Empathy and violence in

Schizophrenia

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By

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"The important thing is not to stop questioning…"

<div align="right">Albert Einstein</div>

Dedication

This thesis is dedicated to:

Pamela Taylor, who has always believed in me and she has been a great source of support and inspiration.

My beloved family and friends, who have always unconditionally loved me and supported me.

ACKNOWLEDGMENTS

ABSTRACT

Background: Associations are recognised between impaired empathy and schizophrenia and, separately, violence, but a systematic literature review revealed little exploration of the three-way relationship. The *Interpersonal Reactivity Index* (IRI), widely used in such research, has been psychometrically established only with healthy students, so I tested it in my sample. My main aim was to examine the relationships between empathy and violence among schizophrenic men.

Hypotheses: Among them, empathy would be 1) more impaired in the schizophrenic group with more serious violence and 2) stable over time.

Methods: Participants were hospital inpatients in South Wales or Bristol. Sample size was estimated from prior empathy and violence studies. Inclusion criteria were diagnosis of schizophrenia, or similar psychotic disorders; exclusion criteria primary developmental disorders or specific empathy interventions. Competent, consenting men were interviewed up to three times over three months. Assessments included the *IRI,* which encompasses cognitive empathy – perspective taking and fantasy - and affective subscales – empathic concern and personal distress; the *Comprehensive Psychopathological Rating Scale* (CPRS), *Maudsley Assessment of Delusions Scale* (MADS) and modified *Gunn-Robertson Criminal Profile* violence subscale. Additional clinical and socio-demographic variables were obtained from records.

The IRI was evaluated using principal component analysis (PCA). Correlations between IRI scores and violence relationships, using different violence thresholds, and all other variables were examined, using Pearson Spearman tests for parametric and non-parametric variables respectively. Empathy stability was tested by repeated measures ANOVA. SPSS v 22 was used throughout.

Results: Eighty-five men, (83%) of 102 eligible, mean age 39.6 years (SD= 12.7) and average illness length 15 years (SD= 10.5), completed the IRI at least once; 44 (52%) had been seriously violent; 43 completed the IRI three times.

PCA confirmed similar structure to the original IRI, but after excluding 10 items, yielding an 18-item 'Modified IRI' (MIRI).

Empathy scores were no different between men who had taken/seriously threatened another's life and the minimally/non-violent. Cognitive subscale scores were, however, significantly lower in the ever than the never interpersonally violent. Depression and substance misuse history were each significantly correlated with empathy scores, but multivariate analysis was not possible given small cell sizes.

Empathy subscale scores were stable over time, regardless of violence history; new violent incidents were rare.

Discussion: The shorter MIRI, with good psychometric properties, helps patients who find the original IRI confusing, but needs testing in a more heterogeneous sample.

My hypothesis of impaired empathy: most serious violence association was not sustained, but cognitive empathy impairment may explain any interpersonal violence.

Illness chronicity may explain temporal stability of IRI self-ratings. Longitudinal studies with more diverse samples are recommended.

LIST OF ABBREVIATIONS

Abbreviation-Name**………………………………………...**First page of appearance

TABLE OF CONTENTS

PART I: INTRODUCTION

CHAPTER 1. THE CONTEXT FOR INVESTIGATING SCHIZOPHRENIA, EMPATHY AND VIOLENCE

1.1 Schizophrenia and violence

Schizophrenia is a serious mental illness that may impair the ability to think, feel and act. Throughout the world it is one of the most common psychiatric disorders, with a prevalence of about 4 per 1000 in the general population (Saha et al., 2005). Among the many social problems associated with schizophrenia is a higher rate of violence than would be expected by chance. Early reviews were not clear on this point because of the tendency to study samples selected either on the basis of illness or criminal offending (Taylor, 1982; Monahan & Steadman, 1983), but later population based studies left little doubt about a small but significant *association* (Fazel et al., 2009). More recently, some confusion has been raised on this point because of claims from *longitudinal, population based prediction* studies, which do not demonstrate this relationship (e.g. Elbogen & Johnson, 2009), but neither take account of intervening treatment, clearly shown to be a relevant factor in one large prisoner cohort (Keers et al., 2014).

Most studies take a broad view of violence as physically aggressive behaviour by one person against another person, but it is worth emphasising that rates of violence even at the most serious levels are higher among people with schizophrenia. A worldwide and long list of national studies of an association between schizophrenia or other psychoses and homicide confirms that 5-10%

of homicides are committed by people with such diagnoses (Taylor & Estroff, 2014).

Given an association between violence and both psychosis generally and schizophrenia more specifically, it is important to try and understand this. Some understanding has come from longitudinal, population based studies. In the small (1037) but impressively retained (96% at age 26) Dunedin birth cohort of 1972/3, for example, the two most prominent explanations for the association between schizophrenia spectrum disorders and violence were psychotic symptoms in childhood and childhood behavioural/lifestyle problems (Arseneault et al., 2000).

Substantial adult patient cohort studies confirm at least two routes towards serious violence in the context of psychosis: an unremarkable childhood followed by an onset of the illness in late teens or early 20s, in which case symptoms of psychosis are prominently associated with violence; and a disrupted childhood with at least some evidence of early conduct or affective disorder, in which case symptoms seem much less likely to be associated with violence (Taylor et al., 1998).

These studies raise the question of probable comorbidity of psychosis and personality disorder in some cases, and some researchers, using recognised assessments of personality, have shown an increased rate of personality disorder among people with psychosis (e.g. Moran et al., 2003). It is important

here, however, to consider that personality change may occur when psychosis follows a deteriorating course.

Substance misuse is a likely confounding factor. The first substantial population based study (Swanson et al., 1990) has clearly demonstrated that while the risk of violence in the context of psychosis alone may be 4-7 times higher than in the general population, the risk escalates to about 30 times when alcohol and/or drugs are involved as well. Prescribed medication, by contrast, appears to reduce the risk (Swanson et al., 1996; Keers et al., 2014).

A history of trauma inflicted by others in childhood is common among people with schizophrenia (Read et al., 2005). Little is known about how this fits in the pathway to violence in the context of schizophrenia, but there is a suggestion that it may be through predisposing the trauma victim to further traumatic experiences before the breakdown into violence (Swanson et al., 2006).

In spite of these important pointers, there is clearly no one fully satisfactory explanation of the association between violence and psychosis. An important consideration is that most violence requires some degree of interpersonal exchange. That is not to say that the victim of violence necessarily provokes the assault, although that may happen, but rather that some unidentified interactional factor between the two protagonists may be important.

When people are violent, it is generally more common for this to occur within their social circle than against strangers, which was even more striking in a

cohort of high security hospital patients with psychosis (Johnson & Taylor, 2003).

Is there something about schizophrenia that may affect the ability to deal with interpersonal exchange? Impairment in empathy may play a role here.

There has been substantial interest in measuring empathy in schizophrenia and studies have been consistent in finding generalised impairment in empathy among people with schizophrenia (Montag et al., 2007; Bora et al., 2008; Derntl et al., 2009; Achim et al., 2011; Lee et al., 2011; Haker et al., 2012; Smith et al., 2012).

1.2 What is empathy and does its impairment play a role in violence?

First, I will consider the concept of empathy and its main components, then measurements of empathy. I will also provide evidence for an association between empathy and violence.

1.2.1 What is empathy and what are its core components?

There have been many definitions of empathy, illustrating that empathy is far from being a simple concept. Nevertheless, there is some consensus on its components and mechanisms involved. It has been suggested that the primary function of empathy is to help individuals form and maintain lasting and stable social bonds (Preston & De Waal, 2002).

Empathy refers to the capacity to recognise, feel and understand the state of mind of others by being able to imagine what it is like to experience that state, including what the other person is thinking and feeling, and to generate an appropriate response to those experiences. It is, effectively, the ability to put oneself in the position of the other whilst remaining conscious of what belongs to oneself and what to the other.

Empathy is considered to have two main components – a cognitive component and an emotional one. The cognitive component of empathy refers to the ability to imagine and understand another person's thoughts, intentions and, to an extent, emotions. The ability to share some experience of the other's emotional state and to generate an appropriate emotional response to it is known as emotional empathy.

These cognitive and emotional components are related to each other and difficult to disentangle, but they may be experienced independently by an individual (Baron-Cohen & Wheelwright, 2004).

Throughout the literature the components of empathy have often been examined in isolation from each other – for example only as a cognitive process (Hogan, 1969), or just as an emotional experience (Meharabian & Epstein, 1972; Hoffman, 1984). Some authors (Miller & Eisenberg, 1988) refer to empathy as the "vicarious experience" of emotions of others (feel what the other is feeling) or an "as if" experience (Gallese, 2008).

The phenomenon of empathy and its components is supported by evidence of two different brain mechanisms being activated, the first in relation to cognitive empathy – the Theory of Mind (ToM), and the second to emotional empathy – the mirror neuron system (MNS). Although these brain areas do not invariably participate in the empathic experience, impairment in either of them may impair empathic communication.

Theory of Mind (ToM) explains how we imagine, infer and understand others' perspectives, emotions, beliefs and intentions. Illustrative of the difficulty in summarising the situation succinctly, some authors refer to affective theory of mind when it involves understanding others' emotions (Shamay-Tsoory et al., 2007) and cognitive theory of mind when it involves inferring and understanding thoughts or intentions.

The neural mechanism supporting Theory of Mind includes the ventromedial prefrontal cortex and orbitofrontal cortex (for cognitive theory of mind) (Shamay-Tsoory & Aharon-Peretz, 2007; Hynes et al., 2006) and the dorsolateral prefrontal cortex and anterior paracingulate cortex, the temporo-parietal junction and inferior temporal cortex (for affective theory of mind) (Bodden, 2013; Montag et al., 2007). At present, although anatomical differences for the two processes of ToM have been suggested, there appears to be a high degree of overlap between these neuronal networks (Völlm et al., 2006).

The mirror neuron system (MNS) is involved in recognition and sharing emotions with others and generating an appropriate emotional response and concern for others. This system has been associated with limbic structures and activity in the inferior frontal gyrus (Shamay-Tsoory et al., 2009).

Whereas emotional empathy can be identified in infants, cognitive empathy is acquired during brain development in childhood and adolescence.
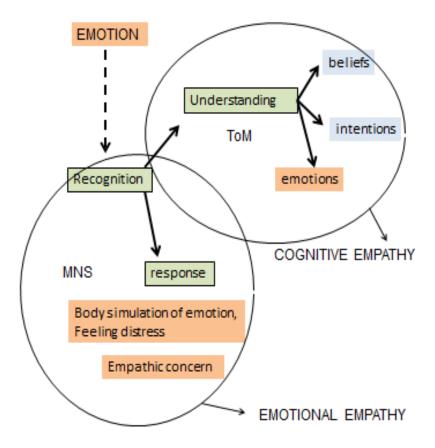
Fig. 1.1 Empathy components and brain mechanisms involved: Cognitive empathy → Understanding emotions (ToM: Theory of Mind) and Emotional empathy → Emotional recognition and emotional response (MNS: Mirror Neuron System).

1.2.2 Elements of the empathy pathways

A. Emotion recognition

A first step in the process of empathic communication consists of the recognition of independent actions, sensations and feelings in others, most commonly, although not solely, through vision. Recognition of facial emotions is an important component of the empathic process that allows socialisation. It has been hypothesised that the mirror neuron system underpins emotion recognition. One has to be able to experience such emotions oneself to be able to recognise them in others.

B. Emotion meta-representation and understanding

Being able to imagine and understand others' desires, thoughts, intentions and even emotions is known as cognitive empathy. This is known as taking other persons' perspective. For this experience, a Theory of Mind or mentalisation ability is required. Theory of Mind (ToM) has different levels of complexity that are acquired during childhood development. First order ToM refers to the ability to understand that another has a belief different from one's own. Second order ToM refers to the ability to understand that another can have a belief about a third person. Third order ToM is required in order to understand another's emotions in a specific social and emotional context.

C. Emotional responsiveness

The emotional response is generated after deducing and understanding the other's emotions in their context, without actual inner experience of the other's emotions (known as meta-representation), *or* by emotional contagion (*inner*

experience of others' emotions in which the mirror neuron system would allow us to feel what others are feeling by activation of our sensory brain areas which would simulate that emotion in ourselves*) or* after both components being involved.

The emotional response does not only refer to how we feel or how we think we would feel when recognising others' emotions but refers also to the concern for others derived from sensing their emotions and social tendencies.

Although, in general, emotional responsiveness has been considered part of emotional empathy, as explained earlier, cognitive processes may affect it, especially among adults, in whom cognitive empathy is well developed and plays a more relevant role in communication than in the infant. The context in which one experiences others' distress or the mechanisms habitually employed to cope with pain may modulate the response (Lamm et al., 2007).

All this means that it is really important that any measure of empathy incorporates the possibility of rating both cognitive and emotional components.

1.3 Does impaired empathy correlate with violence?

Capacity for empathy, as described, is likely to play a role in determining the quality of relationships between people. It seems reasonable to think that prosocial tendencies would follow from a healthy empathic experience. It is not, however, that simple. Although empathy does promote the generation of prosocial behaviour (Eisenberg, 2000), an individual with intact empathy may

nevertheless respond in an antisocial way as his/her behaviour is also influenced by his/her attitude towards the other.

There is a large amount of literature indicating a negative correlation between empathy and antisocial or aggressive behaviour- that is to say, the lower the empathy, the more likely or the more serious the violent behaviour. Following from this, and recognition that cognitive distortion may be used to avoid guilt and empathy (Gibbs, 1991), empathy training is now an established part of programmes for both violent and sexual offenders within the prison system (Beven et al., 2004). The suggested mechanism by which emotional empathy acts as an inhibitor of aggressive behaviour or violence is that accurate empathy – recognising and to an extent experiencing the unpleasant personal distress caused by the aggression - would act as inhibitor of this harmful behaviour. This idea has been supported by authors such as Feshbach (1964) and Bischof-Kolher (1991).

In line with Feshbach and Bischof-Kolher, Blair (2001) proposed a more complete model of a violence inhibition mechanism, in which the prosocial and moral socialisation would be based not only on the personal distress caused by perceiving the other's distress but also on mental representations of the acts, which caused the distress (violent acts); meaning that the pain of others and the thoughts of acts causing pain to others are found aversive, and this would also contribute to violence inhibition.

Blair's theory is congruent with Smith's hypothesis (2006) that empathic concern towards others' distress would emerge from an emotional processing mechanism that combines both emotional and cognitive networks. Blair (2005) referred to the *emotional integrative system* (Blair, 2005). It follows, although there is evidence supporting the involvement of cognitive empathy in inhibiting violence (Richardson et al., 1994), that there is also evidence that it may not be sufficient on its own in the inhibition of violence or harming behaviour. Individuals with intact cognitive empathy but dysfunctional emotional empathy might *understand* emotions in an abstract way, but as they do not *feel* them, there is no inhibition against inflicting pain or harm.

Over time, reviews and meta-analyses have been consistent in showing that there is a relationship between weak capacity for empathy and violence (Feshbach, 1978; Miller & Eisenberg, 1988; Casey & Schlosser, 1994; Davis, 1994, Jolliffe & Farrington, 2004).

The need of this thesis

This brief overview has shown that impairments in empathy have been associated separately with presentations of schizophrenia and with a higher than average risk of violence. Given the lack of a single, comprehensive explanation for the elevated risk of violence among people with schizophrenia my aim was to explore the role of impaired empathy as a candidate contributor to the relationship.

My first step was to conduct a systematic review of published studies of the relationships between schizophrenia *and* empathy *and* violence.

My second step was to select an optimal tool for measurement of empathy in the context of an extended but routine clinical examination.

My third step was to review whether the psychometrics of that tool were adequate for measurement of empathy in the two groups of interest – people with schizophrenia and people with problem violence – and to optimise the tool structure if necessary.

My final step was to explore the possibility of a relationship between schizophrenia, impaired empathy and violence in a new clinical sample of men with schizophrenia and similar psychotic disorders, some of whom had been seriously violent and some of whom had not, adjusting hypotheses about the relationship in the light of the systematic review.

CHAPTER 2. A SYSTEMATIC REVIEW OF PUBLISHED LITERATURE ON THE RELATIONSHIP BETWEEN EMPATHY, SCHIZOPHRENIA AND VIOLENCE

I searched the electronic reference databases Medline, EMBASE and PsycINFO from inception until 30th November 2011 using terms for empathy, schizophrenia and violence (key words and thesaurus in appendix 3) as detailed in the published paper (see appendix 13). Only 52 titles were identified after duplicates had been removed, confirming that this is an under-researched area, despite the promise of its component parts, as described in the previous chapter. After removing the non-empirical studies and then those which did not detail measurement of one of the key components of the enquiry, just six eligible studies could be included. Methods across these studies were too disparate to allow data pooling and meta-analysis. Sample sizes were generally small, with the smallest including 24 people, of whom 10 had been violent, and the largest 115, of whom 35 had been violent. Three of the studies measured emotional recognition, three measured cognitive empathy and one emotional responsiveness. The latter was not linked to violence, but all three emotional recognition studies found a relationship between schizophrenia and impairment in the recognition component of empathy and violence, as did two of the three cognitive empathy studies.

The published paper is incorporated as part of my thesis (see appendix 13).

The findings thus confirmed that this area of study has potential. It suggested that any new study should measure all components of empathy and draw on a sample which, unless large enough to allow for potential confounding, for

example by substance misuse, should be as homogenous in presentation as possible. Some attempt at longitudinal evaluation of empathy in the context of treatment should be attempted.

CHAPTER 3. MEASURING EMPATHY IN SCHIZOPHRENIA

My brief review of empathy in chapter 1 suggests that any useful and valid tool for measuring empathy must incorporate ratings of its cognitive and emotional components. In addition, there has been concern in the literature as to whether empathy is a state – a rather temporary condition, naturally time limited or amenable to an appropriate intervention, or a trait – rather than an enduring, personal characteristic, likely to change slowly over time, if at all.

3.1 Empathy as a personal trait

<u>Cognitive empathy</u>

Studies linking the cognitive mechanism Theory of Mind to empathy suggest that empathy is likely to be a personal trait (Langdon & Coltheart, 1999; Herold et al., 2002; Janssen et al., 2003; Brüne, 2005b). Janssen et al. (2003) also found evidence that, on a Hinting task requiring Theory of Mind, patients with schizophrenia performed similar to their first-degree relatives and both performed worse than controls.

<u>Emotional recognition</u>

There is also evidence to suggest stability of impairment of emotion recognition in schizophrenia, as measured by asking participants to rate facial expressions shown on a screen, throughout the different stages of the disorder (Gaebel & Wolwer, 1992; Wolwer et al., 1996; Streit et al., 1997; Addington & Addington, 1998) as well as among unaffected siblings of people with schizophrenia (Kee et al., 2004).

Bediou et al. (2007) found impairment of emotion recognition in men in a first episode of psychosis *and* in their healthy siblings. Patients had a higher degree of impairment than healthy family members, but still, a measure of occurrence across the family is more supportive of trait than state. This study also reported that the impairment found in male patients with schizophrenia was indicative of emotion processing and that it did not improve despite clinical stabilisation.

One year later, Addington et al. (2008) published a study indicating that face emotion recognition deficits were present in people at high risk of psychosis and it suggested that face emotion recognition deficit may be a vulnerability marker. Bota and Ricci (2007) even proposed impairments in empathy as indicators of a prodromal phase of schizophrenia; Wölwer et al. (1996) also identified impairments at this stage. Other evidence, however, suggests that for at least some people, capacity for empathy varies with the illness.

3.2 Empathy as a disordered state

Cognitive empathy

Several studies have shown that Theory of Mind deficits co-occur with symptoms of schizophrenia and appear to vary with the state of the illness (Corcoran et al., 1995; Frith & Corcoran, 1996; Sarfati & Hardy-Bayle, 1999; Sarfati et al. 1999; Pickup & Frith, 2001).

Emotion recognition

A number of intervention studies suggest that emotion recognition can be improved quite quickly, suggesting that, at least in some cases, the abnormality

behaves more like a state. In 2003, in a brief report, Frommann et al. showed that Training in Affect Recognition (TAR), administered to people with schizophrenia, improved performance on an affect recognition task in 7 of the 11 people in the study. Two years later, Fromman's group (Wölwer et al., 2005) presented results from a larger study of people with schizophrenia using this technique. They found that, after 12 TAR sessions, emotion recognition among people with schizophrenia had improved to similar levels compared to those of healthy controls.

Roncone et al. (2004) administered a six-month educational programme of cognitive rehabilitation to people with schizophrenia, who presented deficits in Theory of Mind and emotion recognition. There was a statistically significant improvement in both first order and second order Theory of Mind abilities as well as improvement in recognising sadness and fear.

Thus, there is evidence for each of the two positions – that empathy may be a trait and that it may be a state.

3.3 Empathy and potential mediating factors

Gender, culture and ethnicity

Literature indicates that women have higher levels of empathy than men (Batson et at., 1996; Toussaint & Webb, 2005). In a study by Rueckert & Naybar (2008), men scored significantly lower than women on an empathy questionnaire. Schulte-Rüther et al (2008) even found that women recruit areas

containing mirror neurons to a higher degree than men during both self- and other-related emotion processing in face-to-face interactions.

It has also been found that people usually achieve ratings indicative of higher emotional empathy when of the same cultural background (Soto & Levenson, 2009) and of both higher emotional and cognitive empathy when of the same ethnicity (Neumann et al., 2013).

Education and intelligence

Education has been correlated with both emotion recognition (Van der Gaag & Haenen, 1990) and cognitive empathy (Davis, 1983) in healthy, general population samples and similarly with both emotion recognition (Borod et al., 1993; Schneider et al., 1995) and cognitive empathy (Brüne, 2003) among people with schizophrenia.

Symptoms

Psychotic symptoms have been significantly correlated with cognitive empathy (Shamay-Tsoory et al., 2007a, b; Montag et al., 2007; Mizrahi et al., 2007), although any relationship between delusions and cognitive empathy deficits remains controversial, as some authors have reported negative findings (Langdon et al., 2010) whilst others have found a positive association (Harrington et al., 2005). Findings are similarly mixed for the more negative symptoms of schizophrenia; in some of the studies negative symptoms were found to be correlated with impaired Theory of Mind /cognitive empathy (Frith, 2004), and in others not (Montag et al., 2007). In a study by Shamay-Tsoory et

al. (2007), the negative symptoms of schizophrenia were found to correlate with both impaired cognitive and affective empathy. There appeared to be a likely common cause in orbitofrontal dysfunction; affective empathy was related to performance in tasks requiring dorsolateral frontal lobe functioning (social function). Some authors refer to 'disorganised' rather than negative symptoms (Langdon et al., 2002; Greig et al., 2004; Brüne, 2005b) which, in this context, may be a better description. Further, they have found more Theory of Mind impairment among those with such symptoms compared with those without.

According to neuroimaging evidence, impaired attention, working memory and lack of mental flexibility among people with schizophrenia are the key features which may affect empathic ability (Meyer et al., 2012; Grattan et al., 1994). Impaired working memory could interfere with the ability to retain and integrate information about emotions in the current social context, which could contribute to wrong perception of others' emotions and hence to an inappropriate emotional response (Smith et al., 2014).

Length of illness

Several authors (Drury et al., 1998; Sarfati et al., 2000; Brüne, 2003; Montag et al., 2007) have found a negative correlation between _Perspective taking_ according to the Interpersonal Reactivity Index (IRI), a comprehensive self-rating measure of empathic ability, and length of illness in people with schizophrenia. In other words, the longer the illness, the greater the impairment in cognitive empathy.

Antipsychotic medication

It has been suggested that the atypical antipsychotics (e.g. risperidone, olanzapine) may improve negative and cognitive symptoms in schizophrenia, and a few studies have tried to explore the role of antipsychotic medication in changing empathic abilities.

A study by Mizrahi et al. (2007) suggested that Theory of Mind performance, as measured by the Hinting Task (when the individual is asked questions to check whether he/she is able to infer real intentions behind indirect speech in a series of vignettes), correlates with negative symptoms, but improved after 2 weeks of antipsychotic treatment. It was interesting that this improvement was not associated with improvement also in reported symptoms, measured by the Positive and Negative Symptom Scale (PANSS). The authors suggested that social cognition and psychotic symptoms could correspond to different areas of the brain. Emotional recognition was improved after treatment with risperidone among patients with treatment resistant schizophrenia (Kee, Kern & Green, 1998), while olanzapine for eight weeks had a positive effect on ability to recognise emotional prosody among 14 men with treatment resistant schizophrenia (Ibarraran-Pernas et al., 2003). During the latter study, participants also showed an improvement in depressive symptoms, which the authors suggested might be the facilitator of improvement in emotional empathy through accurate interpretation of prosody.

Deficits in recognition of facial emotions are not only found in schizophrenia, but also in Parkinson's disease and depression. This suggests they may be related to dopamine dysfunction (Salgado-Pineda et al., 2005). Evidence also shows that increasing serotonin transmission in people with depression improves emotion recognition performance (Harmer et al., 2003). Moreover, dopamine has been associated with cognitive functioning in the frontal lobe; and serotonin transporter gene polymorphism correlates with amygdala emotional response to face expressions (Hariri et al., 2002).

Atypical antipsychotics target both dopamine and serotonin receptors, so might also be expected to have maximum effect (Meltzer, 1999).

Therefore, although the picture of empathy changing with antipsychotic medication is somewhat mixed and, even where improvements have been recorded, it is rarely the case that full function is achieved, there is sufficient evidence of medication affecting results of empathy testing for this to be taken into account in any new study of empathy.

3.4 Tools for measuring empathy in schizophrenia

Two main approaches have been taken to the measurement of empathy – a) systematically recording the person's relevant subjective experiences and b) responses to tests which are thought to mimic components of empathy. The latter is sometimes presented as more objective, but is nevertheless a surrogate for the construct and requires moderately elaborate equipment and individuals to be not too ill or behaviourally disturbed to participate in the experimental

paradigms. This may include emotionally provoking pictures, with individuals required to record their assessment of the emotions conveyed (Bradley et al., 1993; Lang et al., 1999), or the measurement of skin conductance in response to emotionally laden pictures (Winton et al., 1984) or words (Manning & Melchiori, 1974). Tasks may be designed to test cognitive or affective Theory of Mind.

Self-reporting of subjective experiences usually involves participants ticking responses on structured scales, whether on their own or within a supporting interview. Such scales include the *Hogan Empathy Scale* (Hogan, 1969), which only measures cognitive empathy, or the *Questionnaire Measure of Emotional Empathy* (Mehrabian & Epstein, 1972), which only measures emotional empathy. There are two questionnaires which include items related to both cognitive and emotional empathy: the Interpersonal Reactivity Index (IRI, Davis, 1980) and the Empathy Quotient (Baron-Cohen & Wheelwright, 2004). The latter was created to assess empathy specifically in people with autism.

Advantages of the IRI as self-reported measure of empathy for a sample of men
with schizophrenia, some of whom had been violent.

The IRI is possibly the most widely used self-report measure of empathy (Beven et al., 2004). It is not only a comprehensive empathy measurement tool, including both cognitive and emotional components, but with only 28 items, it is about half the length of the *Empathic Quotient (*60 items). This is a considerable advantage when, as happens with people with schizophrenia, attention span may be short and, with people who are violent, irritability is common. It has been also recommended by Polascheck & Reynolds (2001) as a useful

measure of empathy among offenders. It is quick and easy to administer and has also been widely used to test empathy among people with schizophrenia.

The assessment of the two main components of empathy incorporates two subscales for each:

- the *Perspective taking* and *Fantasy subscales* are related to cognitive empathy, and

- the *Personal distress* and *Empathic concern* subscales are related to emotional empathy.

Most studies of patients with schizophrenia demonstrate that they have lower IRI scores in *Perspective taking* and *Empathic concern* and higher scores for *Personal distress* (Montag et al., 2007; Derntl et al., 2009; Achim et al., 2011; Lee et al., 2011; Smith et al., 2012).

General cautions expressed about the use of self-rating scales apply to the use of the IRI as well. Self-awareness and insight may well be impaired in the presence of psychosis and, indeed, affect self-rater agreement on empathy measures (Lysaker et al., 2012). Bora et al. (2005) pointed out also that self-report tools measure people's beliefs about their abilities; insofar as patients recognise the purpose of the questions, certain psychotic beliefs, such as grandiose beliefs, could have a specific effect on ratings. Concerns are also inevitably expressed about simple dissimulation, although in respect of ratings of empathy, this is less clear than, for instance, ratings of moral development or treatment adherence, what constitutes 'faking good' – or even 'faking bad'.

Taking into account advantages and concerns about the self-reported empathy questionnaires, the IRI appeared to be the ideal tool for my research; however, although widely used and recommended in offending and schizophrenia populations, I decided to check its psychometrics in these populations and conducted a limited systematic review of such use.

3.5 IRI and its psychometrics in violent populations: a limited systematic review.

A literature review on the use of IRI in violent populations was conducted using the key words "interpersonal reactivity index" and "violence" with its correspondent thesaurus (violent, aggression, offending, offender, offence, criminal and prison).

The e-databases Embase since 1947, Medline since 1947 and PsycINFO since 1806 were searched, all up to the first week of July 2015. Grey literature was not searched. All published studies in English using the IRI to measure empathy in adult violent populations were eligible. A hand-searching of the reference list of the eligible articles was also carried out.

The search of the key words "IRI" and "violence" produced 252 articles. Following the addition of the key word "psychometrics" and its correspondent thesaurus, 43 references were produced.

One study was selected after screening by title and abstract: Lauterbach & Hoser (2007). Hand-searching of the reference list of the selected study produced another two relevant references (Beven et al., 2004; Ireland, 1999).

