displayed more internalizing and externalizing behaviour at follow-up (Freed & Tompson, 2011; Psychogiou et al., 2017). Although Burkhouse et al. (2012) did not find baseline maternal criticism significantly related to child outcome, maternal criticism latent class (subgroups based on criticism expressed over multiple assessments) was associated with onset of child depressive diagnoses.

Three studies found positive components of EE significantly related to child outcomes, potentially acting as a protective factor. Psychogiou et al. (2017) reported children receiving more positive comments were less likely to develop internalizing behaviour problems by follow-up. Caspi et al. (2004) had similar findings, but found the more warmth and positive comments children received, the less likely they were to develop externalizing problems by follow-up. Similarly, Baker et al. (2000) found children receiving more maternal "positive affect" were less likely to have externalizing behaviour problems.

Only Hudson et al. (2011) found EOI related to child outcome, with maternal overinvolvement significantly relating to increased levels of BI and number of child anxiety diagnoses at follow-up.

Two studies found no significant relationship between any components of maternal FMSS-EE and child outcome (Davis et al., 2020; Rapee, 2014).

Predictive Validity of Maternal FMSS-EE and Child/Adolescent Outcomes

To assess validity of the FMSS-EE as an independent predictor of child outcomes, studies must examine and control for the influence of potential confounding variables on child development. Of the nine studies reporting a basic relationship between FMSS-EE variables and child outcomes, five retained a significant longitudinal relationship with child outcomes when controlling for relevant confounding variables.

Burkhouse et al. (2012) reported the significant association between maternal criticism latent class and onset of child depressive diagnoses at 20 month follow-up was maintained, after controlling for maternal depression and child depressive symptoms during the first six months of follow-up. This suggests the detrimental effect of maternal criticism on a child's risk of developing depression was independent of the impact of having a mother with depression or having existing childhood depressive symptoms. They found no association between child outcome and child age or gender, but did not report the effects of maternal education or family income. This study scored a high quality rating, by using objective measures to control for bias.

Peris and Baker (2000) found baseline maternal criticism (average child age 4.5 years) remained a significant predictor of ADHD symptoms and diagnosis in children at follow-up (average age 9.1 years), after controlling for maternal stress and existing child externalizing behaviour. This study scored a moderate quality rating, using objective measures to reduce risk of bias. Maternal education was not related to child outcomes in this sample.

When Caspi et al. (2004) controlled for child behaviour at 5 years old, maternal "number of negative comments" and "negativity" remained significant predictors of increased externalizing behaviour problems (rated by parents and teachers) in children at 7 years old. By controlling for pre-existing behavioural differences between monozygotic twins, they also demonstrated that twins of

more negatively speaking mothers had more behavioural problems two years later. This study scored a very high quality rating, with its strengths in its sample size and ability to rule out genetic factors.

In two-year-old infants, St John-Seed and Weiss (2005) observed more internalizing problems longitudinally in children whose mothers expressed negative emotion towards them at 6 months old, including when accounting for existing baseline temperament. No longitudinal relationship between maternal FMSS-EE and externalizing problems was found. The only covariate significantly related to maternal EE was maternal age, with older mothers showing less negative emotion towards their children. This study scored a high quality rating. A limitation reducing its rating was mothers being the only informant for child behaviour.

After controlling for baseline child anxiety at four years old, Hudson et al. (2011) found maternal EOI no longer significantly related to child anxiety at follow-up. However, maternal EOI remained a significant predictor of BI in children at six years old, when baseline BI and anxiety levels were controlled for. This study obtained a high quality rating, considering a number of covariates in their study.

When considering the generalisability of these findings, the samples of Burkhouse et al. (2012) and Peris and Baker (2000) were high-percentage Caucasian families volunteering from the community, with the latter study using a well-educated and upper SES sample. Caspi et al. (2004) used a sample two-thirds representative of the general population in England and Wales, and one-third high risk. Findings can therefore only be generalised to corresponding populations. Hudson et al. (2011) and St John and Weiss (2005) used at-risk samples, with children being behaviourally inhibited/uninhibited, or low birth weight respectively. Given the lack of control groups in these studies, findings can only inform how groups differ from each other and not the general population.

Six studies observed no predictive relationship between maternal EE and child outcomes, five finding that previously significant relationships were better explained by another variable. For one study, after controlling for baseline maternal stress (measured by the FIQ and Dyadic Adjustment

Scale), associations between EE components (maternal criticism, positive affect, and worry) and externalizing behaviour were no longer significant (Baker et al., 2000). Therefore, within this sample, maternal stress was a stronger predictor of externalizing behaviour problems, and could be a risk factor for child psychopathology. This study scored a moderate quality rating. Two limitations reducing quality were using subjective measures, and mothers being sole informants for child behaviour.

In two studies, when controlling for baseline child externalizing and internalizing behaviour, maternal criticism no longer significantly associated with externalizing behaviour or internalizing behaviour at follow-up (Freed & Tompson, 2011; Frye & Garber, 2005). For Freed and Tompson (2011), lower income and less perceived parental control predicted increases in child externalizing behaviour at follow-up. This study scored the lowest quality score, with weaknesses in the representativeness of their low-income sample, use of subjective measures, and relatively short follow-up period. Frye and Garber (2005) found maternal depression history and baseline adolescent externalizing behaviour predicted maternal criticism at follow up after controlling for baseline maternal criticism, supporting the theory that the relationship between maternal EE and child development is likely bidirectional (Peris & Miklowitz, 2015). This study scored a high quality rating, using structured clinical interview to assess for psychopathology.

Psychogiou et al. (2017) found positive comments of fathers not mothers significantly predicted change in child emotional and behavioural outcomes at follow-up. This illustrates the importance of assessing paternal EE, to investigate it as a potential risk factor for child psychopathology, and to control for its effect when investigating the independent impact of maternal EE on child development. This study scored a moderately high rating, being one of two studies to control for the impact of fathers.

Two studies provided evidence for alternative risk factors for child psychopathology. Davis et al. (2020) found maternal representations of their own mothers (assessed via FMSS-EE) was predictive of child negative affect at follow-up. They frame this as a demonstration of attachment theory, showing

that people's representation of their mothers can impact the way they parent their child. This study scored a moderately high quality rating, using objective measures to assess child outcomes. Rapee (2014) found maternal anxiousness and baseline BI in children (assessed through laboratory tasks and maternal report via the TABC-R) predicted adolescent social anxiety disorders 11 years later, whereas other anxiety disorders were predicted only by maternal anxiousness. This study did not use the PFMSS despite investigating preschool children, potentially impacting their findings. This study scored a moderate quality rating.

Discussion

Does FMSS-EE Predict Child/Adolescent Outcomes?

This is the first systematic review investigating the predictive validity of FMSS-EE in relation to child emotional and behavioural development over time. Longitudinal studies suggest that maternal FMSS-EE is likely to have longitudinal associations with child outcomes. However, evidence is mixed regarding whether this relationship is better accounted for by other variables. Almost half of the identified studies found FMSS-EE predicted child or adolescent emotional and behavioural development after controlling for relevant confounding variables, such as baseline child psychopathology. The quality of the five studies finding this predictive relationship were mostly high (four scored 75% and above) in contrast to the six studies not finding a predictive relationship, which proportionality had more moderate quality ratings (three scored 66.6 and lower). This suggests the studies finding a predictive relationship could be weighted more heavily. The variability in FMSS-EE sub-components used across studies was a barrier to making general conclusions about the measure, yet four of five studies found the negative components of EE predicted child psychopathology, such as maternal criticism. Child outcomes predicted in these studies consisted of externalizing and internalizing difficulties, and disorders such as depression and ADHD. These predictive relationships were maintained after controlling for covariates such as child baseline emotions/behaviour, influence of maternal depression, maternal stress, and behavioural differences between monozygotic twins.

These high quality rated studies suggest negative EE from mothers can predict their child's emotional and behavioural development, and should be considered a risk factor for child psychopathology. However, even when using predictive analyses, causation cannot be implied with certainty.

The six studies finding no predictive relationship between maternal EE and child outcomes provides evidence against the predictive impact of this relationship. The difference in findings cannot be explained by difference in child/adolescent sample type, because both at-risk and community samples varied across all studies. It is unlikely the mixed findings result from differences in the age of the child/adolescent, number or source of informants, type of outcome measure used, or the version of FMSS-EE used, as these factors varied across all studies. Sample size also varied across studies, with studies finding no predictive relationship tending to have larger sample sizes, suggesting they were more likely to find even a small effect.

When assessing difference in covariates across studies, all six studies not finding a predictive relationship between maternal EE and child outcomes examined the impact of maternal depression. This is in contrast to the studies finding a predictive relationship, where only one of five studies reported maternal depression as a covariate (Burkhouse et al., 2012), and three studies having no measure of maternal psychopathology at all (Caspi et al., 2004; Peris & Baker, 2000; St John-Seed & Weiss, 2005). Hudson et al. (2011) assessed for maternal current and lifetime Axis 1 diagnosis, but only assessed for maternal anxiety and not depression. Given the evidence for maternal depression impacting upon child development (Bernard-Bonnin, 2004), one hypothesis could be that studies reporting a predictive relationship between maternal EE and child emotional and behavioural development, could be been better explained by the impact of maternal depression.

Alternatively, parental EE might moderate longitudinal relationships between maternal depression and child outcomes, but this hypothesis was not tested in these six studies. Burkhouse et al. (2012) found maternal EE latent class predicted child depression onset and depressive symptoms after controlling for maternal depression, suggesting a complex relationship between maternal depression,

FMSS-EE and later child outcomes, warranting further study. This study obtained a high quality rating, and in contrast to other studies, used the gold standard method of assessment for assessing maternal depression. Importantly, the predictive relationship found in Burkhouse et al. (2012) is different in that it found evidence for a causal impact of maternal criticism latent class membership on child outcomes, and not baseline maternal criticism. The subgroup membership reflected levels of criticism expressed over multiple assessments (e.g. indicating a "trait"-like tendency to be critical), and is arguably a more accurate reflection of maternal EE than single point assessments common in other studies. Therefore, one hypothesis could be that "trait" criticism, but not "state" criticism, has a causal impact on adverse child outcomes independently of maternal depression. For the studies assessing maternal EE once at baseline and follow-up (Davis et al., 2020; Frye & Garber, 2005; Psychogiou et al., 2017), EE measures are entered into analysis separately, reflecting more of a "state"-like measure.

Amongst identified studies, multiple other variables were highlighted as potential risk factors for child emotional and behavioural development: maternal stress (Baker et al., 2000); lower income and low perceived parental control (Freed & Tompson, 2005); paternal depressive symptoms (Psychogiou et al., 2017); maternal EE towards their own mothers (Davis et al., 2020), and maternal anxiousness (Rapee, 2014).

The mixed findings discussed above highlight the need for further research to build a clearer picture of how maternal EE is associated with child psychopathology. Areas to consider will be discussed below.

Confounding Variables

When attempting to isolate the impact of maternal EE on child psychopathology, it is imperative to consider other stressors potentially impacting child development. As previously discussed, family and parental characteristics, and environmental stressors all impact the home environment within which children develop.

Variables describing environmental stressors were considered across studies but mostly limited to SES or family income. These are important covariates because low SES and family income can have a profound impact on quality of home life and leave children and adolescents at higher risk of mental health problems (Reiss, 2013). Freed and Thompson (2011) hypothesised this may be because higher income families have fewer life stressors, enabling them to direct more attention to parenting. Nine studies had a measure of either SES of family income, and could therefore control for its impact on child development.

Information regarding family structure and quality of the home environment was uncomprehensive in the studies reviewed. Marital or relationship status was reported in half of the studies and only two studies reported number of children in the participating family, both of which impact emotional wellbeing of children at home (Pearce et al., 2014). Birth order can impact child outcomes and parental behaviour, but was only reported in one study (Lehmann et al., 2016). No studies directly measured family functioning or quality of the home environment using measures such as the SLEQ (Roohafza et al., 2011) or Family Environment Scale (FES; Moos, 1990). These could give valuable insight into family emotional climate. Peris and Baker (2000) described maternal FMSS-EE as the index of the home environment and other studies used the FIQ (Donenberg & Baker, 1993) to gather information about the child's impact on the family. However, both measures reflect the mother's subjective view of the home, based on the quality of their relationship with their child and their behaviour. It is challenging to obtain objective measures of the home environment, but a variety of questionnaires and informants could increase the reliability and validity of information.

Psychopathology in family members other than mothers was also rarely reported, despite this being an influential factor on children's mental wellbeing (Behere et al., 2017). In two-parent families, children are exposed to EE from fathers/partners, but this was rarely investigated. Previous research demonstrates that fathers influence child psychopathology, identifying it as a covariate of interest. For example, one review concluded that paternal psychiatric disorders seem associated with increased

behavioural problems in children (Ramchandani & Psychogiou, 2009). This was supported by Psychogiou et al. (2017), finding baseline paternal "positive comments" predicted child outcomes at follow-up, with no predictive relationship for maternal EE and child outcomes. Therefore, further research into the interaction of maternal and paternal FMSS-EE in predicting child outcomes is required.

FMSS-EE

The FMSS appears to be a useful method of assessing EE, but there are challenges in drawing conclusions based on the literature reviewed. For example, the results of this review demonstrate the variability of components studied using the FMSS-EE, which makes it a challenge to draw general conclusions about the measure. The original procedure (Magaña et al., 1986) remains most popular, but age adapted versions have been developed and codes expanded upon on the basis of being more developmentally sensitive (Baker et al., 2000; Daley et al., 2003; Davis et al., 2020; St John-Seed & Weiss, 2005). However, age-adapted versions were not always being used (Hudson et al., 2017; Rapee, 2014) and it was not always clear newly developed codes were validated.

Validity of the FMSS-EE was questioned in one study finding maternal stress and adjustment measures more predictive of child behaviour than maternal EE (Baker et al., 2000). Given FMSS-EE scores were moderately related to maternal stress and adjustment measures, they question whether the observed association between FMSS-EE and child outcomes involves the construct of EE at all, hypothesising FMSS-EE may be more reflective of parent stress, which correlates highly with child behaviour problems (Baker et al., 2000). But in Peris and Baker (2000), this concern was not founded when the FMSS-EE had predictive validity after maternal stress was controlled for. One potential reason for this difference could be that the latter study only used one measure to represent maternal stress (FIQ; Donenberg & Baker, 1993), whereas the former used four measures to assess maternal stress and adjustment.