Forty two references were excluded (8 were not in adult populations, 22 did not include violent people, 36 did not use the IRI and 14 did not explore its psychometrics). All were published between 1998 and 2015.
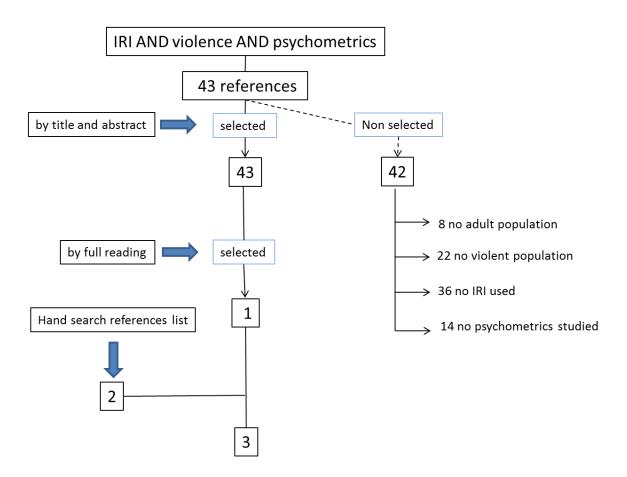
Fig. 3.4 Diagram for the systematic review IRI and violence and psychometrics

Leuterbach & Hosen (2007) tested the psychometric properties of a German version of the IRI (excluding one item from *Perspective taking* and 3 items from the *Personal distress* scales and using a 4-point instead of the 5-point scale used by Davis, to avoid a central tendency error) when testing empathy differences among 839 young adult offenders clustered according to the frequency of their violent offences. They also tested the predictive validity of this scale for future violent offending among a large sample of German prisoners. They could not validate the original German version of the IRI among these offenders, and they found IRI subscale reliability to be only moderate. Psychometric properties of the IRI were, as expected, influenced by cognitive abilities, intelligence and verbal skills. Analysis indicated that the negatively worded IRI items were not well differentiated by participants, possibly indicating poor cognitive or reading abilities. They produced a short version of the IRI without these items. This new short version of the IRI proved to be valid and reliable among prisoners, but Leuterbach & Hosen (2007) did not recommend its widespread use among offenders, in part due to the social desirability bias not having been studied, and in part because all participants were younger than average for the German prison population. They nevertheless considered that the IRI needed optimising for such populations, in particular by considering removing negatively worded items. They were not alone with respect to such recommendations (Beven et al., 2004; Ireland, 1999).

Beven et al. (2004) studied the psychometric properties of the IRI in a sample of 88 men who had committed non-sexual violent offences and were resident in an Australian maximum security prison. In this study too, the negatively worded

items or reversed items decreased the validity of the IRI. Analysis of the IRI structure for this sample, using a principal component analysis, produced three components. One component consisted mainly of the reversed items; the second consisted of all items including the word "emergency", and the third one held all the other items. Beven et al. (2004) suggested that verbal intelligence, commonly low among offenders (Blackburn, 1993), might be responsible. Use of the IRI among violent offenders was recommended, however, with caution as it may require some modification to be used reliably in such samples. The author also recommended not including the *Personal distress* subscale, given the finding of its low reliability in this sample.

Ireland (1999) studied the relationship between the IRI and bullying behaviour in a sample of prisoners and found lower reliabilities (PT = 0.70, FS = 0.64, EC = 0.43, PD = 0.52) than the ones reported in its original validation (reliabilities reported were from 0.71 to 0.77) by Davis (1980). While it is inevitable that there is some loss in psychometric values of a scale when tested in a new sample, it is striking here that the emotional empathy subscales (*Empathic concern* and *Personal distress*) were most affected – the subscales least likely to be affected by intelligence or level of education.

3.6 IRI and its psychometrics in schizophrenia: a limited systematic review

The IRI has been widely used to measure empathy among people with schizophrenia (Haker et al., 2012; Smith et al., 2012; Achim et al., 2011; Lehmann et al., 2014; Haker et al., 2009; Fujiwara et al., 2008; Montag et al.,

2007). Despite this, it is appropriate to question the reliability and validity of this scale in this population as Davis (1980) validated this scale only among college students. It is possible that other populations may have specific psychological deficits/characteristics which interfere with the scale's properties.

In order to find studies using the IRI in people with schizophrenia, a systematic review of published studies, which included the key words "IRI" and "schizophrenia" and their corresponding thesaurus, was carried out. The review was then refined by the addition of the key word "psychometrics" and its corresponding thesaurus.

As with the previous review, studies were identified from Embase since 1947, Medline since 1947 and PsycINFO since 1806, all of them searched up to the first week of July 2015. Grey literature was not searched. All published studies using the IRI to measure empathy in adult people with schizophrenia were eligible.

Seventy unique titles were found – 59 papers and 11 conference abstracts, all between 2007 and 2015. After screening by title and abstract, 44 references remained for full reading. Twenty six studies were excluded, seven of them measured the IRI, but not in schizophrenia, seven had not used the IRI to measure empathy and thirteen were neither about schizophrenia nor the IRI.
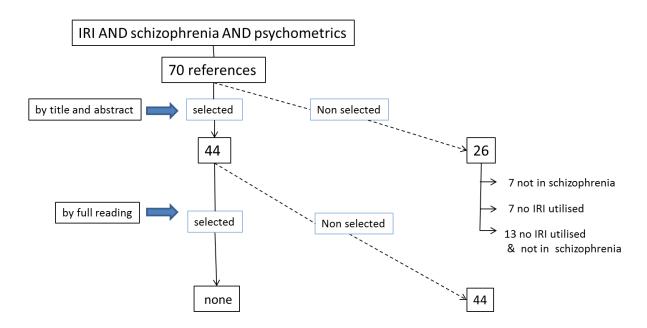
Fig. 3.5 Diagram for the systematic review: IRI and its psychometrics in schizophrenia

Of the 44 potentially eligible studies which measured the psychometrics of the IRI in people with schizophrenia, 39 were case control studies, one was a randomised control trial with schizophrenia and healthy controls, two studies were longitudinal studies; two studies validated the IRI in Taiwan and China for use with people with schizophrenia, but both were written in Chinese. There were no published studies in English (or Spanish), which measured the psychometric properties of the IRI among people with schizophrenia.

3.7 The IRI and its psychometrics in a population with schizophrenia – the need for a revised scale.

As the psychometrics of the IRI had not been investigated among people with schizophrenia in Western countries, my next step was to test those in my sample before proceeding further.

PART II: STUDY AIMS, HYPOTHESES, DESIGN AND METHODS

CHAPTER 4. AIMS, HYPOTHESES, STUDY DESIGN AND ETHICAL APPROVAL

4.1 Aims

- To explore the psychometrics of the IRI in a sample of men with schizophrenia or similar psychotic disorders;

- To explore differences in self-reported empathy among men with schizophrenia or similar psychotic disorders but different violence histories;

- To explore whether self-reported empathy changes over time among men with schizophrenia or similar psychotic disorders, taking into account history of serious violence.

4.2 Hypotheses

Primary hypotheses:

- Men with [chronic] schizophrenia or similar psychotic disorders and a history of serious violence -interpersonal violence resulting in lasting damage- will show impairment in cognitive and in affective empathy relative to men without such a history.

- Self-reported cognitive and affective empathy are stable over time in men receiving treatment for schizophrenia or similar psychotic disorders.

4.3 Empirical study: Phases I and II

The study will be conducted in two separate phases:

Phase 1: A cross-sectional design will be used to compare the empathic abilities of men receiving treatment for schizophrenia with and without history of serious violence, allowing for the nature and severity of their psychotic symptoms to be taken into consideration.

Phase 2: A longitudinal design will be used to test the stability of the empathy measure over time in the whole sample and in both serious and non-serious violent patient groups.

4.4 Ethical issues

Ethical approval: This study is embedded in a larger research multicentre longitudinal prospective study, for which the protocol was approved by the North Somerset and South Bristol Research Ethics Committee (09/MEH/4521), here acting as a Multi-Centre Research Ethics Committee within the NHS National Research Ethics Service, and by local health Boards and Trusts (see appendix 4). The original protocol did not include use of the IRI or the simple cognitive testing I wanted to employ to check for confounding intellectual ability, so a proposal was submitted to the ethics committee for a 'substantial amendment' to include these additional elements. Approval was granted.

Informed consent: Both verbal and written consent for participation (see appendix 5) in the study was sought from each potential participant. In order to ensure that the consent was fully informed, each participant was provided with preliminary written information about the study (see appendix 5). While every effort was made to keep the language as simple as possible, it was likely that some patients would have difficulty with comprehension, and perhaps some

might have had a low level of literacy, so the researcher went through the information with them orally and invited questions before taking formal consent (or refusal). It was made clear to the patient that his participation was voluntary and the decision to participate or not would not affect clinical care or legal rights. It was made clear that all data would remain confidential and not be shared with anyone outside the research team with two exceptions: if the participant reported intent to harm himself or others, this information alone would be passed on to his clinical team. Participants were also informed that their data would be anonymised and not identifiable in future published results.

Risk to the participants: Similar clinical research has previously indicated little reluctance by patients to discuss their symptoms and in particular their beliefs, and in fact most participants welcomed the opportunity to talk in confidence about their beliefs. Participants, especially those with active psychosis, might become tired during the interview and therefore be offered a break and encouraged to complete the interview later. If a participant became distressed, the clinical researcher would stop the research interview and seek to calm and reassure the participant and, if necessary, assist him in seeking support from the ward clinical team.

CHAPTER 5. METHODS

5.1. The sample

5.1.1 Sample recruitment

Potentially eligible men were sought from any of the 9 participating forensic and general psychiatric hospital in-patient units in South Wales and Bristol.

Inclusion criteria: male sex, diagnosis of schizophrenia or similar psychotic disorders, age at least 18 years, and with capacity to consent.

Exclusion criteria: *Primary* disorders of speech, language, development (including severe or moderate intellectual disability), or gross brain damage.

Identification of eligible patients and permission to approach them were first sought from the consultants in psychiatry in the selected units. This meant that only those patients who fitted the above inclusion criteria and who were deemed by the clinician in charge of their case to have the capacity to consent to research participation were approached. A meeting was then arranged with nursing staff on the psychiatric wards in order to discuss the study. We then asked staff to display a poster about the study to increase awareness among patients, provided information leaflets and asked them to facilitate the first contact with eligible participants.

A clinical researcher met each potentially eligible patient by appointment, discussed the study and left an information leaflet with him. A further appointment was then made with any patient who indicated willingness to

participate about 24 hours later in order to obtain formal written consent. Consenting men were then interviewed.

5.1.2 Sample size

None of the studies identified in the systematic review used the IRI to measure empathy in order to differentiate between seriously violent and non-seriously violent groups of people with schizophrenia. Indeed, there is no previous such study reported using any measure of empathy, so no direct estimation of the likelihood of potential IRI score differences between violent and non-violent men with schizophrenia could be made.

The Beven et al. study (2004), which used the IRI to evaluate empathic difference between violent and non-violent men, while not entirely satisfactory as it raised questions about the psychometrics, did; however, find that the instrument separated the two groups with a sample size of just 88 men.

My proposed study had, therefore, to be regarded as somewhat exploratory in a nearly new area. For a priory minimum sample size calculation for a study comparing two means for independent sample t test, the equation is

$$N = (1+1/\kappa) \, \delta^2 \, (Z_{\alpha/2} + Z_{\beta})^2 / d^2$$

where N is the minimum sample size, κ is 1, the matching ratio between the two samples, δ is the standard deviation of each group (assumed to be 1 and equal for both groups), the $Z_{\alpha/2}$ value is 1.960 for the significance conventional standards of alpha (α) =0.05 for two-tailed hypothesis, the Z_{β} value is 0.842 for a statistical power of 80%, and d is 0.67 for a moderate size effect, the

minimum expected difference between the two means. The sample would require a minimum of 35 people in each group.

Based on this, and without the advantage of being able to rely on prior studies, the sample size was calculated to be of at least 35 participants in each subsample, in total a minimum of 70 participants.

5.2 **The Measures**

5.2.1 The dependent variable: history of serious violence

Lifetime history of serious violence was rated according to the modified violence subscale of the Gunn Robertson scale (Gunn & Robertson, 1976; Wong et al., 1993). This has been used widely in previous studies both of prisoners, for whom it was originally designed, and patients with psychosis and other major mental disorders (e.g. Wong et al., 1993). This allows a scaled rating of the seriousness and/or frequency of violent incidents which takes into account the full range of recorded and reported behaviour, whether criminalised or not. In making this rating, the best documented violence (self and observer/independent reports) takes precedence, with the episode with the most serious consequences then determining the final rating following the guide in table 5.2.1. I used the scale specifically to reflect lifetime seriousness of violence.

No violence or no injury caused by violence	**0**
Threats/minor property damage, no personal injury	**1**
Minor personal injury/moderate property damage	**2**
Life or long-term health at risk (injuries might include bone fractures, permanent dysfunction, organ failure and/or any incident requiring surgical intervention); serious sexual violence, e.g. rape; serious property damage such as destruction of a room/building by fire; damage by fire if this knowingly threatened life); threats to kill if made with a weapon drawn, or repeated and explicitly serious violence	**3**
Homicide	**4**

Table 5.2.1 Guide to seriousness of violence rating

- 0 -2: no/low level violence; 3-4**:** serious violence

- For the coding for violence and an extended description of serious violence for each participant, see appendices 6 and 7 respectively.

5.2.2 The primary independent variable: Self-reported empathy

The Interpersonal Reactivity Index (IRI) is a well-established self-report measure of dispositional empathy, developed with psychology students, which captures both cognitive and affective components of empathy (Davis, 1983). It has 28 items and four sub-scales established by factor analysis: *Perspective taking* and *Fantasy scale*, which capture cognitive empathy, *Empathic concern* and *Personal distress*, emotional empathy sub-scales, which reflect affective empathy. Subscale scores range from 0 to 28 (Davis, 1983) (see appendix 8).

The IRI is easy and quick to administer with healthy people, and widely used in research. It has been used in psychiatric research, including schizophrenia research. It requires no specific training to administer or interpret. It has been

well validated and has good intra-scale and test re-test reliability in healthy groups (17); in this context, the internal reliability of each subscale ranges from 0.71 to 0.77, and test re-test reliabilities from 0.62 to 0.71 (3). Convergent validity is indicated by correlations with other established empathy scales (Davis, 1980). Sex differences probably exist, with women tending to score higher than men on each subscale (Davis, 1980).

The IRI subscales:

The *Perspective taking* (**PT**) scale measures the tendency to take the psychological point of view of others. This is akin to "Theory of Mind" (e.g. "When I am upset at someone, I usually try to 'put myself in his shoes' for a while.").

The *Fantasy scale* **(FS)** measures the tendency to get caught up in fictional stories and imagine oneself in the same situations as fictional characters in books, movies or plays. Another descriptor for it might be 'imaginative empathy' (e.g. "I really get involved with the feelings of the characters in a novel."). Again, it relies most on cognitive abilities.

The *Empathic concern* **(EC)** scale measures sympathy and concern for others (e.g. "When I see someone being taken advantage of, I feel kind of protective towards them."). This is a more emotional kind of response.

The *Personal distress* **(PD)** scale measures the kind of feelings that may get in the way of helping others, the tendency to experience distress in stressful situations (e.g. "In emergency situations, I feel apprehensive and ill-at-ease.").

The PD subscale assesses self-orientated anxiety when experiencing the distress of others.

Convergence of the four subscale scores, as they measure different constructs of cognitive and emotional empathy, is meaningless because the four subscales are not necessarily correlated (Davis, 1980, 1983; independently confirmed by D'Orazio, 2004; Albiero et al., 2006; and Eisenberg & Fabes, 1990). Nevertheless, total score has, in some previous studies, been considered an index of high or low empathy.

5.2.3 Other independent variables:

Psychiatric symptoms: The Comprehensive Psychopathological Rating Scale (CPRS) provides a highly sensitive and reliable assessment of a wide range of psychiatric symptoms. Although it may be used as a tool in cross-sectional studies, it was designed for measuring change in symptoms over time (Asberg et al., 1978). Sixty-five scaled items are accompanied by explicit definitions in non-technical language, with clearly describe scale steps. Raters must be trained in its use, but particular clinical training is not a prerequisite. Forty items are ratings of psychopathology reported by the interviewee, and the remainder are interviewer ratings of observed psychopathology, with an additional item to allow the rater to indicate their judgement of how ill the person is (the global illness rating) and another to indicate how reliable s/he considers the interview ratings to be.

The global illness rating is important because, given the comprehensive symptom inclusion, calculating a total score for the CPRS simply by summing scores on all items is meaningless. A person with, say, one wholly disabling delusion would have a total score of 3, but a person with many mild neurotic symptoms would score well into double figures. Accordingly, various subscales of the CPRS have been derived which provide greater sensitivity to change. These include the schizophrenia subscale (CPRS-SS; Montgomery et al., 1978), which includes 12 items: feeling controlled, lack of appropriate emotion, disrupted thoughts, commenting voices, depersonalisation, perplexity, inability to feel, sadness, pessimistic thoughts, other delusions, ideas of persecution and delusional mood; the negative symptoms subscale (CPRS-NS; Lindström & Lindström, 1996), which positively correlates with the Schedule for Assessment of Negative Symptoms (SANS) and includes 5 items: withdrawal, reduced speech, lack of appropriate emotions, slowness of movements and indecision; and the depression subscale (CPRS-DS; Martinsen et al., 1989), which has been strongly correlated with the self-reported Beck Depression Inventory (BDI; Martinsen et al., 1995) and includes 12 items: sadness, inability to feel, pessimistic thoughts, suicidal thoughts, worrying over trifles, indecision, inertia, concentration difficulties, failing memory, reduced sexual interest, apparent sadness and slowness of movement.

The Maudsley Assessment of Delusion Schedule (MADS; Taylor et al, *1994*) was used to measure dimensions of the belief (not necessarily recognised as a delusion by the participant), which the participant considered to be his most important belief. First, his description of this belief was recorded

verbatim, with the interviewer using neutral prompts (such as "tell me a bit more about that") to get as rich a description as possible. Content of the belief was classified according to the CPRS, but the other nine dimensions of delusion were rated using the MADS: conviction, belief maintenance factors, affective impact, delusionally driven actions, idiosyncrasy of belief, preoccupation, systematisation, insight, and response to hypothetical challenge. The interview takes around 15-20 minutes to complete.

Premorbid intelligence: The Wechsler Test Adult Reading (WTAR; Wechsler, 2001) is quick and easy to administer and score. It provides an estimate of pre-morbid intelligence and memory (assuming normal development of reading skills prior to injury or cognitive decline). The participant is asked to read out loud 50 words. Pronunciations are provided on the rater's recording form for scoring accuracy; the total score is the number of words read correctly. The WTAR has an advantage over other such tests because it was developed and evaluated simultaneously with the widely-used Wechsler Adult Intelligence Scale (WAIS–III, UK version). This co-development makes the WTAR a particularly effective method for estimating full-scale Intelligence Quotient (IQ).

General Cognitive ability:

o *Category fluency test (CFT)* takes 3 minutes to complete and uses 3 semantic categories: animals, fruits and vegetables. It measures verbal fluency, in particular the ability to generate categorical lists, processing speed of various cognitive functions including verbal memory and semantic

organisation (Bokat et al., 2003; Prescott et al., 2006; Brebion et al., 2004). The researcher asks the participant to list as many animals as possible in one minute, and to then repeat the same for fruit and vegetables. The score is the number of unique and appropriate answers per category per minute. A normal adult should be able to list at least 15 in each category in one minute.

o **_Trial Making Test, Part B (TMT-B)_** takes about 5 min to complete. It is very sensitive to brain function and measures a series of cognitive skills, including set-shifting, executive function and working memory, attention, motor and processing speed, and visuospatial scanning (Mahurin et al., 2006; Hobart et al., 1999; Crowe, 1998). Participants are asked to connect circles which appear on a sheet containing letters (A-L) and numbers (1-13) in ascending order, alternating numbers and letters without lifting the pencil from the sheet. The score is the number of seconds required to complete the task. Performance varies by age and education, and thus normative standards are used to classify performance. Errors affect the patient's score only in that the correction of errors is included in the completion time for the task.

Demographic data:

At the beginning of each baseline interview, each participant was asked a few basic demographic and historical questions. This way of starting the interview was chosen because such questions are rather neutral and provided an opportunity for the interviewer and the participant to establish rapport prior to proceeding to more difficult questions about mental state. If the patient had any difficulty in answering these questions, the interviewer moved on; the

information was then checked or, as necessary, extracted from the clinical record. Items were:

− **Age** (years)

− **Socio-economic status** (occupation of participant and parents) based on the National Statistics Socio-economic Classification (NS-SEC)*

− **Educational level** (years of education)

− **Legal Status during admission to the inpatient unit**

− **Type of institution** (Forensic, non-forensic)

− **Length of admission** (years)

*http://webarchive.nationalarchives.gov.uk/20160109040159/http://www.ons.gov.uk/ons/rel/uncategorised/classifications/new-coding-tool-enables-users-to-measure-socio-economic-status/sty-coding-tool.html

Clinical data were extracted from the clinical record. Data included:

− **Diagnostic category (ICD-10 code)**

− **Illness (psychotic disorder) duration (years)**

− **Co-morbid personality disorder (yes/no)**

− **Co-morbid depressive episode (yes/no)**

− **Co-morbid alcohol or illicit substance abuse/dependence (yes/no)**

− **Current antipsychotic treatment (name, route, dose, frequency)**

− **Social Cognition Interaction Training** (yes/no)

As extant literature suggests that social cognition interaction training (SCIT) has proved to be specifically relevant to empathy scores, we checked clinical records for evidence of such interventions, with a view to excluding participants

who had had such training. Searches confirmed, however, that none of the participants recruited had received SCIT prior to/during the study.

(See data coding in annexe 9)

5.3 <u>The procedures:</u>

<u>5.3.1 Data collection schedule, timescale and variables measured</u>

Consenting patients were interviewed on three occasions by trained clinical researchers about their psychiatric symptoms, features of their delusions and were asked to complete the TMT-B and CFT and the IRI. In the first interview only, some demographic information was collected and the WTAR was completed.

Interview One (week 0)

- CPRS
- MADS
- TMT-B, CFT
- IRI questionnaire
- WTAR

Interview Two – four weeks after interview one

- CPRS
- MADS
- TMT-B, CFT
- IRI questionnaire

Interview Three 12 weeks after interview one

- CPRS
- MADS
- TMT-B, CFT
- IRI questionnaire

Sociodemographic data were collected after the first interview from the records. Clinical data on treatment were collected after each interview.

The seriousness of reported violence represents both criminalised and non-criminalised violence. It was extracted from the records, but included any participant self-reported violence.

5.4 Data management:

Confidentiality: Any identifiable personal information, including consent forms, was stored separately from the main data in a locked cabinet and a separately encrypted electronic folder. Each participant was allocated a research number and all other data were anonymised and linked only to this. Data were entered onto an electronic database, again with individual data streams identifiable only by research number, as a continuous process following data collection. Data cleaning was performed by checking electronic entries with the paper data in all cases. The error rate was less than 2%, mostly affecting 'don't know' or 'inapplicable' ratings. Dummy descriptive analyses were then run for age and CPRS as a further check for errors. None were found.

NOTE: My participation in this project has included the design and distribution of the information leaflets to recruit participants among the participating hospitals, co-writing the study protocol, completing 70% of first interviews, 80% of second interviews and 90% of third interviews, 90% of data collection from the records, the creation of the data base and 75% of the data entering.

5.5 <u>Data analysis:</u>

The factor structure of the IRI when used with violent men with schizophrenia

A principal component analysis (PCA) was conducted with the 28 items from the original version of the IRI. Monte Carlo PCA (Watwins, 2000) was used to test the scree plot. Reliability analyses (Corrected Item-Total Correlations and Cronbach's Alpha) were conducted to allow for estimated IQ scores. For item-total correlation, Nunnally & Bernstein (1994) criteria with a cut-off score of 0.30 were used to exclude any invalid items.

Description of the sample

The Student t-test and Mann-Whitney U-test for parametric and non-parametric variables respectively were performed to compare all categorical variables; for continuous variables, correlation tests (Pearson and Spearman for parametric and non-parametric variables respectively) were calculated.

Planned hypothesis testing:

Hypothesis 1: Means and standard deviations would be calculated for each subscale score of the IRI [and of the modified version (MIRI), established by principal component analysis]. First, I proposed to test for normality of distributions; in the event of normal or non-normal distribution of scores, an independent t-test or Mann-Whitney test respectively, would then be performed to test for differences in empathy scores between the serious and less serious violent groups.

Should any empathy subscale score distinguish the serious and less serious violent groups, regression analyses would then be performed to test for possible effects of the other social and clinical variables in the relationship between violence and empathy subscales, with violence group as the dependent variable and empathy subscale score as well as with any other variable which had shown a significant relationship to violence group in the binary analyses, as independent variables.

Hypothesis 2: Again, my first step would be testing for the nature of distribution of IRI [and MIRI] scores, here the dependent variable. In the event of a normal distribution, repeated measures ANOVA would be used; in the case of non-normal distribution, the Friedman tests would be used to investigate differences in the scores of each of the IRI subscales at each data collection point (T1, T2 and T3). Regression analyses would be performed including significantly associated social and clinical variables if results indicated significant changes of empathy scores over time.

Analyses will be conducted using SPSS v. 22.

PART III: RESULTS

CHAPTER 6: PSYCHOMETRICS OF THE INTERPERSONAL REACTIVITY INDEX (IRI) IN MEN WITH SCHIZOPHRENIA AND DEVELOPMENT OF A MODIFIED VERSION OF THE IRI (MIRI)

6.1 Investigation of the psychometrics of the IRI in men with schizophrenia

6.1.1 The data collection experience

The IRI was designed as a pencil and paper self-rating scale. My patient-participants had various difficulties with this. At least a third of the participants reported finding the IRI too long and, especially when items had long sentences or negative rated sentences, reported that they struggled to understand the sentences. All the men were invited to complete the ratings independently, if they chose, but interviewers also offered to read each item to them if that was preferred. Most wanted some items read to them; a substantial minority (35%) wanted all items read. Another variation was that some patients struggled with the original rating system, which requires circling "A, B, C, D and E" on a Likert scale; they found "1, 2, 3, 4, 5" easier to follow. After the first few interviews, therefore, numerical scoring was adopted.

6.1.2 IRI completion

Among the consenting men, 85 completed the empathy questionnaire, the IRI, at least once - 81 in the first interview and four of them in the second interview. Fifty two (64%) of the 81 first interview IRI completers also completed the IRI in the second interview and, of those, 43 (82%) completed the IRI on a third interview. Four of the 81 first interview IRI completers who did not complete the

IRI at time 2 and two of the four patients who had only completed IRI at time 2 also completed the IRI at time 3. In total, 43 patients completed the IRI three times.

6.1.3 The pattern of factor loading of items

The principal component analysis, using varimax with Kaiser Normalisation, yielded a model which forced the data into four factors, corresponding with the four recognised subscales of the IRI. The rotated component matrix of the IRI converged in 6 iterations. Those items which strongly loaded to an unexpected component, or did not significantly load to the expected component, were regarded as discordant items.

The following table shows the loading pattern of each item to the four components. Next to each column of each component, the factor loading pattern of the IRI items as published by Davis (1980) is also shown. The two items (item 3 and 15), which loaded discordantly, are highlighted in blue (table 6.1.3.1). Both items were reverse-scored and part of the original *Perspective taking* subscale. Otherwise, items presented similar loading patterns to those in Davis' original study with students.

	Components							
	1 **PD**	**Davis** **PD**	**2** **EC**	**Davis** **EC**	**3** **FS**	**Davis** **FS**	**4** **PT**	**Davis** **PT**
IRI_1	0.51	-0.07	0.08	-0.17	**0.32**	**0.34**	0.13	-0.11
IRI_2	-0.00	0.05	**0.72**	**-0.66**	-0.04	-0.03	0.18	0.09
IRI_3 (-)	-0.32	0.07	0.38	0.04	0.14	-0.04	**0.05**	**-0.56**
IRI_4 (-)	0.22	-0.04	**0.59**	**0.34**	0.06	-0.09	0.11	-0.07
IRI_5	0.22	-0.05	0.03	0.01	**0.33**	**0.60**	0.21	0.05
IRI_6	**0.60**	**0.52**	0.11	-0.05	0.05	-0.01	0.00	-0.05
IRI_7 (-)	-0.07	-0.03	-0.02	0.09	**0.43**	**0.35**	-0.06	0.13
IRI_8	0.17	-0.07	0.21	0.03	-0.20	-0.04	**0.75**	**0.58**
IRI_9	0.11	-0.18	**0.49**	**-0.41**	0.10	-0.07	0.31	0.16
IRI_10	**0.67**	**0.26**	0.21	-0.27	-0.03	-0.04	0.05	-0.14
IRI_11	0.10	0.02	0.22	-0.14	0.40	-0.06	**0.40**	**0.47**
IRI_12 (-)	0.23	0.01	0.09	-0.04	**0.51**	**0.45**	0.07	-0.01
IRI_13 (-)	**0.44**	**-0.35**	0.01	0.19	0.18	0.07	0.00	0.01
IRI_14 (-)	0.11	-0.02	**0.66**	**0.60**	-0.08	-0.02	-0.00	-0.01
IRI_15 (-)	0.03	-0.03	0.38	-0.04	-0.23	-0.01	**0.07**	**-0.45**
IRI_16	0.21	0.05	0.00	0.02	**0.76**	**-0.74**	-0.00	-0.01
IRI_17	**0.75**	**0.47**	0.00	-0.08	0.18	-0.08	0.23	-0.05
IRI_18 (-)	-0.17	0.09	**0.68**	**0.39**	0.09	0.02	-0.05	-0.05
IRI_19 (-)	**0.60**	**-0.70**	-0.24	-0.06	-0.14	-0.08	-0.26	-0.02
IRI_20	0.05	-0.08	**0.61**	**-0.52**	0.23	-0.15	0.22	-0.04
IRI_21	0.02	-0.05	0.15	-0.01	-0.07	-0.04	**0.82**	**0.65**
IRI_22	-0.03	0.19	**0.51**	**-0.53**	0.28	-0.08	0.14	0.12
IRI_23	0.16	0.08	0.09	0.08	**0.78**	**-0.76**	0.03	0.12
IRI_24	**0.64**	**0.88**	0.03	0.13	0.20	0.01	-0.10	0.05
IRI_25	-0.12	0.04	0.14	-0.05	0.19	-0.02	**0.69**	**0.51**
IRI_26	0.30	0.06	0.13	0.06	**0.66**	**-0.74**	0.28	0.17
IRI_27	**0.59**	**0.77**	-0.21	0.17	0.30	-0.02	0.22	0.02
IRI_28	0.02	0.03	0.08	-0.16	0.23	-0.02	**0.74**	**0.48**

(PT=Perspective taking; EC=Empathic concern; FS=Fantasy scale; PD=Personal distress) (-) reverse-scored item. (IRI: Interpersonal Reactivity Index); (In bold items which were expected to load across the correspondent component/subscale)

Table 6.1.3.1 Factor loading pattern of IRI items in men with schizophrenia and similar psychotic disorders sample compared with original loading pattern of IRI items published by Davis (1980)

6.1.4 The Cronbach alpha coefficients

The Cronbach alpha coefficients were all above 0.7, which means that the subscales had an acceptable internal reliability when used in the schizophrenia sample. Table 6.1.4.1 shows similar coefficients for each component among men with schizophrenia and those for Davis' student sample.