Findings on the stability of EE as a construct also differ. Peris and Baker (2000) found EE was stable over a two-year period, and concluded that EE could be a longitudinal reflection of the home environment. In contrast, Frye and Garber (2005) argue the criticism component of FMSS-EE lacks stability, and hypothesised that EE may be an episodic account of a short-term response to difficulties in the parent-child relationship, rather than a trait-like characteristic. Burkhouse et al. (2012) provide further evidence for the instability of EE, suggesting a single measure of EE may be insufficient to capture maternal EE in the home, which is likely to fluctuate. Other research also questions how accurately EE expressed in front of researchers reflects home life (Psychogiou et al., 2017). Multiple assessments of FMSS-EE could therefore help to obtain more accurate measurements of maternal EE children are exposed to at home.

This review shows that EOI measured by the FMSS was rarely associated with child outcomes longitudinally. Some studies only investigated the impact of criticism as they felt there was little research linking EOI to child psychopathology (e.g. Frye & Garber, 2005). The FMSS-EE has also been criticised for underestimating EOI (Magaña et al., 1986; Jacobsen et al., 2000), casting doubt on how well EOI is being captured in this measure. Applicability of EOI when assessing parent-child interaction in younger children was also questioned in multiple studies (Baker et al., 2000; Davis et al., 2020; Peris & Baker, 2000) as higher levels of involvement are needed at a young age. For example, in one study in infants, EOI was assessed but not included in analysis because of low inter-rater reliability (Davis et al., 2020). It is therefore important to use the appropriate adapted version of the FMSS-EE to measure EE in different age groups.

Child/Adolescent Emotional and Behavioural Difficulties

The variety of measures used to assess child and adolescent outcomes focused on assessing for BI, externalizing/internalizing difficulties, and mental health diagnosis. The variety of child outcomes used can also act as a barrier to building cohesive evidence for the relationship between EE and child development.

A common limitation in reviewed studies was the issue of shared method variance. Measurement of child outcomes often relied on two sources, mostly mothers and teachers. However, mothers often reported on multiple variables, such as personal mental health status, EE, and the impact of her child on family life. Reliance on the same reporter can strengthen the relationship between variables (Baker et al., 2000), so results of studies using maternal measures only should be considered with caution (Freed & Thompson, 2011; Frye & Garber, 2005; St John-Seed & Weiss, 2005).

Multiple studies investigated maternal EE in depressed mothers, which is a further source of potential bias in relation to assessing child outcomes. Depression can impact a person's perception of the world, and is therefore likely to impact how mothers views their child's behaviour. For example, some researchers hypothesise that women actively experiencing depressive symptoms may be hypervigilant to similar symptoms in their children (Freed & Thompson, 2011; Frye & Garber, 2005), potentially influencing how they view and describe their behaviour. This challenges the reliability of depressed maternal reports of child behaviour, although some research demonstrates they can be reliable and valid reporters (Richters, 1992). To avoid risk of bias, the use of other informants and researcher-coded observational methods should also be employed in studies examining the longitudinal relationship between FMSS-EE and child outcomes.

Studies investigating the impact of maternal EE during transition from childhood to adolescence are especially important, given research showing the detrimental effects of stressors during this time on adult cognitive and emotional functioning (Holder & Blaustein, 2014).

Mechanisms of Effect

In line with Coercion Theory (Reid et al., 2002), a strong theory emerging from the evidence base is that the association between parental EE and child outcomes is bidirectional, with the child's behaviour impacting parental EE, which in turn impacts the child's behaviour (Peris & Miklowitz, 2015). Frye and Garber (2005) found child externalizing behaviour predicted maternal criticism at follow up, and mediated the relationship between maternal criticism and depression. In addition to

research finding child BI predicted maternal criticism at follow-up (Hirshfeld et al., 1997), Frye and Garber's (2005) study adds to the evidence that child internalizing and externalizing behaviour problems can impact maternal EE.

Of the studies finding significant predictive relationships between maternal EE and child psychopathology, none directly examined the mechanisms of effect of this relationship; however the authors of many studies expressed theories about potential mechanisms. Burkhouse et al. (2012) and St. John-Seed & Weiss (2002) hypothesised that maternal criticism may cause the development of negative cognitive styles or a negative sense of self in children, which could contribute to depression. Peris & Baker (2000), who found a predictive relationship between maternal EE and child ADHD, acknowledged the likelihood of a bidirectional process between mother and child. Caspi et al. (2004) could rule out the effect of genetics by using a sample of monozygotic twins, and could conclude that maternal EE was a non-shared environmental experience that explained difference in child psychopathology between twins. Hudson et al. (2011), who found a predictive relationship between maternal EOI and child BI, hypothesised that BI may mediate the relationship between maternal EOI and child anxiety. Attachment security was not found to be related to BI or anxiety in children in this study.

Five studies used mediating and moderating models to investigate the relationships between parental psychopathology, parental EE and child psychopathology. One study found maternal depression did not moderate the link between maternal criticism and child depression onset (Burkhouse et al., 2012) and another study concluded that maternal criticism was not a mediator between maternal depression and child symptomology (Frye & Garber, 2005). Freed and Thompson (2011) reported that child symptoms did not moderate the relationship between maternal locus of control and criticism. Psychogiou et al. (2017) reported the relationship between paternal depressive symptoms and child outcomes was moderated by child gender and maternal depressive symptoms, highlighting the importance of measuring psychopathology in both parents as a covariate impacting

child development. Further research is needed to examine how maternal EE relates to child development and to assess the role of key covariates in this process.

Clinical Implications

Children experiencing emotional and behavioural problems are at risk of experiencing psycho-social difficulties in adult life (Campbell et al., 2000), which can negatively impact the individual, their families and society (Hammerton et al., 2019; Ogundele, 2018). Evidence of the predictive validity of maternal FMSS-EE on child outcomes potentially identifies maternal EE as a modifiable risk factor for child psychopathology, alongside other variables such as maternal psychopathology. A goal of preventative interventions might be maternal psycho-education, which could teach mothers adaptive ways of interacting with their child and managing emotions. Stand-alone psychoeducational interventions have been ineffective at reducing EE in other areas of research (Eisner & Johnson, 2008). Other evidence suggests that training parents with high-EE can change EE status and improve outcomes in adolescents, if delivered alongside targeted intervention for the adolescent (Garcia-Lopez et al., 2014). Being time and cost-effective, the FMSS-EE could be used to evaluate changes in the parent-child relationship following targeted EE interventions. The demonstrated involvement of maternal psychopathology as a variable likely to relate with maternal EE, indicate that EE interventions should also incorporate strategies for improving maternal mental health. Such interventions could help reduce demands on health and social care services.

As the FMSS is less prone to social desirability bias than questionnaire measures, the FMSS-EE could be of use for families in need of support services, as a timely and less intrusive assessment tool. Evidence supporting the predictive validity of FMSS-EE for childhood onset of depression and ADHD (Burkhouse et al., 2012; Peris & Baker, 2000) suggests the potential utility of the FMSS-EE measure as a prognostic tool.

Research Implications

Further research is needed to develop the evidence demonstrating maternal EE as a risk factor for child psychopathology. A focus on longitudinal studies would provide opportunity to control for existing child emotional and behavioural difficulties on the development of child psychopathology. Use of non-clinical samples would allow increased homogeneity across studies, and assist in building a cohesive evidence base.

Inclusion of influential covariates such as SES/family income (Reiss, 2013), marital/relationship status (Pearce et al., 2014), birth order (Lehmann et al., 2016), psychopathology in family members (Behere et al., 2017) and a measure of the family climate can be used to help isolate the independent impact of maternal EE on child psychopathology. Larger sample sizes and longer follow-up periods can help inform how this relationship may evolve. Multiple EE assessments are needed to track its longitudinal stability and improve the validity of the EE measure (e.g. Burkhouse et al., 2012). Researchers could consider using Smartphone technology to obtain repeated FMSS-EE measures remotely, which could increase ecological validity of the data and allow multiple assessments with limited inconvenience for participants (Harari et al., 2016).

Use of multi-informant objective measures to assess child and parent psychopathology can minimise risk of bias and reduce shared method variance. Future research could incorporate observations at home and/or in laboratory settings to obtain additional objective perspective. Randomised controlled trials of parental interventions targeting maternal EE (e.g. Garcia-Lopez et al., 2014), could be used to evaluate the evidence of the predictive relationship between maternal EE and child psychopathology. Establishing risk factors for high maternal EE could allow for interventions to be offered to a targeted population.

Strengths and Limitations

This is the only review to systematically review longitudinal evidence for the predictive validity of FMSS-EE on child outcomes. Broad search terms and lack of restrictions of child outcomes

ensured all relevant papers were captured. The results highlight a potential risk factor for the development of child psychopathology to inform future research and development of preventative interventions. A meta-analysis of the evidence was not possible because of different methodologies used across studies. Articles published in languages other than English were not reviewed, which could have included relevant information. There is also an element of subjectivity in the quality review. Lastly, findings of this review can only be generalised to mothers, as paternal EE was not included within its focus.

Conclusion

This review systematically summarises longitudinal evidence and quality of studies investigating the impact of FMSS-EE on child psychopathology. To establish predictive validity of the FMSS-EE in relation to child outcomes, the review was restricted to longitudinal studies. CASP quality ratings for the studies ranged from moderate to high. Five studies (four of which were high quality) provided evidence for the predictive validity of the FMSS-EE in relation to child emotional and behavioural development, after controlling for baseline measures of child psychopathology and other relevant confounding variables. However, the degree to which the FMSS-EE predicted child psychopathology appeared less in studies controlling for maternal psychopathology. The review highlighted the importance of using multiple time-points to capture accurate measures of EE at home. Maternal criticism was identified as a potential risk factor for child psychopathology, which can be used to inform development of preventative interventions in clinical practice alongside focus on other related factors, such as maternal psychopathology.

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Examination of the Predictive Validity of the Five Minute Speech Sample-Coherence in Children at High Risk of Developing Psychopathology

Charlotte Jug

South Wales Doctoral Programme in Clinical Psychology, Cardiff University

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Abstract

Research demonstrates that the parent-child relationship can influence child development. One way to assess the quality of this relationship is by the "coherence" demonstrated in the way a parent talks about their child, characterised by flexibility, sensitivity and balance. The Five Minute Speech Sample coded for coherence (FMSS-Coherence) is a recently developed measure of coherence, in need of further validation in different populations against different measures of the family environment, parenting relationship, and child development. The FMSS-Coherence measure presents coherence as a dichotomous variable. An ongoing research study in Wales provided 174 parent-child dyads for participation. Children (4-7 years) had been referred by teachers due to concerns about their emotional and behavioural development. Parent's completed the FMSS-Coherence alongside measures of perceived family environment and parenting quality. Teacher and parent reports of child social and behavioural adjustment were obtained, alongside a measure of child cognitive empathy, using facial emotion recognition. Prevalence of FMSS-Coherence was low in this "at-risk" sample, which led to the development of a 'liberal' definition of coherence, used to further investigate the measure. Coherent parents reported significantly more cohesion in their family environment, less hostility in their parenting, more prosocial behaviour and less conduct problems in their children. Teacher-reported behaviour did not differ significantly between groups. Children of coherent parents had improved facial recognition of fear and lower intensity emotions. This study provides partial support for the validity of the FMSS-Coherence in this at-risk sample. Further research is needed to build upon this evidence to further inform the utility of this measure in research and clinical practice.

Keywords: Five Minute Speech Sample, Coherence, Child Development, parental

Examination of the Predictive Validity of the Five Minute Speech Sample-Coherence in Children at High Risk of Developing Psychopathology

The influence of the parent-child relationship on child development is an established area of interest in developmental research. Bowlby's attachment theory suggested children receiving more responsive care from their parents were more likely to develop secure attachments, and less likely to develop psychological difficulties later in life (e.g., Bowlby, 1988). This is supported by research demonstrating that people perceiving more parental care and less parental psychological control in this caregiving relationship, are more likely to have better wellbeing and psychological functioning across the life span (Stafford et al., 2016). Other research reports closeness and affection shown in the parent-child relationship is associated with increased adolescent self-worth, which relates to less emotional and behavioural problems (McAdams et al., 2017). Further research shows secure adolescent attachment representations are associated with less antisocial and adjustment difficulties (Scott et al., 2011), fewer mental health problems, and increased coping skills (Moretti & Peled, 2004).

Measuring the Parent-Child Relationship

Given the impact of the parent-child relationship on child development, developing cost-effective, valid, and reliable measures of this relationship is important for developmental research and clinical practice (Aspland & Gardner, 2003; Sher-Censor, 2015). Expressed emotion (EE) is an established measure of the patient-relative relationship, which captures a relative's attitudes towards a patient in speech about that patient (Hooley & Parker, 2006). This concept has transitioned to developmental research, where it is used to capture the parent-child relationship (Sher-Censor, 2015). However, much EE research fails to examine the reciprocal nature of the impact of parental EE on child behaviour, and the influence child behaviour has on parental EE (Boger et al., 2008). The Five Minute Speech Sample (FMSS) originally developed by Gottschalk and Gleser (1969), was used to assess caregiver relationships in adult

psychiatry, but has been adapted to assess expressed emotion (EE) as a measure of the parent-child relationship (FMSS-EE; Magaña et al., 1986). Parents are asked to speak for five minutes uninterrupted about their child and their relationship with their child. The speech is transcribed and coded for EE, representing the amount of criticism and emotional overinvolvement in parents' speech and vocal tone. The Camberwell Family Interview (CFI; Rutter & Brown, 1966) is the most common measure of EE, but is costly in terms of administration and coding time. The FMSS-EE is a brief and cost-effective alternative measure of the same construct, potentially with better predictive validity than the CFI in relation to child behaviour (Calam & Peters, 2006). However, future research is needed to establish how much EE as measured by the FMSS relates to actual parenting, and needs to consider other confounding factors that may influence parental EE during the assessment, such as culture, parental psychopathology and socio-economic status (Calam & Peters, 2006), as well as the context of the assessment itself.

Measuring Coherence Using the FMSS

The first FMSS coding protocol based on attachment theory is the recently developed FMSS-Coherence protocol (Sher-Censor & Yates, 2010). FMSS-Coherence was adapted from the Insightfulness Assessment (Koren-Karie & Oppenheim, 2004) used in attachment research to assess parental coherence. Coherent narratives are organised, flexible, authentic, and balanced, reflecting positive and negative attributes of an individual and their relationship with them (Grice, 1975). The relevance of coherence comes from the gold standard of measuring adult attachment, the Adult Attachment Interview (AAI; George et al., 1985). When AAI subscales were coded, low maternal coherence was the biggest predictor of insecure attachment styles in offspring (Fonagy et al., 1991), highlighting the potential importance of coherence in understanding child adjustment. Indeed, coherence measured by the Insightfulness Assessment has been related to maternal sensitivity and secure attachment in low-risk children (Koren-Karie et al., 2002), and high-risk children (Feiniger-Shaal & Oppenheim, 2012), and been

shown to moderate treatment effectiveness of a parenting intervention for children with Autism Spectrum Disorder (Siller et al., 2013). The FMSS-Coherence was developed as a time and cost-effective method of measuring coherence, which has potential research and clinical utility (Sher-Censor, 2019).

Coherence reflects the information processing rules guiding the storage and retrieval of attitudes which influence behaviour (Hesse, 2008). Parental coherent narrative of their child is thought to enable flexible interpretation of behaviour and attuned responses to the child's needs, which facilitates child development and adjustment (George & Solomon, 1996; Oppenheim, 2006). Incoherent narratives can be inconsistent, unbalanced, overwhelmed with concern or emotionally rejecting, which can hinder parental attuned responsiveness to child needs and lead to development of child emotional and behavioural difficulties (Oppenheim, 2006; Sher-Censor et al., 2018).

The FMSS-Coherence requires transcripts to be coded on six sub-components of coherence: focus; elaboration; separateness; concern/worry; acceptance/warmth and rejection; and complexity. Based on subscale scores, parents are scored as non-coherent or coherent.

The FMSS-Coherence has shown it reflects aspects of the parent-child relationship beyond EE. For example, FMSS-Coherence and not FMSS-EE was associated with pre-schoolers positive play narratives reflecting the parent child relationship (Sher-Censor et al., 2013), which supports attachment theory describing that parental sensitivity of coherent parents can be internalized by the child, and demonstrated in positive representations of this relationship (Main et al., 1985).

Maternal FMSS-Coherence has been associated with fewer maternal reports of internalizing and externalizing behaviour problems (Sher-Censor et al., 2018) and fewer observer reports of externalizing behaviour problems in young children (Sher-Censor & Yates, 2015). Teacher-reported child behaviour problems have had good concordance with coherent

parent-reported behaviour problems compared to non-coherent parents, suggesting coherent parents produce more accurate reports of child behaviour (Sher-Censor & Yates, 2015).

Maternal FMSS-Coherence predicted adjustment in children with existing self-regulation difficulties, where pre-schoolers with self-regulation difficulties and non-coherent mothers had more externalizing behaviour problems and lower peer acceptance, compared to pre-schoolers with better self-regulation and non-coherent mothers (Sher-Censor et al., 2016). The FMSS-Coherence has also demonstrated that adolescents with coherent representations of the parent-child relationship in part mediated the relationship between higher maternal sensitivity and fewer adolescent behaviour problems (Sher-Censor, Koren-Karie et al., 2018).

In intellectual disability (ID) research, the FMSS-Coherence has demonstrated that coherent mothers and their acceptance of their child's autism diagnosis was associated with more emotional availability in a study of Arab-Israeli mothers (Sher-Censor et al., 2017).

FMSS-Coherence in Research and Clinical Practice

The FMSS-Coherence is more time and cost-effective in comparison to other attachment-based measures of the quality of the parent-child relationship. For example, the Parent Development Interview (PDI; Aber et al., 1985) is a semi-structured interview that assesses adult representations of themselves as parents, their children and their relationship with their children. Observed parent-child coding schemes (Aspland & Gardner, 2003) and story-stem narrative measures (e.g. Attachment Story Completion Task; Bretherton & Ridgeway, 1990) also involve costly and lengthy training, administration and coding processes.

There are a number of factors that could influence parental coherence measured by the FMSS, which must be considered in research and clinical practice. For example, the context of the assessment and cultural narratives may influence whether parents emphasise or minimise their child's difficulties, depending on potential outcomes of the assessment. Other parental characteristics such as first spoken language, education level, psychopathology and disability

could all impact a parent's ability to provide a five minute speech narrative. Some of these factors are acknowledged by the FMSS-Coherence manual (Sher-Censor & Yates, 2010), which emphasises that coherence is assessed through coherence of thought rather than speech, to make allowances for parents who are not native speakers, or have little experience addressing open ended questions. Factors which are not addressed in the manual should be assessed alongside the FMSS-Coherence measure to facilitate accuracy of conclusions drawn about the parent-child relationship.

A brief measure of coherence in the parent-child relationship could be used in clinical practice to help assess parental ability to flexibly understand and respond to child behaviour, and build an understanding of the child's socio-emotional presentation (Sher-Censor, 2019). Research using the FMSS-Coherence could inform the development of interventions aiming to increase coherence, parental understanding of the child, and responsiveness to their needs. If proven to be valid, the measure itself could be used to evaluate change in such interventions.

Further Validation of the FMSS-Coherence

FMSS-Coherence research demonstrates it is a promising method of measuring the parent-child relationship, but highlights a number of areas for further research. Although research suggests FMSS-Coherence is robust to ethnocultural differences (Sher-Censor et al., 2013; Sher-Censor & Yates, 2015), there is need to validate this measure in different cultural contexts outside of the Unites States and Israel (Sher-Censor, 2019) to assess generalizability to other populations. There is need to test its predictive validity in different clinical contexts and sample types against validated measures of child development, family environment and parenting style. For example, no study has used the FMSS-Coherence in an at-risk sample of children with existing emotional and behavioural difficulties, as past research has used community/ID samples.

Attachment research would indicate that parent-child attachment problems are associated with high household conflict, low household cohesion, low parental warmth and high parental hostility (Belsky & Fearon, 2002; Fearon & Belsky, 2011). Establishing whether lower levels of parental FMSS-Coherence predict a poorer quality family environment could provide evidence for the FMSS-Coherence as a tool reflective of the wider home and parenting environment.

Despite research demonstrating increased empathy in children with secure attachments (Panfile & Laible, 2012) no research has investigated association between FMSS-Coherence (as an attachment-informed measure) with child empathy development. Given that low parental FMSS-EE has been associated with increased externalising behaviour problems and peer problems (Sher-Censor & Yates, 2015; Sher-Censor et al., 2018), a possible contributor may be disruption in child cognitive empathy development, particularly in relation to fear and sadness. Indeed, children with more conduct problems and callous/unemotional traits consistently struggle to identify sadness and fear emotional expressions in particular, in line with the Violence Inhibition Mechanism (VIM; Blair & Coles, 2000; Fido et al., 2017; van Goozen, 2015). The VIM describes the process where viewing emotions such as fear and sadness in others evokes a distress cue that prompts a withdrawal response, and as a result challenging behaviour is ceased.

The ability to recognise and understand emotions and take other people's perspective is conceptualised as "cognitive empathy", and some research shows it associates with affective perspective taking and theory of mind in young children (Bensalah et al., 2016). Given that coherent parents have better abilities to think flexibly and sensitively about their child, we expect coherent parents would be more emotionally responsive and attuned with their child, hereby enhancing child emotional development (Fonagy & Target, 1997). One measure of child cognitive empathy ability is emotional recognition ability, because if emotions in others

are not cognitively recognised, affective empathy is unlikely to be present. Recognition of social cues are used to guide behaviour and relationships, and has been linked with child behavioural functioning (Denham, 1986; Izard et al., 2001).

Study aims

This study aims to establish whether the FMSS-Coherence is a valid measure of the parent-child relationship in a school-referred sample at risk of developing psychopathology. By using the FMSS-Coherence in a UK sample with a different research team to previous studies (which have all involved the developer of the FMSS-Coherence) this study will build upon existing evidence for its validity. This study aims to establish if associations previously found between FMSS-Coherence and child outcomes are found in this different sample, and investigate gaps in the evidence base in relation to potential associations between FMSS-Coherence and measures of the family environment, parenting style, and child cognitive empathy abilities. The following hypotheses will therefore be investigated to test the validity of FMSS-Coherence:

1. There will be a greater proportion of non-coherent parents than coherent parents in a school-referred sample of children with behavioural difficulties compared to proportions found in previous studies using community/non-referred samples.
2. Coherent parents will report a significantly more cohesive family environment, with less conflict.
3. Coherent parents will report significantly higher levels of warmth and lower levels of hostility in their interaction with their children.
4. Children of coherent parents will have significantly less conduct problems and higher prosocial abilities reported by both parents and teachers.
5. Children of coherent parents will have significantly better cognitive empathy abilities, reflected in superior recognition of facial emotions, especially fear and sadness.

Method

Participants

One hundred and seventy four parent-child dyads participated in this study, having been recruited from an ongoing study. Participating children aged between 4 and 7 years (M = 5.84, SD = 1.14) had been referred by teachers to the Neurodevelopmental Assessment Research Unit (NDAU) at Cardiff University for a university-based assessment. Children were referred by teachers if they had concerns about their emotional and behavioural development; teachers were specifically asked not to refer children with a diagnosis of Autism.

Children are assessed in a variety of domains before the NDAU produces a report overseen by an Educational Psychologist, and information collected is used for research. The majority of parents were mothers (92.5%), with 80.5% identifying as British. Children were mostly male (73.6%) with mean verbal intelligence quotient (IQ) of 103.94 (SD = 16.33). Family size had mean number of 3.83 people (SD = 1.56), with 61.5% of children living with their biological mother and father, 25.3% living with their biological mother only, and 6.9% living with their biological mother and stepfather. Average family income was £28,652 (SD = 17906.61) and maternal education years ranged from 3 years to 19 years, with a mean of 13.83 years (SD = 2.83).

Measures

Perceived Family Environment

The Family Environment Scale (FES; Moos & Moos, 1994) is a self-report measure used to assess the socio-emotional climate of families in the home environment. It draws upon social ecological psychology and general systems theories to assess interpersonal relationships, personal growth and system maintenance of families. The 90-item measure covers 10 subscales (cohesion, expressiveness, conflict, independence, achievement orientation, intellectual-cultural orientation, active recreational orientation, moral-religious, organization and control),

but only the cohesion and conflict subscales were measured in the NDAU sample (Appendix E). Participants rate each item as 'true' or 'false'. Higher scores reflect more positive perceptions of family interactions. The FES has demonstrated good validity, adequate internal consistency and stability over time in diverse samples (Moos, 1990). This study focuses on the relationship dimension of the FES, and analyses the cohesion and conflict subscales to measure of the perceived quality of the socio-emotional climate and parent-child relationship at home. Higher subscale scores indicate a more cohesive or conflicted family environment.

Perceived Parenting Quality

The Iowa Youth and Families Project (IYFP) Family Interaction Rating Scales (Melby et al., 1993) is a 10-item self-report questionnaire measuring parents' self-perception of their parenting towards their child (Appendix F). It consists of two subscales, hostility (4 items) and warmth (6 items). Each item is coded from 1 to 7, with higher scores representing high hostility or low warmth. The warmth items were subsequently reversed so high scores reflected high warmth.

Child Social and Behavioural Adjustment

The Strengths and Difficulties Questionnaire is a self-report behavioural measure for children and adolescents aged between 3 and 16 years old (SDQ; Goodman, 1997), with parent and teacher versions (Appendix G). Due to the young age of children in this study, only parent and teacher ratings were collected. The SDQ is a useful screening tool for detecting child psychopathology in community samples (Goodman et al., 2000), demonstrates good internal consistency and test-retest stability (Goodman, 2001) and validity (Goodman & Scott, 1999).

This brief 25-item questionnaire assess emotional problems, conduct problems, hyperactivity-inattention, peer relationship problems and prosocial behaviour. Parents or teachers rate items on a Likert scale, depicting how true items are of the child's behaviour in the past 6 months. Response options were "not true", "somewhat true", or "certainly true". Due

to the need to minimise the number of statistical tests, and guided by our specific aims, only the conduct and prosocial behaviour subscale scores were analysed, as indicators of child social and behavioural adjustment.

Child Verbal IQ

The Lucid Ability Assessment (Version 5.15; www.lucid-research.com) was used to assess verbal reasoning as a measure of verbal IQ. Verbal IQ is assessed by a computerised picture vocabulary task for children aged 4-6 years or conceptual similarities task for children aged 7-16 years (see Appendix H). The Lucid Ability tasks were standardised on 2300 children in the UK aged 4-16 years, and has demonstrated validity by comparison to conventional IQ measures such as the Wechsler Intelligence Scale for Children (WISC-III). A low verbal IQ standard score falls between 70 and 85, an average standard score falls between 85 and 115, and a high standard score falls between 115 and 130.

Child Cognitive Empathy Ability

The Facial Emotion Recognition measure (FER) consists of 60 photographs from the Radboud Faces Database (Langner et al., 2010) of male and female adults of a variety of ages showing different emotions. Images included only the faces of adults, with hair and background removed (see Appendix I). The emotions happiness, sadness, fear, anger and neutral expression were morphed to low intensity (20-40%) to high intensity (60-80%).

Children were first asked to label cartoons and photographs showing emotions at 100% intensity to ensure they understood the emotions. If there was uncertainty, the emotion was explained using examples. This served as an opportunity to note the varied labels children used for emotions (e.g. upset for sad). Children then gave verbal responses to “what emotion (if any) is this person showing?” for 60 photographs, which researchers recorded. Children were given the options of the four emotions or neutral expression. As it was common for some children to

struggle to grasp the concept of neutrality, the data from the neutral expression was not used in the analyses.

Parental Coherence

The FMSS – Coherence measure (Sher-Censor & Yates, 2010) was used to assess parental coherence when speaking about their child. Firstly, researchers explained that parents were to speak generally about their child and their relationship with them, and not to necessarily focus on the reason for referral to the NDAU. They were told not to worry about pauses, and encouraged to wait and share what comes to mind. Participants were given the verbatim instructions "Now I'd like you to speak about (child's name) for five minutes without any interruptions from me. While you do this, I will record what you say. Can you tell me in your own words what kind of person (child's name) is and how you get along?". If there was a non-speech delay of over 30 seconds, to ensure the FMSS yielded enough material for reliable coding, occasionally non-directive prompts "e.g. how would you describe (child's name) personality?" were used with permission from the FMSS-Coherence author and in line with procedure outlined in Caspi et al. (2004). Thirty seconds of silence were allowed before prompts were given to allow for spontaneous speech. Audio-recordings were transcribed by a member of the NDAU research team.