	Cronbach alpha coefficient of IRI components	
	Schizophrenia sample	Davis' sample
Component 1 (PD)	0.76	0.78
Component 2 (EC)	0.77	0.72
Component 3 (FS)	0.75	0.78
Component 4 (PT)	0.71	0.75

(PT=Perspective taking; EC=Empathic concern; FS=Fantasy scale; PD=Personal distress); (IRI: Interpersonal Reactivity Index)
Table 6.1.4.1 Cronbach alpha coefficient internal reliability for the IRI in men with schizophrenia and similar psychotic disorders sample and during its validation by Davis (1980)

6.1.5 Test re-test reliability

Table 6.1.5.1 shows the intraclass correlation coefficients (ICCs) as calculated for the IRI among the men with schizophrenia, using an absolute agreement definition and average measures, and checking for the percentage of the variance mean scores for each respondent in both time 1 and time 2 interviews. ICCs of 0.7 or above are considered to be indicative of good consistency/reliability. There was evidence of minor weakness in the test re-test reliability of the *Perspective taking*, but that otherwise ICCS were strong and similar to, or slightly better than, the ICCs reported for each of the four

subscales in Davis' (1980) original analysis (*Perspective taking*= 0.61; *Fantasy scale*= 0.79; *Empathic concern*= 0.72; *Personal distress*= 0.68).

IRI subscales	Intraclass Correlation*	95% Confidence Interval	
		Lower Bound	**Upper Bound**
Perspective taking	0.60	0.29	0.77
Fantasy scale	0.68	0.45	0.82
Empathic concern	0.86	0.76	0.92
Personal distress	0.81	0.66	0.89

*This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise. ICCs obtained by Davis (1980), during validation of the IRI among university students, were: Perspective taking= 0.61; Fantasy scale= 0.79; Empathic concern= 0.72; Personal distress= 0.68. (IRI: Interpersonal Reactivity Index)

Table 6.1.5.1 IRI-subscales ICCs between time 1 and time 2 interviews in men with men with schizophrenia and similar psychotic disorders

6.1.6 Inter-correlations of the four subscales of the IRI among men with schizophrenia

Table 6.1.6.1 shows the correlations (strength of linear relationship between two variables) between the subscales for the IRI in my sample of men with schizophrenia and similar psychotic disorders, using the Spearman rho coefficient (N=79). Significant correlations were found between *Perspective taking*, the *Fantasy scale* and *Empathic concern*; and between the *Fantasy scale* and *Personal distress*. All these correlations were, however, below 0.5. This means that the correlations were not sufficiently strong to suggest that the subscales were measuring the same thing; therefore the four subscale model is reasonably well supported.

These results were different from those reported during the validation of IRI by Davis (1980). While he found a negative correlation between *Perspective taking*

and *Personal distress* and a significant positive correlation between *Empathic concern* and *Personal distress*, I did not.

	IRI Perspective taking	IRI Empathic concern	IRI Personal distress
IRI **Fantasy scale**	0.23[*]	0.27[*]	0.46[**]
IRI **Perspective taking**		0.48[**]	0.09
IRI **Empathic concern**			0.10

*$p<0.05$ **$p<0.01$; (IRI: Interpersonal Reactivity Index)

Table 6.1.6.1 IRI-subscales inter-correlations in a sample of men with men with schizophrenia and similar psychotic disorders (N=79)

6.1.7 Summary

My evaluation of the psychometrics of the IRI when used by my patient sample suggests that it is a reliable questionnaire. In particular, three subscales (*Fantasy scale, Empathic concern* and *Personal distress*) showed good internal reliability, good test re-test reliability and no concerns on the item loading pattern for each subscale. The *Perspective taking* subscale, by contrast, contained two out of seven items (3 and 15), which did not load to this subscale component as expected. Nevertheless, even for this subscale, both the internal reliability and the test re-test reliability were acceptable among men with schizophrenia and similar psychotic disorders, with only small differences from the results obtained during the original IRI validation with students.

Use of the IRI with men who have schizophrenia and similar psychotic disorders, therefore seemed appropriate for testing my hypothesis about

empathy in relation to violence in this context; but, in part because of *Perspective taking* items 3 and 15 and in part because of the difficulties in practice administering the full IRI, I decided to explore the psychometrics of a shorter version.

6.2 A Modified IRI (MIRI) for people with schizophrenia

The process of developing the Modified IRI (MIRI) (see appendix 8) among people with schizophrenia and similar psychotic disorders is fully described in the paper prepared for submission (see appendix 14). The following is a brief description of the MIRI psychometric evaluation.

6.2.1 The pattern of factor loading of items

Table 6.2.1.1 shows the pattern loading of each item for the MIRI, from principal component analysis as before. Moreover, as in my exploration of the psychometrics of the parent IRI among my patient sample, I have compared this factor pattern loading with the original one obtained from the IRI items used among students, as reported by Davis (1980). The results indicated that the items presented similar pattern loadings to the four components for both, MIRI used among men with schizophrenia and similar psychotic disorders, and the IRI used in University students for its validation by Davis (1980).

	Components							
	MIRI PD	**Davis IRI-PD**	**MIRI EC**	**Davis IRI-EC**	**MIRI FS**	**Davis IRI-FS**	**MIRI PT**	**Davis IRI-PT**
IRI_2	-0.06	0.05	**0.75**	**-0.66**	-0.00	-0.03	0.20	0.09
IRI_4 (-)	0.31	-0.04	**0.55**	**0.34**	0.03	-0.09	0.11	-0.07
IRI_6	**0.59**	**0.52**	0.14	-0.05	0.09	-0.01	-0.00	-0.05
IRI_8	0.16	-0.07	0.20	0.03	-0.07	-0.04	**0.75**	**0.58**
IRI_10	**0.65**	**0.26**	0.11	-0.27	0.05	-0.04	0.17	-0.14
IRI_12 (-)	0.17	0.01	-0.00	-0.04	**0.55**	**0.45**	0.08	-0.01
IRI_14 (-)	0.13	-0.02	**0.66**	**0.60**	-0.02	-0.02	0.07	-0.01
IRI_16	0.06	0.05	0.04	0.02	**0.80**	**-0.74**	0.00	-0.01
IRI_17	**0.73**	**0.47**	-0.02	-0.08	0.22	-0.08	0.22	-0.05
IRI_18 (-)	-0.11	0.09	**0.74**	**0.39**	0.07	0.02	-0.04	-0.05
IRI_19 (-)	**0.64**	**-0.70**	-0.28	-0.06	-0.09	-0.08	-0.24	-0.02
IRI_20	-0.03	-0.08	**0.59**	**-0.52**	0.28	-0.15	0.25	-0.04
IRI_21	0.03	-0.05	0.09	-0.01	-0.06	-0.04	**0.82**	**0.65**
IRI_23	0.06	0.08	0.11	0.08	**0.84**	**-0.76**	-0.01	0.12
IRI_24	**0.66**	**0.88**	0.01	0.13	0.28	0.01	-0.17	0.05
IRI_25	-0.11	0.04	0.11	-0.05	0.27	-0.02	**0.71**	**0.51**
IRI_26	0.20	0.06	0.09	0.06	**0.77**	**-0.74**	0.27	0.17
IRI_28	-0.01	0.03	0.08	-0.16	0.24	-0.02	**0.74**	**0.48**

(PT=Perspective taking; EC=Empathic concern; FS=Fantasy scale; PD=Personal distress) (-) inversely rated item. (In bold items expected to load the correspondent component/subscale)

Table 6.2.1.1 Factor loading pattern of MIRI items in men with schizophrenia and similar psychotic disorders and loading pattern of IRI items by Davis (1980)

6.2.2 The Cronbach alpha coefficients

The Cronbach alpha coefficients were also calculated for the four MIRI subscales in my sample of men with schizophrenia and similar psychotic disorders. They were all equal to or above 0.7, indicating that the subscales had an acceptable internal reliability when used in my sample, and the coefficients were similar to the ones obtained by Davis in the original validation of the IRI (1980) (Table 6.2.2.1).

	Cronbach alpha coefficient of IRI components	
	Schizophrenia sample	Davis' sample
Component 1 (PD)	0.70	0.78
Component 2 (EC)	0.72	0.72
Component 3 (FS)	0.78	0.78
Component 4 (PT)	0.79	0.75

(PT=Perspective taking; EC=Empathic concern; FS=Fantasy scale; PD=Personal distress); (IRI: Interpersonal Reactivity Index)
Table 6.2.2.1 Cronbach alpha coefficient for MIRI (Modified Interpersonal Reactivity Index) subscales and for IRI during its validation by Davis (1980)

6.2.3 Test re-test reliability of the MIRI

The *Empathic concern* and *Personal distress* scales, and to some extent the *Fantasy scale*, had good consistency, with ICCs above 0.7 and acceptable confidence intervals (CI); however, the ICC for *Perspective taking* was under 0.7 and the CI were large. This indicated some continuing problems with the reliability of this scale, when repeated by the same individuals over time (table 6.2.3.1). That said, the MIRI ICC for *Perspective taking* was very similar to that

in the original Davis sample (MIRI 0.59; IRI 0.61), as were the *Fantasy scale* (MIRI 0.71; IRI 0.79) and *Personal distress* (MIRI 0.72; IRI 0.68), while the *Empathic concern* scale appeared a little better (MIRI 0.83: IRI 0.72).

MIRI subscales	Intraclass Correlation*	95% Confidence Interval	
		Lower Bound	Upper Bound
Perspective taking	0.59	0.28	0.76
Fantasy scale	0.71	0.49	0.83
Empathic concern	0.83	0.71	0.90
Personal distress	0.72	0.52	0.84

*This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise; (MIRI: Modified Interpersonal Reactivity Index for schizophrenia)
Table 6.2.3.1 MIRI-subscales ICCs between time 1 and time 2 in men with schizophrenia and similar psychotic disorders

6.2.4 Intercorrelations of the MIRI four subscales in people with schizophrenia and similar psychotic disorders

Using the Spearman rho coefficient, significant correlations were found only between *Perspective taking* and *Empathic concern* subscales; and between the *Fantasy scale* and *Personal distress*. The correlations were, however, small (< 0.5), indicating that it is unlikely that the scales were measuring the same construct (Table 6.2.4.1). These correlations were also found by Davis (1980) during the original validation of the IRI, although he found a negative correlation between *Perspective taking* and *Personal distress* and a significant positive correlation between *Empathic concern* and *Personal distress*, which was not found in MIRI subscales.

	MIRI Perspective taking	MIRI Empathic concern	MIRI Personal distress
MIRI **Fantasy scale**	0.21	0.17	0.30**
MIRI **Perspective taking**		0.33**	0.01
MIRI **Empathic concern**			0.06

**p<0.01. (MIRI: Modified Interpersonal Reactivity Index for schizophrenia)

Table 6.2.4.1 MIRI-subscales inter-correlations among a sample of men with schizophrenia and similar psychotic disorders (N=85)

CHAPTER 7: GENERAL DESCRIPTION OF THE SAMPLE

7.1 Recruitment:

All eligible and consenting men diagnosed with schizophrenia and similar psychotic disorders (schizoaffective and delusional disorder) were recruited from among the 393 patients resident at some point in one of four forensic (234 patients) or five general psychiatric (159 patients) inpatient units in South Wales and Bristol during the two years and six months of data collection. 220 (55.9%) met eligibility criteria for the study, of whom 102 (46.3%) consented to participate (Fig. 7.1.1).

Table 7.1 summarises the interviews and questionnaires completed. Figures 7.1.1 and 7.1.2 show sample attrition.

IRI completed	N	CPRS completed	MADS completed	CFT completed	TMT-B completed
At least once	85	82	51	55	55
Twice	58	57	47	42	40
Three times	43	41	18	41	38

(IRI: Interpersonal Reactivity Index; CPRS: Comprehensive Psychiatric Rating Scale; MADS: Maudsley Assessment of Delusions Schedule; CFT: Category Fluency Test; TMT-B: Trial Making Test-Part B).
Table 7.1 Number of patients, who completed clinical measures for men with schizophrenia and similar psychotic disorders first IRI completers
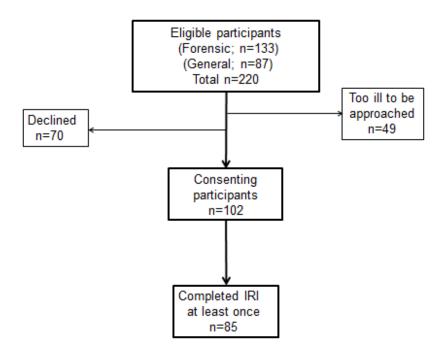
Fig. 7.1.1: Recruitment of participants who completed the Interpersonal Reactivity Index for first time
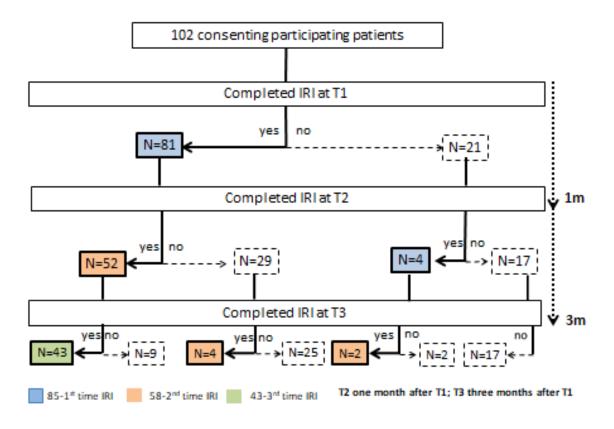
Fig. 7.1.2: Participants who completed the Interpersonal Reactivity Index (IRI) in T1, T2 and T3 interviews.

7.2 Sociodemographic characteristics of the sample

Characteristics of the sample were calculated for those, who completed the IRI for their first time (81 at the first interview, 4 at the second).

Table 7.2.1 shows that 76 (90%) participants were white, 71 (83%) were single and 83 (97%) were unemployed. Their average age was 39.6 (SD= 12.7) and the average number of years of education was 12.1 (SD= 2.4). Immediately prior to their admission at the time of this research study, most of them (n=59; 69%) had been living in other institutions, including prisons or hospitals, 14 (16%) were living with their families and 12 (14%) were living alone in the community. Most of them (n= 66; 77%) had a low to medium socioeconomic status, based on the highest occupational level among those held by the patients and their parents.

Information on tested pre-morbid intelligence was available for only 59 participants; their mean intelligence quotient (IQ) was 102.3 (SD= 10). None had an estimated IQ of less than 70. There was no suggestion at interview or from records that the other men not tested using the WTAR had less than average intelligence, based on their reported education.

	N	%
Ethnicity		
White	76	89.4
Black	6	7.0
Other	3	3.6
Marital status		
Single	71	83.5
Separated/widower	12	14.1
Married/partner	2	2.4
Living status prior to participants' hospital admission		
Institution (prison, hospital)	59	69.4
Alone	12	14.1
With parents	9	10.6
Spouse cohabiting	3	3.5
With family member(s)	2	2.4
Professional status according to patients' or their parents' occupation[**]		
Refuse Collector, Waitress, Shop Assistant, Care Assistant	35	41.1
Train Driver, Plumber, Electrician, Builder, Hairdresser, Fisherman	31	36.4
Nurse, Actor, Journalist, Doctor, Barrister, Dentist, Chief Executive, Manager	18	21.1
Unknown	1	1.1
	Mean	**SD**
Age (years)	39.6	12.7
Education (years)	12.1	2.4
Estimated Intelligence Quotient[*]	102.3	10.1

[*]data available on 59 participants;[**]lists based on the National Statistics Socio-economic Classification (NS-SEC)

Table 7.2.1 Sociodemographic characteristics of 85 men with schizophrenia and similar psychotic disorders first IRI completers

7.3 Clinical characteristics of the sample

7.3.1 Diagnosis, legal status, duration of illness and treatment

7.3.1 Diagnosis, legal status, duration of illness and treatment

Most men who completed the IRI at least once had a diagnosis of schizophrenia (78, 92%) with schizoaffective disorder (5, 6%) and delusional disorder (2, 2%) making up the remainder. Sixty-six (78%) also had a history of alcohol or illicit drug misuse or dependence, although most of them had been abstinent for at least six months prior to the first interview; only seven participants had consumed illicit drugs and only one had misused alcohol during that time. Nearly a fifth of patients (16, 19%) had a co-morbid diagnosis of personality disorder.

Table 7.3.1 shows that the majority of these men had a history of suicide-related behaviour (54, 63.5%). Most of them (77, 78%) had previously been detained in hospital under mental health legislation. Only 8 (9%) patients had been admitted informally at that time, all others had been subjected to detention under the Mental Health Act (MHA) 1983/2007, most commonly under longer treatment or hospital orders (sections 3 or 37+/-41 respectively). Sixty patients (71%) were in a forensic psychiatric hospital unit and 25 (29%) in a general psychiatric hospital at the time of this research study. The average length of continuous admission at the time of first interview was 11.7 months (standard deviation [SD]= 13.6 months). Mean duration of illness was 14.9 (SD= 10.5) years, with most (63, 74%) having been ill for at least 10 years. Mean age of onset of psychosis was 24.2 (SD= 8.9) years.

All participants were on psychotropic medication at the time of their first time of IRI completion. The average chlorpromazine equivalent antipsychotic dose at the time of the first interview was 647.6 mg/day (SD= 447 mg/day). The majority of men (73, 88%) were on atypical antipsychotics.

As previous literature suggests that social cognition interaction training (SCIT) is specifically relevant to empathy scores, I conducted clinical record reviews and confirmed that none of the participants had received SCIT prior to/during the study.

History of suicide/para-suicide	N	%
Yes	54	63.5
No	31	36.5
Legal status		
Detention under MHA-III	50	58.8
Detention under MHA –II	27	31.7
Informal	8	9.7
Type of psychiatric unit		
Forensic	60	70.6
General	25	29.4
	Mean	**SD**
Duration of illness (years)	14.9	10.5
Age onset psychosis (years)	24.2	8.9
Length admission (months)	11.7	13.6
Chlorpromazine equivalent antipsychotic dose (mg/day)	647.6	447.6

Table 7.3.1 Clinical characteristics of men with schizophrenia and similar psychotic disorders first IRI completers (n=85)

7.3.2 Distribution of psychiatric symptoms

Eighty-three of the 85 first time IRI completers were rated according to the Comprehensive Psychiatry Rating Scale (CPRS) (Table 7.3.2).

First, I examined the subscale scores of the CPRS. The CPRS-SS (schizophrenia subscale) showed a mean score of 6.55 (SD= 4.06), which indicates an average low intensity of psychosis. The participants also showed an average low intensity of negative symptoms, indicated by a CPRS-NS (negative symptom) subscale, with a mean score of 2.34 (SD= 2.01). Finally, the CPRS-DS (depression subscale), with a mean score of 6.80 (SD= 5.15), suggested low intensity depression.

	Minimum	Maximum	Mean	SD
CPRS-SS schizophrenia *	0	17	6.55	4.06
CRPS-DS depression *	0	29	6.80	5.15
CPRS-NS negative symptoms *	0	8	2.34	2.01

(*) *CPRS-SS and CPRS-DS subscales comprise 12 items each with possible maximum score of 3 points per item, with maximum score of 36 points. CPRS-NS comprises 5 items with possible maximum of 3 points per item, with maximum score of 15 points.* Data available for 83 patients

Table 7.3.2 Comprehensive Psychiatric Rating Scale for men with schizophrenia and similar psychotic disorders first IRI completers

7.3.3 Distribution and characteristics of delusions

Seventy-two of the 85 first time IRI completers agreed to undergo the Maudsley Assessment Delusions Schedule (MADS). Among those, only 51 reported having had a main delusional belief within the last 28 days; the MADS was then completed for all these men (Table 7.3.3.1). The most commonly reported content of the belief/delusion, which the participant rated as most important to him, was persecutory (26, 51%), followed by grandiose (11, 21%) and religious (11, 21%) (Table 7.3.3.1).

Type of delusions	N	%
Persecutory	26	51.0
Grandiose	11	21.6
Religious	11	21.6
Hypochondriac	2	3.9
Passivity	1	2.0
Total	51	100.0

Table 7.3.3.1 Type of delusions based on the MADS most important belief for men with schizophrenia and similar psychotic disorders first IRI completers

Data for *level of systematization* of the delusions were available for 48 responders. Among them, 15 (31%) had delusions which were not elaborated; 19 (40%) had some degree of systematic elaboration, but substantial areas of experiences were intact; and 14 (29%) were rated as interpreting all experiences in delusional terms (Fig. 7.3.1).
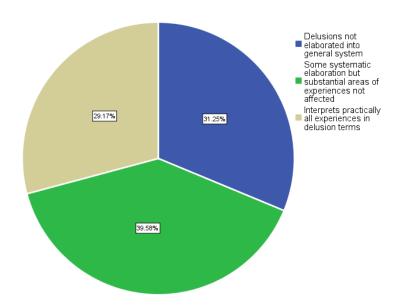
Fig. 7.3.1 Systematisation of delusions for the first time IRI completers (n=48, 3 cases missing)

The *level of conviction* in the delusions was high; only 7 (14%) of the men with active delusions expressed some doubts about them (Fig 7.3.3).

Only 47 men *responded to a hypothetical challenge* to their belief. In most cases, the challenge had no effect on belief reporting (27, 58%); 6 (13%) accommodated the challenge into their delusional system; 5 (10%) decreased their conviction in the belief, and 9 (19%) reported to have dismissed their belief (Fig 7.3.4).
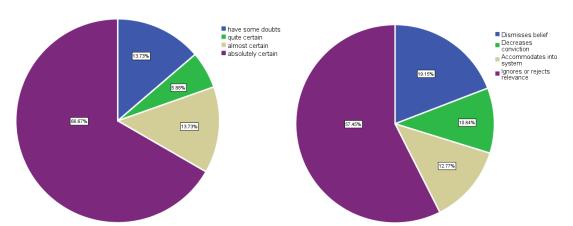
Fig. 7.3.3 Conviction of delusions for first time IRI completers (n=51)

Fig. 7.3.4 Reaction observed to hypothetical challenge for first time IRI completers (n=47, 4 cases missing)

7.3.4 Cognitive abilities: Category Fluency Test- Animals/ Vegetables/ Fruits (CFT-A/V/F) and Trail Making Test-B (TMT-B)

Fifty-five of the 85 first time IRI completers completed the Category Fluency Test (CFT), which estimates verbal fluency, and the Trial Making Test B (TMT-B), which estimates executive function and cognitive speed process (Table 7.3.4). Results indicated that participants had impaired levels of executive function, attention, working memory and cognitive speed process, with the average time in seconds required to complete the TMT-B lower than the normal

66

range (55.7 +/- 18.3) and a higher total number of errors than the normal range (0.5+/-1.8) (Mahurin et al., 2006). Findings reciprocated what has been reported in previous studies with schizophrenia patients (Mahurin et al., in 2006 reported 151+/-73 as the average seconds to complete TMT-B and 3+/-5.6 as the number of total errors in completing TMT-B in people with schizophrenia). Moreover, in my sample participants had also impaired verbal fluency and memory, with lower than normal mean scores for verbal fluency (animals' category) tests compared with the normative data for English speakers stratified for age and number of years of education (Tombaugha et al., 1999).

	Mean	SD	Minimum	Maximum	N
CFT Animals in 60 seconds*	14.36	4.49	5	24	55
CFT Vegetables in 60 seconds*	9.71	3.04	1	21	55
CFT Fruit in 60 seconds*	9.50	2.86	4	16	55
TMT B seconds to complete**	106.69	54.47	37	336	55
TMT B total number of errors	3.91	4.50	0	24	55

*Healthy adults should be able to list at least 15. **Time varies with age and education, in general less than 300 seconds. (CFT: Category Fluency Test; TMT-B: Trial Making Test-Part B)
Table 7.3.4 Cognitive abilities in men with schizophrenia and similar psychotic disorders first time IRI completers

7.4 Characteristics of violence for the first time IRI completers

The lifetime history of violence characteristics of the sample, including the index offence/act, if any, are shown in table 7.4.1, regardless of criminal conviction for any of this behaviour. Only five participants had never been violent at all. At the other extreme, 6 had committed homicide. Forty-four had put the victim's life or

long-term health at risk and were considered to fall in the most seriously violent group.

Seriousness of violence	Cut off	Code	Number of patients			
No violence or no injury caused by violence		0	5			
Threats/minor property damage		1		9		
Minor personal injury/moderate property damage		2	80		41	
Life or long term health at risk *		3		76		79
Homicide		4			44	6

*Included serious property damage such as destruction of a room/building by fire if this knowingly threatened life; include threats to kill if made with a weapon in the hand.

Table 7.4.1 Distribution of lifetime perpetration of violence, rated by seriousness according to the Modified Gunn Robertson Scale of 85 men with schizophrenia and similar psychotic disorders first IRI completers

Seventy-seven (90%) of the men had been convicted of a criminal offence. For 56 (66%) of the participants this had been a major factor in their admission and is referred to as the "index offence" (Figure 7.4.1); all of these patients were residents in forensic hospitals. Most of them (44, 79%) had already had an offending history. Twenty-nine participants (34%) had no index offence, but 21 (72%) of these had a previous offending history. Average age at first offence of any kind was 22.83 years (SD= 11.71). For those who had been violent, the average age at the time of their first violent episode was 18.35 years (SD= 10.43). Forty-seven of the 182 offences committed by 77 participants, who were offenders, were violent. Sexual offences were unlikely (8, 10%) (Fig. 7.4.3).
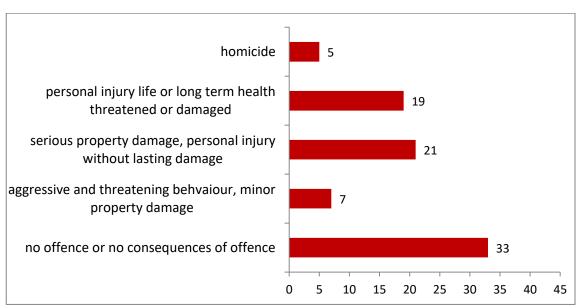
Fig. 7.4.1 Seriousness of Index Offence (IO) among 85 men with schizophrenia and similar psychotic disorders first IRI completers
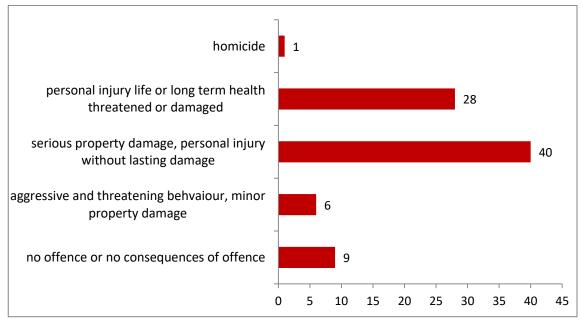
Fig. 7.4.2 Seriousness of lifetime criminalised and non-criminalised violence (prior to Index Offence) in 85 men with schizophrenia and similar psychotic disorders first IRI completers
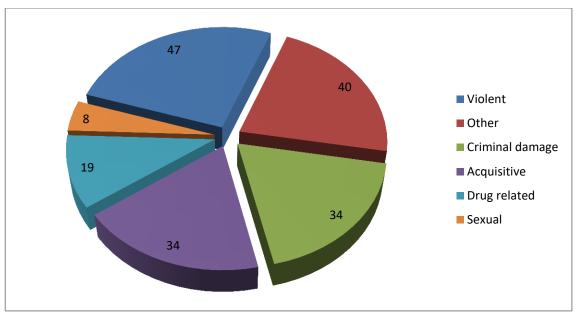
Fig. 7.4.3 Type of offences among 77 offenders with schizophrenia and similar psychotic disorders who were first IRI completers

In addition to recording violence histories from all available information in the records, violence was considered in terms of self-report on two MADS items – "damage to property in response to the 'most important' delusion" and "inter-personal violence in response to the most important delusion". Eight (16%) men reported having broken objects due to their delusions (Fig.7.4.4); 12 (26%) said that they had hit someone because of their belief (Fig 7.4.5). There was no interpersonal violence and only one incident of property damage during the period of data collection, and initial classification of violence was not affected.