Transcripts were coded by the author on the six following subscales of FMSS-Coherence, rated from 1 to 7. "Focus" captures how focused parents stay on their child and their relationship with their child. "Elaboration" assesses how rich in detail the transcript is. "Separateness" assesses the parent's ability to relate to the child as a separate person. Before rating this subscale, transcripts are assessed for evidence of "boundary dissolution" (BD), where the roles of parent and child seem equal or reversed. For example, "caregiver BD" is ascribed if a child is described as the caregiver in the relationship. "Peer BD" is ascribed if parents speak about their child as a best friend, and neither child nor parent has control in the

relationship from the parent's perspective. "Partner BD" is ascribed when the child is described as if they were a partner. "Controlling BD" is ascribed if the child has control in the relationship, and the parent will not or is afraid to take back control. Boundary dissolutions are rated on a scale of no BD (BD = 0) to major BD (BD = 2), and impacts the maximum score parents can achieve on the separateness subscale. "Concern/worry" assesses the concern or worry parents express about their child or their parenting. "Acceptance and warmth versus rejection" assesses the amount of acceptance, warmth and rejection expressed in the transcript. "Complexity" reflects the parents ability to describe their child and their relationship in a balanced and comprehensive way. Based on subscale ratings, a final coherence score of 1 to 7 was given for each parent, in line with decision rules described in the manual (Sher-Censor & Yates, 2010). The manual recommends that parents with scores of 1 to 4 are labelled "non-coherent" and parents with scores of 5 to 7 are labelled "coherent"; however, due to the low number of "coherent" parents in the sample, an alternative categorisation system was also employed in which parents scoring the mid-score of 4 were included in the "coherent" group (see 'Results' Section).

Twelve percent of transcripts were coded by a second researcher, reaching total agreement of 70.95 % across all categories and cases. Past FMSS-Coherence papers typically established reliability by coding 20% of transcripts or more, however past FMSS-EE research have established reliability coding with only 6.5% of transcripts (Caspi et al., 2004), thus 12% was considered sufficient. Cohen's kappa across dichotomized coherence rating was good (Kappa= .769 , 90.48% agreement). Intraclass correlation coefficients (ICC) for subscales were acceptable (Elaboration = .72), good (Separateness = .86, Acceptance = .87, Focus = .88) and excellent (Complexity = .92, Concern = .92). ICC for final coherence score was excellent at .96, with an acceptable ICC for final coherence rating .88.

Procedure

Data was part of an ongoing study at the NDAU with ethical approval from the Cardiff University School of Psychology Ethics Committee (approval number: EC.16.10.11. 4592GRA5; Appendix J). Parents provided written informed consent for data to be used for research purposes (Appendix K). Parent-child dyads visited the NDAU to complete an assessment over one or two testing sessions. Multiple parent and child measures were obtained, of which only a sub-sample were analysed relating to the specific aims of this study. Postgraduate students completed the parent and child assessments (primarily PhD students and one Clinical Psychology doctoral student). Children completed the facial emotion recognition task and computerised verbal IQ task whilst parents completed a battery of measures, including the FES, IYFP measure, SDQ and FMSS-Coherence. Teacher SDQ measures were received as part of the referral pack for the child. The author was trained by a Clinical Psychologist formally trained as a trainer in FMSS-Coherence by the developer of the measure. Training consisted of six 1.5 hour sessions and coding/discussion of multiple exemplar transcripts provided by the developer as part of the training plan (Appendix L). Additional note-making strategies developed by the NDAU were also used (Appendix M). Transcripts were coded blind by the author, who was not involved directly in data collection. The author was blind to the individual case and other outcome measures, which had all identifiers removed.

Sample Size and Analysis

An a priori power analysis was conducted using G*Power 3.1 (Faul et al., 2007), using a medium effect size based on prior similar research (Sher-Censor et al., 2013; Sher-Censor et al., 2018). A minimal sample of 128 was required to achieve a power of .80, which indicated the sample size of 174 participants was adequate. Correlational (Pearson's R) and group (Chi-squared and ANOVA) statistical analyses were conducted using the Statistical Package for the

Social Science software (IBM SPSS 25), with a significance level set at $p<.05$ and corresponding confidence interval level of 95%.

Results

Prevalence of Non-Coherence in an At-Risk Sample (Hypothesis 1)

The FMSS-Coherence was applied according to author guidelines (Sher-Censor & Yates, 2010). In this referred sample, 32 parents were coherent (18.4 % of sample) and 142 parents were non-coherent. Descriptive statistics based on parental coherence can be found in Table 1. The percentage of coherent parents in this school-referred sample was less than in previous studies using the FMSS-coherence measure in non-referred community-based samples (Sher-Censor et al., 2013; Sher-Censor & Yates, 2015; Sher-Censor et al., 2016; Sher-Censor et al., 2017; Sher-Censor et al., 2018) which found the proportion of coherent parents of pre-schoolers that had not been referred for emotional and behavioural difficulties to be between 31.55% and 34.8%, and at its lowest at 21.82% in toddlers. This supports hypothesis one, that there would be a greater proportion of non-coherent parents in a referred sample of children with behavioural difficulties.

Given the small percentage of coherent parents in this sample, data was analysed in two ways to address potential statistical power issues and allow full exploration of the FMSS-Coherence construct. Firstly, a "conservative" definition of coherence was given when coherent parents were rated 5 and above, in line with guidance. Secondly, for the first time in the literature in parallel analyses a "liberal" definition of coherence was given when coherent parents were rated 4 and above. There appeared to be ecological validity in considering this novel liberal definition, given parents rated 4 according to the manual do not necessarily exhibit complete non-coherence. For example, parents are given a coherence score 4 if there are no major issues in any of the subscales, but a mid-score on one scale. Mid-scores were most commonly in the complexity subscale, which describes caregivers that speak positively about

their child in different contexts with supporting examples, but do not refer to any negatives. It could be argued this is not clear evidence of complete non-coherence. Hence, findings are presented using a conservative and liberal definition of FMSS-Coherence.

Analyses to Inform Testing for Hypotheses 2-5

Transformation, Outliers and Missing Data

After completion of descriptive statistics, data was subject to examination of skew, outliers and missing data. The Kolmogorov-Smirnov test and histograms were used to check the distribution of data. Z-scores for skew and kurtosis were calculated, and variables with a z-score greater than 2.58 were considered significantly skewed at $p<0.01$ (Field, 2005). Three common transformations were applied to significantly skewed variables (logarithmic, square root and reciprocal). The transformation that most successfully reduced the skew in each variable was retained and used in subsequent analysis. Child's recognition of anger was subject to a square root transformation, whereas child's recognition of happiness and high intensity emotion were subject to a reciprocal transformation. For analyses using parent-rated child prosocial behaviour and parental warmth, bootstrapping was used due to unsuccessful transformation of these variables.

Four outliers were identified across fourteen dependent variables, defined as being more than three standard deviations away from the mean (Field, 2005). Outliers were examined and viewed as sampled from the population and not due to data entry or computer error. To reduce the impact of these values, outliers were changed to three times the standard deviation of the mean (Field, 2005).

Missing data was not missing completely at random according to Little's (1998) MCAR test, so missing data could not be estimated. Given the total percentage of missing values was below five percent (total missing values = 3.4%), missing values were replaced by the variable mean.

Potential Confounding Variables

To ascertain which covariates to control for in later analyses, group comparisons of potential covariates between coherent and non-coherent groups were conducted for conservative and liberal coherence (Table 1). Analysis of variance was used to investigate differences in child age, verbal IQ, household size, maternal education years, and income. With a conservative definition of coherence, the non-coherent group (N=142) was significantly older and household size was larger than in the coherent group (N=32). With a liberal definition of coherence, the non-coherent group (N=90) had lower income and larger household size than the coherent group (N=84). Maternal education years and child verbal IQ did not differ significantly by coherence, whether defined conservatively or liberally. Chi-Square analysis was used to investigate differences in child gender, nationality (% British) and caregivers (% mother and father), but they did not differ significantly by coherence when defined conservatively or liberally.

Covariates that were significantly different for coherent and non-coherent parents whether defined conservatively or liberally, were controlled for in subsequent group analyses.

Table 1

Demographic Comparisons of Children of Coherent and Non-Coherent Parents, Split by Conservative Coding and Liberal Coding of the Parental FMSS-Coherence Measure

	Conservative			Liberal		
	Coherent (n=32)	Non-coherent (n=142)	X^2	Coherent (n=84)	Non-coherent (n=90)	X^2
Child gender (% male)	75.00	73.20	0.04	72.60	74.40	0.07
Nationality (% British)	78.10	81.00	0.14	83.30	77.80	1.69
Caregivers (%mother and father)	71.90	59.90	1.64	66.70	57.80	1.61
	Mean (sd)	*Mean (sd)*	*F*	*Mean (sd)*	*Mean (sd)*	*F*
Child age years	5.44 (0.98)	5.94 (1.16)	5.10*	5.72 (1.12)	5.96 (1.16)	1.80
Verbal IQ	103.03 (14.94)	104.16 (17.10)	0.13	103.52 (19.55)	104.34 (13.52)	0.10[a]
Maternal education years	14.45 (2.79)	13.70 (2.87)	1.75	14.25 (2.99)	13.46 (2.71)	3.23
Income	32,419.35 (17,314.30)	27,794.12 (18,446.77)	1.63	31,626.00 (18,619.70)	25,919.54 (17,628.74)	4.13*
Household size	3.23 (1.48)	3.98 (1.66)	5.77*	3.44 (1.54)	4.20 (1.60)	9.60**

Note: Household size = number of people in household.

* $p<0.05$; ** $p<0.01$.

[a]Welch's F statistic.

To further inform the choice of covariates in main analyses, bivariate correlations were conducted to explore the relationship between demographic variables and dependent variables (Table 2). There were some significant gender effects, in that male children had lower prosocial behaviour and higher levels of conduct problems (teacher-rated only).

There was an effect of nationality whereby British parents had higher child conduct problems, and children of non-British parents had lower teacher ratings of prosocial behaviour. Children of British parents had improved ability to recognise anger.

Table 2

Bivariate Correlations Between Demographic Variables and Dependent Variables

	Teacher		Parent		Family environment/parenting				Child cognitive empathy abilities					
	SDQ:C	SDQ:P	SDQ:C	SDQ:P	CHN	CFT	HOS	WAR	Happy	Sad	Scared	Angry	HI	LI
Child gender	-.217**	.299**	-.145	-.117	.095	-.020	-.043	.075	-.013	.051	.123	-.029	-.09	.088
Nationality	-.073	-.172*	.160*	.063	-.077	.088	.109	.004	.022	-.030	.085	.216**	-.127	.078
Caregivers	-.013	-.009	.068	.081	.013	-.049	-.086	.001	.053	-.054	.092	.036	-.099	-.014
Child age years	-.098	.242**	-.089	-.113	.003	.103	.128	-.053	.216**	.079	.209**	.154*	.273**	.173*
Verbal IQ	-.045	.205**	-.142	.009	-.046	.057	.103	.001	.190*	.121	.101	-.057	-.163*	.164*
Maternal education years	-.107	.129	.206**	.010	.033	.111	.017	-.050	.086	.078	.180*	-.137	-.157*	.179*
Income	-.082	.014	.218**	.024	.101	.011	.026	-.054	-.016	.056	.133	-.106	-.050	.138
Household size	.051	.134	0.14	.214**	-.133	.150*	.237**	.057	.123	.057	.009	.028	.033	.058

Note. SDQ:C/P = Strengths and Difficulties Questionnaire: Conduct/Prosocial, CHN/CFT = Family Environment Scale: Cohesion/Conflict, HOS/WAR = IYFP Hostility/Warmth, HI = High Intensity, LI = Low Intensity, household size = number of people in household, child gender coded as follows: 1 = male, 2 = female, nationality coded as follows: 1 = British, 2 = non-British, caregivers coded as follows: 1 = mother and father, 2 = other.

*p<0.05. **p<0.01.

Whether children had both biological parents as their main caregivers at home was not significantly correlated with any dependent variables.

Older children had significantly higher teacher-rated prosocial behaviour, but child age did not significantly correlate with any other SDQ measures for parents or teachers. Older children had significantly better cognitive empathy abilities, demonstrated in significantly better performance in recognising happiness, fear, anger, high and low intensity emotions, but not sadness.

Children with higher verbal IQ had significantly higher teacher prosocial ratings, but did not receive any other significantly different SDQ ratings by teachers or parents. Children with higher verbal IQ were significantly better at recognising happiness and low intensity emotions, but significantly worse at recognising high intensity emotions.

Mothers' years of formal education positively correlated with parent-rated conduct problems, child recognition of fear and low intensity emotions, but negatively correlated with recognition of high intensity emotions.

Parents with higher income rated their children with significantly higher levels of conduct problems, but there was no significant difference for teacher-rated child behaviour.

Parents from larger households rated their children significantly higher in prosocial behaviour, reported significantly more hostility towards their child, and described higher levels of conflict in the family environment.

Based on these analyses, covariates significantly correlated with each dependent variable were controlled for in subsequent corresponding analyses.

Analyses Concerning Hypotheses 2-5

Parental Coherence, Family Environment and Parenting Quality (Hypotheses 2 and 3)

Individual ANCOVAs compared coherent and non-coherent parent reports of cohesion and conflict in the family environment, and hostility and warmth in their parenting (Figure 1).

This was conducted for coherence defined conservatively and liberally. Informed by previous analyses, child age, household size, and income were controlled for in these analyses. The assumption of homogeneity of variance measured by Levene's test was not met for cohesion when coherence was defined conservatively or liberally, so the ANCOVA was performed using bootstrapping and untransformed raw data (Zhang, 2015).

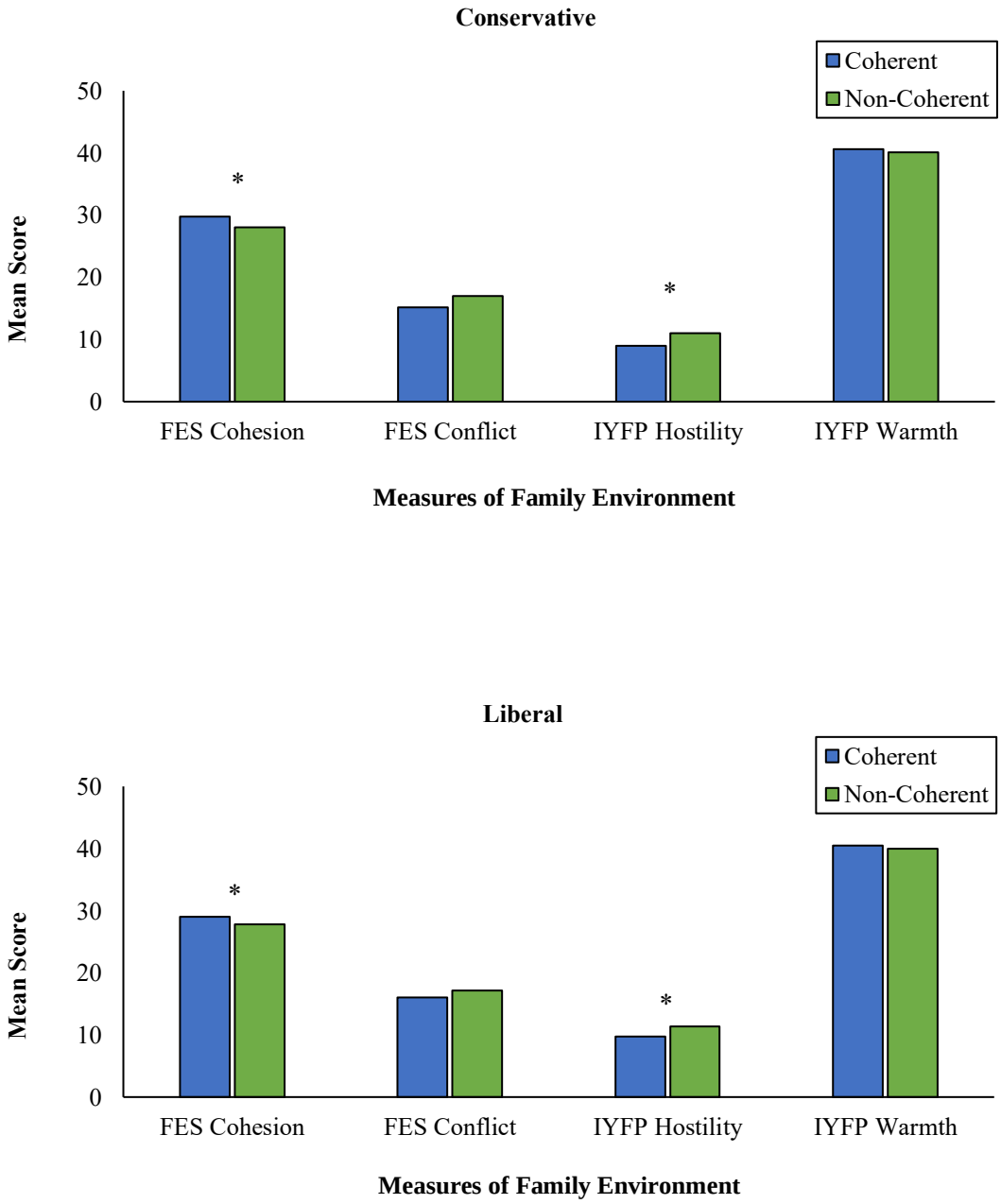
Coherent parents reported significantly more cohesion in the family environment when coherence was defined conservatively ($F(1,169) = 5.68$, $p=.018$) and liberally ($F(1,169) = 4.06$, $p=.045$).

There was no significant difference between reported levels of conflict in the family environment for coherent and non-coherent parents, whether defined conservatively ($F(1,169) = 2.77$, $p = .098$) or liberally ($F(1,169) = 1.41$, $p = .237$). Observed differences in conflict were in the direction hypothesised, with coherent parents reporting less conflict in the family environment than non-coherent parents, for both conservative and liberal definitions of coherence. Overall, these results provide partial support for hypothesis two, in that there was evidence for family environments being more cohesive in coherent parents, but there were no significant differences in reported levels of conflict between the coherent/non-coherent groups.

Non-coherent parents reported significantly higher levels of hostility in their parenting when coherence was defined conservatively ($F(1,169) = 6.31$, $p = .013$) and liberally ($F(1,169) = 6.06$, $p = .015$). There was no significant difference in reported parental warmth towards their child, whether coherence was defined conservatively ($F(1,169) = .72$, $p = .398$) or liberally ($F(1,169) = .00$, $p = .948$). Warmth scores were very skewed towards parents reporting high warmth, which might account for the lack of observed differences. Overall, there was partial support for hypothesis three in that coherent parents reported more hostility in their parenting, but no significant group difference was found for warmth.

Figure 1

Parental Coherence Defined Conservatively and Liberally for Parent-Reported Family Environment/Parenting



*p<0.05. **p<0.01.

Parental Coherence and Child Behavioural and Social Adjustment (Hypothesis 4)

Individual ANCOVAs compared coherent and non-coherent parent and teacher reports of children's behavioural and social adjustment (Figure 2). These analyses were conducted for coherence defined conservatively and liberally. Informed by previous analyses, child age, gender and verbal IQ, household size, income, maternal education years, and nationality were controlled for. The assumption of homogeneity of variance measured by Levene's test was not met for teacher ratings of child prosocial behaviour when coherence was defined conservatively, so the ANCOVA was performed using bootstrapping and untransformed raw data (Zhang, 2015).

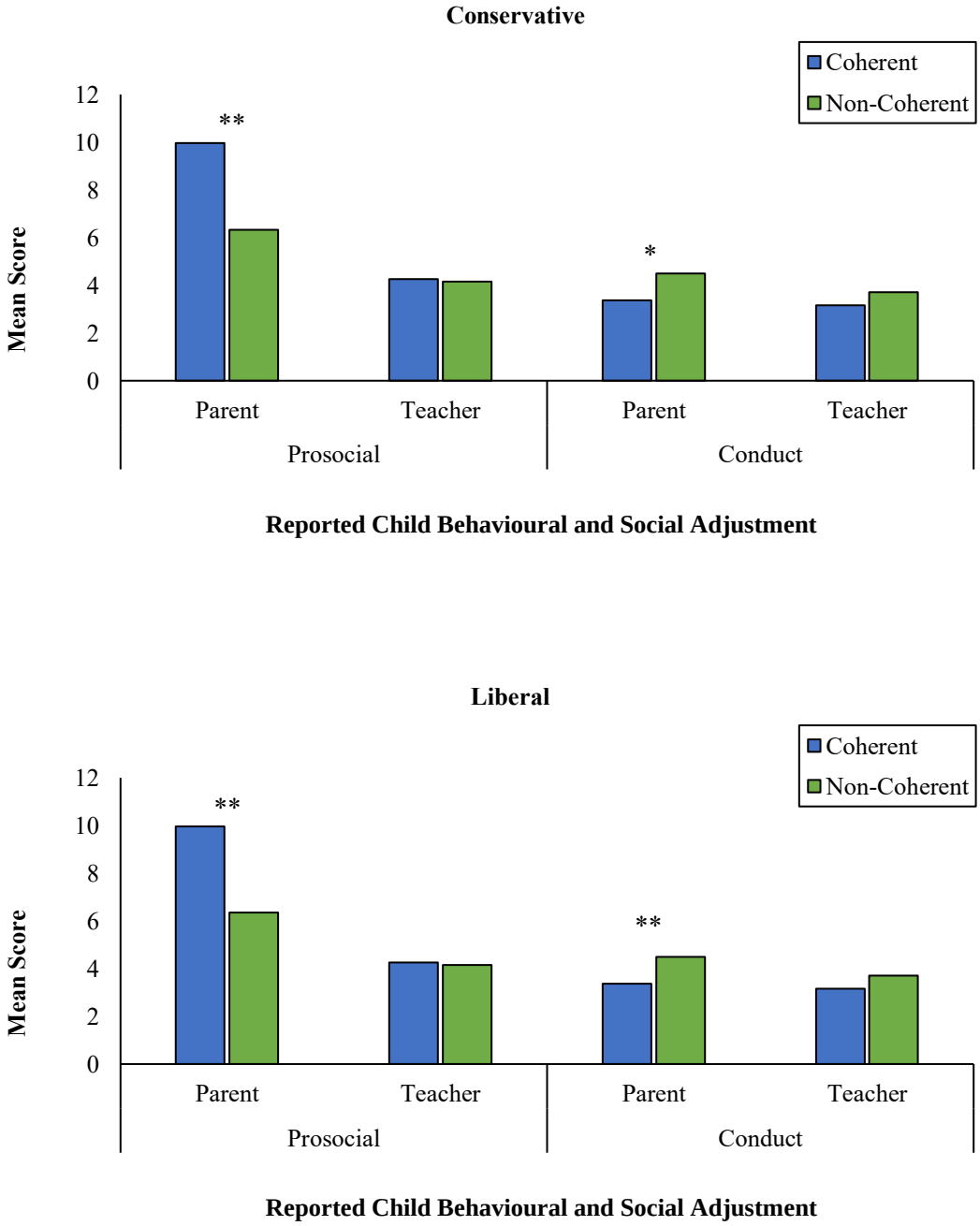
Coherent parents reported significantly more child prosocial behaviour whether coherence was defined conservatively ($F(1,165) = 7.88$, $p = .006$) or liberally ($F(1,165) = 11.20$, $p = .001$). There were no significant differences between teacher-reported child prosocial behaviour for coherent and non-coherent parents, whether defined conservatively ($F(1,165) = 1.18$, $p = .279$) or liberally ($F(1,165) = .47$, $p = .496$).

Parent-reported child conduct problems were significantly lower in coherent parents when coherence was defined conservatively ($F(1,165) = 3.94$, $p = .049$) and liberally ($F(1,165) = 7.64$, $p = .006$). There were no significant differences between teacher-reported child conduct problems, whether defined conservatively ($F(1,165) = 1.09$, $p = .298$) or liberally ($F(1,165) = .48$, $p = .491$).

Overall this provides partial support for hypothesis four, in that children of coherent parents had significantly lower conduct problems and higher prosocial behaviour based on parental reports. However, there no significant differences found in teacher reports, but the direction of differences (albeit small) echoed those found in parents.

Figure 2

Parental Coherence Defined Conservatively and Liberally and Child Behavioural and Social Adjustment Measured by the SDQ



*p<0.05. **p<0.01.

Parental Coherence and Child Cognitive Empathy Abilities

Individual ANCOVAs compared children of coherent and non-coherent parents on their cognitive empathy abilities (Figure 3). These were conducted for coherence defined conservatively and liberally. Informed by previous analyses, child age and verbal IQ, household size, income, maternal education years, and nationality were controlled for in this analysis. Sample size for this analysis was reduced (N = 160) because some children in this sample were not able to complete the full FER task which was lengthy. The assumption of homogeneity of variance measured by Levene's test was not met for low intensity scores when coherence was defined liberally, so the ANCOVA was performed using bootstrapping and untransformed raw data (Zhang, 2015).

Children's ability to recognise happiness was not significantly different between children of coherent and non-coherent parents, whether defined conservatively ($F(1,152) = .49$, $p = .485$) or liberally ($F(1,152) = .10$, $p = .756$). Children's ability to recognise anger was not significantly different between children of coherent and non-coherent parents, whether defined conservatively ($F(1,152) = .00$, $p = .968$) or liberally ($F(1,152) = .11$, $p = .747$). Children's ability to recognise high intensity emotions was not significantly different between children of coherent and non-coherent parents, whether defined conservatively ($F(1,152) = .10$, $p = .747$) or liberally ($F(1,152) = .01$, $p = .939$).

Children's ability to recognise sadness was not significantly different between children of coherent and non-coherent parents, when defined conservatively ($F(1,152) = 2.39$, $p = .124$). However, the difference was marginally significant in the expected direction when coherence was defined liberally ($F(1,152) = 3.82$, $p = .052$).

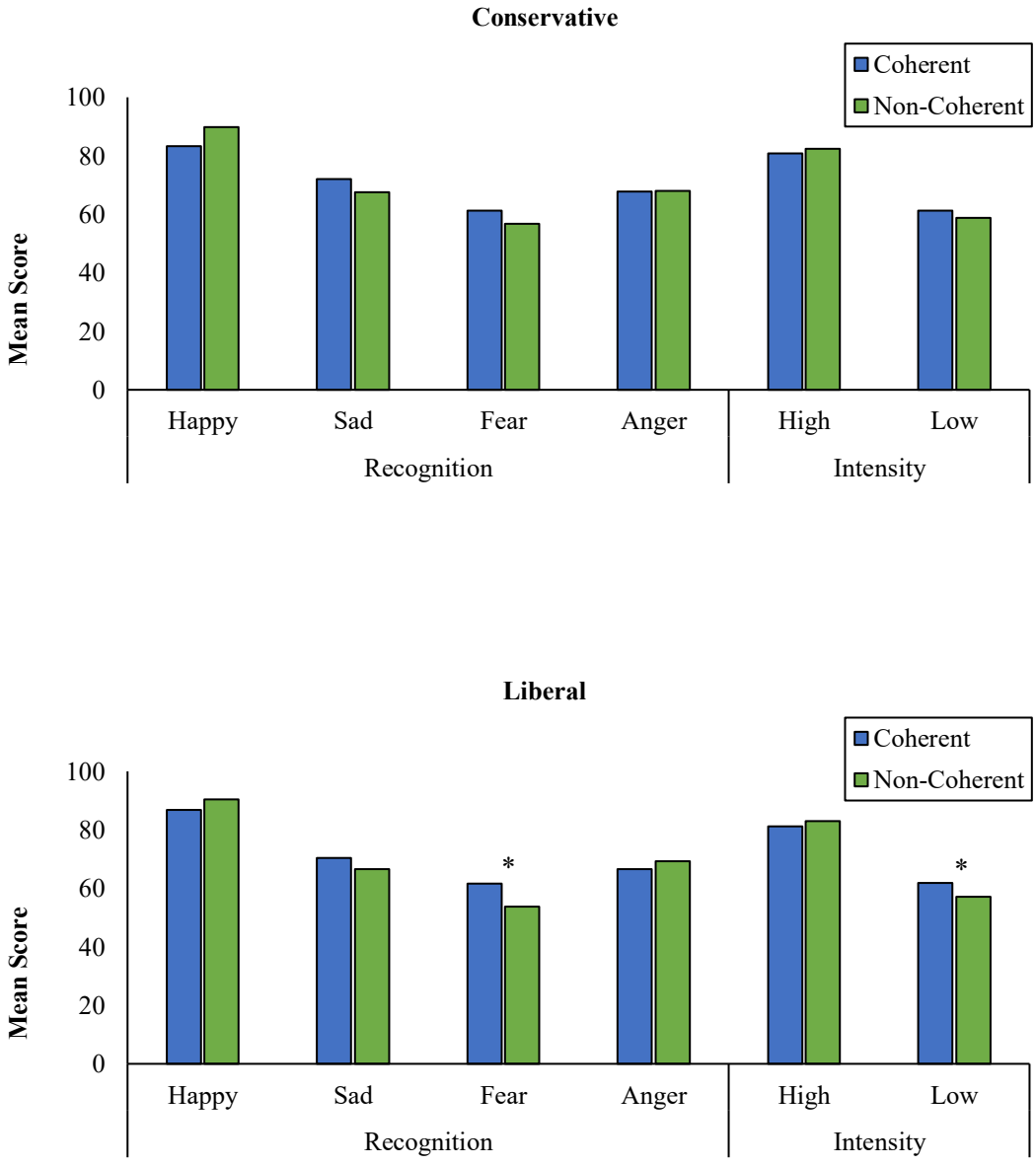
Children's ability to recognise fear was significantly better in children of coherent parents when defined liberally ($F(1,152) = 5.54$, $p = .02$), but not when defined conservatively

($F(1,152) = 1.30$, $p = .256$). Children of coherent parents were also better at recognising low intensity emotions when coherence was defined liberally only ($F(1,124) = 6.29$, $p = .013$).