Self-reported violence influenced by delusions

According to the MADS, 8/49 (16.3%) participants with delusions reported having damaged property ("broken anything") at least once, and 12/46 responders (26%) reported having committed interpersonal violence ("hit anyone") due to their delusions.
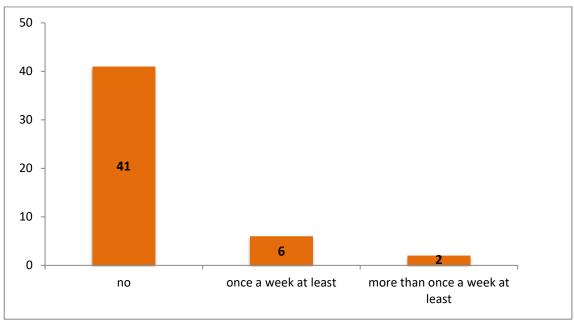
Fig 7.4.4 Self-reported property damage due to delusion in first IRI and MADS completers men with schizophrenia and similar psychotic disorders (n=49, 2 cases no data available)
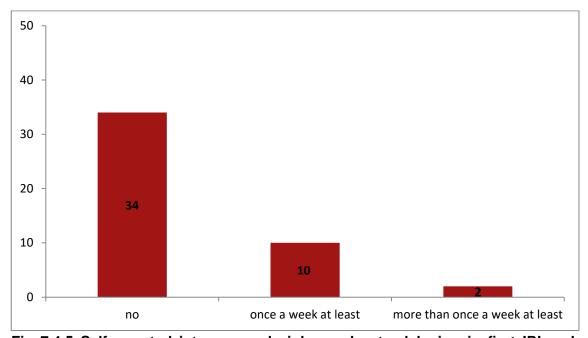
Fig 7.4.5 Self-reported interpersonal violence due to delusion in first IRI and MADS completers men with schizophrenia and similar psychotic disorders (n=46, 6 cases no data available)

7.5 Interpersonal Reactivity Index (IRI) and Modified IRI for schizophrenia (MIRI) among men with schizophrenia and similar psychotic disorders

The mean IRI and MIRI subscale scores for all of the men who completed the first IRI are shown in figs. 7.5.1 and 7.5.2. As there are fewer items in the MIRI, the scores are, by definition, lower than for the IRI, but it can be seen that the patterns of scale scores are similar, regardless of whether the full instrument or the modified form was rated.
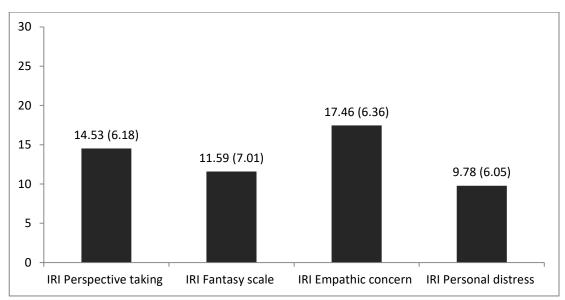
Fig 7.5.1 IRI mean scores among first time IRI completers men with schizophrenia and similar psychotic disorders (N=85)
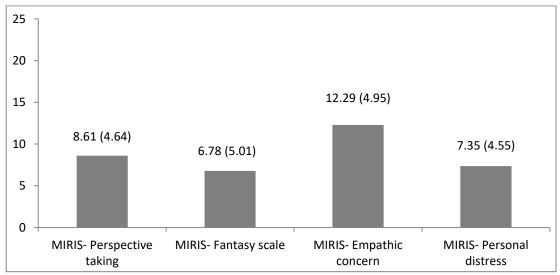
Fig 7.5.2 MIRI mean scores among first time IRI completers men with schizophrenia and similar psychotic disorders (N=85)

7.6 Distribution patterns of IRI, MIRI, and sociodemographic and clinical continuous variables

Tests for normality of distribution were performed on all variables. The four IRI subscales, the MIRI-PD subscale and the CFT-A showed a normal distribution as indicated by the Kolmogorov-Smirnov test. Other key variables (MIRI-PT, FS, EC subscales, CFT-V, CFT-F, TMT-B, CPRS subscales, age, education, intelligence, dose of antipsychotics, duration of illness and age at first episode of violence) presented a non-normal distribution. Details are shown in Appendix 9, with a set of Q-plots for the main items.

I then subsequently checked for possible outliers. None was found for age, education, antipsychotic doses, CFT-A and CFT-F, CPRS schizophrenia and CPRS depressive scales, IRI or MIRI subscales.

Case 57 was an outlier in terms of age at first offence (59 years) and there were several men (cases 44, 54, 66, 70, 71 and 72) who were much older at first episode of violence (ages 30 to 42). Just one (case 57) was an outlier for age of onset of psychosis (age 44), but cases 36 and 61 were outliers with respect to duration of illness (45 and 50 years respectively). Cases 72 and 74 scored extremely high (8 points) on the CPRS negative symptoms scale. All these indicators were regarded, however, as valid clinical variation, so all these cases were retained in the analyses. Case 61 was an outlier for scoring only 1 point on the CFT-V test and for the exceptional length of time taken (336 seconds) for the TMT-B test. These values were considered to be so extreme and

unexplained that they could have been possible contaminants of the results, so this case was removed from relevant analyses.

7.7. Relationship between empathy, as measured by the IRI and the MIRI, and other personal variables

There was no relationship between any of the IRI subscale scores and duration of illness or age at first episode of violence. *Empathic concern* did not show any association with any variable. Intelligence and education correlated with cognitive scales of the IRI and age, cognitive abilities and negative emotions due to delusions correlated with the *Personal distress* scale. All the significant findings are detailed below.

7.7.1 The IRI

Perspective taking

There was a moderate positive correlation between the IRI *Perspective taking* subscale and both the Intelligent Quotient, IQ (r_s= 0.44, p= 0.001) and the number of years of education (r_s= 0.34, p= 0.001), that is, the higher the *Perspective taking* score, the more intelligent and educated were the participants according to these measures (Table 7.7.1.1). There was a moderate but significant negative correlation between *Perspective taking* and dose of antipsychotic medication (r_s= -0.35, p= 0.01), suggesting that lower *Perspective taking* abilities are associated with higher antipsychotic doses (Table 7.7.1.2).

Fantasy scale

The IRI *Fantasy scale* showed a significant small negative correlation with the IQ (r_s= 0.31, p= 0.01), but a small positive correlation with number of years of education (r_s= 0.24, p= 0.03). There was also a minor correlation between IRI *Fantasy scale* score and age at first offence (r_s= 0.25, p= 0.03) and a minor negative correlation between the *Fantasy scale* score and age at first episode of violence (r_s= -0.24, p= 0.04) (Table 7.7.1.1)

Empathic concern

There were no significant correlations between IRI *Empathic Concern* subscale scores and sociodemographic or clinical variables (Tables 7.7.1.1 and 7.7.1.2).

Personal distress

There were small, inverse correlations between the IRI *Personal distress* subscale and the age of the participants (r_s= -0.29, p= 0.001) and with the duration of the illness (r_s= -0.22, p= 0.05) (Table 7.7.1.1), suggesting that lower *Personal distress* was a feature of younger participants with shorter illnesses. There was, however, a small positive correlation between the IRI *Personal distress* subscale and the CPRS depression scale score (r_s= 0.31, p= 0.001), suggesting a relationship between *Personal distress* and depressive symptoms (Table 7.7.1.2).

IRI		Age years	IQ	Years of educa-tion	Duration of illness	Age onset illness	Age 1st offence	Age 1st episode violence	Chlorpro-mazine equivalent antipsycho-tic doses
	r_s	0.17	0.44**	0.34**	0.16	0.05	0.13	0.00	- 0.35**
PT	p	0.13	0.01	0.01	0.16	0.62	0.26	0.96	0.01
	N	80	56	71	71	71	72	73	71
	r_s	-0.20	0.31*	0.24*	-0.07	-0.24*	0.25*	0.11	-0.72
FS	p	0.07	0.01	0.03	0.55	0.04	0.03	0.35	0.55
	N	79	56	70	70	70	71	72	70
	r_s	0.04	0.10	0.07	0.05	0.06	-0.07	-0.04	-0.02
EC	p	0.69	0.45	0.54	0.64	0.57	0.53	0.70	0.85
	N	80	56	70	70	70	72	73	70
	r_s	-0.35**	0.12	0.04	-0.22	-0.19	0.00	-0.15	-0.10
PD	p	0.01	0.35	0.74	0.05	0.11	0.94	0.20	0.36
	N	79	56	70	70	70	71	72	70

*Correlation is significant at $p< 0.05$ level (2-tailed). **Correlation is significant at $p< 0.01$ level (2-tailed); (r_s= Spearman's rho coefficient); (PT=Perspective taking; EC=Empathic concern; FS=Fantasy scale; PD=Personal distress)

Table 7.7.1.1 Correlations between IRI subscales and age, IQ, education, duration of illness (years) and age (years) at offending and violence first episodes in first IRI completers men with schizophrenia and similar psychotic disorders

IRI		CPRS negative subscale	CPRS Schizophrenia subscale	CPRS depression subscale
PT	r_s	-0.01	-0.00	-0.04
	p	0.90	0.97	0.68
	N	79	78	78
FS	r_s	0.09	0.08	0.14
	p	0.39	0.45	0.19
	N	78	77	77
EC	r_s	0.01	0.00	0.13
	p	0.92	0.99	0.22
	N	79	78	78
PD	r_s	-0.09	0.11	0.31**
	p	0.41	0.33	0.01
	N	78	77	77

*Correlation is significant at $p < 0.05$ level (2-tailed). **Correlation is significant at $p < 0.01$ level (2-tailed); (r_s = Spearman's rho coefficient); (PT=Perspective taking; EC=Empathic concern; FS=Fantasy scale; PD=Personal distress)

Table 7.7.1.2 Correlations between IRI subscales and negative schizophrenia and depressive symptoms measured by the CPRS (Comprehensive Psychiatric Rating Scale) in first IRI completers men with schizophrenia and similar psychotic disorders

When comparing the IRI subscales mean scores among those on typical (first generation) or atypical (second generation) antipsychotics), no significant differences were obtained (Table 7.7.1.3).

IRI	Type of antipsychotic	Mean (SD)	t	p
Perspective taking	Typical	13.0 (7.2)	-0.85	0.39
	Atypical	14.8 (6.1)		
Fantasy scale	Typical	9.4 (7.4)	-1.07	0.28
	Atypical	11.9 (7.0)		
Empathic concern	Typical	18.4 (7.0)	0.48	0.62
	Atypical	17.3 (6.0)		
Personal distress	Typical	7.0 (7.1)	-1.61	0.11
	Atypical	10.2 (5.9)		

*Correlation is significant at $p< 0.05$ level (2-tailed). **Correlation is significant at $p< 0.01$ level (2-tailed).

Table 7.7.1.3 Student test (*t*): Differences among IRI subscales mean scores among type of antipsychotics in first IRI completers men with schizophrenia and similar psychotic disorders (n=85)

Figures showing the scatter plots for the significant correlations between IRI subscale scores and other variables can be found in appendix 10.

7.7.2 The MIRI

The analyses conducted to test for correlations between IRI subscale scores and personal demographic and clinical variables were repeated for the MIRI. Findings are summarised briefly and compared with correlations shown by the parent IRI subscales.

Perspective taking

As with the parent IRI, there was a significant, small to moderate correlation between the MIRI *Perspective taking* subscale and both FISQ ($r_s= 0.42$, p= 0.001) and number of years of education ($r_s= 0.30$, p= 0.001), but, for the MIRI,

there was also a small correlation between *Perspective taking* and both age (r_s= 0.25, p= 0.001) and duration of the illness (r_s= 0.24, p= 0.03) (Table 7.7.2.1). There was also a suggestion of an extant inverse correlation between MIRI *Perspective taking* and antipsychotic doses (r_s= -0.20, p= 0.05) (Table 7.7.2.2).

Fantasy scale

Similar to the IRI *Fantasy scale*, the MIRI *Fantasy scale* scores significantly moderately correlated with FISQ scores (r_s= 0.42, p= 0.001) and with the number of years of education (r_s= 0.29, p= 0.001) and the age at first offence (r_s= 0.27, p= 0.001). they did not, however, significantly correlate with the age at first episode of violence in contrast to the IRI *Fantasy scale* (Table 7.7.2.1).

None of the IRI or the MIRI *Fantasy scales* showed a significant correlation with antipsychotic dose; however, for the MIRI *Fantasy scale* there was a trend towards a negative correlation (r_s= -0.20, p= 0.05) (Table 7.7.2.2).

Empathic concern

As with the IRI *Empathic concern* scale, the MIRI *Empathic concern* did not significantly correlate with any independent sociodemographic or clinical variable as shown in tables 7.7.2.1 and 7.7.2.2.

Personal distress

Similar to the IRI *Personal distress*, there were moderate negative correlations between the MIRI *Personal distress* subscale and the age of the participants

(r_s= -0.35, p= 0.001) and the duration of the illness (r_s= -0.32, p= 0.001); and significant correlation, though small, was found with the CPRS depression scale (r_s= 0.25, p= 0.01) (Table 7.7.2.2).

MIRI		Age	IQ	Years Edu-cation	Duration of illness	Age onset illness	Age at 1st offence	Age at 1st violence	Anti-psycho-tic doses
PT	r_s	0.25*	0.42**	0.30**	0.24*	0.09	0.18	-0.03	-0.91
	p	0.01	0.01	0.01	0.03	0.41	0.09	0.75	0.41
	N	85	59	85	75	75	77	77	83
FS	r_s	-0.09	0.42**	0.29**	0.01	-0.15	0.27**	0.10	-0.20
	p	0.39	0.01	0.01	0.90	0.19	0.01	0.35	0.06
	N	85	59	85	75	75	77	77	83
EC	r_s	0.07	0.15	0.06	0.07	0.09	-0.02	-0.08	-0.11
	p	0.48	0.24	0.52	0.54	0.42	0.82	0.44	0.30
	N	85	59	85	75	75	77	77	83
PD	r_s	-0.35**	0.05	-0.07	-0.32**	-0.14	-0.02	-0.17	0.06
	p	0.01	0.66	0.48	0.01	0.20	0.80	0.12	0.56
	N	85	59	85	75	75	77	77	83

*Correlation is significant at $p< 0.05$ level (2-tailed). **Correlation is significant at $p< 0.01$ level (2-tailed). (r_s= Spearman's rho coefficient) (PT=Perspective taking; EC=Empathic concern; FS=Fantasy scale; PD=Personal distress)

Table 7.7.2.1 Correlations between MIRI subscales and sociodemographic and clinical variables, in men with schizophrenia and similar psychotic disorders first IRI completers

MIRI		CPRS negative subscale	CPRS Schizophrenia subscale	CPRS depression subscale
	r_s	-0.00	-0.02	-0.03
PT	p	0.97	0.84	0.73
	N	83	82	82
	r_s	-0.11	0.07	0.14
FS	p	0.28	0.50	0.18
	N	83	82	82
	r_s	-0.01	0.00	0.11
EC	p	0.87	0.97	0.29
	N	83	82	82
	r_s	-0.08	0.05	0.25[*]
PD	p	0.47	0.61	0.01
	N	83	82	82

*Correlation is significant at $p< 0.05$ level (2-tailed). **Correlation is significant at $p< 0.01$ level (2-tailed); ($r_s=$ Spearman's rho coefficient) (PT=Perspective taking; EC=Empathic concern; FS=Fantasy scale; PD=Personal distress)

Table 7.7.2.2 Correlations between MIRI subscales and negative and depressive symptoms measured by the CPRS (Comprehensive Psychiatric Rating Scale) in men with schizophrenia and similar psychotic disorders first time IRI completers

When comparing the MIRI subscales mean scores among those on typical (first generation) or atypical (second generation) antipsychotics, no significant differences were obtained (Table 7.7.2.3).

MIRI	Type of antipsychotic	Mean (SD)	Mann-Whitney U	*p*
Perspective taking	Typical	7.6 (5.3)	409.5	0.53
	Atypical	8.7 (4.6)		
Fantasy scale	Typical	6.9 (4.5)	360.5	0.95
	Atypical	6.8 (5.1)		
Empathic concern	Typical	12.5 (6.0)	343.5	0.76
	Atypical	12.3 (4.9)		
Personal distress	Typical	8.6 (4.9)	301.5	0.37
	Atypical	7.1 (4.5)		

*Difference is significant at *p*< 0.05 level (2-tailed). **Correlation is significant at p< 0.01 level (2-tailed).

Table 7.7.2.3 Differences in MIRI subscales mean scores between men with schizophrenia and similar psychotic disorders first IRI completers with prescribed typical and atypical antipsychotics (n=85)

The figures representing the scatter plots for the significant correlations between MIRI subscales and variables can be found in the appendix 10.

7.8. Distribution of the IRI and the MIRI according to legal status, diagnoses and comorbidities

7.8.1 The IRI and medico-legal status

Tables 7.8.1.1 and 7.8.1.2 confirm that there was no relationship between any IRI subscale score and type of unit placement (forensic or general) or legal status.

IRI	Legal Status	Mean (SD)	F	p
Perspective taking	MHA III	13.6 (6.2)	1.08	0.34
	MHA II	15.8 (6.0)		
	Informal	15.0 (6.0)		
Fantasy scale	MHA III	11.3 (7.3)	0.75	0.49
	MHA II	11.1 (6.7)		
	Informal	14.3 (6.1)		
Empathic concern	MHA III	17.5 (6.4)	0.97	0.38
	MHA II	16.5 (6.8)		
	Informal	20.1 (4.1)		
Personal distress	MHA III	9.4 (5.3)	0.53	0.59
	MHA II	9.6 (6.6)		
	Informal	11.8 (7.9)		

Difference is significant at $p < 0.05$ level (2-tailed).

Table 7.8.1.1 Anova test combined within groups (F): Differences among IRI subscales mean scores among men with schizophrenia and similar psychotic disorders first IRI completers admitted in hospital under part III of MHA (n=46), part II of the MHA (n=26) and informal (n=8)

IRI	Type of institution	Mean (SD)	t	p
Perspective taking	General	16.1 (5.9)	1.52	0.13
	Forensic	13.8 (6.2)		
Fantasy scale	General	13.0 (6.4)	1.17	0.24
	Forensic	10.9 (7.2)		
Empathic concern	General	18.21 (5.2)	0.68	0.49
	Forensic	17.1 (6.8)		
Personal distress	General	10.6 (7.1)	0.81	0.41
	Forensic	9.4 (5.5)		

Difference is significant at $p < 0.05$ level (2-tailed)

Table 7.8.1.2 Student t-test (*t*): Differences among IRI subscales mean scores between men with schizophrenia and similar psychotic disorders first IRI completers admitted in forensic (n=56) and general (n=24) psychiatric hospitals
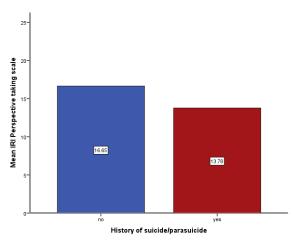
7.8.2 The IRI and clinical variables

Among the other clinical variables examined (history of suicide or parasuicide attempts, comorbidity with alcohol or substance misuse and personality disorder), the only significant finding was of a difference between the IRI *Fantasy scale* mean score between those with and without a history of suicide/parasuicide attempts (t= 3.27, p= 0.002). There was, however, a trend towards IRI *Perspective taking* also distinguishing between suicidal and non-suicidal groups (t= 1.98, p= 0.05) (Table 7.8.2.1).
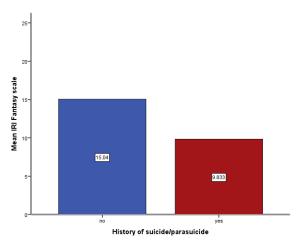
IRI	History of suicide/parasuicide attempts	Mean (SD)	*t*	*p*
Perspective taking	No	16.6 (5.4)	1.98	0.05
	Yes	13.7 (6.2)		
Fantasy scale	No	15.0 (7.3)	3.27*	0.01
	Yes	9.8 (6.0)		
Empathic concern	No	17.7 (6.6)	-0.01	0.98
	Yes	17.7 (6.0)		
Personal distress	No	10.8 (7.0)	1.03	0.30
	Yes	9.4 (5.1)		

*Difference is significant at *p*< 0.05 level (2-tailed)
Table 7.8.2.1 Student t-test (*t*): Differences among IRI subscales mean scores between men with schizophrenia and similar psychotic disorders first IRI completers with (n=49) and without (n=26) history of suicide/parasuicide attempts

Figs 7.8.1.1 Mean scores for IRI Perspective taking among men with schizophrenia and similar psychotic disorders with and without history of suicide/parasuicide attempt

Figs 7.8.1.2 Mean scores for IRI Fantasy scale among men with schizophrenia and similar psychotic disorders with and without history of suicide/parasuicide attempt

None of the IRI subscales were significantly different among participants with and without a history of alcohol or substance misuse or a comorbid personality disorder (Tables 7.8.2.2 and 7.8.2.3).

IRI	Alcohol/illicit drug misuse	Mean (SD)	t	*P*
Perspective taking	No	16.9 (6.8)	1.76	0.08
	Yes	14.0 (5.8)		
Fantasy scale	No	9.4 (7.1)	-1.53	0.13
	Yes	12.3 (6.8)		
Empathic concern	No	15.3 (7.1)	-1.71	0.09
	Yes	18.2 (6.0)		
Personal distress	No	7.5 (7.7)	-1.74	0.08
	Yes	10.4 (5.4)		

Difference is significant at *p*< 0.05 level (2-tailed)

Table 7.8.2.2 Student test (t): Differences among IRI subscales mean scores between men with schizophrenia and similar psychotic disorders first IRI completers with (n=61) and without (n=18) comorbid alcohol/illicit drug misuse history

IRI	Personality disorder	Mean (SD)	t	*p*
Perspective taking	No	14.7 (6.1)	0.50	0.61
	Yes	13.8 (6.6)		
Fantasy scale	No	11.9 (7.3)	0.97	0.33
	Yes	10.0 (5.6)		
Empathic concern	No	17.8 (6.1)	-1.12	0.26
	Yes	19.1 (7.1)		
Personal distress	No	9.6 (6.3)	-0.43	0.66
	Yes	10.4 (4.4)		

Difference is significant at *p*< 0.05 level (2-tailed)

Table 7.8.2.3 Student t-test (t): Differences among IRI subscales mean scores between men with schizophrenia and similar psychotic disorders first IRI completers with (n=15) and without (n=65) comorbid personality

7.8.3 The MIRI and medico-legal status

Table 7.8.3.1 shows that the MIRI *Fantasy scale* mean score, in contrast to parent IRI findings, differed significantly between legal groups, accounted for by the higher mean scale score among informal patients (X^2 = 4.96, p= 0.02). The other subscale scores did not significantly differ between legal categories and Table 7.8.3.2 confirms that, as for the IRI, there was no significant difference in MIRI subscale mean scores between the types of hospital unit placements.

MIRI	Legal status	Mean (SD)	*X²*	*P*
Perspective taking	MHA III	8.0 (4.7)	0.37	0.54
	MHA II	9.7 (4.6)		
	Informal	8.7 (3.9)		
Fantasy scale	MHA III	6.6 (5.1)	4.96*	0.02
	MHA II	6.0 (4.7)		
	Informal	10.2 (4.0)		
Empathic concern	MHA III	12.3 (5.0)	0.65	0.41
	MHA II	11.8 (5.2)		
	Informal	13.5 (3.6)		
Personal distress	MHA III	7.3 (4.0)	0.30	0.58
	MHA II	7.0 (5.1)		
	Informal	8.3 (5.7)		

*Difference is significant at *p*< 0.05 level (2-tailed); *X²*= Kruskal Wallis Test.
Table 7.8.3.1 Differences among MIRI subscales mean scores among men with schizophrenia and similar psychotic disorders first time IRI completers admitted in hospital under part III of MHA (n=50), part II of the MHA (n=27) and informal (n=8)

MIRI	Hospital type	Mean (SD)	Mann-Whitney U	*P*
Perspective taking	General	9.4 (4.2)	639.50	0.28
	Forensic	8.2 (4.7)		
Fantasy scale	General	8.2 (4.7)	571.00	0.08
	Forensic	6.1 (5.0)		
Empathic concern	General	12.4 (4.0)	712.50	0.71
	Forensic	12.2 (5.3)		
Personal distress	General	7.6 (5.4)	743.50	0.95
	Forensic	7.2 (4.1)		

Difference is significant at *p*< 0.05 level (2-tailed)

Table 7.8.3.2 Differences among MIRI subscales mean scores between men with schizophrenia and similar psychotic disorders first time IRI completers admitted to forensic (n=60) and general (n=25) psychiatric hospitals

7.8.4 MIRI and clinical variables

In most respects, MIRI subscale score relationships to other clinical variables were very similar to those seen with the parent IRI subscales, but no MIRI subscale differentiated between suicidal/parasuicidal patients and those without any such ideas or behaviours (Table 7.8.4.1).
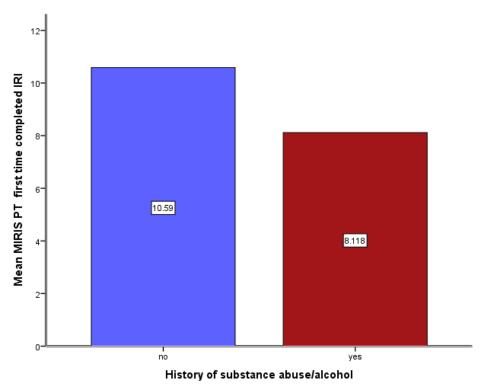
MIRI	Suicide/parasuicide attempt history	Mean (SD)	Mann-Whitney U	*p*
Perspective taking	No	9.4 (4.3)	701	0.21
	Yes	8.1 (4.7)		
Fantasy scale	No	7.9 (4.9)	665	0.11
	Yes	6.1 (4.9)		
Empathic concern	No	11.7 (5.3)	779	0.59
	Yes	12.6 (4.7)		
Personal distress	No	7.3 (5.2)	828.5	0.93
	Yes	7.3 (4.1)		

Difference is significant at *p*< 0.05 level (2-tailed)

Table 7.8.4.1 Differences among MIRI subscales mean scores between men with schizophrenia and similar psychotic disorders first time IRI completers with (n=54) and without (n=31) history of suicide/parasuicide attempt

As for the IRI parent subscales, the MIRI subscales mean scores were not significantly different between participants with or without history of comorbid alcohol or substance misuse or between those with and without personality disorder (Tables 7.8.4.2 and 7.8.4.3); however, there was a trend towards a lower mean MIRI *Perspective taking* (U= 404, p= 0.05) score in those with a history of substance misuse (Fig. 7.8.4.3).

MIRI	Alcohol/illicit substance abuse	Mean (SD)	Mann-Whitney U	*p*
Perspective taking	No	10.5 (4.8)	404.5	0.05
	Yes	8.1 (4.4)		
Fantasy scale	No	5.8 (4.4)	502	0.40
	Yes	7.0 (5.1)		
Empathic concern	No	10.9 (4.9)	489	0.32
	Yes	12.6 (4.6)		
Personal distress	No	6.1 (6.6)	419	0.08
	Yes	7.6 (3.8)		

Difference is significant at *p*< 0.05 level (2-tailed)

Table 7.8.4.2 Differences among MIRI subscales mean scores between men with schizophrenia and similar psychotic disorders first time IRI completers with (n=68) and without (n=17) history of alcohol/substance misuse

Figs 7.8.4.1 Mean scores for MIRI Perspective taking between men with schizophrenia and similar psychotic disorders first time IRI completers with (n=68) and without (n=17) history of alcohol/substance misuse

MIRI	Personality disorder	Mean (SD)	Mann-Whitney U	*p*
Perspective taking	No	8.7 (4.5)	521.0	0.72
	Yes	8.2 (5.0)		
Fantasy scale	No	7.0 (5.0)	469.5	0.35
	Yes	5.7 (5.1)		
Empathic concern	No	11.9 (4.8)	404.0	0.09
	Yes	13.9 (5.1)		
Personal distress	No	7.1 (4.8)	459.0	0.29
	Yes	8.0 (3.3)		

Difference is significant at *p*< 0.05 level (2-tailed)

Table 7.8.4.3 Differences among MIRI subscales mean scores between men with schizophrenia and similar psychotic disorders first time IRI completers with (n=16) and without (n=69) personality disorder

Table (7.8.4.4) summarises the significant findings and trends of the associations between variables of the study and empathy subscales. Whether using the IRI or the MIRI, lower IQ and fewer years of education were associated with lower cognitive empathy scores, indicative of some impairment. Also, the higher the dose of antipsychotic medication, the lower the *Perspective taking* scores specifically. Lower *Perspective taking* scores were also associated with history of alcohol or illicit drug misuse and, here according to the IRI only, with a history of suicide related behaviours. Lower *Fantasy scale* scores were similarly associated with suicide related behaviour histories, but also older age at onset of illness and time of offending and, according only to the MIRI, involuntary treatment and forensic hospital placement.

With respect to emotional empathy, there was only one *Fantasy scale* score aberration, in relation to suicide related behaviours. Elevated *Personal distress*,

however, was consistently related to younger age at onset, shorter illness and

being more depressed and using more alcohol/illicit substances.

| | IRI | | | | MIRI | | | |
| | Cognitive | | Emotional | | Cognitive | | Emotional | |
	PT	FS	EC	PD	PT	FS	EC	PD
Less IQ	↓	↓			↓	↓		
Less educated	↓	↓			↓	↓		
Higher ATP dose	↓				↓*			
Older at 1ˢᵗ offence		↓				↓		
Shorter duration illness				↑*	↓			↑
Younger age				↑	↓			↑
More depressed				↑				↑
OH/drug history	↓*		↑*	↑*	↓*			↑*
Suicide history	↓*	↓						
Older at onset illness		↓						
Forensic unit						↓*		
Involuntary treatment						↓		
Personality disorder							↑*	

(*almost significant *p*>0.05) (↓ lower, ↑ higher)
Table 7.8.4.4 Significant correlations (*p*<0.05) between IRI and MIRI subscales and characteristics of the men with schizophrenia and similar psychotic disorders (n=85)

7.8.5 Self-reported violence due to delusions and relationship with IRI and MIRI subscales

There were no significant differences between IRI or MIRI subscales mean

scores either between those participants who reported or did not report having

broken anything (aggression to property) or between those who reported or did

not report having assaulted anyone (interpersonal violence) due to their

delusions. Tables with statistics and details are in appendix 11.

7.9 Relationships between sociodemographic and clinical variables among men with schizophrenia and similar psychotic disorders with and without history of serious violence

For completeness, I tested for relationships between social and clinical variables and violence, using the Modified Gunn Robertson violence scale scores 3-4 to define the seriously violent group (violence putting life or long term health at risk, including serious property damage that knowingly threatened life, e.g. by arson or threats to kill if made with a drawn weapon) and characterise the other group as minimally or non-violent (scores 0-2). Not only was this where I was expecting to find the differences in empathy, as stated in my hypothesis, but the sample was ideally distributed between these groups: with 44 in the seriously violent category and 41 in the low level/non-violent group. To test for significant differences between continuous variables, Mann Whitney U was calculated, with asymptomatic 2-tailed significance test. Chi square, or Fisher exact test when more appropriate because of cell size, was calculated for the categorical variables.

The seriously violent group presented with fewer years of education (U= 672, p= 0.04) and they were younger at their first episode of violence (U= 508, p= 0.02) than their less seriously violent peers. (Table 7.9.1) (Fig.7.9.1). Both education and age at first time of violence were lower in the seriously violent group compared to the less seriously violent one; therefore I searched for a correlation between the two variables and results indicated that they were significantly correlated (r_s = 0.31, p= 0.005) (n= 77) (Fig.7.9.2).

| | Mean scores (SD) | | Mann-Whitney | *P* |
	SV	NSV	U	
Age	37.9 (13.4)	40.6 (11.7)	737.5	0.14
FSIQ	102.2 (10.5)	102.4 (9.9)	432.5	0.98
Education	11.6 (2.3)	12.7 (2.4)	672.0*	0.04
Duration illness	15.8 (11.2)	15.5 (10.4)	692.5	0.93
Age onset illness	22.4 (7.2)	24.9 (9.7)	604.5	0.30
Age 1st violence	15.0 (5.7)	22.7 (13.3)	508.0	0.02*
Dose antipsychotic	683.5 (422)	607.0 (466)	752.5	0.33
CFT-A	13.7 (4.0)	14.9 (4.8)	321.5	0.34
CFT-F	9.2 (2.6)	9.7 (3.1)	377.5	0.99
CFT-V	9.4 (2.9)	9.9 (3.1)	360.0	0.59
TMT-B	118.0 (63)	94.9 (40.9)	288.0	0.13
CPRS-schizophrenia	6.0 (3.4)	6.9 (4.6)	763.5	0.49
CPRS-negative	2.2 (2.0)	2.4 (2.0)	823.0	0.74
CPRS-depression	6.7 (4.4)	6.8 (5.9)	784.0	0.62

(CFT: Category Fluency Test) (CPRS: Comprehensive Psychiatry Rating Scale) (Age, education and duration of illness in years). *Difference is significant at $p < 0.05$ level (2-tailed)

Table 7.9.1 Differences on independent variables mean scores between men with schizophrenia and similar psychotic disorders first time IRI completers with (n=41) and without (n=44) history of serious violence
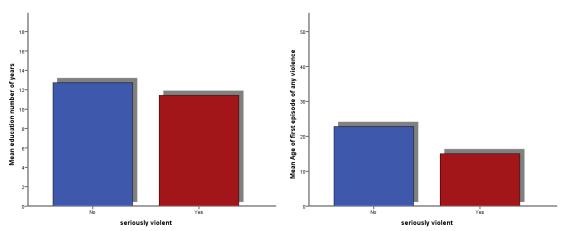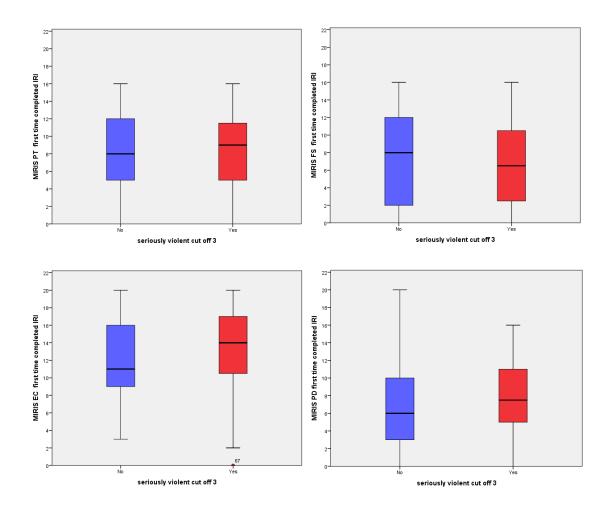

Fig. 7.9.1 Significant differences in education and age at first violence between men with schizophrenia and similar psychotic disorders first time IRI completers with (n=41) and without (n=44) history of serious violence
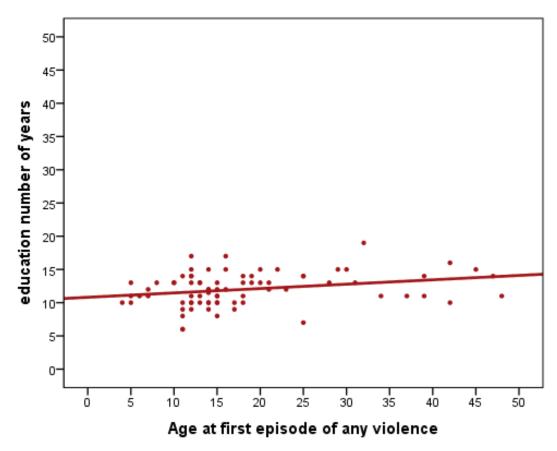
Fig. 7.9.2 Significant correlation between education and age at first episode of violence in men with schizophrenia and similar psychotic disorders first time IRI completers (n=85)

As expected, the seriously violent participants were more commonly admitted under part III of mental health legislation (X^2= 16.20, p= 0.001) and none of them were admitted informally; they were also more likely to have had an offending history (X^2= 10.8, p= 0.001) and to be admitted to a forensic unit (X^2= 27.16, p= 0.001) than the non-serious violent peers. Seriously violent participants were also more likely to have had a diagnosis of personality disorder (X^2= 4.26, p= 0.03). None of the groups differed statistically on other social or clinical variables studied (Table 7.9.2) (Fig. 7.9.3).

| | | SERIOUS VIOLENCE | | | | N | X^2 | *p* |
| | | YES | | NO | | | | |
		N	%	N	%			
Ethnicity	white	38	50	38	50	76		
	other	6	66.6	3	33.4	9	5.90	0.21
Marital status	Single	37	52	34	48	71		
	Married/partner	1	50	1	50	2	0.02	1.00
	Divorced/Widower	6	50	6	50	12		
Legal status	MHA III	34	68	16	32	50		
	MHA II	10	37	17	63	27	16.20*	0.00
	Informal	0	0	8	100	8		
Type hospital	General	2	8	23	92	25		
	Forensic	42	70	18	30	60	27.16*	0.00
Diagnosis	Schizophrenia	41	53.2	36	46.8	77		
	Other	3	37.5	5	63.5	8	0.88	0.70
Offender	Yes	44	58	32	42	76		
	No	0	0	9	100	9	10.8*	0.00
Suicide/para-suicide history	Yes	15	48.4	16	51.6	31		
	No	29	53.7	25	46.3	54	0.22	0.63
Substance abuse	Yes	10	58.8	7	41.2	17		
	No	34	50	34	50	68	0.42	0.51
Personality disorder	Yes	32	46.4	37	53.6	69		
	No	12	75	4	25	16	4.26*	0.03

*Difference is significant at *p*< 0.05 level (2-tailed); MHA: Mental Health Act.
Table 7.9.2 Differences on independent variables distributions between men with schizophrenia and similar psychotic disorders first time IRI completers with (n=41) and without (n=44) history of serious violence
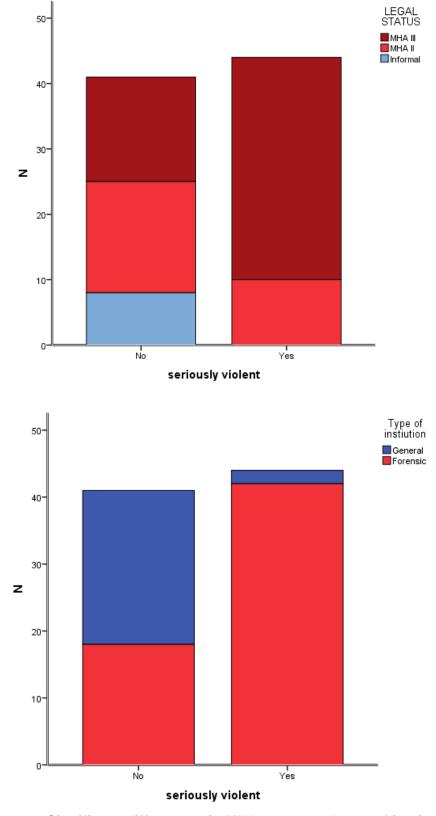
Fig. 7.9.3 Significant differences in MHA status and type of institution between serious and less seriously violent men with schizophrenia and similar psychotic disorders first time IRI completers (n=85)
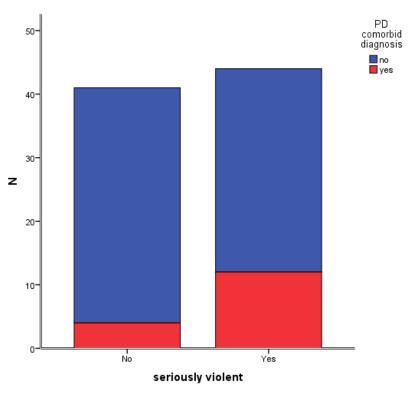
Fig. 7.9.4 Significant differences in personality disorder comorbidity between serious and less seriously violent men with schizophrenia and similar psychotic disorders first time IRI completers (n=85)

CHAPTER 8: CHARACTERISTICS OF EMPATHY AMONG SERIOUSLY AND LESS SERIOUSLY VIOLENT MEN WITH SCHIZOPHRENIA AND SIMILAR PSYCHOTIC DISORDERS

8.1 Self-reported empathy, according to IRI scores, among men with schizophrenia and similar psychotic disorders with and without history of serious violence

None of the IRI mean subscale scores differed significantly between the participants who had and had not been seriously violent over their lifetimes (Table 8.1.1; Fig. 8.1.1) (serious violence defined, as before, by the consequences of violence being death or life threatening or serious enduring injury: Modified Gunn Robertson violence seriousness subscale score of 3-4).

	Mean (SD)		t	p
	Serious Violence	Less serious violence		
IRI-PT	14.4 (6.1)	14.4 (6.3)	-0.07	0.94
IRI-FS	11.7 (7.0)	11.4 (7.1)	-0.13	0.89
IRI-EC	17.5 (6.7)	17.3 (6.0)	-0.17	0.86
IRI-PD	10.2 (5.7)	9.2 (6.4)	-0.72	0.46

(PT=Perspective Taking; EC=Empathic concern; FS=Fantasy scale; PD=Personal Distress); Difference is significant at $p < 0.05$ level (2-tailed)
Table 8.1.1 Student t-test (t): IRI subscales mean scores among men with schizophrenia and similar psychotic disorders first IRI completers, with (n=41) and without (n=44) history of serious violence
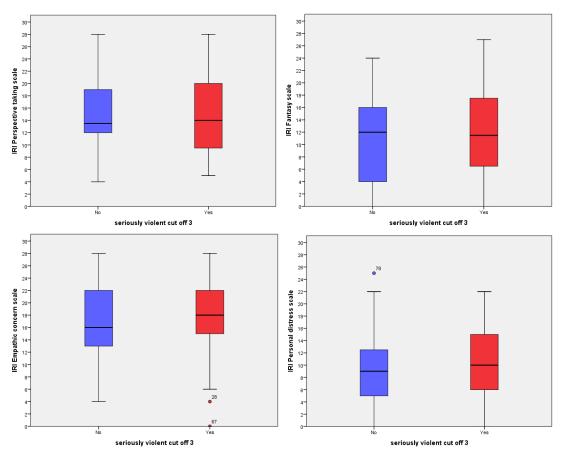
Fig. 8.1.1 IRI subscales mean scores among serious and non-serious violent groups of men with schizophrenia and similar psychotic disorders first time IRI completers (n=85)

In order to explore differences treating the IRI subscales as categorical variables, perhaps better reflecting true pathology, *Perspective taking, Fantasy scale, Empathic concern and Personal distress* categories were created using values for the 25th, 50th and 75th percentiles as cut-offs. None of these categories distinguished between serious and less serious violent patients (Table 8.1.2).

IRI		Perspective taking	Fantasy scale	Empathic concern	Personal distress
	25	10.00	6.00	13.00	5.00
Percentiles	50	14.00	12.00	18.00	10.00
	75	19.00	17.00	22.00	15.00

Percentile 25		SERIOUS VIOLENCE				N	X^2	p
		YES		NO				
		N	%	N	%			
IRI PT <10	Yes	30	50.2	31	50.8	61		
	No	10	52.6	9	47.4	19	0.06	1.00
IRI FS <6	Yes	32	53.3	28	46.7	60		
	No	8	46.3	11	53.7	54	0.72	0.43
IRI EC <13	Yes	32	54.2	27	45.8	59		
	No	9	43	12	57	21	0.80	0.44
IRI PD <5	Yes	9	45	11	57	69		
	No	31	52.2	28	47.5	16	0.34	0.56

Percentile 50								
IRI PT <14	Yes	29	47.5	32	52.5	61		
	No	11	57.9	8	47.1	19	0.62	0.60
IRI FS <12	Yes	22	50	22	50	44		
	No	18	51.4	17	48.6	35	0.01	1.00
IRI EC <18	Yes	21	50	21	50	42		
	No	20	52.6	18	47.4	38	0.05	0.81
IRI PD <10	Yes	8	61.5	5	38.5	13		
	No	33	49.3	34	50.7	67	0.65	0.41

Percentile 75		SERIOUS VIOLENCE				N	X^2	p
		YES		NO				
		N	%	N	%			
IRI PT <19	Yes	**21**	47.7	**23**	52.3	44	0.20	0.82
	No	**19**	52.8	**17**	47.2	36		
IRI FS <17	Yes	**28**	48.3	**30**	51.7	58	0.48	0.61
	No	**12**	57.1	**9**	42.9	21		
IRI EC <22	Yes	**31**	50.8	**30**	49.2	61	0.01	1.00
	No	**10**	52.6	**9**	47.4	19		
IRI PD <15	Yes	**26**	45.6	**31**	54.4	57	2.06	0.21
	No	**14**	63.6	**8**	36.4	22		

Difference is significant at $p < 0.05$ level (2-tailed); X^2= Fisher exact test

Table 8.1.2 Using the IRI percentiles to test for empathy differences among men with schizophrenia and similar psychotic disorders first IRI completers, with (n=41) and without (n=44) history of serious violence

8.2 Self-reported empathy, according to the MIRI, among men with schizophrenia and similar psychotic disorders with (n=41) and without (n=44) history of serious violence

Repeating the test of empathy scale score-violence relationships using MIRI mean subscale scores similarly found no significant differences between groups (Table 8.2.1; Fig.8.2.1).

	Mean scores (SD)		Mann Whitney U	Wilcoxon W	Z	*p*
	Serious Violence	Less serious Violence				
MIRI-PT	8.66 (4.75)	8.56 (4.57)	897	1758	-0.04	0.96
MIRI-FS	6.57 (5.02)	7.00 (5.06)	855	1845	-0.41	0.67
MIRI-EC	12.75 (4.94)	11.80 (5.37)	751	1612	-1.32	0.18
MIRI-PD	7.84 (4.15)	6.83 (4.94)	752	1613	-1.32	0.18

(PT=Perspective Taking; EC=Empathic concern; FS=Fantasy scale; PD=Personal distress); Difference is significant at *p*< 0.05 level (2-tailed)

Table 8.2.1 Differences among MIRI subscales mean scores among men with schizophrenia and similar psychotic disorders first IRI completers with (n=41) and without (n=44) history of serious violence

Fig. 8.2.1 MIRI mean subscales scores among serious and non-serious violent men with schizophrenia and similar psychotic disorders first IRI completers, with (n=41) and without (n=44) history of serious violence

As before, the relationship between empathy and violence was re-tested with empathy scores as categorical variables, this time applying percentile based cut-offs to the MIRI. This time, using percentile 30 to indicate the category, a score of 10 or below on the *Empathic concern* scale distinguished between men with a history of serious violence and those without (χ^2= 4.23, p= 0.04) (Table 8.2.2). Categorising according to the 50th or 70th percentiles for MIRI subscales produced no significant differences between participants clustered by serious violence.

MIRI		Perspective taking	Fantasy scale	Empathic concern	Personal distress
	30	6	3	10	5
Percentiles	50	9	7	13	7
	70	11	10	16	10

Percentile 30		SERIOUS VIOLENCE				N	X^2	*p*
		YES		**NO**				
		N	**%**	**N**	**%**			
MIRI-PT<=6	Yes	**15**	51	**14**	49	**29**		
	No	**29**	51	**27**	49	**56**	0.00	1.00
MIRI -FS <=3	Yes	**13**	50	**13**	50	**26**		
	No	**31**	52	**28**	48	**59**	0.04	0.82
MIRI -EC <=10	Yes	**11**	36	**19**	64	**30**		
	No	**33**	60	**22**	40	**55**	4.23*	0.04
MIRI -PD <=5	Yes	**13**	43	**17**	57	**30**		
	No	**31**	56	**24**	44	**55**	1.32	0.25

Percentile 50		SERIOUS VIOLENCE				N	X^2	p
		YES		NO				
		N	%	N	%			
MIRI-PT<=9	Yes	23	52	21	48	44		
	No	21	51	20	49	41	0.00	0.92
MIRI -FS <=7	Yes	18	51	17	49	35		
	No	26	52	24	48	50	0.00	0.95
MIRI -EC <=13	Yes	19	43	25	57	44		
	No	25	60	16	40	41	2.69	0.10
MIRI -PD <=7	Yes	8	57	6	43	14		
	No	36	51	35	49	71	0.19	0.65

Percentile 70		SERIOUS VIOLENCE				N	X^2	p
		YES		NO				
		N	%	N	%			
MIRI-PT<=11	Yes	33	54	29	46	62		
	No	11	49	12	51	23	0.19	0.65
MIRI -FS <=10	Yes	33	55	28	45	61		
	No	11	45	13	55	24	0.47	0.49
MIRI -EC <=16	Yes	31	49	32	51	63		
	No	13	60	09	40	22	0.63	0.42
MIRI -PD <=10	Yes	32	50	32	50	64		
	No	12	57	9	43	21	0.32	0.57

Difference is significant at $p < 0.05$ level (2-tailed); X^2= Fisher exact test

Table 8.2.2 Differences in MIRI subscales using percentiles among men with schizophrenia and similar psychotic disorders first IRI completers, with (n=41) and without (n=44) history of serious violence

8.3 Differences in empathy between groups of men with schizophrenia and similar psychotic disorders using different thresholds for seriousness of violence

As empathy in violent men has not previously been studied in this way, other cut-off points for seriousness of violence, using the Modified Gunn Robertson Scale, were then applied.

8.3.1 Homicide: No significant differences were found between IRI and MIRI subscales mean scores between homicidal and non-homicidal men completing the IRI at least once (Tables 8.3.1.1 and 8.3.1.2), but there were just six men who had killed and 79 who had not.

IRI	Homicide	Mean (SD)	*t*	*p*
Perspective taking	No	14.39 (6.11)	-0.77	0.44
	Yes	16.60 (7.60)		
Fantasy scale	No	11.47 (7.16)	-0.59	0.55
	Yes	13.40 (4.33)		
Empathic concern	No	17.41 (6.34)	-0.28	0.78
	Yes	18.17 (7.30)		
Personal distress	No	9.82 (6.11)	0.22	0.82
	Yes	9.20 (5.54)		

Difference is significant at *p*< 0.05 level (2-tailed)

Table 8.3.1.1 Student t-test (*t*): Differences in IRI subscales mean score among men with schizophrenia and similar psychotic disorders first IRI completers who committed homicide (n=6) and those who did not (n=74)

MIRI	Homicide	Mean (SD)	Mann Whitney U	p
Perspective taking	No	8.59 (4.65)	240.0	0.95
	Yes	8.83 (4.72)		
Fantasy scale	No	6.75 (5.15)	249.5	0.82
	Yes	7.17 (2.92)		
Empathic concern	No	12.19 (4.92)	291.0	0.35
	Yes	13.67 (5.68)		
Personal distress	No	7.48 (4.57)	189.5	0.41
	Yes	5.57 (4.27)		

Difference is significant at $p < 0.05$ level (2-tailed)

Table 8.3.1.2 Differences in MIRI subscales mean score among men with schizophrenia and similar psychotic disorders first IRI completers who committed homicide (n=6) and those who did not (n=74)

8.3.2 Minor personal injury/moderate property damage: All patients who had committed moderate property damage had also caused minor personal injury, so this type of violence is considered interpersonal violence. When the violence distinction was made between any interpersonal violence compared with none (MGR 0-1 compared with 2-4), the *Perspective taking* subscale whether using the IRI (t= 3.02; p= 0.003) or MIRI (U= 195.5; p= 0.03), and the MIRI *Fantasy scale* (U= 176.5; p= 0.01) distinguished between violent groups, even though there were only 9 men in the group without interpersonal violence and 76 with such violence, albeit in a substantial group (n= 32) at a trivial level (Tables 8.3.2.1, 8.3.2.2).

IRI	Minor personal injury/ Moderate property damage	Mean	(SD)	t	p
Perspective taking	No	20.50	(6.14)	3.02*	0.01
	Yes	13.86	(5.86)		
Fantasy scale	No	16.13	(6.74)	1.96	0.05
	Yes	11.08	(6.90)		
Empathic concern	No	19.75	(3.95)	1.07	0.28
	Yes	17.21	(6.55)		
Personal distress	No	9.88	(8.83)	0.04	0.96
	Yes	9.77	(5.74)		

Difference is significant at $p< 0.05$ level (2-tailed)

Table 8.3.2.1 Student t-test (t): Differences on IRI subscales mean score between men with schizophrenia and similar psychotic disorders first IRI completers who committed minor personal injury/moderate property damage (n=72) and those who did not (n=8)

MIRI	Minor personal injury/ Moderate property damage	Mean	(SD)	Mann Whitney U	p
Perspective taking	No	11.67	(4.30)	195.5*	0.03
	Yes	8.25	(4.50)		
Fantasy scale	No	10.56	(4.41)	176.5*	0.01
	Yes	6.33	(4.91)		
Empathic concern	No	13.67	(3.87)	290.0	0.45
	Yes	12.13	(5.06)		
Personal distress	No	8.11	(7.09)	331.5	0.88
	Yes	7.26	(4.22)		

*Difference is significant at $p< 0.05$ level (2-tailed)

Table 8.3.2.2 Differences on MIRI subscales mean score between men with schizophrenia and similar psychotic disorders first IRI completers who committed minor personal injury/moderate property damage (n=72) and those who did not (n=8)

The interpersonal violent (n= 76) group had significantly fewer years of education (U= 91.5; p= 0.01), lower intelligence (U= 42.5; p= 0.01) and were younger at their first episode of violence (U= 5.5; p= 0.01) than those without interpersonal violence (n= 9). Interpersonally violent patients were 30 times

more likely to be offenders, ten times more likely to be admitted to forensic hospitals and 7 times more likely to be diagnosed with schizophrenia.

	Interpersonal violence	N	Mean Rank	Mann Whitney U	*p*
Age (years)	No	9	57.72		
	Yes	76	41.26	209.5	0.05
Education (number of years)	No	8	60.06		
	Yes	67	35.37	91.5*	0.01
Intelligence Quotient	No	5	45.50		
	Yes	51	26.83	42.5*	0.01
Duration (years) of illness	No	8	37.63		
	Yes	67	38.04	265.0	0.95
Age at onset of psychotic illness	No	8	50.75		
	Yes	67	36.48	166.0	0.07
Age of first episode of any violence	No	2	73.75		
	Yes	75	38.07	5.5*	0.01
Chlorpromazine equivalent dose antipsychotics	No	9	28.72		
	Yes	74	43.61	213.5	0.07
CFT Animals	No	4	33.88		
	Yes	51	27.54	78.5	0.46
CFT Vegetables	No	4	27.63		
	Yes	52	28.57	100.5	0.92
CFT Fruits	No	4	29.13		
	Yes	52	28.45	101.5	0.94
Trail Making Test B (seconds to complete)	No	3	20.67		
	Yes	52	28.42	56.0	0.43
CPRS Schizophrenia subscale	No	8	44.13		
	Yes	74	41.22	275.0	0.74
CPRS Negative symptoms subscale	No	8	40.81		
	Yes	75	42.13	290.5	0.88
CPRS Depression subscale	No	8	44.25		
	Yes	74	41.20	274.0	0.73

*Difference is significant at p< 0.05 level (2-tailed); (CFT: Category Fluency Test; CPRS: Comprehensive Psychiatric Rating Scale)

Table 8.3.2.3 Differences in independent variables mean scores between men with schizophrenia and similar psychotic disorders first time IRI completers with and without history of interpersonal violence men (n=85)

		Interpersonal violence				N	X^2	p
		YES		NO				
		N	%	N	%			
Ethnicity	white	68	89.5	8	10.5	76		
	other	8	88.8	1	11.2	9	0.01	0.95
Marital status	Single	62	88.6	8	11.4	70		
	Married/partner	2	100	0	0	2	0.34	1.00
	Divorced/Widower	11	91.7	1	8.3	12		
Legal status	MHA III	48	96	2	4	50		
	MHA II	22	81.5	5	18.5	27	6.19	0.05
	Informal	6	75	2	25	8		
Type hospital	General	18	72	7	28	25		
	Forensic	58	96.7	2	3.3	60	11.34*	0.00
Diagnosis	Schizophrenia	71	92.2	6	7.8	77		
	Other	5	62.5	3	37.5	8	6.75*	0.03
Offender	Yes	73	94.8	4	5.2	77		
	No	3	37.5	5	62.5	8	25.13*	0.00
Suicide/para-suicide history	Yes	49	94.2	3	5.8	52		
	No	22	78.6	6	21.4	28	4.47	0.05
Substance abuse	Yes	60	90.9	6	9.1	66		
	No	15	83.3	3	16.7	18	0.84	0.39
Personality disorder	Yes	16	100	0	0	16		
	No	60	87	9	13	69	2.33	0.19

X^2=Fisher exact test; *Difference is significant at p< 0.05 level (2-tailed)

Table 8.3.2.4 Differences in independent variables distributions between men with schizophrenia and similar psychotic disorders first time IRI completers with and without history of interpersonal violence (n=85)

8.3.3 Threats/minor property damage: Finally, when the violence scale score threshold was set to reflect non-violence (MGR 0 compared to 1-4), IRI *Perspective taking* distinguished between the non-violent and violent men (t= 2.41, p= 0.01), but it was the only subscale score to do so (Tables 8.3.3.1 and 8.3.3.2).

IRI	personal threats minor property damage	Mean (SD)		*t*	*p*
Perspective taking	No	20.80	(5.80)	2.41*	0.01
	Yes	14.11	(5.86)		
Fantasy scale	No	14.20	(7.69)	0.85	0.39
	Yes	11.42	(6.99)		
Empathic concern	No	18.60	(3.28)	0.41	0.68
	Yes	17.39	(6.52)		
Personal distress	No	10.20	(8.89)	0.15	0.87
	Yes	9.76	(5.89)		

*Difference is significant at p< 0.05 level (2-tailed)

Table 8.3.3.1 Student t-test (*t*): Differences on IRI subscales mean score between men with schizophrenia and similar psychotic disorders who committed minor personal injury/moderate property damage (n=75) and those who did not (n=5)

MIRI	personal threats minor property damage	Mean (SD)	Mann Whitney U	*p*
Perspective taking	No	11.80 (4.71)	112.5	0.10
	Yes	8.41 (4.59)		
Fantasy scale	No	11.00 (5.56)	101.0	0.06
	Yes	6.51 (4.89)		
Empathic concern	No	12.60 (4.15)	203.0	0.95
	Yes	12.28 (5.06)		
Personal distress	No	9.40 (7.73)	163.0	0.48
	Yes	7.23 (4.33)		

Difference is significant at p< 0.05 level (2-tailed)

Table 8.3.3.2 Differences on MIRI subscales mean score between men with schizophrenia and similar psychotic disorders who committed minor personal injury/moderate property damage (n=75) and those who did not (n=5)

I then tested differences in socio-clinical characteristics between groups of any violence (n= 80) and no violence at all (n= 5). Only education was significantly lower in those with a history of any violence compared to those who had never been violent (U= 46.5; p= 0.02). Violent patients were 22 times more likely to be offenders and 10 times more likely to be admitted to forensic hospitals.