Overall, results provide partial evidence for hypothesis five in that lower parental coherence would be associated with children having poorer empathic abilities in the areas of sadness and fear recognition.

Figure 3

Parental Coherence Defined Conservatively and Liberally and Child Cognitive Empathy Abilities



*p<0.05. **p<0.01.

Discussion

This study sought to further validate the FMSS-Coherence, as a brief and cost-effective measure of the parent-child relationship. In contrast to previous research utilising non-referred community-based samples, the validity of FMSS-Coherence was investigated in a school-referred sample in the UK, deemed at risk of developing child psychopathology. The FMSS-Coherence was validated in relation to parent reports of the family environment and parenting quality, parent and teacher reports of child behavioural and social adjustment and child cognitive empathy abilities. Results were presented with a conservative definition of coherence in accordance with author guidelines (Sher-Censor & Yates, 2010), and for the first time in the literature, also a liberal definition of coherence. This novel inclusion of a liberal definition of coherence was in response to potential issues of statistical power related to the low number of coherent parents in this referred sample, and facilitated a more comprehensive exploration of the FMSS-Coherence construct.

Prevalence of Parental Non-Coherence in an At-Risk Sample

In line with hypothesis one, prevalence of non-coherent parents was higher in this sample of children referred for emotional or behavioural difficulties, compared with prevalence of non-coherence in community/non-referred samples previously reported. This is consistent with existent research linking lower FMSS-Coherence with child emotional and behavioural difficulties (e.g., Sher-Censor et al., 2018; Sher-Censor & Yates, 2015). This finding was based on observed prevalence, not formal tests.

Coherence and the Family Environment

In line with hypothesis two, significantly more cohesion was perceived in families of coherent parents for both liberal and conservative definitions of coherence. This finding was obtained after controlling for relevant covariates (child age, verbal IQ, household size, and household income). Lower reports of family cohesion by non-coherent parents is consistent

with attachment theory (Belsky & Fearon, 2002; Fearon & Belsky, 2011), as one can deduce that attuned parents facilitate more cohesive family environments. FMSS-Coherence could therefore reflect a parent's ability to provide attuned parenting.

Non-coherent households had more perceived conflict in comparison to coherent households, but as this difference did not reach significance, hypothesis two was only partly supported. The lack of significant difference could be explained by the fact that even in secure attachment relationships, conflict is a normal and important process where children learn skills in conflict resolution (Eisenberg, 1992). Past research has also shown non-coherent parents may be more likely to give less accurate reports in questionnaire measures (Sher-Censor & Yates, 2015), and that self-reports of negative behaviours are more likely to trigger social desirability bias in parents of young children (Bornstein et al., 2015). So conflict may have been under-reported by non-coherent parents in an attempt to avoid negative evaluation in the assessment. The observed trend that non-coherent households had more perceived conflict is also in line with attachment theory, as we would expect coherent parents to be more balanced and attuned to their child's needs, thereby reducing risk of conflict.

In line with hypothesis three, non-coherent parents reported significantly more hostility in their parenting whether defined conservatively or liberally. This finding was obtained after controlling for relevant covariates (child age, household size, and income). In line with attachment theory, more hostile parenting in non-coherent parents may reflect inflexible and insensitive thinking about their child's behaviour and needs (Oppenheim, 2006). This provides evidence for the validity of the FMSS-Coherence as an attachment-related measure. Unmet childhood needs are likely to perpetuate behavioural and adjustment difficulties, especially in the presence of emotional unavailability (Sturge-Apple et al., 2006).

No significant differences were found in parent-reported warmth between coherent/non-coherent groups, hence hypothesis three was partly supported. Absence of difference in

reported parental warmth between coherence groups could potentially be explained by social desirability bias, as warmth ratings were highly positively skewed across the sample, thereby minimising the likelihood of group differences being found.

Parental Coherence and Child Behavioural and Social Adjustment

In line with hypothesis four, when controlling for child age, gender, verbal IQ, household size, family income, maternal education level and nationality, coherent parents reported significantly more prosocial behaviour when defined both conservatively and liberally. Consistent with attachment theory, this finding echoes previous FMSS-Coherence research observing fewer reports of behavioural problems in young children of coherent mothers (e.g. Sher-Censor & Yates, 2015). However, significant differences were not found in teacher reports, hence hypothesis four was partly supported.

After controlling for covariates, parents reported significantly more conduct problems in their children if they were non-coherent, whether defined conservatively or liberally. This is in line with previous research finding fewer behavioural difficulties in children of coherent mothers when reported by mothers (Sher-censor et al., 2018). However significant differences between coherence groups was not evident in teacher reports of child conduct problems, in contrast to some past research (e.g., Sher-Censor & Yates, 2015).

These results offer some support for the predictive validity of parental FMSS-Coherence in relation to child behavioural and social adjustment, but due to the cross-sectional design of the study causation cannot be inferred. In addition, significant findings were found in parental-reported behaviour only, which is more subjective and prone to bias than teacher reports. As the sample was originally referred by teachers for concerns about emotional or behavioural problems, there was likely to be lower variability in teacher ratings of child adjustment, hereby reducing the likelihood of significant effects being found, compared to other studies utilising community samples.

Parental Coherence and Child Cognitive Empathy Abilities

In line with hypothesis five, after controlling for child age, verbal IQ, household size, family income, maternal education level and nationality, there were no significant differences in child cognitive empathy comparing children of coherent and non-coherent parents defined conservatively. However, when coherence was defined liberally, children of coherent parents performed significantly better when recognising a fearful emotional expression, thus demonstrating superior cognitive empathy for fear. This pattern was also reflected in children's ability to recognise sadness, although the difference was marginally significant. Interestingly, children of coherent parents were significantly better at recognising the subtlety of facial emotional expressions at low intensity but not better at recognising other emotions such as happiness or anger, or high intensity expressions.

These findings offer partial evidence that children of have better cognitive empathy for the emotions particularly important for prosocial behaviours, in line with the VIM model (Fido et al., 2017). In line with attachment-informed predictions, increased cognitive empathy for fear in children of coherent parents provides some evidence for the validity of the FMSS-Coherence as an attachment-informed measure, as it could reflect superior emotional learning in children with coherent, emotionally responsive and attuned parents.

Strengths and Limitations

This is the first study to use the FMSS-Coherence measure in a sample outside of North America or Israel, and explore its validity as an attachment-informed measure against a range of different measures in an at-risk sample without ID. This is the first study to use a conservative and liberal definition of coherence with the FMSS-Coherence measure, which could facilitate future adaptations of the measure for use in clinical populations. The study attempted to control for many potential confounding variables such as maternal education and nationality, strengthening conclusions regarding any significant findings. However, there is the

possibility that the context of the teacher-referred assessment may have resulted in child difficulties being emphasised by parents in order to facilitate access to support, or difficulties being minimised to avoid judgement and unwanted intervention. Analysis was conducted by researchers independent to the developers of the measure, minimising experimenter bias.

The absence of healthy control group limits the generalizability of findings to a similar at-risk population, and therefore the study can only conclude how children with behavioural difficulties of coherent and non-coherent parents differ from each other, and not the general population. However, absence of a control group reduces probability of detecting significant effects in statistical analyses, due to potentially lower variability in dependent variables scores. Therefore, significant differences found in relation to parental coherence are more likely to represent valid findings, but due to the statistical analysis used in this study, findings can only describe the difference and cannot inform causality. An important covariate not included in this study is maternal psychopathology, which could also contribute to observed child emotional and behavioural difficulties and more negative home environment (Bayer, et al., 2006; Connel & Goodman, 2002).

Measures of the family environment and parenting were limited to parental self-report, and can only reflect parental perceptions of the family emotional climate or their own parental attitudes. Child behaviour did not differ significantly when reported by teachers, which was in contrast to significant differences found between parental-reported child behaviour depending on coherence status, which is more prone to bias (Sher-Censor & Yates, 2015).

Clinical Implications

Due to the low prevalence of coherent parents in this at-risk sample, a novel liberal definition of coherence was developed to explore the construct of FMSS-Coherence. The pattern of results between conservatively and liberally defined coherence differed most notably when examining the difference between parental coherence and corresponding child cognitive

empathy abilities, as significant findings were only associated with liberal definitions of coherence. This highlights the possibility that criteria for coherence using the FMSS-Coherence could be too strict for at-risk samples, where prevalence of non-coherence is higher than in general population samples used in previous research conducted by the author (e.g. Sher-Censor et al., 2013).

To capitalise on the clinical applicability of the FMSS-Coherence as a brief and cost-effective measure of the parent-child relationship, the measure must be sensitive enough to capture differences in coherence in at-risk samples, as they are more likely to seek support and intervention from services (Hodgkinson et al., 2017) . The approach of defining coherence in alternative ways, is in line with recent author recommendations (Sher-Censor, 2019) suggesting that future research could look at associations with different FMSS-Coherence score distributions. Further understanding of the construct could lead to the FMSS-Coherence being used in clinical practice to investigate parental attitudes, their ability to be attuned and meet their child's needs, and inform psychological formulations of child difficulties (Sher-Censor, 2019). Despite being brief and cost-effective in comparison to other measures of the parent-child relationship, the time required for training, transcription, and coding of the transcripts means this measure may not be suitable for some clinical settings. However, there is potential for the measure to be useful in child care proceedings to assess the parent-child relationship. Continued research using the FMSS-Coherence could assist in the development of parenting interventions to increase coherence, and it can be used to evaluate the efficacy of such interventions.

Research Implications

To increase the generalizability of findings, further research is needed to build upon the evidence-base for the validity the FMSS-Coherence measure in countries other than the UK, America and Israel, using clinical and non-clinical populations (Sher-Censor, 2019). Research

is needed to compare results from the FMSS-Coherence with and without approved prompts outlined by Caspi et al. (2004).

Given that measures of the family environment and parenting warmth/hostility were self-reported in this study, further research is needed to investigate the validity of the FMSS-Coherence as an attachment-based measure using objective and multi-informant measures of family environment and parenting quality.

The cross-sectional design of this study can only infer association and not causation. Therefore, future focus on longitudinal studies would be beneficial in investigating the predictive validity of the FMSS-Coherence measure in relation to child behavioural and social adjustment, and facilitate clinical utility of this measure. The use of multi-informant objective measures for child behaviour and social adjustment could strengthen the validity of findings. Research comparing the FMSS-Coherence measure to the Insightfulness Assessment from which it was developed (Koren-Karie & Oppenheim, 2004) is needed to build on evidence for its clinical applicability and attachment-informed basis, as an absence of nuance in the measure has been acknowledged (Sher-Censor & Yates, 2015; Sher-Censor 2019).

An important covariate to consider is parental psychopathology, as it is well documented to have detrimental effects on child emotional and behaviour development (Breaux et al., 2014; Connell & Goodman, 2002). Motivation to emphasise or minimise child emotional and behavioural difficulties must be considered depending on the context of the assessment (e.g. Calam & Peters, 2006), and the impact of this on FMSS-Coherence explored. Future research is needed to further investigate the potential association between parental non-coherence and disruption in the development of child cognitive empathy, which can be a contributing factor in observed behavioural difficulties in children (van Goozen, 2015).

Conclusion

This study investigated the validity of the FMSS-Coherence, as a recently developed attachment-based measure of the parent-child relationship. It is the first study to utilise a school-referred sample at risk of psychopathology to investigate the prevalence of FMSS-Coherence in children with existing emotional and behavioural difficulties. We provide some evidence for the validity of the FMSS-Coherence, in terms of coherence having low prevalence in this at-risk sample, and coherence being related to parental-reports of higher family cohesion; lower parental hostility; increased child prosocial behaviour; less child conduct problems and in relation to superior child cognitive empathy. However, expected relationships between coherence and lower family conflict, higher parental warmth and teacher-reported child social/behavioural adjustment were not found. Further research must build upon the evidence-base for the validity of this brief cost-effective measure in order to better understand its utility as a brief attachment-informed measure of the quality of the parent-child relationship in research and clinical practice.

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Appendices

Appendix A: Author Guidelines for the International Journal of Behavioural Development

1. What do we publish?

1.1 Aims & Scope

Before submitting your manuscript to International Journal of Behavioral Development, please ensure you have read the Aims & Scope.