	ANY VIOLENCE	N	Mean Rank	Mann Whitney U	p
Age (years)	No	5	60.80	111.0	0.09
	Yes	80	41.89		
Education (number of years)	No	4	61.88	46.5*	0.02
	Yes	71	36.65		
Intelligence Quotient	No	3	44.50	31.5	0.08
	Yes	53	27.59		
Duration (years) of illness	No	4	35.63	132.5	0.83
	Yes	71	38.13		
Age at onset of psychotic illness	No	4	50.88	90.5	0.23
	Yes	71	37.27		
Chlorpromazine equivalent dose antipsychotics	No	5	26.70	118.5	0.14
	Yes	78	42.98		
CFT Animals	No	3	33.50	61.5	0.56
	Yes	52	27.68		
CFT Vegetables	No	3	27.33	76.0	0.91
	Yes	52	28.57		
CFT Fruits	No	3	25.50	70.5	0.76
	Yes	52	28.67		
Trail Making Test B (seconds to complete)	No	5	21.75	40.5	0.60
	Yes	78	28.24		
CPRS Schizophrenia subscale	No	5	45.40	173.0	0.71
	Yes	77	41.25		
CPRS Negative symptoms subscale	No	5	44.20	184.0	0.83
	Yes	78	41.86		
CPRS Depression subscale	No	5	46.20	169.0	0.66
	Yes	77	41.19		

∗ Difference is significant at $p< 0.05$ level (2-tailed); (CFT: Category Fluency Test; CPRS: Comprehensive Psychiatric Rating Scale)

Table 8.3.3.3 Differences on independent variables mean scores among men with schizophrenia and similar psychotic disorders first time IRI completers with and without history of any violence (n=85)

		ANY VIOLENCE				N	X^2	P
		YES		NO				
		N	%	N	%			
Ethnicity	white	72	94.7	4	5.3	76		
	other	8	88.8	1	11.2	9	0.00	0.43
Marital status	Single	65	92.9	5	7.1	70		
	Married/partner	2	100	0	0	2	0.96	1.00
	Divorced/Widower	12	100	0	0	12		
Legal status	MHA III	49	98	1	2	50		
	MHA II	24	88.9	3	11.1	27	3.94	0.13
	Informal	7	87.5	1	12.5	8		
Type hospital	General	21	72	4	28	25		
	Forensic	59	96.7	1	3.3	60	6.54*	0.02
Diagnosis	Schizophrenia	74	96.1	3	3.9	77		
	Other	6	75	2	25	8	5.83	0.06
Offender	Yes	75	97.4	2	2.6	77		
	No	5	62.5	3	37.5	8	15.94*	0.00
Suicide/para-suicide attempt history	Yes	50	96.2	2	3.8	52		
	No	25	89.3	3	10.7	28	1.46	0.33
Substance abuse	Yes	63	95.5	3	4.5	66		
	No	16	88.9	2	11.1	18	1.08	0.29
Personality disorder	Yes	16	100	0	0	16		
	No	64	92.8	5	7.2	69	1.23	0.57

X^2= Fisher exact test; *Difference is significant at p< 0.05 level (2-tailed)
Table 8.3.3.4 Differences on independent variables distributions among men with schizophrenia and similar psychotic disorders first time IRI completers with and without history of any violence (n=85)

A multivariate analysis with *Perspective taking* and education as dependent variables was not performed as education was not normally distributed for each of the categories of the independent variable (in either groups with and without interpersonal violence or any violence).

CHAPTER 9. A LONGITUDINAL PROSPECTIVE STUDY OF EMPATHY CHANGE OR STABILITY OVER TIME AMONG MEN WITH SCHIZOPHRENIA AND SIMILAR PSYCHOTIC DISORDERS WITH AND WITHOUT HISTORY OF SERIOUS VIOLENCE

Forty-eight (59%) of the 81 participants who completed the IRI at time 1 also did so one month later (at time 2). Forty-three of those with time 1 and time 2 interviews (85%) also completed the IRI after a further two months (time 3). Tests for changes in self-reported empathy over a three month period were conducted with this subgroup of 43 men.

First, I tested distribution of the IRI subscale scores on each of the three occasions measured, this time using the Shapiro-Wilk test, as the sample was small. The data were considered to be normally distributed when the significance value of the Shapiro-Wilk Test was greater than 0.05. The resulting histograms are shown in the appendix 12.

Outliers were also calculated for each subscale of the IRI at times 1, 2 and 3. There was one extreme value of 25 for *Personal distress* of the IRI at time 1 (case 95) and time 3 (case 30) respectively; however, these were considered likely to be valid as they were similar to the other scores the cases presented for that subscale at the other times completed, and relevant for the calculations, so they were not eliminated for the prospective calculations ahead.

Table 9.1 confirms that IRI subscale scores were normally distributed on each occasion, except for *Empathic concern* at time 1 and *Personal distress* at time 2. Accordingly, parametric tests were used to calculate changes over time of

Perspective taking and *Fantasy scale* whereas *Empathic concern* and *Personal distress* were tested using non-parametric tests.

	Shapiro-Wilk	
	Statistic	***p***
TIME 1		
IRI Perspective taking	0.97	0.41
IRI Fantasy scale	0.96	0.23
IRI Empathic concern	0.94[*]	0.02
IRI Personal distress	0.97	0.61
TIME 2		
IRI Perspective taking	0.97	0.37
IRI Fantasy scale	0.97	0.57
IRI Empathic concern	0.95	0.09
IRI Personal distress	0.93[*]	0.02
TIME 3		
IRI Perspective taking	0.97	0.57
IRI Fantasy scale	0.97	0.33
IRI Empathic concern	0.95	0.06
IRI Personal distress	0.97	0.40

*Difference is significant at p< 0.05 level (2-tailed)
Table 9.1 Tests of Normality of IRI subscales in men with schizophrenia and similar psychotic disorders, who completed the IRI three times

9.1 Changes of *Perspective taking* and *Fantasy scale* scores overtime

Table 9.1.1 includes the mean scores, standard deviations of the IRI subscales *Perspective taking* and *Fantasy scale* for times 1, 2 and 3 among the participants who completed the three interviews (n= 43).

		Mean	SD	Minimum	Maximum
Perspective taking	**time 1**	14.95	6.26	4	28
Perspective taking	**time 2**	14.88	6.09	4	28
Perspective taking	**time 3**	16.00	6.81	1	28
Fantasy scale	**time 1**	12.49	7.36	0	27
Fantasy scale	**time 2**	11.65	6.37	0	25
Fantasy scale	**time 3**	11.79	7.29	0	28

Table 9.1.1 IRI *Perspective taking* and *Fantasy scale* mean scores and standard deviation (SD) over three month period: time 1 (baseline), time 2 (one month later), time 3 (three months later) in men with schizophrenia and similar psychotic disorders (n=43)

Repeated Measures ANOVA tests were used to test the null hypothesis that self-reported empathy would not change over time for each of the subscales with normally distributed scores. Time was the factor and the levels were three (time 1, 2 and 3). Each of the IRI subscales measured over the three times was chosen as intra-subject variables. Multivariate Wilks' lambda tests were calculated based on the linearly independent pairwise comparisons among the estimated marginal means; the mean difference was significant at the $p= 0.05$ level. Bonferroni was used for adjustment of multiple comparisons.

Table 9.1.2 shows that there was no change over the three month period in the *Perspective taking* or *Fantasy scale* scores ($F_{(2, 41)}= 1.11$, $p= 0.33$ and $F_{(2, 41)}= 0.43$, $p= 0.65$, respectively).

	Value	F	Hypothesis df	Error df	*p*
Perspective taking	0.95	1.11[a]	2	41	0.33
Fantasy scale	0.97	0.43[a]	2	41	0.65

[a] Exact statistic.

Table 9.1.2 Multivariate Wilks' lambda Test: Each F tests the multivariate effect of time on IRI *Perspective taking* and *Fantasy scale* among 43 men with schizophrenia and similar psychotic disorders who completed the IRI three times

Mauchly's Tests of Sphericity were applied to the two subscales with non-normally distributed scores; probabilities were greater than 0.05 for both *Perspective taking* and the *Fantasy scale*; therefore sphericity was assumed. Repeated measures ANOVA confirmed no difference in *Perspective taking* or *Fantasy scale* scores between the three time points (PT: $F_{(2, 84)}= 1.20$, *p*= 0.30); FS: ($F_{(2, 84)}= 0.49$, *p*= 0.61) (Table 9.1.3). Therefore, we can conclude that cognitive empathy, as measured by self-reported *Perspective taking* and *Fantasy scale* of the IRI among male inpatients with schizophrenia, remains stable over three months, at least while the men remained in hospital under treatment.

		Type III Sum of Squares	df	Mean Square	F	*p*
Perspective taking						
Time	Sphericity Assumed	33.62	2	16.81	1.20	0.30
Error(time)	Sphericity Assumed	1117.03	84	14.01		
Fantasy scale						
Time	Sphericity Assumed	17.30	2	8.65	0.49	0.61
Error(time)	Sphericity Assumed	1461.36	84	17.39		

*Difference is significant at *p*< 0.05 level (2-tailed)

Table 9.1.3 Tests of Within-Subjects Effects for *Perspective taking* and *Fantasy scale* at time 1 (baseline), time 2 (one month later), time 3 (three months later) for 43 men with schizophrenia and similar psychotic disorders, who completed the IRI three times

Representative figures of these results are shown in the following Figs. 9.1.1:
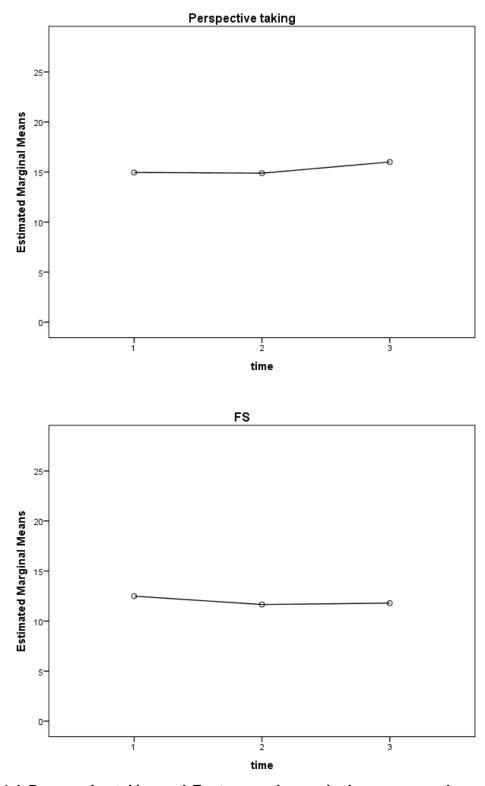
Fig. 9.1.1 *Perspective taking* and *Fantasy scale* marginal means over three month period in 43 men with schizophrenia and similar psychotic disorders

9.2 *Perspective taking* in men with history of serious violence over three months

Table 9.2.1 shows the means and standard deviations for the IRI *Perspective taking* subscales at three times across the groups with and without history of serious violence.

IRI	Seriously violent	Mean	SD	N
Perspective taking time 1	No	15.11	6.65	19
	Yes	14.83	6.07	24
Perspective taking time 2	No	14.63	5.42	19
	Yes	15.08	6.69	24
Perspective taking time 3	No	16.53	6.69	19
	Yes	15.58	7.01	24

Table 9.2.1 Descriptive Statistics *Perspective taking* time 1, 2 and 3 for serious and less serious violent 43 men with schizophrenia and similar psychotic disorders

There was neither a main effect of the variable time ($F= 1.29$; $p= 0.27$) nor a significant interaction between the two variables time/serious violence ($F= 0.36$; $p= 0.69$) (Table 9.2.2).

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
time	Sphericity Assumed	36.94	2.00	18.47	1.29	0.27	0.03
time * Seriously violent	Sphericity Assumed	10.31	2.00	25.48	0.36	0.69	0.01
Error(time)	Sphericity Assumed	1166.72	82.00	14.22			

Table 9.2.2 Tests of Within-Subjects Effects of *Perspective taking* time 1, 2 and 3 for serious and less serious violent men with schizophrenia and similar psychotic disorders

As seen in Table 9.2.3, the main effect of serious violence (F= 0.02; p= 0.88) on

Perspective taking over time was not significant.

Transformed Variable: Average						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	13555.10	1	13555.10	139.66	0.00	0.77
Seriously violent	2.05	1	2.05	0.02	0.88	0.001
Error	3979.22	41	97.05			

Table 9.2.3 Tests of Between-Subjects Effects of time 1, 2 and 3 on *Perspective taking* scores among 43 serious and less serious violent men with schizophrenia and similar psychotic disorders

Adding the serious violence variable (MGR scale scores 0-2 versus 3-4) to the repeated measures ANOVA model for comparing IRI *Perspective taking* means over the three month period indicated no significant differences (Fig 9.2.1).
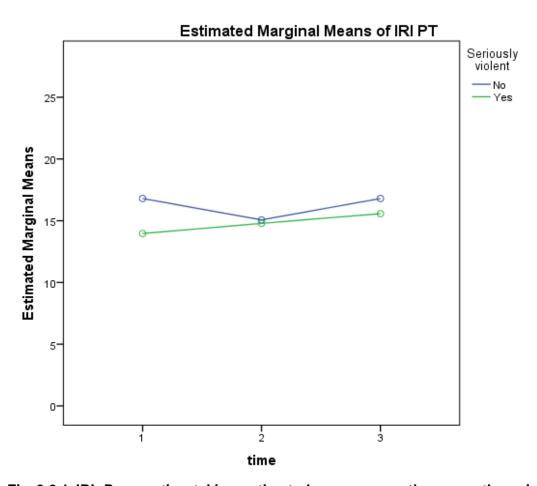
Fig 9.2.1 IRI *Perspective taking* estimated means over three month period for men with schizophrenia and similar psychotic disorders with and without history of serious violence

9.3 *Fantasy scale* in men with history of serious violence over three months

IRI	Seriously violent	Mean	SD	N
	No	12.05	7.89	19
Fantasy scale time 1	Yes	12.83	6.97	24
	No	11.79	5.78	19
Fantasy scale time 2	Yes	11.54	6.90	24
	No	11.68	6.13	19
Fantasy scale time 3	Yes	11.68	8.21	24

Table 9.3.1 Descriptive Statistics *Fantasy scale* at time 1, 2 and 3 for serious and less serious violent men with schizophrenia and similar psychotic disorders (n=43)

There was no main effect of time on *Fantasy scale* scores (F= 0.39; p= 0.96), and, as for the *Perspective taking* subscale, a main effect of serious violence (F= 0.16; p= 0.85) was not significant (Tables 9.3.1 and 9.3.2) (Fig. 9.3.1).

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
time	Sphericity Assumed	1.36	2	0.68	0.39	0.96	0.01
time * Seriously Violent	Sphericity Assumed	5.64	2	2.82	0.16	0.85	0.01
Error(time)	Sphericity Assumed	1455.71	82.00	17.75			

Table 9.3.2 Tests of Within-Subjects Effects of *Fantasy scale* at time 1, 2 and 3 for serious and less serious violent men with schizophrenia and similar psychotic disorders
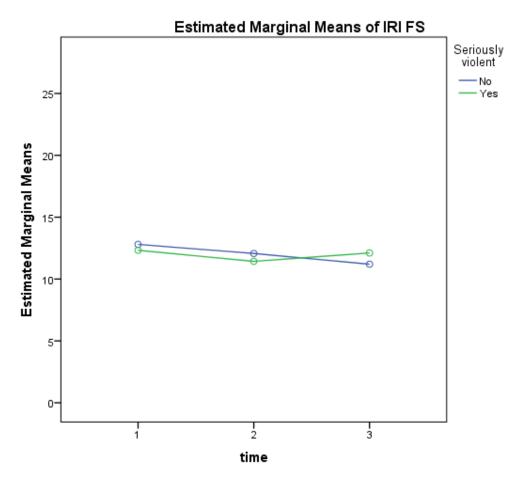
Fig 9.3.1 IRI Fantasy scale estimated means over three month period for 43 men with schizophrenia and similar psychotic disorders with and without history of serious violence

9.4 Changes of *Empathic concern* and *Personal distress* over time

Table 9.4.1 shows the mean scores and standard deviations of the IRI *Empathic concern* and *Personal distress* subscales for times 1, 2 and 3 among the men with schizophrenia, who completed the three interviews (n= 43). Given the inconsistency in normal distribution across time, the Friedman test was used to test differences in means over time.

	Mean	SD	Minimum	Maximum	Mean Rank	X^2	p
Empathic concern time 1	17.84	6.76	0	28	2.03		
Empathic concern time 2	17.42	7.00	1	28	2.02	023	0.81
Empathic concern time 3	17.35	6.92	1	28	1.94		
Personal distress time 1	10.77	5.26	0	25	2.22		
Personal distress time 2	9.93	6.63	0	26	1.94	3.73	0.15
Personal distress time 3	8.84	5.26	0	24	1.84		

Table 9.4.1 Friedman Test (X^2= chi square*) for the IRI *Empathic concern* and *Personal distress* and standard deviation (SD) over three month period: time 1 (baseline), time 2 (one month later), time 3 (three months later) (gl=2, n=43)

There were no significant differences between means of IRI *Empathic concern* and *Personal distress* subscales overtime among men with schizophrenia and

similar psychotic disorders (X^2= 0.23, gl= 2, p= 0.81; X^2= 3.73, gl= 2, p= 0.15 respectively). Figs. 9.4.1. and 9.4.2 illustrate this graphically.
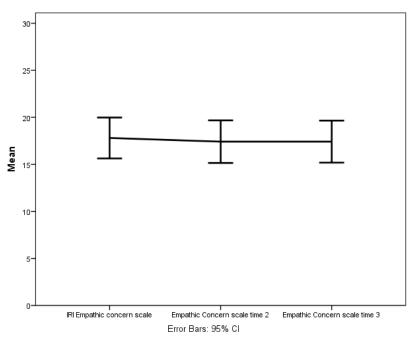
Fig 9.4.1 IRI *Empathic concern* estimated means over three month period for 43 men with schizophrenia and similar psychotic disorders
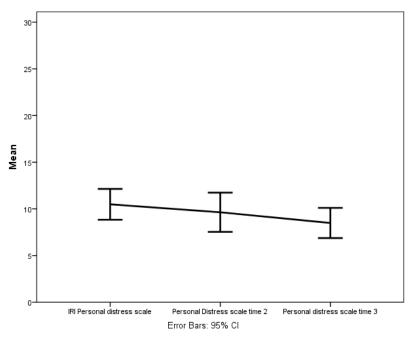
Fig. 9.4.2 IRI *Personal distress* estimated means over three month period for 43 men with schizophrenia and similar psychotic disorders

There were no significant differences in *Empathic concern* or *Personal distress* over time for either seriously and/or less seriously violent/non-violent groups (Table 9.4.2) (Fig 9.4.3 and 9.4.4).

		SV Mean Rank	SV X^2	p	NSV Mean Rank	NSV X^2	p
Empathic concern	**time 1**	1.96			2.13		
Empathic concern	**time 2**	2.02	0.06	0.96	2.03	0.88	0.64
Empathic concern	**time 3**	2.02			1.84		
Personal distress	**time 1**	2.22			2.03		
Personal distress	**time 2**	1.94	6.02	0.49	2.00	0.03	0.98
Personal distress	**time 3**	1.84			1.97		

Friedman Test (*X²*=chi square*)*

Table 9.4.2 Differences in the IRI *Empathic concern* and *Personal distress* subscales among seriously (n=24) and less seriously violent (n=19) men with schizophrenia and similar psychotic disorders, over a 3 month period: time 1 (baseline), time 2 (one month later), time 3 (three months later) (gl=2, n=43)
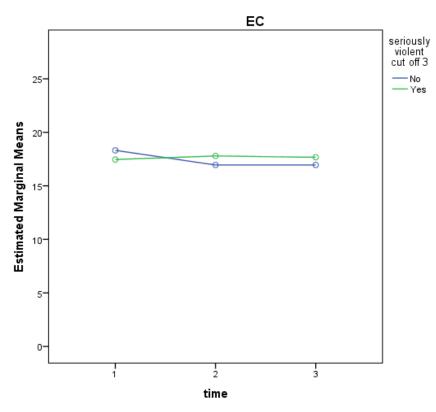
Fig 9.4.3 IRI *Empathic concern* estimated means over three month period for men with schizophrenia and similar psychotic disorders with and without history of serious violence
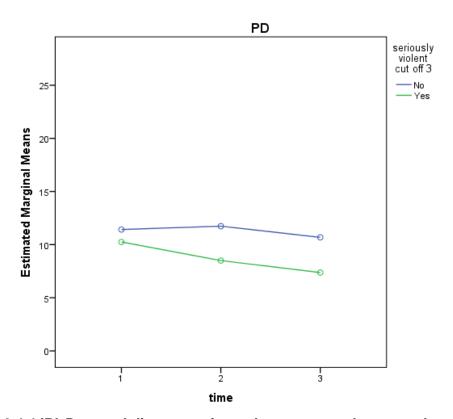
Fig 9.4.4 IRI *Personal distress* estimated means over three month period for men with schizophrenia and similar psychotic disorders with and without history of serious violence

PART IV: DISCUSSION

CHAPTER 10. DISCUSSION, CONCLUSION AND FUTURE DIRECTIONS

10.1   Overview

This research emerged from a systematic review of the literature on schizophrenia, empathy and violence (Bragado & Taylor, 2012), which found a dearth of research into this tripartite relationship, despite good evidence of extant correlations between schizophrenia and impaired empathy on the one hand and impaired empathy and [serious] violence on the other. In order to examine a hypothesised association between all three, a sample of men with chronic schizophrenia, schizoaffective and delusional disorders was recruited and empathy differences were tested between those participants with a history of serious violence and those without such history. Stability of empathy over three months was also examined. Following a literature review on measurements of empathy in similar populations, the *Interpersonal Reactivity Index* (IRI), a self-reported empathy questionnaire, was found to be the most comprehensive, relevant and appropriate tool to use; it had already been recommended in previous studies with violent people (Beven et al., 2004). Although widely applied in research with people with schizophrenia and similar psychotic disorders; however, I could find no evidence that it had been validated for use with such a population. Therefore my next step was to examine its psychometrics in my sample.

10.2 Summary of findings

Principal component analysis confirmed that the IRI has acceptable psychometrics among men with schizophrenia and similar psychotic disorders, but its use suggested the need for a shorter version - the modified IRI (MIRI) which is similarly reliable, but much easier to administer: an indisputable advantage when administering to people with florid psychotic symptoms. Both versions of the scale are used to test the hypotheses in this thesis. The *Personal distress* scale, which was reported not to be reliable in another offender sample (Beven et al., 2004), showed good internal validity and reliability for both IRI and MIRI in my sample.

Neither IRI nor MIRI scores among men with schizophrenia and similar psychotic disorders suggested significant differences in empathy between those with a lifetime history of life or health threatening violence and those with minimal violent or non-violent behaviour. Therefore, my main hypothesis was not sustained.

As this was a novel study, further analyses were conducted of empathy differences among men with schizophrenia and similar psychotic disorders using other thresholds for lifetime violence history. A potential barrier in identifying group differences was the prevalence of violence in this sample of men. Only 10% (9/85) had no history of interpersonal physical violence at all and just 5% (5/85) of the sample had no history of violence at all, including damage to property. Nevertheless, results suggest that, whether measured by the IRI or the MIRI, those with a history of interpersonal violence have significantly impaired cognitive empathy compared to those without such

history. Moreover, findings suggest that men without any history of violence at all were less impaired than the violent comparison group. As the number of participants in each of these groups was lower than the estimated required sample size for this study, results should be interpreted with caution. Although unable to conduct multivariate analyses because of the small numbers in some cells when all significant variables were taken into account, bivariate analyses suggested that duration of illness, depression and substance misuse were amongst the clinical factors to be taken into account as potential dynamic or modifying variables in a future, larger study.

Measurements of empathy over a three month period among the 43/85 participants, who agreed to complete the empathy scale on three occasions, demonstrated no significant change over time, suggesting that in my study group, capacity for empathy was a stable trait.

10.3   Psychometrics of the IRI in men with schizophrenia and similar psychotic disorders with history of violence and the creation of the MIRI, a shorter modified version of the IRI

Although my main psychometric finding was that the IRI is a satisfactory tool for use with men with chronic schizophrenia and similar psychotic disorders, in spite of being only previously validated among University students (Davis, 1980), there are still some grounds for caution in its application to people with schizophrenia, schizoaffective and delusional disorders.

The absence of an inverse correlation finding between *Perspective taking* and *Personal distress* scores, found in the original Davies validation study among students is interesting. Hoffman (2000) proposed a developmental explanation. He argued that *Personal distress* is a more primitive empathic mechanism, prominent in children, which tends to decrease with age, whereas *Perspective taking*, a more cognitive complex ability, tends to increase. In people with chronic schizophrenia and similar psychotic disorders, the combination of higher *Personal distress* with lower scores in components of cognitive empathy may indicate an association between chronic and/or deteriorating course of psychotic disorders, such as schizophrenia and widespread empathy impairment affecting both cognitive and emotional components. If, as seems possible from my findings, impairments in empathy in this context are associated with interpersonal violence of any level of seriousness, one important future research question would be how early this combination of empathic problems can be identified and another whether specific interventions, which actually improve either or both of these components of empathy, could reduce risk of interpersonal violence by people with schizophrenia. This would certainly warrant further testing in a sample with people at all stages of illness development.

Although the IRI seemed to have sound psychometric properties among these men, many of them had difficulty in completing the 28 item scale without a lot of help. Further, their symptoms were an explicit barrier to rating some items. Some patients informed the researcher that they did not watch TV or read books as their concentration was poor or had distressing psychotic experiences

when they watched TV (e.g. TV talks to them) and thus declined to provide a rating for that sentence or provided a 'floor' effect rating.

The MIRI, largely derived by principal component analysis from the IRI, offers an alternative, with 10 fewer items. It also had good psychometric properties, but needs further testing in a more heterogeneous sample.

Further, indirect confirmation of the likely validity of the MIRI lies in its similar relationship to education, age and intelligence as reported in previous literature on the IRI (Brüne, 2003) and as found in my separate tests with the IRI in my sample. History of fewer years of education and lower intelligence, albeit within the normal range, correlated with lower cognitive empathy, as measured by both IRI and MIRIS. In another previous study, Montag et al. (2007) found no correlation between age and empathy, and my findings, whether applying the IRI or the MIRI, fitted with this.

In this sample, there was no correlation between any IRI or MIRI subscales and cognitive measures, such as the Trial Making Test or the Category Fluency Tests. Other studies have shown similar results and support my findings (Montag et al., 2007). However, there are other researchers, who have reported positive correlations with both cognitive and emotional empathy and neurocognitive tests (Mizrack et al., 2016; Arous et al., 2016).

10.4 Differences in self-reported empathy between patients with schizophrenia and similar psychotic disorders who had committed life-threatening violence and those who had been non or less seriously violent

My hypothesis that empathy would be more impaired in those with the most serious violence histories was not sustained. Seriously and non-seriously violent participants were almost identical in all characteristics with the exception that the seriously violent group was significantly less educated and more likely to be diagnosed with comorbid personality disorder. These are coherent findings taking into account that, among people with schizophrenia and similar psychotic disorders, personality disorder has been reported as a risk factor for violence (Bo et al., 2011).

As empathy scale scores did not differentiate the violence groups as hypothesised, no multivariate analysis was performed in relation to the main hypothesis.

A possible effect on the results is that cognitive empathy appeared to be too consistently low among these men to be able to detect differences. In this study, I had no schizophrenia free control group for comparison, but all scale scores were much lower than those in the original IRI study with students (Davis, 1980). A study on people with schizophrenia that could be used to compare my data with is the McCormick et al. (2012) study, with although a shorter sample, similar participants' age and education level and duration of illness. My sample had lower IRI mean subscale scores than in McCormick's sample participants. However, McCormick group included 2/14 (12%) women and empathy tends to be higher in women.

So, what is likely to make a difference to these results? Although findings in previous literature are somewhat contradictory, there is some evidence suggesting that mentalising abilities and therefore cognitive empathy deteriorate over the course of a schizophrenic illness. Thus, cognitive empathy may be less impaired in the first years of the illness (Achim et al., 2010), and therefore, it may be possible that including less chronic patients in the study may lead to different results. This is not, however, supported by contrasting my data with McCormick et al. (2012).

In the Jolliffe & Farrington (2004) meta-analysis, results indicated that offenders had lower cognitive empathy, and this finding was more pronounced among younger and violent participants. In my study 77/85 participants were offenders with an average age of 39.6 (+/-12.7); it might therefore be hypothesised that not only the inclusion of less chronic patients, but also the inclusion of younger participants without history of offending in the sample might yield different results.

The tool chosen to measure empathy may be another element to consider after results failed to show any significant difference in empathy between groups clustered by lifetime serious violence. In this respect, not only have the cognitive subscales of the IRI been shown to correlate with other validated tools for measuring cognitive empathy, such as the Hogan empathy scale (Hogan, 1969), but also I showed that the psychometrics of the IRI in my sample specifically were reliable, as recommended in previous studies among violent

participants (Beven et al., 2004). It is particularly useful to employ a tool to measure self-reported tendencies among participants when taking into account lifetime history of violence.

Another explanation for failing to sustain my hypothesis could lie in violence measurement, but I believe that in my study this was sound and enhanced as it was based not only on recorded data, but also by asking the participants of the study directly. This has been recommended as the most accurate approach to violence history measurement (Walsh et al., 2002; Elliott et al., 1986). Therefore, this is not likely to be a factor affecting the results. Choice of cut-off in the classification of violence does, however, seem critical here. I chose the cut-off between serious and non-serious violence on practical grounds. In clinical practice, this is what tends to determine where people may expect to receive treatment when necessary – in secure hospital services or in generic services. In addition, however, awareness of the likely distribution of violence histories in an inpatient sample led me to consider that this would be a good, research-pragmatic cut-off. Taking a flexible approach yielded the much more interesting finding that empathic impairment accompanying schizophrenia may be a major factor in determining whether interpersonal violence occurs at all, or, indeed, any violence.

The relationship between cognitive empathy and violence in schizophrenia is not yet well understood; several authors have reported different results. Some suggest that a degree of cognitive empathy is required to be able to commit a serious act of violence (Bo et al., 2011; Rice, 1997); however Abu-Akel et al.

(2004) found that people with schizophrenia who are violent have better basic mentalisation abilities but an impairment in higher levels of Theory of Mind which may contribute to violent behaviour, and this is yet to be clarified. Krakowski et al. (1989) found that a highly violent group of inpatients with schizophrenia had more neuropsychological abnormalities than their less violent peers - in the areas of integrative sensory and motor functions. While I did not assess these specific characteristics in my study, cognitive function assessed by the TMT B or the CFT was not significantly different between the serious and less seriously violent groups.

10.5 Cognitive empathy: does this moderate or mediate the relationship between chronic schizophrenia and violence?

In this study, cognitive empathy impairment distinguished those participants who had ever been interpersonally violent from those who had not. Whether, among men with schizophrenia and similar psychotic disorders, impaired cognitive empathy is a mediator of violence, and therefore, necessary for a violent outcome to occur, or whether it is a moderator and then affects the strength of correlation with violence, is still unknown and could not be resolved with this study due to the small sample size and abnormal distribution of the education scores. These results are at least encouraging to consider further study using a larger sample. A suggestion from this finding would be that cognitive empathy may be a moderator or a mediator of interpersonal violence in men with schizophrenia and similar psychotic disorders. Acting violently against an individual occurs within a social multifactorial context; and though not

uniquely, certainly impaired cognitive empathy may contribute to dysfunction of the violence inhibitory system.

When using percentiles to categorise empathy scales in order to test empathy scores differences, only using the percentile 30, a score of 10 or below in the MIRI empathic concern significantly differentiated between seriously and non-seriously violent groups. It would not be appropriate to make conclusions on these results at this stage due to the unknown clinical significance of the chosen empathic categories, the arbitrary selection of the percentiles and unknown influence of potential moderating factors. Nevertheless, it would be still desirable to further explore the potential categorisation of empathy scales in a larger sample, which would allow for further analysis of potential moderating factors.

10.6 Stability over time of self-reported empathy scores in patients with schizophrenia and similar psychotic disorders

The apparent stability over time of most IRI self-ratings may have been an artefact of the chronicity of illness in this group of men. Certainly, there was no evidence of significant change in psychotic symptoms over that period, and none of changes in medication either. On the other hand, these results are obtained from a self-reported tool that measures empathic tendencies, which may not be able to detect specific changes over a three month period.

Although these results may contribute to the evidence that empathy is more likely to be a trait than a state, results should be interpreted with caution. Previous literature has been equivocal on this.

Some studies suggest that cognitive empathy deficits may be a trait marker rather than a state of the disorder (Langdon & Coltheart, 1999; Herold et al., 2002; Janssen et al., 2003; Brüne, 2005b). Some studies support this by finding degrees of impairment in both people with schizophrenia and their first-degree relatives compared with healthy controls (Janssen et al., 2003).   Similar evidence has been adduced to support that emotion recognition as part of emotional empathy is also a trait in people with schizophrenia; Bediou et al. (2007) found emotion recognition impairment in men with first episode of psychosis did not improve despite clinical stabilisation, and their healthy siblings had lower degree of impairment. Adding evidence for impaired empathy being a trait marker, Addington et al. (2008) found that face emotion recognition deficits were present in people at high risk of psychosis, and similar impaired emotion recognition abilities was found by Streit et al. (1997) among those with prodromal phases of schizophrenia.

Against the evidence towards empathy being a trait, there are other studies suggesting that cognitive empathy or Theory of Mind deficits are symptoms of schizophrenia and subjected to change over the course of the illness, therefore supportive of cognitive empathy being a state of the illness (Corcoran et al., 1995; Frith & Corcoran, 1996; Sarfati & Hardy-Bayle, 1999; Sarfati et al. 1999; Pickup & Frith, 2001). In 2003 a brief report was published by Frommann et al.,

in which Training in Affect Recognition (TAR) was administered to people with schizophrenia showing promising results, as 7 out of 11 patients improved their performance in emotion recognition following the intervention. Two years later, Fromman's group presented results from a larger study (Wölwer et al., 2005) using the TAR in people with schizophrenia. The authors found that people with schizophrenia improved their emotion recognition function, and reached similar levels to healthy controls, after receiving the TAR for 12 sessions. Moreover, Combs et al. (2007) contributed to this evidence when he found some aspects of empathy recognition and understanding of others' actions and feelings improved in people with schizophrenia following a specific empathy training programme.

As can be intuited, taking into account the evidence so far, despite two differentiated positions in the literature, which would indicate different potential for either of the hypotheses to prevail –empathy as a trait or as a state-, it is actually sensible to think that empathy deficit may well in part be a trait, and in part, there may be some plasticity to improve functionality of empathy by rehabilitation programmes.

Evidence from my study to support *Perspective taking* as a trait, rather than a consequence of chronicity in men with schizophrenia, was the fact that *Perspective taking* did not correlate with duration of illness. This is similar to findings reported by Bora et al. (2008) when using the EQ (Baron-Cohen & Wheelwright, 2004), which correlates with the IRI *Perspective taking*. Evidence suggesting the opposite; however, is found in previous studies (Montag et al.,

2007; Brüne, 2003; Sarfati et al., 2000; Drury et al., 1998). These all suggest that low *Perspective taking* scores were indicative of a possible deterioration of cognitive empathy along the psychotic illness. Duration of illness in these studies was similar to that in mine; in the Montag et al. (2007) study, for example, duration of illness was 11.6 (SD= 9.6) years and in mine it was 14.9 (SD= 10.5) years, so difference in chronicity seems unlikely to explain the difference between my findings and his; insofar as it is relevant, it merits emphasising that my sample size was larger (n= 85) than that of Montag et al. (2007) (n= 45).

By contrast, in my study, patients with longer duration of psychosis experienced lower *Personal distress*, which may indicate either habituation to distressing symptoms or effective treatment of psychosis. Frequent involvement in violent episodes may also regulate *Personal distress*, with violence constituting a form of catharsis; but frequency of violence was not investigated in this study, and this is also an interesting further area for further investigation.

Whether empathy is a state or a trait, it may be susceptible to change given specific intervention, meritorious *per se*, and potentially critical in risk reduction strategies, if further evidence can be adduced in support of an association between impaired cognitive empathy and interpersonal violence. Amongst a body of equivocal literature, some investigators have reported that intensive psychological treatment yields very little change in empathy over 3 years in white American patients with schizophrenia, but that in other ethnic groups, such as Hispanics and African-American patients, it decreased (Barrio, 2001).

In contrast, according to another study, empathic abilities improved among four veterans of unknown ethnic background with chronic schizophrenia following an intensive reorientation programme (Linnell et al., 1975).

Most of the evidence for empathy as a state comes from intervention studies and it may well be best to understand it as a trait with some plasticity. It is also possible, however, that outcome variations when measuring empathy may arise from contextual or measurement variables.

10.7 Potential moderators of empathy in schizophrenia and similar psychotic disorders

There is still ongoing debate in the literature as to whether or not positive symptoms of psychosis correlate or not with empathy; some authors suggest so (Mrizak et al., 2016; Frith & Corcoran, 1996). In my study, and according to antecedent studies (Montag et al., 2007; Bratton et al., 2017), results indicate a lack of correlation between empathy and positive psychotic symptoms of schizophrenia *per se*.

I found no correlation between negative symptoms and self-reported empathy overall, which is consistent with previous reports (Montag et al., 2007). Some authors have found that enhanced capacity for *Perspective taking* is associated with fewer negative symptoms. (Frith, 2004; Brüne, 2005b); and other investigators have shown that severe negative symptoms correlate with impaired cognitive or emotional empathy. Shamay-Tsoory et al. (2007) examined this association among 26 people with schizophrenia. My study sample was larger than that of previous studies; the fact that I did not find a

relationship between aspects of empathy and negative symptoms cannot therefore be explained as a mere artefact of sample size. Other studies, like mine, relied on self-report in response to quite complex questions about empathic abilities. Therefore, outcome differences might reflect differences in the extent to which we elicited information. As the participants were helped to understand the items of the IRI, I am confident that I enhanced the reliability of information available.

Substance misuse and empathy in schizophrenia and similar psychotic disorders

My findings are not the first to show that emotional empathy, as measured by *Personal distress*, is abnormally increased among those with depression (Abramowitz et al., 2014; Derntl et al., 2012; O'Connor et al., 2002; Schneider et al., 2012). In line with previous studies (O'Connor et al., 2002; Thoma et al., 2011), in my study, higher *Personal distress* levels correlate with severity of depressive symptoms as measured by the CPRS-depression subscale. A link between *Personal distress* and depression, however, seems almost a truism. Of more interest, especially in the context of violence, is a possible association between *Personal distress* and substance misuse, particularly given the finding in respect of *Personal distress* and emotions attributed to delusions.

A trend was observed, both with the IRI and MIRI, for lower scores on *Perspective taking* and higher scores for *Personal distress* among those men with a history of alcohol or illicit drug misuse compared to those without such a history. There are no previous studies examining any association between

empathy and alcohol history in a schizophrenia cohort, but in samples of people without psychosis, there is evidence in favour of a history of alcoholism being associated with lower *Perspective taking* (Martinotti et al., 2009) and higher *Personal distress* (Thoma et al., 2013). Maurage et al. (2011b), however, found lower *Personal distress* among patients with an alcohol dependent history compared with healthy controls. All these studies are cross sectional, and a longitudinal perspective would better help to interpret possible relationships. It may be, for example, that high *Personal distress* increases the risk of patients with schizophrenia and similar psychotic disorders misusing substances, and substance misusing behaviour may moderate distress, therefore reinforcing a maladaptive behaviour pattern. It would be important to explore such associations further as substance misuse has commonly been cited as an important variable in the relationship between psychosis and violence (e.g. Swanson et al., 1990; Fazel et al., 2009).

So, is dysfunctional empathy a mediating or moderating factor in the relationship between schizophrenia, misusing substances and violence? *Personal distress* results in aversive distress and self-regulatory failure, self-defensive behaviour patterns and/or avoidance in subjects with schizophrenia and similar psychotic disorders, rather than enhancing prosocial behaviour followed by distress reduction. High *Personal distress* may facilitate substance misuse and in the short term at least, substance misuse would reciprocally affect *Personal distress* regulation. Another interesting potential subject of investigation would be whether substance misuse can result in or contribute to blunting of *Perspective taking.*

Discrepant findings with respect to *Personal distress* levels in the context of substance misuse may be the result of evolution during different stages of substance misuse. The three studies mentioned earlier (Maurage et al., 2011b; Thoma et al., 2013; Martinotti et al., 2009) investigated the relationship between empathy and alcohol abuse selecting recently detoxified inpatients; however, none has investigated empathy at different stages of abuse in longitudinal models.

Depression and empathy in schizophrenia and similar psychotic disorders

Evidence suggests that emotional empathy measured by *Personal distress* is abnormally increased among those with depression (Abramowitz et al., 2014; Derntl et al., 2012; O'Connor et al., 2002; Schneider et al., 2012). In line with previous studies (O'Connor et al., 2002; Thoma et al., 2011), in my study, higher *Personal distress* levels correlate with severity of depressive symptoms as measured by the CPRS-DS. Thoma et al. (2013) found that people with depression tend to have impaired cognitive empathy and dysfunctional, increased emotional empathy so that the distress of others would be more likely to generate *Personal distress* experiences with poor ability to distinguish between emotions of self and others.

Suicide risk and empathy in schizophrenia and similar psychotic disorders

It is estimated that 23–57% of adults with schizophrenia and similar psychotic disorders have comorbid depression (Buckley et al., 2009), which constitutes a suicide lifetime risk of 5% in schizophrenia (Hor & Taylor, 2010; meta-analysis).

Among others risk factors, comorbid substance misuse, young age and high education level have been identified as contributive by the authors; however, to date, the relationship between empathic abilities and suicide attempts has not been thoroughly examined. In my study, those men with a history of suicide attempts had significantly impaired cognitive empathy, with significantly lower *Fantasy scale* scores, and displayed a trend towards lower *Perspective taking* scores than those without such history. This correlation would merit further investigation that would potentially substantially affect and improve risk management strategies in men with schizophrenia and similar psychotic disorders.

Treatment with antipsychotics

The role of psychotropic substances in moderating empathic responses – antipsychotic medication – is less clear. That those with lower *Perspective taking* were on higher doses of antipsychotic medication was an interesting finding emphasising, once again, the importance of conducting prospective longitudinal studies.

One possible explanation might be that the use of higher doses of antipsychotics may impair, or further impair, cognitive empathy in these patients. Antecedent literature has produced different results, ranging from a suggestion that Theory of Mind, which correlates with cognitive empathy as measured by the IRI, improves after treatment with antipsychotics (Mizrahi et al., 2007) to the more indirect suggestion that psychosocial function scales, which include empathy items, such as the Quality of Life scale, modestly

improve after treatment with atypical antipsychotics in people with chronic schizophrenia (Swartz et al., 2007). The effectiveness of atypical antipsychotics, in particular, olanzapine and risperidone, in improving emotional recognition test performance by people with treatment resistant schizophrenia, has also been observed (Ybarraran-Pernas et al., 2003; Kee et al., 1998).

Although I did not measure emotion recognition, as such, I did examine differences in self-reported empathy with different types of antipsychotic medications. There were no statistically significant differences in self-reported cognitive or emotional empathy between patients on typical or atypical antipsychotics. The analysis did not take into account, however, other potential mediators, such as other prescribed medications. In a larger patient sample, this could be an interesting subject for further research.

10.8 Limitations

There are several limitations and biases, which could influence generalisation of results from this study. First, no matched healthy control group is available for either the cross-sectional or longitudinal part of this study. Nevertheless, it is important to point out that the main focus of this study was to investigate empathy differences among men with schizophrenia and similar psychotic disorders according to their violence background, and currently this is the only study to have addressed this subject matter.

Second, required sample size was difficult to estimate because a similar research study has never been carried out before, but I attempted a conservative estimate, based on a review of the literature, concerning self-reported empathy among violent participants. Although I achieved the sample size estimated from the calculation, a larger sample might have captured a wider range of violence histories, allowing for more discriminatory testing.

The sample size, although sufficient according to the preliminary sample size calculation, and larger than those in previous studies of empathy, schizophrenia and violence, was nevertheless quite small and consisted almost exclusively of chronically psychotic men with symptom severity requiring hospital based treatment; and the study participants remained in such controlled environments throughout the study.

Third, a selection bias of the study could have resulted from the exclusion of both, more acutely unwell subjects unable to participate, as well as less acutely unwell subjects not having been captured as their treatment occurred exclusively in the community. The study was limited to men with schizophrenia and similar psychotic disorders and all participants were English speakers and resident in the United Kingdom. A study with people of both sexes, at all stages of illness and taking into account different cultural backgrounds would now be indicated. The ethics committee had expressed concern that the studied patients could become distressed during or following administration of tests and interviews, and therefore limited me to inpatient samples; but the subjects of this study were not apparently adversely affected by their participation

symptomatically or behaviourally. There seems no plausible reason to exclude out-patients from a future study in order to generate a more heterogeneous sample.

Fourth, violence was rated only by its seriousness and not frequency. In future studies it may also be of value to consider differentiating between impulsive and instrumental violence. This is important as it has been hypothesised that the latter would be more likely to be associated with dysfunction in sharing feelings with others - emotional empathy; whereas the impulsive type would be more likely influenced by a lack of impulse control (Decety et al., 2007) and have little, if any, relation with empathy.

Fifth, moderating variables with the potential to influence results may not have been sufficiently accounted for. I did not recruit study subject who had had specific interventions to modify empathy with my exclusion criteria. In fact, no otherwise eligible research subject had to be excluded on such grounds. It is conceivable, however, that other types of cognitive therapies completed prior to hospital admission could have had a confounding impact, and I could not test this. However, I was able to focus in some depth on the role of antipsychotic medication, which has started to attract interest in relation to empathy; the potential effect of other medication, for example antidepressant agents, was not examined because such medications were too inconsistently prescribed within the test sample, but it could potentially have influenced the results.

10.9 Conclusions and future directions

Men admitted to hospital with chronic schizophrenia and similar psychotic disorders show impairments in empathy according to self-rating measurements using the IRI. This study adds evidence that impairments in cognitive empathy – *Fantasy scale* and, in particular, *Perspective taking* - are more prevalent among men who have been interpersonally violent. Therefore, this finding may contribute to risk assessment tools for men with schizophrenia and similar psychotic disorders and ultimately facilitate prevention of more serious violence; and reduction of violence escalation and stigma perpetuating factors. Although under treatment for their illness, identified impairments seemed stable over three months in this group of men, who had had no intervention specifically for empathic difficulties. Such intervention might be desirable. Affective empathy, although also somewhat impaired at the beginning of the study, did not distinguish between violent and non- or less violent men. As these men tolerated the study well, future work might compare inpatient with outpatient outcomes.

Future directions for research on empathy and violence among people with schizophrenia and other similar psychotic disorders, may focus on the use of larger longitudinal studies with more heterogenic sample; explore the feasibility of establishing a categorical measure of empathy with the intention of producing a reliable tool for clinicians, as part of the risk assessment of violence among this population; and consist of interventional studies to potentially improve empathic abilities, which ultimately contribute to reduce the risk of interpersonal violence among this population.

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APPENDIX 1. LIST OF TABLES

APPENDIX 2. LIST OF FIGURES

APPENDIX 3. KEYWORDS AND THESAURUS SYSTEMATIC REVIEW: EMPATHY AND VIOLENCE IN SCHIZOPHRENIA

Number of references for each keywords and thesaurus used in electronic databases: MEDLINE, PsycINFO, EMBASE, DARE and Cochrane.

(ToM or " Theory of Mind "): **11076**

schizophren: **296418**

"emotional responsiveness": **552**

("emotional recognition" or "emotional perception"): **716**

empath: **45421**

(criminal or offend or violen or aggressive): **453004**

Number of references after combined keywords and their thesaurus IRI psychometric properties among schizophrenia and among violent populations: Combined systematic review

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(ToM or "Theory of Mind ") and schizophren: **853**

"emotional responsiveness" and schizophren: **17**

("emotional recognition" or "emotional perception") and schizophren: 86

empathy and schizophren: **807**

(ToM or "theory of mind") and schizophren and (criminal or offend or violen or aggressive): **30**

"emotional responsiveness" and schizophren and (criminal or offend or violen or aggressive): **0**

("emotional recognition" or "emotional perception") and schizophren and (criminal or offend or violen or aggressive): **4**

empathy and schizophren and (criminal or offend or violen or aggressive): **52**

schizophren and (criminal$ or offend$ or violen or aggressive): **7876**

((ToM or "Theory of Mind ") or "emotional responsiveness" or ("emotional recognition" or "emotional perception") or empath) and schizophren and (criminal or offend or violen or aggressive): **77**

Criteria of inclusion: English published studies, which examine psychometric properties of the IRI in schizophrenia (1), and in violent population (2).

Data bases: Embase 1947-Present, PsycINFO 1806 to June Week 4 2015 and Medline 1946 to June Week 5 2015

Search strategy: references identified (SZ: schizophrenia; V: violence):

1	schizophren	399776
2	"Interpersonal Reactivity Index".	1810
3	1 and 2	110
4	**remove duplicates from 3 (SZ + IRI)**	**70**
5	violen.	187916
6	aggress.	442957
7	criminal.	99101
8	crime.	94905
9	offend.	67148
10	5 or 6 or 7 or 8 or 9	758715
11	(psychometric or validation or validity or reliability).	1013975
12	2 and 10	275
13	**remove duplicates from 12 (V +IRI)**	**252**
14	11 and 13	43
15	**remove duplicates from 14 (V + IRI + Psychometrics)**	**43**
16	**SELECTED STUDIES (+ hand searching selected studies reference list) (V + IRI + Psychometrics)**	**2 (+2)= 4**
17	4 and 11	7
18	**remove duplicates from 16 (SZ + IRI + Psychometrics)**	**7**
19	**SELECTED STUDIES (SZ + IRI + Psychometrics)**	**0**

APPENDIX 4. ETHICAL APPROVAL

National Research Ethics Service
North Somerset & South Bristol Research Ethics Committee

Assembly Rooms
UBHT Headquarters
Marlborough Street
Bristol BS1 3NU
Tel: 0117 928 3613
Email: naaz.nathoo@ubht.nhs.uk
Facsimile: 0117 928 3724

09 November 2007

Professor Pamela J Taylor
Professor Forensic Psychiatry/Honorary Consultant Forensic Psychiatrist
Cardiff University/Bro Morgannwg NHS Trust
Department of Psychological Medicine
School of Medicine, Cardiff University
Heath Park, Cardiff
CF14 4XN

Dear Professor Taylor

Full title of study:	Delusions, social interaction and violence: A study to evaluate the effect of social interaction on the conviction and persistence of delusional beliefs and likelihood of delusionally driven violent acts.
REC reference number:	07/H0106/148

Thank you for your letter of 03 October 2007, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information was considered at the meeting of the Sub-Committee of the REC held on 08 November 2007. A list of the members who were present at the meeting is attached.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised.

Ethical review of research sites

The Committee has designated this study as exempt from site-specific assessment (SSA. There is no requirement for [other] Local Research Ethics Committees to be informed or for site-specific assessment to be carried out at each site.

Conditions of approval

The favourable opinion is given provided that you comply with the conditions set out in the attached document. You are advised to study the conditions carefully.

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	Version	Date
Application		09 August 2007
Investigator CV		
Protocol	1 (given by REC Coordinator)	07 August 2007
Covering Letter		21 August 2007
Summary/Synopsis	for GP	
Letter from Sponsor		26 June 2007
Peer Review	Prof. P Rogers	09 August 2007
Peer Review	Prof. S Estroff	09 August 2007
Compensation Arrangements		01 August 2007
Questionnaire	PEESS	
Questionnaire	The LEE Scale	
Questionnaire	MADS	
Questionnaire	SCL-90-R	
Questionnaire	MADS informant interview	
Questionnaire	Family Q.	
Questionnaire	CPR Scale	
Questionnaire	EPQ-R	
GP/Consultant Information Sheets	1 (given by RECC)	07 August 2007
Participant Information Sheet	2.03 (informant - significant other)	07 August 2007
Participant Information Sheet	2.04 (informant - significant other)	02 October 2007
Participant Information Sheet	1.04 - patient	02 October 2007
Participant Information Sheet	3.03 (staff informant)	02 October 2007
Participant Consent Form	3.03 - staff informant	02 October 2007
Participant Consent Form	1.04 - patient	02 October 2007
Participant Consent Form	2.04 (significant other)	02 October 2007
Response to Request for Further Information		03 October 2007

R&D approval

All researchers and research collaborators who will be participating in the research at NHS sites should apply for R&D approval from the relevant care organisation, if they have not yet done so. R&D approval is required, whether or not the study is exempt from SSA. You should advise researchers and local collaborators accordingly.

Guidance on applying for R&D approval is available from http://www.rdforum.nhs.uk/rdform.htm.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Now that you have completed the application process please visit www.nres.npsa.nhs.uk (After Review). Here you will find links to the following

a) Providing feedback. You are invited to give your view of the service that you have received from the National Research Ethics Service on the application procedure. If you wish to make your views known, please use the feedback form available on the website https://www.nationalres.org.uk/AppForm/Modules/Feedback/EthicalReview.aspx.

b) Please refer to the attached Standard conditions of approval by Research Ethics Committees regarding submission of Progress Reports, Safety Reports, Amendments and End of Study/Project procedures.

We would also like to inform you that we consult regularly with stakeholders to improve our service. If you would like to join our Reference Group please email referencegroup@nationalres.org.uk .

07/H0106/148	Please quote this number on all correspondence

With the Committee's best wishes for the success of this project

Yours sincerely

Daog Nathoo

Mr Richard Ashby
Chair

Enclosures: List of names and professions of members who were present at the meeting and those who submitted written comments
Standard approval conditions

Copy to:

Dr K J Pittard-Davies
Head of Research Policy & Management
Research & Commercial Division
Cardiff University
7th Floor, 30-36 Newport Road
Cardiff CF24 0DE

==

North Somerset & South Bristol Research Ethics Committee

Attendance at Sub-Committee of the REC meeting on 08 November 2007

Name	Profession	Present	Notes
Mr Richard Ashby	Chartered Manager - Lay	Yes	
Mr Stephen Brown	Director of Pharmacy	Yes	
Dr Pamela Cairns	Consultant Neonatologist	Yes	

National Patient Safety Agency

National Research Ethics Service

NOTICE OF SUBSTANTIAL AMENDMENT

For use in the case of all research other than clinical trials of investigational medicinal products (CTIMPs). For substantial amendments to CTIMPs, please use the EU-approved notice of amendment form (Annex 2 to ENTR/CT1) at http://eudract.emea.eu.int/document.html#guidance.

To be completed in typescript by the Chief Investigator in language comprehensible to a lay person and submitted to the Research Ethics Committee that gave a favourable opinion of the research ("the main REC"). In the case of multi-site studies, there is no need to send copies to other RECs unless specifically required by the main REC.

Further guidance is available at http://www.nres.npsa.nhs.uk/applicants/review/after/amendments.htm.

Details of Chief Investigator:

Name:	Professor Pamela J Taylor
Address:	Department of Psychological Medicine & Neurology
	School of Medicine
	Cardiff University,
	1st Floor, Neuadd Merionydd
	Heath Park
	CARDIFF, CF14 4YS
Telephone:	Tel: +44 (0)29 2068 7910
Email:	taylorpj2@cardiff.ac.uk
Fax:	Fax: +44 (0)29 2068 7915

Full title of study:	Delusions, social interaction and violence: a study to evaluate the effect of social interaction on the conviction and persistence of delusional beliefs and likelihood of delusionally driven violent acts
Name of main REC:	North Somerset & South Bristol Research Ethics Committee
REC reference number:	07/H0106/148
Date study commenced:	01 08 2009
Protocol reference *(if applicable),* current version and date:	Original protocol: 08 08 2007 Minor revision, only to allow for end date amendment: 24 02 09

Amendment number and date: Extension to end date (now 21 12 2012) agreed 14 07 2009

Type of amendment (indicate all that apply in bold)

(a) Amendment to information previously given on the NRES Application Form

> *Yes*

> *If yes, please refer to relevant sections of the REC application in the "summary of changes" below.*

(b) Amendment to the protocol

> *Yes*

> *If yes, please submit <u>either</u> the revised protocol with a new version number and date, highlighting changes in bold, <u>or</u> a document listing the changes and giving both the previous and revised text.*

(c) Amendment to the information sheet(s) and consent form(s) for participants, or to any other supporting documentation for the study

> *No*

> *If yes, please submit all revised documents with new version numbers and dates, highlighting new text in bold.*

Is this a modified version of an amendment previously notified to the REC and given an unfavourable opinion?

> *No*

Summary of changes

Briefly summarise the main changes proposed in this amendment using language comprehensible to a lay person. Explain the purpose of the changes and their significance for the study. In the case of a modified amendment, highlight the modifications that have been made.

If the amendment significantly alters the research design or methodology, or could otherwise affect the scientific value of the study, supporting scientific information should be given (or enclosed separately). Indicate whether or not additional scientific critique has been obtained.

Three main changes are proposed:
1. Selection of the staff informant. In the original protocol, we proposed that the staff informant should be patient nominated. Experience from data collection is that patients are not always able to do this. We therefore propose the amendment that a staff person should be patient nominated where possible, but that, where not, the patient's primary nurse would be approached, subject to the patient's consent. We have trialled this new approach with about 10 patients

and found that it is acceptable to the patients and results in a better return of data.
Application date 21 08 2007, para A10, over view last line para1.

2. Changes to the questionnaires administered to the patients
The Level of Expressed Emotion Scale (LEES) will be dropped
[patients found this too long and tedious]
Original application, A10, last line page 6
Brief, well established scales to record empathy (The Interpersonal Reactivity Index) and anger (the Clinical Anger Scale) will be substituted.
We have trialled this approach with 10 patients, who all found it acceptable

3. Change to the timing of the third interview
It was proving difficult to recruit patients to a third interview 8 weeks after the first; we now propose a formal change to the protocol to reflect preference for the third interview to be 12 weeks after the first.
Original application, A10, page 7

The revised protocol is attached to reflect the changes and more information about the revised questionnaires, all these changes highlighted. The revised protocol also confirms that there has been some change in personnel participating in the study. All are approved as appropriate researchers through possession of a research passport or equivalent approval from the relevant health boards. Any other changes from the original supplied reflect clarifications, not changes in the protocol.

Any other relevant information

Applicants may indicate any specific ethical issues relating to the amendment, on which the opinion of the REC is sought.

We do not believe these changes indicate any new ethical issues, not least because they have in large part been introduced to meet difficulties which the earlier participants had experienced with the earlier protocol.

List of enclosed documents

Document	Version	Date
Research protocol	3	17 02 2011

Declaration

- I confirm that the information in this form is accurate to the best of my knowledge and I take full responsibility for it.

- I consider that it would be reasonable for the proposed amendment to be implemented.

Signature of Chief Investigator: ……………………………………

Print name: Pamela J Taylor

Date of submission: …………………………………….

Whitefriars
Level 3, Block B
Lewin's Mead
Bristol BS1 2NT
Email: uhb-tr.SouthWest3@nhs.net

Tel: 0117 342 1335
Fax: 0117 342 0445

23 March 2011

Professor Pamela J Taylor
Professor Forensic Psychiatry/Honorary Consultant Forensic Psychiatrist
Cardiff University/Bro Morgannwg NHS Trust
Department of Psychological Medicine
School of Medicine, Cardiff University
Heath Park, Cardiff
CF14 4XN

Dear Professor Taylor

Study title:	Delusions, social interaction and violence: A study to evaluate the effect of social interaction on the conviction and persistence of delusional beliefs and likelihood of delusionally driven violent acts.
REC reference:	07/H0106/148
Protocol number:	SPON 410-07
Amendment number:	n/a
Amendment date:	19 February 2011

The above amendment was reviewed by the Sub-Committee in correspondence.