1.2 Article Types

The *International Journal of Behavioral Development* publishes empirical, methodological, theoretical, and review papers on human behavioural development. The journal welcomes submissions from all disciplines. As an international journal, special emphasis is placed on geographical diversity in participants and authors.

All papers must have a developmental focus. Manuscripts with multiple methods or informants are encouraged. Longitudinal or experimental designs are recommended. Manuscripts that concern a comparison between countries or (sub)cultures must be motivated by a clear theoretical and developmental rationale. Studies whose sole purpose is to replicate well-established developmental phenomena in different countries or (sub)cultures are not typically published in the *International Journal of Behavioral Development*.

Manuscripts that are under review elsewhere will not be considered for publication. The introduction to the manuscript should note if the manuscript is one of several papers derived from the same dataset. A cover letter to the Editor that indicates what is new and unique about the manuscript should accompany a submission derived from a large dataset.

Papers. Empirical papers should describe findings of the highest scientific quality that represent an original contribution to the literature on human behavioural development. The theoretical, practical, and/or scientific implications of the main findings must be clearly articulated. Multiple sample or multiple study replications are encouraged. Submissions should be no longer than 8,500 words, all inclusive. Longer submissions will not be considered without prior approval from the Editor.

Reports. Empirical reports may include any of the following: single sample studies; cross-sectional studies; studies with practical implications; and studies designed to test one or two straightforward hypotheses. Empirical reports may also be used for studies of timely importance. Empirical reports may describe failure to replicate, so long as they include large samples, preferably from multiple studies. The methods and results should be reported in full; the statement of purpose and the discussion should be brief and concise. To ensure the fastest possible dissemination of results, empirical reports will not be subjected to multiple rounds of review. Action Editors will make a publication decision on the basis of a single set of peer reviews. Submissions should be no longer than 4,500 words, all inclusive.

Reviews. Review articles should provide integrative summaries of empirical research. Alternatively, a review article may provide a conceptual overview of a topic, toward the goal of advancing a new theory or framework for understanding developmental mechanisms or a developmental phenomenon. Submissions should be no longer than 10,500 words, all inclusive. Longer submissions will not be considered for review without prior approval from the Editor.

Methods and Measures. Methodological articles should focus on issues related to instrumentation, design, or statistical analysis of research on human behavioural development. Formats include brief and full-length primers on cutting edge developmental methodologies, instrument development and validation, presentations of new methodologies, expert guidance on using advanced methodologies, and empirical studies that illustrate unique advances in statistics or measurement. Manuscripts should be written for an audience of developmental scholars. The Editor of the Methods and Measures section is Todd D. Little (yhat@ttu.edu). Submissions should be between 1000 to 6000 words, all inclusive. Online support materials are encouraged and should be fully annotated.

1.3 Writing your paper

The SAGE Author Gateway has some general advice and on how to get published, plus links to further resources.

1.3.1 Make your article discoverable

When writing up your paper, think about how you can make it discoverable. The title, keywords and abstract are key to ensuring readers find your article through search engines such as Google. For information and guidance on how best to title your article, write your

abstract and select your keywords, have a look at this page on the Gateway: How to Help Readers Find Your Article Online

2. Editorial policies

2.1 Peer review policy

The International Journal of Behavioral Development adheres to a double-blind reviewing policy in which the identity of both the reviewer and the author are concealed. Before sending a manuscript out for review, two Editors screen each submission to determine whether it is a good match for the journal and whether it is competitive for publication. At this point, a manuscript is either returned without review or assigned to an Action Editor. The initial screening will be completed within two weeks of submission, to allow authors of returned manuscripts to quickly resubmit to a more suitable publication outlet. Approximately 30% of manuscripts are returned without review.

Manuscripts deemed suitable for review are forwarded to an Action Editor, who is responsible for the review process, including soliciting reviewers and making a final determination as to whether to accept a manuscript for publication. Authors with manuscripts that receive a full review should expect a decision within 10 weeks of the submission date. The journal accepts, on average, 25% of all submissions for publication.

2.2 Authorship

Papers should only be submitted for consideration once consent is given by all contributing authors. Those submitting papers should carefully check that all those whose work contributed to the paper are acknowledged as contributing authors.

The list of authors should include all those who can legitimately claim authorship. This is all those who:

- Made a substantial contribution to the concept or design of the work; or acquisition, analysis or interpretation of data,
- Drafted the article or revised it critically for important intellectual content,
- Approved the version to be published,
- Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content.

Authors should meet the conditions of all of the points above. When a large, multicentre group has conducted the work, the group should identify the individuals who accept direct responsibility for the manuscript. These individuals should fully meet the criteria for authorship.

Acquisition of funding, collection of data, or general supervision of the research group alone does not constitute authorship, although all contributors who do not meet the criteria for authorship should be listed in the Acknowledgments section. Please refer to the International Committee of Medical Journal Editors (ICMJE) authorship guidelines for more information on authorship.

2.3 Acknowledgements

All contributors who do not meet the criteria for authorship should be listed in an Acknowledgements section. Examples of those who might be acknowledged include a person who provided purely technical help, or a department chair who provided only general support.

Please supply any personal acknowledgements separately to the main text to facilitate anonymous peer review.

2.4 Funding

International Journal of Behavioral Development requires all authors to acknowledge their funding in a consistent fashion under a separate heading. Please visit the *Funding Acknowledgements* page on the SAGE Journal Author Gateway to confirm the format of the acknowledgment text in the event of funding, or state that: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

2.5 Declaration of conflicting interests

International Journal of Behavioral Development encourages authors to include a declaration of any conflicting interests and recommends you review the good practice guidelines on the *SAGE Journal Author Gateway*

3. Publishing Policies

3.1 Publication ethics

SAGE is committed to upholding the integrity of the academic record. We encourage authors to refer to the Committee on Publication Ethics' International Standards for Authors and view the Publication Ethics page on the SAGE Author Gateway

3.1.1 Plagiarism

International Journal of Behavioral Development and SAGE take issues of copyright infringement, plagiarism or other breaches of best practice in publication very seriously. We seek to protect the rights of our authors and we always investigate claims of plagiarism or misuse of published articles. Equally, we seek to protect the reputation of the journal against malpractice. Submitted articles may be checked with duplication-checking software. Where an article, for example, is found to have plagiarised other work or included third-party copyright material without permission or with insufficient acknowledgement, or where the authorship of the article is contested, we reserve the right to take action including, but not limited to: publishing an erratum or corrigendum (correction); retracting the article; taking up the matter with the head of department or dean of the author's institution and/or relevant academic bodies or societies; or taking appropriate legal action.

3.1.2 Prior publication

If material has been previously published it is not generally acceptable for publication in a SAGE journal. However, there are certain circumstances where previously published material can be considered for publication. Please refer to the guidance on the SAGE Author Gateway or if in doubt, contact the Editor at the address given below.

3.2 Contributor's publishing agreement

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3.3 Open access and author archiving

International Journal of Behavioral Development offers optional open access publishing via the SAGE Choice programme. For more information please visit the SAGE Choice website. For information on funding body compliance, and depositing your article in repositories, please visit *SAGE Publishing Policies* on our Journal Author Gateway.

4. Preparing your manuscript for submission

4.1 Formatting

The preferred format for your manuscript is Word. LaTeX files are also accepted. Word and (La)Tex templates are available on the Manuscript Submission Guidelines page of our Author Gateway. Please use double spacing throughout the manuscript.

4.2 Artwork, figures and other graphics

For guidance on the preparation of illustrations, pictures and graphs in electronic format, please visit SAGE's *Manuscript Submission Guidelines*

Figures supplied in colour will appear in colour online regardless of whether or not these illustrations are reproduced in colour in the printed version. For specifically requested colour reproduction in print, you will receive information regarding the costs from SAGE after receipt of your accepted article.

4.3 Supplementary material

This journal is able to host additional materials online (e.g. datasets, podcasts, videos, images etc) alongside the full-text of the article. For more information please refer to our guidelines on submitting supplementary files.

4.4 Reference style

International Journal of Behavioral Development adheres to the APA reference style, that is, the Publication Manual of the American Psychological Association (7th Ed.). View the APA guidelines to ensure your manuscript conforms to this reference style and please ensure APA is applied throughout the manuscript.

4.5 English language editing services

Authors seeking assistance with English language editing, translation, or figure and manuscript formatting to fit the journal's specifications should consider using SAGE Language Services. Visit SAGE Language Services on our Journal Author Gateway for further information.

5. Submitting your manuscript

International Journal of Behavioral Development is hosted on SAGE Track, a web based online submission and peer review system powered by ScholarOne™ Manuscripts. Visit http://mc.manuscriptcentral.com/ijbd to login and submit your article online.

IMPORTANT: Please check whether you already have an account in the system before trying to create a new one. If you have reviewed or authored for the journal in the past year it is likely that you will have had an account created. For further guidance on submitting your manuscript online please visit ScholarOne Online Help.

5.1 ORCID

As part of our commitment to ensuring an ethical, transparent and fair peer review process SAGE is a supporting member of ORCID, the Open Researcher and Contributor ID. ORCID provides a unique and persistent digital identifier that distinguishes researchers from every other researcher, even those who share the same name, and, through integration in key research workflows such as manuscript and grant submission, supports automated linkages between researchers and their professional activities, ensuring that their work is recognized.

The collection of ORCID iDs from corresponding authors is now part of the submission process of this journal. If you already have an ORCID iD you will be asked to associate that to your submission during the online submission process. We also strongly encourage all co-authors to link their ORCID ID to their accounts in our online peer review platforms. It takes seconds to do: click the link when prompted, sign into your ORCID account and our systems are automatically updated. Your ORCID iD will become part of your accepted publication's metadata, making your work attributable to you and only you. Your ORCID iD is published with your article so that fellow researchers reading your work can link to your ORCID profile and from there link to your other publications.

If you do not already have an ORCID iD please follow this link to create one or visit our ORCID homepage to learn more.

5.2 Information required for completing your submission

You will be asked to provide contact details and academic affiliations for all co-authors via the submission system and identify who is to be the corresponding author. These details must match what appears on your manuscript. At this stage please ensure you have included all the required statements and declarations and uploaded any additional supplementary files (including reporting guidelines where relevant).

5.3 Permissions

Please also ensure that you have obtained any necessary permission from copyright holders for reproducing any illustrations, tables, figures or lengthy quotations previously published elsewhere. For further information including guidance on fair dealing for criticism and review, please see the Copyright and Permissions page on the SAGE Author Gateway

6. On acceptance and publication

6.1 SAGE Production

Your SAGE Production Editor will keep you informed as to your article's progress throughout the production process. Proofs will be sent by PDF to the corresponding author and should be returned promptly. Authors are reminded to check their proofs carefully to confirm that all author information, including names, affiliations, sequence and contact details are correct, and that Funding and Conflict of Interest statements, if any, are accurate. Please note that if there are any changes to the author list at this stage all authors will be required to complete and sign a form authorising the change.

6.2 Online First publication

Online First allows final articles (completed and approved articles awaiting assignment to a future issue) to be published online prior to their inclusion in a journal issue, which significantly reduces the lead time between submission and publication. Visit the SAGE Journals help page for more details, including how to cite Online First articles.

6.3 Access to your published article

SAGE provides authors with online access to their final article.

6.4 Promoting your article

Publication is not the end of the process! You can help disseminate your paper and ensure it is as widely read and cited as possible. The SAGE Author Gateway has numerous resources to help you promote your work. Visit the Promote Your Article page on the Gateway for tips and advice.

7. Further information

Any correspondence, queries or additional requests for information on the manuscript submission process should be sent to the International Journal of Behavioral Development editorial office as follows:

Managing Editor, Dr. Donna Marion: IJBDeditor@gmail.com

Appendix B: Systematic Review Search Terms

Expressed emotion search terms	AND	Maternal search terms
Expressed emotion (mapped to subject headings) OR Expressed emotion.mp. (mp= title, abstract, heading word, table of concepts, key concepts, original title, tests & measures, mesh)		Mothers (mapped to subject headings) OR Mother.mp. (mp= title, abstract, heading word, table of concepts, key concepts, original title, tests & measures, mesh) OR Maternal.mp. (mp= title, abstract, heading word, table of concepts, key concepts, original title, tests & measures, mesh) OR Mothers.mp. (mp= title, abstract, heading word, table of concepts, key concepts, original title, tests & measures, mesh) OR Parent*.mp. (mp= title, abstract, heading word, table of concepts, key concepts, original title, tests & measures, mesh) OR Parental.mp. (mp= title, abstract, heading word, table of concepts, key concepts, original title, tests & measures, mesh)

Appendix C: Systematic Review Inclusion and Exclusion Criteria

	Include	Exclude
Participants	Studies of children or adolescents	Studies of adults Studies on children or adolescents in a specific diagnostic group or clinical sample
Study design	Longitudinal Studies Cohort studies	Meta-analysis Systematic review Randomised controlled trial Case-control study Cross sectional study Case reports or studies Ideas, editorials or opinions Dissertations Animals studies
Intervention	Studies in which participants receive no therapeutic intervention in the study period	Studies in which participants receive a therapeutic intervention during the study
Outcomes	Studies which assess the relationship between maternal EE and child or adolescent emotional/behavioural outcomes	Studies which do not assess the relationship between maternal EE and child or adolescent emotional/behavioural outcomes Studies where outcome is in adulthood Studies where FMSS is conducted in late adolescence/adulthood
Measures	Studies which use the FMSS to measure maternal EE	Studies which do not measure maternal EE using the FMSS Studies that use self-report measures of maternal EE Studies which have no maternal measure of EE (e.g. reports combined/mixed parental EE, paternal EE) Studies that investigate just emotional overinvolvement (EOI)

Appendix D: Critical Appraisal Skills Programme for Cohort Studies

Removed due to Copyright

Appendix E: Family Environment Scale (FES; Moos & Moos, 1994) Cohesion and Conflict Subscale Questions

Removed due to copyright

Appendix F : IYFP Family Interaction Rating Scales for Hostility and Warmth

Removed due to copyright.

Appendix G : Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997) Parent and Teacher Versions

Removed due to copyright.

Appendix H : Verbal IQ Information Sheet

NDAU Task Information Sheet
Verbal Reasoning

What is Verbal Reasoning?

Verbal reasoning involves the ability to use words and language to think, such as comparing or contrasting, using verbal memory for facts or descriptions, expressing an opinion, or problem solving. Children with good verbal reasoning ability are thought to do well in curriculum areas that necessitate fluent verbal thinking, such as English, history and modern languages.

How does the NDAU measure Verbal Reasoning?

In the NDAU we measure verbal reasoning through a software programme called Lucid Ability, which uses colourful games and tasks to engage the child. It has been standardised and norm referenced. This means that we can compared the scores of a child against these of children of the same age and highlight how they are performing at this stage of their development.

The task that a child will do at the centre will depend on their age. Children aged 4-6 receive the Picture Vocabulary test (see Figure 1). In this test five pictures appear on the screen in random positions. One is the target picture and the other four are distractors. The child is given audio instructions: “Which picture goes best with the word …?” and has to click on the chosen picture.

Children aged 7 will receive the Link Word task (See Figure 2). In this task two pictures are presented on the screen and separated by six words. The child’s task is to identify the word that provides the best conceptual link between the two pictures: For example, in Figure 2 the pictures are of a bottle of milk and a piece of cheese. Out of the six words on the list, the best word that links these pictures conceptually is ‘dairy’. If the child wishes, the computer will speak the words when they are clicked on, so reading competence is not necessary.

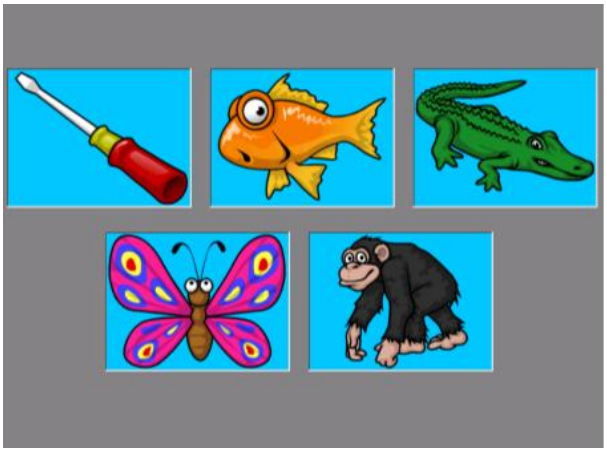


Figure 1. Picture Vocabulary

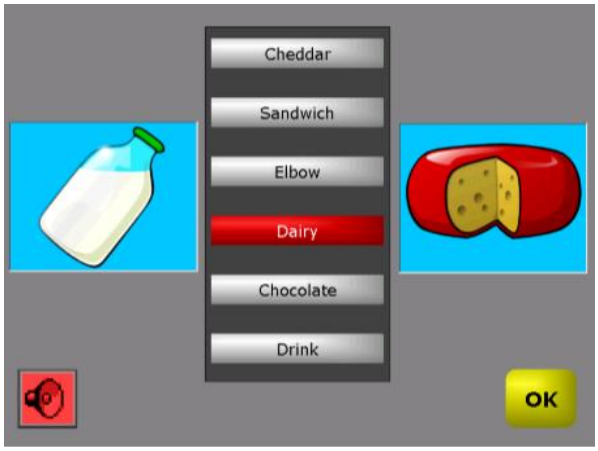


Figure 2. Link Word Task

Appendix: I Facial Emotion Recognition Task Information Sheet

NDAU Task Information Sheet
Facial emotion recognition

What is facial emotion recognition?

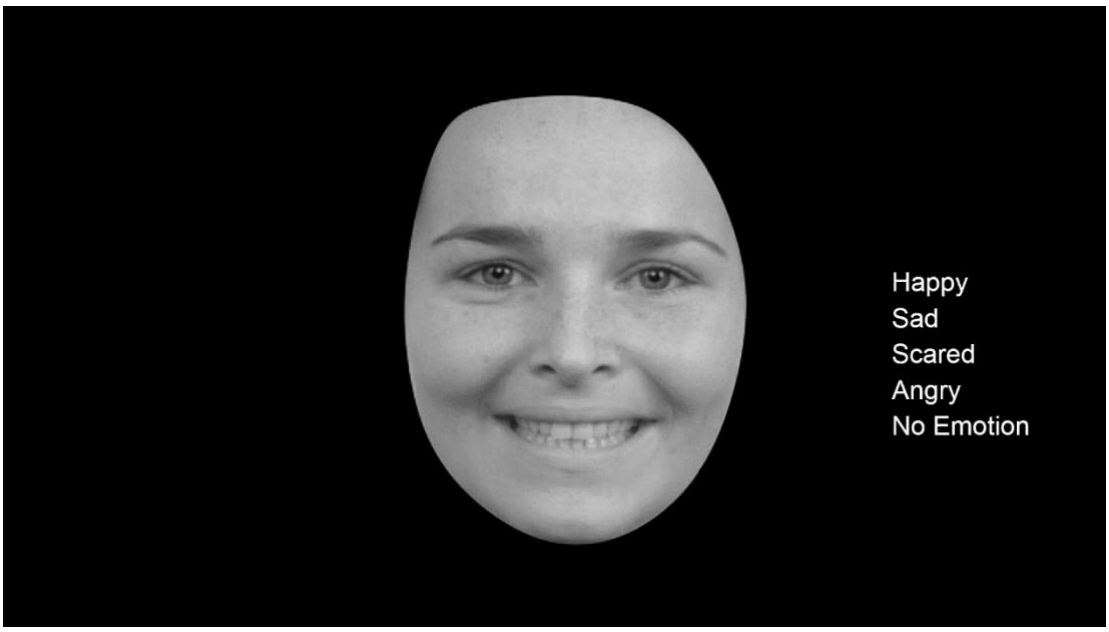
Emotions like happiness or sadness are associated with specific emotional expressions. The ability to accurately identify these facial expressions develops and improves throughout childhood, aiding our understanding of other's feelings. This accurate understanding of the expressions of others is important for appropriate social communication, and so is critical for everyday functioning. Difficulties in identifying facial expressions can have negative consequences on an individual's ability to understand or relate to other's emotions, interfering with the ability to engage in appropriate social behaviour and to maintain friendships.

How does the NDAU measure the ability to recognise facial emotion?

The NDAU measure an individual's ability to recognise facial emotion through presenting the child with different facial expressions and asking them to identify how that person is feeling.

The child is presented with images of different male and female faces, either displaying expressions of happiness, sadness, fear, anger or no emotion. The child is asked to identify how that person is feeling. The intensity of the expression also varies from more subtle to overt facial expressions of emotions.

Many children have completed this task, and so we can compare each child's ability to recognise facial emotions to the performance of children of a similar age in order to determine their developmental progress.



Appendix J: Ethical Approval

From: psychethics <psychethics@cardiff.ac.uk>
Subject: Ethics Feedback - EC.16.10.11.4592GRA5
Date: 5 July 2018 at 10:34:22 BST
To: Stephanie Van Goozen <VangoozenS@cardiff.ac.uk>

Dear Steph,

The Ethics Committee has considered the amendment to your Staff project proposal: A Feasibility Study of a Neurodevelopmental Disorders Assessment Unit (EC.16.10.11.4592GRA5).

The amendment has been approved on the condition that a comment is added to the information, stating that if a child shows distress the monitor can be removed immediately.

Please note that if any changes are made to the above project then you must notify the Ethics Committee.

Best wishes,
Mark Jones

School of Psychology Research Ethics Committee

Cardiff University
Tower Building
70 Park Place
Cardiff
CF10 3AT

Tel: +44(0)29 208 70360
Email:
psychethics@cardiff.ac.uk
http://psych.cf.ac.uk/aboutus/ethics.html

Prifysgol Caerdydd
Adeilad y Tŵr
70 Plas y Parc
Caerdydd
CF10 3AT

Ffôn: +44(0)29 208 70360
E-bost:
psychethics@caerdydd.ac.uk

Appendix K: NDAU Parent Consent Form

Neurodevelopment Assessment Unit
Cardiff University Centre for Human Developmental Science
School of Psychology
Cardiff. CF10 3AT

thewaterloofoundation

CUCHDS

STUDY CONSENT FORM

(for parents of children aged 4-7 years)

This is to be completed by parents/care-givers on behalf of their child and themselves.

Please initial box

1. I confirm that I have read and understood the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my participation and that of my child is voluntary and that I am free to withdraw at any time without giving any reason, without my legal rights being affected. ☐
3. I am happy for the research team to make contact with me if there are any future research studies that might be of interest to me. ☐
4. I agree for my child to perform the developmental assessments as part of the study named above, including measuring my child's heart-rate. ☐
5. I agree to complete the parental interview and questionnaires as part of the study named above. ☐
6. I understand that relevant sections of my child's data collected during the study (including my ratings about my child on the Strengths and Difficulties Questionnaire) may be looked at by individuals from the NDAU study team, from regulatory authorities or by my child's referring agent, where it is relevant to their taking part in this research. I give permission for these individuals to have access to my child's data. ☐
7. I understand that an assessment report of my child's strengths and difficulties will be sent to the referring agent to guide their intervention with my child within the school environment. I understand that I do not receive a copy of this report. ☐
8. I understand that a video recording will be made of my child's assessments for research, safety and training purposes. I understand that brief clips from the video may be used to illustrate important aspects of child development, and to train new researchers, and so such clips may be shown to students or at professional meetings. I give consent for such clips to be taken from this video record, with the understanding that my name or my child's name will never be associated with the video clip. I understand that the video will remain in the possession of Prof. Van Goozen and the NDAU research team, and will never be given to other unauthorised individuals. ☐

9. I agree that assessment can be linked to routinely collected, anonymised datasets (such as those held in the Secure Anonymised Information Linkage [SAIL] databank), in order to answer future questions related to mental health. I understand that the data within any such dataset will be fully anonymised and my child would not be identifiable in any way. ☐

_____	_____	_____
Name of parent	Date	Signature
_____	_____	_____
Name of person taking consent	Date	Signature

The information provided will be held in compliance with GDPR regulations. Cardiff University is the data controller and Matt Cooper is the data protection officer (inforequest@cardiff.ac.uk). The lawful basis for processing this information is public interest. This information is being collected by Professor Stephanie van Goozen.

The information on the consent form will be held securely and separately from the research information. Only the researcher will have access to this form and it will be destroyed after 7 years.

The research information you provide will be used for the purposes of research only and will be stored securely. Only members of the NDAU research team will have access to this information. After 7 years the data will be anonymised (any identifying elements removed) and this anonymous information may be kept indefinitely or published.

Appendix L : FMSS-Coherence Training Plan

FMSS-Coherence Training Plan

Week Before Session 1
Trainer to send manual to trainee. Trainee to prepare questions if needed.

Session 1
Trainer to go through manual and allow discussion about the main principles of the coding scheme.
Homework for trainee: Code 2 transcripts (1a, 1b); enter scores onto shared excel file (link to be given in due course) at least one day before the next training session.

Session 2
Discussion of homework coding transcripts. Look at comparison between trainee's coding scores and the author's coding scores. Particular focus on scales that are different from the author's codes.
Homework for trainee: Code 3 transcripts (2a-c); enter scores onto shared excel file at least one day before the next training session.

Session 3
Discussion of homework coding transcripts. Look at comparison between trainee's coding scores and the author's coding scores. Particular focus on scales that are different from the author's codes.
Homework for trainee: Code 3 transcripts (3a-c); enter scores onto shared excel file at least one day before the next training session.

Session 4
Discussion of homework coding transcripts. Look at comparison between trainee's coding scores and the author's coding scores. Particular focus on scales that are different from the author's codes.
Homework for trainee: Code 3 transcripts (4a-c); enter scores onto shared excel file at least one day before the next training session.

Session 5
Discussion of homework coding transcripts. Look at comparison between trainee's coding scores and the author's coding scores. Particular focus on scales that are different from the author's codes.
Agree plan of coding NDAU tapes.

Appendix M: NDAU Note-making Strategies for the FMSS-Coherence

NDAU: Strategy for Reading through FMSS Transcripts for Coherence Coding

The strategy here is to have a system of making notes which in most likelihood will help improve reliability within and between raters.

Use two coloured pens so that when marks are made on the side you can underline the relevant part of the text in the same colour so that you know what you are referring to. Just use one mark for one segment of text even if that text involves more than one line.

Right hand side of transcript

This side of the transcript will be for notes to help make judgements about the balance of positive and negative comments and the degree of elaboration in each area (key information for the Elaboration, Acceptance and Complexity codes).

Ng, Nt or Ps Denotes new negative or neutral, positive information without elaboration e.g., "he is smart"). Example of a neutral would be "she likes princesses".

Ng+, Nt+ or Ps+ Denotes new negative or positive comment with mild elaboration (e.g., "He is smart. He is above his age level in reading").

Ng++, Nt++ or Ps++ Denotes new negative or positive comment with more detailed elaboration (e.g., "He is smart. Like the other day his older brother was struggling with his homework and then TC went to sit with him and showed him how to do it").

H, S, R Denotes giving examples in different contexts (**H**ome, **S**chool and **R**elationships).

Left hand side of transcript

Foc Refers to minor evidence of lack of focus, subtle/minor (e.g., use of "they" or "them"), or brief shift to another topic.

Foc+ Refers to more major evidence of lack of focus (e.g., parent talking in detail about their work routine without reference to the child).

Con1 **[If more than one area of concern, label subsequent areas as Con2, Con3 etc…]** Refers to an instance of the parent being concerned about a child. If the same concern arises again, make another mark by that part of the text. It is important to know how many times the same concern appears for coding.

Con1+ The same as above but a "+" is added when the parent also expresses a lack of expressed confidence in the child's or caregiver's coping ability.

Rej/Rej+ Minor/strong remark indicating lack of acceptance

Acc Remark showing acceptance of challenging behaviour of child

BD/BD+ Major or minor remark(s) suggesting boundary dissolution

End of transcript

For coding for Complexity:

A) Portraying a multidimensional picture of the child (range of characteristics, behaviours and feelings regarding the child) as well as various contexts (home, school, different relationships).
B) Presenting balanced picture of the child, ie Balanced (mostly positive but also referring to some negative aspects) vs Unbalanced (e.g., only positives, or overly negative).
C) Providing vivid examples from everyday life that supports the statements.

Note: A parent with a high score on Complexity is likely to also have a high score on Elaboration. However, a score can be high on Elaboration (many descriptions/adjectives) but low on Complexity (descriptions point to varied aspects of the child's behaviour, in different, contexts, balanced, with vivid examples).