Ethical opinion

The members of the Committee taking part in the review gave a favourable ethical opinion of the amendment on the basis described in the notice of amendment form and supporting documentation, with the following stipulation:

The protocol bears the date 17 February 2010, although the Notice of Substantial amendment Form quotes Version 3 and gives the date as 17 February 2011. Kindly correct the protocol and lodged a copy with the Ethics Office prior to instituting this amendment.

Approved documents
The documents reviewed and approved at the meeting were:

Document	Version	Date
Protocol ***	3	17 February 2010
Notice of Substantial Amendment (non-CTIMPs)		19 February 2011
Covering Letter		22 February 2011

***See above.

183

Membership of the Committee

The members of the Committee who took part in the review are listed below.

R&D approval

All investigators and research collaborators in the NHS should notify the R&D office for the relevant NHS care organisation of this amendment and check whether it affects R&D approval of the research.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

07/H0106/148:	Please quote this number on all correspondence

Yours sincerely

Dr Pamela Cairns
Chair

Copy to: Dr K J Pittard-Davies

....

South West 3 REC

Attendance at Sub-Committee of the REC meeting on 07 March 2011

Name	Profession	Capacity
Dr Pamela Cairns	Consultant Neonatologist	Expert
Dr Margrid Schindler	Consultant senior lecturer	Expert

184

APPENDIX 5. PARTICIPANT INFORMATION SHEET

A RESEARCH STUDY TO FIND OUT ABOUT IMPORTANT ILLNESS-RELATED BELIEFS: DO PEOPLE TALK ABOUT THEM AND ARE THERE ANY EFFECTS OF DOING SO?

We are inviting you to take part in research. Before deciding if you want to, please read this sheet carefully. It will explain why the research is being done and what it will involve. If there is anything that is not clear, please ask us.

Please take time to decide if you would like to take part in this research. A researcher will come and discuss the study with you and answer any questions you might have.

Thank you for taking the time to read this information and think about this.

Why have I been chosen? Everyone resident in selected inpatient units is being invited to take part in this research if they would like to.

What is the study about? Almost all people have beliefs that are important to them. Our beliefs can affect the way we think and feel about things, and the way we act in everyday life. Sometimes beliefs which are very important to a person may be attributed to an illness. We are interested in talking to people for whom this has happened and who are in hospital. We would particularly like to find out more about this.

What will happen to the findings of the research? The results will be written in papers for professional journals, and in reports which will be submitted in order for the researchers to gain postgraduate qualifications. There will also be reports prepared for the people who fund and approve our research. Information about the identity of people who participate in this study will not be included in any of the reports about the findings of the study. If you want to find out more about how to access this information in the future please ask us.

Who is organising and funding the research study? This research is being organised by psychiatrists, psychologists and other professionals who are employed in the School of Medicine at Cardiff University.

Who has reviewed and approved the research study? This research project has been reviewed by Multi-Centre research Ethics Committee who have raised no objection on ethical grounds. It has also been approved by Abertawe Bro Morgannwg NHS Trust and Cardiff and Vale University health board.

How to get further information: We will ensure that the staff looking after you know how to contact our researchers, and be able to contact us if they need more information about our work or if you have any questions that we have not already answered. If you want to contact us, write to us:

Forensic Psychiatry Research Group
Department of Psychological Medicine
School of Medicine
Cardiff University
Heath Park
Cardiff, CF14 4YS

APPENDIX 6. MODIFIED GUNN ROBERTSON SCALE

SERIOUSNESS OF VIOLENCE *IN THE YEAR PRIOR TO INTERVIEW* (EXCLUDING INDEX OFFENCE/ACT)

-NO PREVIOUS EVIDENCE OF VIOLENCE	0
-AGGRESSIVE AND THREATENING BEHAVIOUR, MINOR DAMAGE TO PROPERTY	1
-PERSONAL ASSAULT AGAINST ANOTHER WITHOUT LASTING DAMAGE	2
-PERSONAL INJURY REQUIRING MEDICAL TREATMENT, HEALTH THREATENED OR RESIDUAL DAMAGE	3
-LIFE SERIOUSLY IN DANGER, OR LIFE TAKEN	4

FREQUENCY OF VIOLENCE *IN THE YEAR PRIOR TO INTERVIEW* (EXCLUDING INDEX OFFENCE/ACT)

-NEVER	0
-ONCE OR TWICE, WHETHER OR NOT CONVICTED	1
-MULTIPLE EPISODES 3-10	2
-REPEATED ACTS OF VIOLENCE >10	3

LIFETIME SERIOUSNESS OF VIOLENCE *UP TO A YEAR PRIOR TO INTERVIEW* (EXCLUDING THE LAST YEAR AND THE INDEX OFFENCE)

-NO PREVIOUS EVIDENCE OF VIOLENCE	0
-AGGRESSIVE AND THREATENING BEHAVIOUR, MINOR DAMAGE TO PROPERTY	1
-PERSONAL ASSAULT AGAINST ANOTHER WITHOUT LASTING DAMAGE	2
-PERSONAL INJURY REQUIRING MEDICAL TREATMENT, HEALTH THREATENED OR RESIDUAL DAMAGE	3
-LIFE SERIOUSLY IN DANGER, OR LIFE TAKEN	4

LIFETIME FREQUENCY OF VIOLENCE *UP TO A YEAR PRIOR TO INTERVIEW* (EXCLUDING THE LAST YEAR AND THE INDEX OFFENCE)

-NEVER	0
-ONCE OR TWICE, WHETHER OR NOT CONVICTED	1
-MULTIPLE EPISODES 3-10	2
-REPEATED ACTS OF VIOLENCE >10	3

SEVERITY OF PHYSICAL CONSEQUENCES OF INDEX OFFENCE/ACT (If no index offence/act, rate 0)

-NO INJURY	0
-SERIOUS THREATS – MILD TO MODERATE PROPERTY DAMAGE	1
-SERIOUS PROPERTY DAMAGE/PERSONAL INJURY NEEDING SPECIFIC TREATMENT	2
-LIFE OR LONG TERM HEALTH THREATENED	3
-HOMICIDE	4

APPENDIX 7. DESCRIPTION OF SERIOUS VIOLENCE

Lifetime seriousness of violence was included in the seriousness (0-4) as a combination of year prior to interview and up to a year prior to interview and the violent consequences of the index offence, if any, were also included in this scale:

0. **No violence:** no violence recorded or self-reported.

1. **Aggressive and threatening behaviour, minor damage to property:** offences such as breach of peace, criminal damage, threats to kill are included. Verbal threats and verbal aggression and racial abuse, slamming or hitting doors, smashing or throwing items, hostile and intimidating behaviour are included.

2. **Personal assault against another without lasting damage/serious property damage:** common assault, affray and ABH damage to property due to arson without intention to endanger life and sexual offences with violence but not rape are included. Violence includes pushing, punching, slapping, kicking, hitting, and head butting without lasting damage to the body, causing damage such as soreness, lacerations, swelling, bruises or none.

3. **Personal injury requiring medical treatment, health threatened or residual damage:** It includes offences such malicious wounding, wounding with intent causing GBH and, arson with intention of endangering others'

lives. Violence includes pushing, punching, slapping, kicking, hitting, and head butting with lasting damage to the body, causing injuries might including bone fractures, permanent dysfunction, organ failure and/or anything requiring surgical intervention); serious sexual violence, e.g. rape; serious property damage such as destruction of a room/building by fire; damage by fire if this knowingly threatened life); threats to kill if made with a drawn weapon, attempt to strangle or repeated and of explicitly serious violence.

4. **Life taken or seriously in danger:** includes offences such as homicide/murder/manslaughter and attempt of murder.

Classification according to seriousness of violence: examples

Participant V:

- <u>IO</u>: none
- <u>Previous violent offending</u>: none.
- <u>Previous known violence (non-criminalised)</u>: none

Participant V lifetime seriousness of violence would be classified as **no violence**, so he scores **0** in the MGR scale.

Participant W:

- <u>IO</u>: none
- <u>Previous violent offending</u>: none
- <u>Previous known violence (non-criminalised)</u>: smashed a car window

Participant W lifetime seriousness of violence would be classified as **threatening or minor damage to property**, so he scores **1** in the MGR scale.

Participant X:

- <u>IO</u>: possession of weapons
- <u>Previous violent offending</u>: none
- <u>Previous known violence (non-criminalised)</u>: hit others and required restrain by 6 officers

Participant X lifetime seriousness of violence would be classified as **personal assault without lasting damage**, so he scores **2** in the MGR scale.

Participant Y:

- <u>IO</u>: assaulted a person and with a knife threatened to kill others. He also caused a fracture of clavicle to one of the persons and bruises to another one.
- <u>Previous violent offending</u>: none
- <u>Previous known violence (non-criminalised)</u>: verbally and physically aggressive

Participant Y lifetime seriousness of violence would be classified as **personal injury requiring medical treatment, health threatened or residual damage**, so he scores **3** in the MGR scale.

Participant Z:

- <u>IO</u>: attempt of murder- numerous times stabbed s person with a knife with intention to kill
- <u>Previous violent offending</u>: carrying knifes
- <u>Previous known violence (non-criminalised)</u>: fights breaking digits of both hands during the fights

Participant Z lifetime seriousness of violence would be classified as **like taken**, so he scores **4** in the MGR scale.

APPENDIX 8. THE IRI AND THE MIRI

INTERPERSONAL REACTIVITY INDEX: IRI QUESTIONNAIRE

The following statements inquire about your thoughts and feelings in a variety of situations. For each item, indicate how well it describes you by choosing the appropriate letter on the scale at the top of the page: A, B, C, D, or E. When you have decided on your answer, fill in the letter on the answer sheet next to the item number. READ EACH ITEM CAREFULLY BEFORE RESPONDING. Answer as honestly as you can. Thank you.

ANSWER SCALE:

A	B	C	D	E
A	**B**	**C**	**D**	**E**

DOES NOT   DESCRIBES ME

DESCRIBE ME   VERY

WELL   WELL

1. I daydream and fantasize, with some regularity, about things that might happen to me. (FS)

2. I often have tender, concerned feelings for people less fortunate than me. (EC)

3. I sometimes find it difficult to see things from the "other guy's" point of view. (PT) (-)

4. Sometimes I don't feel very sorry for other people when they are having problems. (EC)(-)

5. I really get involved with the feelings of the characters in a novel. (FS)

6. In emergency situations, I feel apprehensive and ill-at-ease. (PD)

7. I am usually objective when I watch a movie or play, and I don't often get completely caught up in it. (FS) (-)

8. I try to look at everybody's side of a disagreement before I make a decision. (PT)

9. When I see someone being taken advantage of, I feel kind of protective towards them. (EC)

10. I sometimes feel helpless when I am in the middle of a very emotional situation. (PD)

11. I sometimes try to understand my friends better by imagining how things look from their perspective. (PT)

12. Becoming extremely involved in a good book or movie is somewhat rare for me. (FS) (-)

13. When I see someone get hurt, I tend to remain calm. (PD) (-)

14. Other people's misfortunes do not usually disturb me a great deal. (EC) (-)

15. If I'm sure I'm right about something, I don't waste much time listening to other people's arguments. (PT) (-)

16. After seeing a play or movie, I have felt as though I were one of the characters. (FS)

17. Being in a tense emotional situation scares me. (PD)

18. When I see someone being treated unfairly, I sometimes don't feel very much pity for them.
    (EC) (-)

19. I am usually pretty effective in dealing with emergencies. (PD) (-)

20. I am often quite touched by things that I see happen. (EC)

21. I believe that there are two sides to every question and try to look at them both. (PT)

22. I would describe myself as a pretty soft-hearted person. (EC)

23. When I watch a good movie, I can very easily put myself in the place of a leading character. (FS)

24. I tend to lose control during emergencies. (PD)

25. When I'm upset at someone, I usually try to "put myself in his shoes" for a while. (PT)

26. When I am reading an interesting story or novel, I imagine how I would feel if the events in the story were happening to me. (FS)

27. When I see someone who badly needs help in an emergency, I go to pieces. (PD)

28. Before criticizing somebody, I try to imagine how I would feel if I were in their place. (PT)

NOTE: (-) denotes item to be scored in reverse fashion

PT = Perspective taking scale, FS = Fantasy scale, EC = Empathic concern scale, PD = Personal distress scale

A = 0, B = 1, C = 2, D = 3, E = 4

Except for reversed-scored items, which are scored:

A = 4, B = 3, C = 2, D = 1, E = 0

MODIFIED IRI (MIRI)

PT (Perspective taking)

- I believe that there are two sides to every question and try to look at them both. (PT)
- I try to look at everybody's side of disagreement before I make a decision. (PT)
- Before criticizing somebody, I try to imagine how I would feel if I were in their place. (PT)
- When I am upset at someone, I usually try to "put myself in his shoes" for a while. (PT)

FS (Fantasy subscale)

- When I watch a good movie, I can easily put myself in the place of a leading character. (FS)
- After seeing a play or movie, I have felt as though I were one of the characters. (FS)
- When I am reading an interesting story or novel, I imagine how I would feel if the events of the story were happening to me. (FS)
- Becoming extremely involved in a good book or movie is somewhat rare for me. (FS) (-)

EC (Empathic concern)

- When I see someone being treated unfairly, I sometimes don't feel very much pity for them. (EC) (-)
- I often have tender, concerned feelings for people less fortunate than me. (EC)
- Other people's misfortunes do not usually disturb me a great deal. (EC) (-)
- I am often quite touched by things that I see happen. (EC)
- Sometimes I don't feel very sorry for people less fortunate than me. (EC) (-)

PD (Personal distress)

- Being in a tense emotional situation scares me. (PD)
- I am usually pretty effective in dealing with emergencies. (PD) (-)
- I sometimes feel helpless when I am in the middle of a very emotional situation. (PD)
- I tend to lose control during emergencies. (PD)
- In emergency situations, I feel apprehensive and ill-at-ease. (PD)

ITEMS REMOVED FROM IRI AFTER PCA TO CREATE MIRI:

3. I sometimes find it difficult to see things from the "other guy's" point of view. (PT) (-)

5. I really get involved with the feelings of the characters in a novel. (FS)

7. I am usually objective when I watch a movie or play, and I don't often get completely caught up in it. (FS) (-)

9. When I see someone being taken advantage of, I feel kind of protective towards them. (EC)

11. I sometimes try to understand my friends better by imagining how things look from their perspective. (PT)

13. When I see someone get hurt, I tend to remain calm. (PD) (-)

15. If I'm sure I'm right about something, I don't waste much time listening to other people's arguments. (PT) (-)

22. I would describe myself as a pretty soft-hearted person. (EC)

27. When I see someone who badly needs help in an emergency, I go to pieces. (PD)
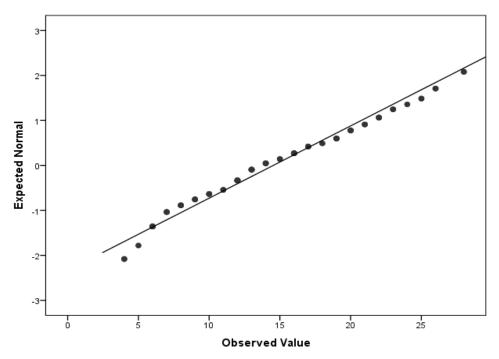
APPENDIX 9. DISTRIBUTION OF IRI, MIRI AND SOCIODEMOGRAPHIC AND CLINICAL VARIABLES

	Kolmogorov-Smirnov		
	Statistic	df	*p*
IRI Perspective taking	0.09	80	0.16
IRI Fantasy scale	0.07	79	0.20
IRI Empathic concern	0.09	80	0.09
IRI Personal distress	0.08	79	0.20
MIRI Perspective taking	0.10*	85	0.03
MIRI Fantasy scale	0.10*	85	0.03
MIRI Empathic concern	0.11*	85	0.01
MIRI Personal distress	0.08	85	0.20
FSIQ	0.12*	56	0.38
Education (years)	0.13**	75	0.01
Length of illness (years)	0.13**	75	0.01
CPRS negative symptoms scale	0.15**	82	0.01
CPRS depression scale	0.12**	82	0.01
CPRS schizophrenia scale	0.15**	82	0.01
Chlorpromazine equivalent doses of antipsychotics	0.11*	75	0.01
CFT Animals in 60 seconds	0.09	53	0.20
CFT Vegetables in 60 seconds	0.12*	53	0.03
CFT Fruit in 60 seconds	0.13*	53	0.02
TMT B seconds to complete	0.13*	53	0.02
Age of first episode of any violence	0.18**	77	0.01
Age at first offence	0.19**	77	0.01
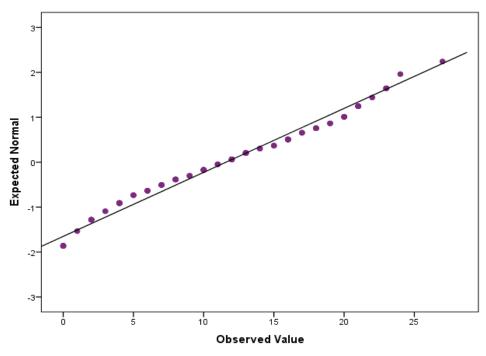
(FSIQ=Full scale intelligent quotient)(CPRS= Comprehensive Psychiatric Rating Scale) (CFT= Category Fluency test) (TMT= Trial Making Test); *Correlation is significant at *p*< 0.05 level (2-tailed) ** Correlation is significant at *p*< 0.01 level (2-tailed).

Table 1 (Appendix 9) Tests of Normality of IRI, MIRI, socio-demographic and clinical variables for men with schizophrenia and similar psychotic disorders first time IRI completers (n=85)
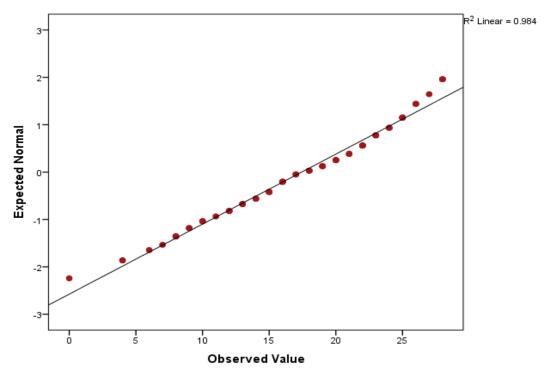
Normal Q-Q plot of the IRI subscales
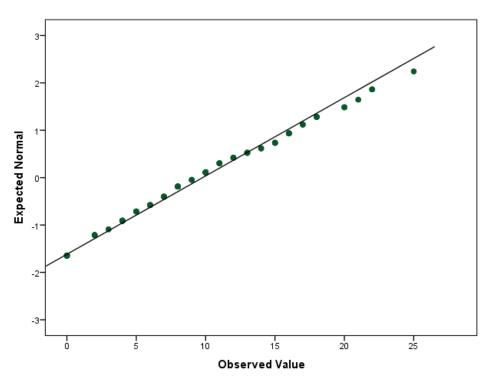
Normal Q-Q plot of the IRI Perspective taking

Normal Q-Q plot of the IRI Fantasy scale
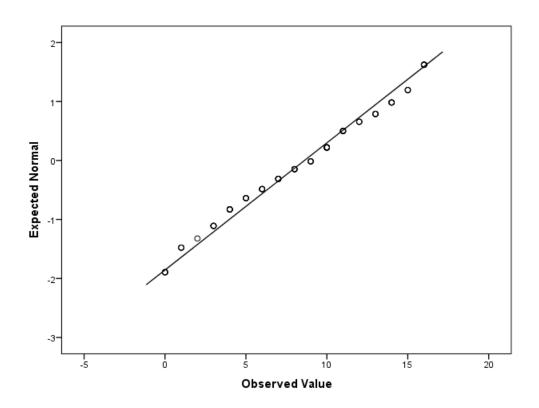
Normal Q-Q plot of the IRI Empathic concern
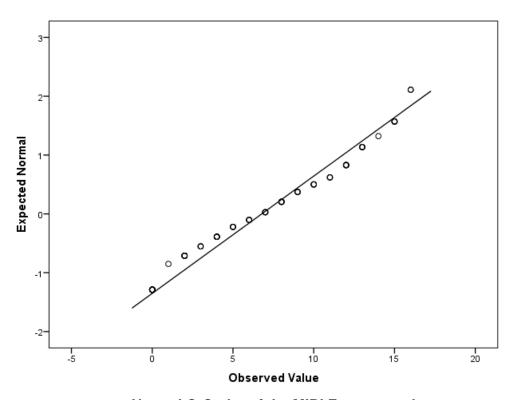
Normal Q-Q plot of the IRI Personal distress subscale
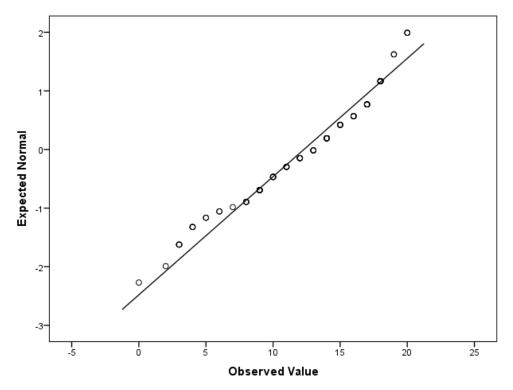
Normal Q-Q plot of the MIRI subscales
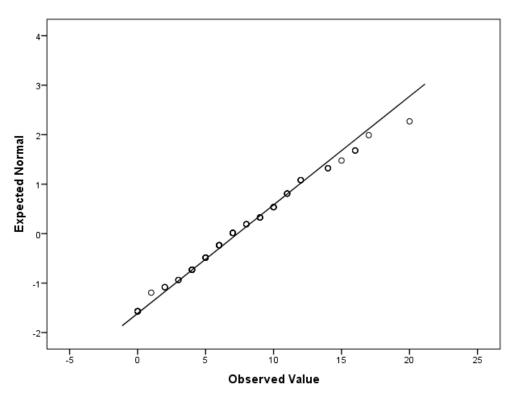
Normal Q-Q plot of the MIRI Perspective taking

Normal Q-Q plot of the MIRI Fantasy scale
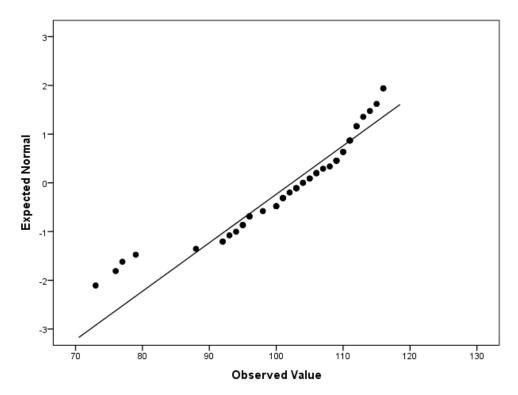
Normal Q-Q plot of MIRI Empathic concern subscale
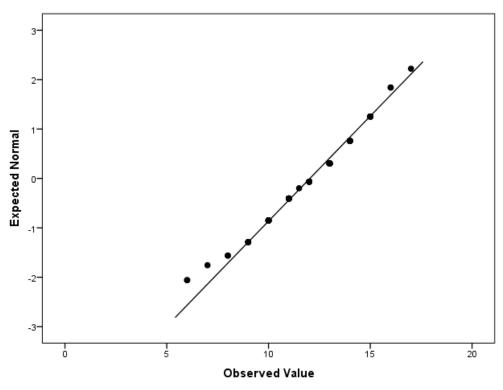
Normal Q-Q plot of MIRI Personal distress subscale
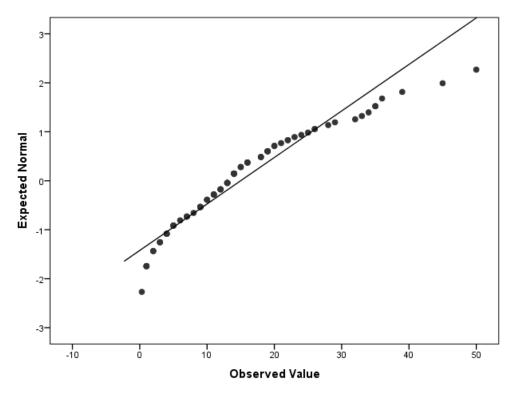
Normal Q-Q plot of the sociodemographic and clinical variables
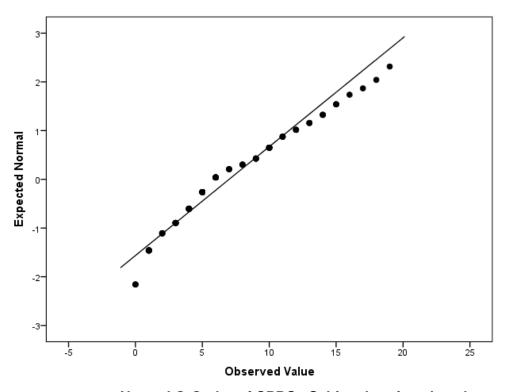
Normal Q-Q plot of Intelligence quotient
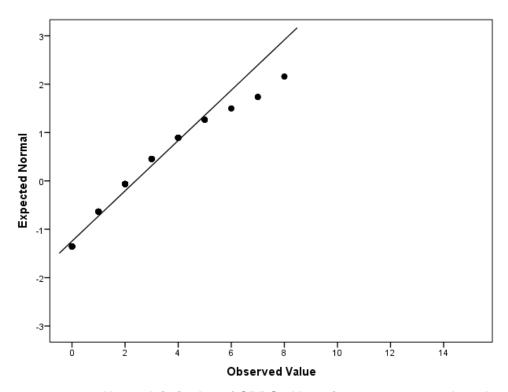
Normal Q-Q plot of education (years)
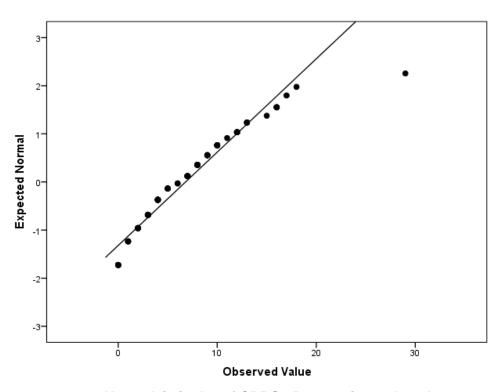
Normal Q-Q plot of duration of illness

Normal Q-Q plot of CPRS –Schizophrenia subscale
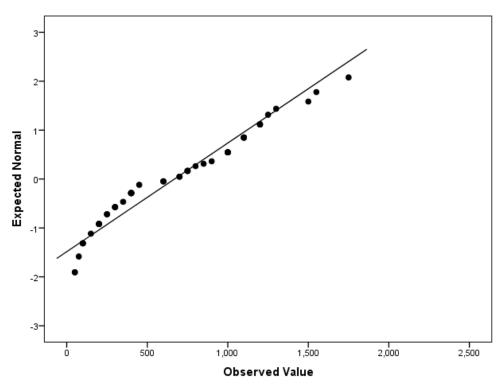
Normal Q-Q plot of CPRS –Negative symptoms subscale
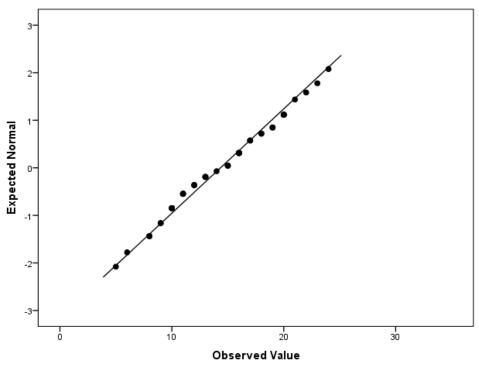
Normal Q-Q plot of CPRS –Depression subscale
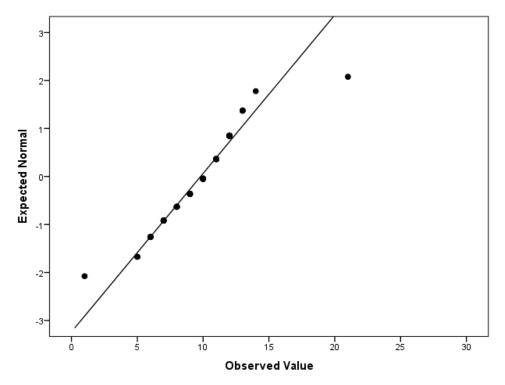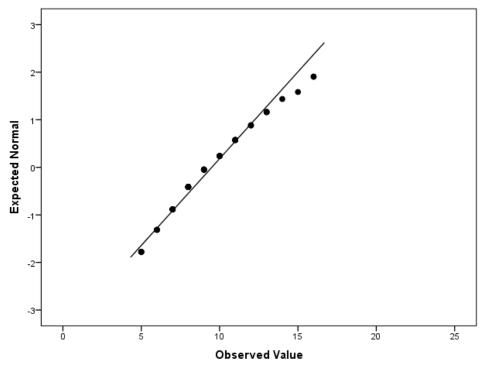
Normal Q-Q plot of chlorpromazine equivalent antipsychotic doses
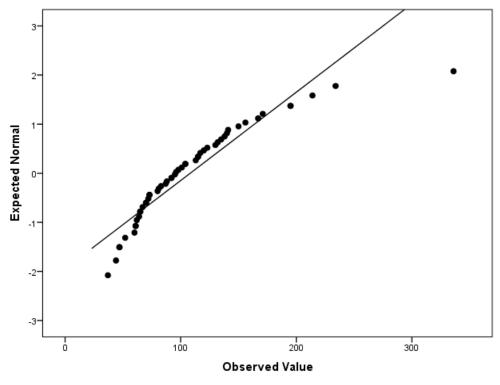
Normal Q-Q plot of CFT- Animals
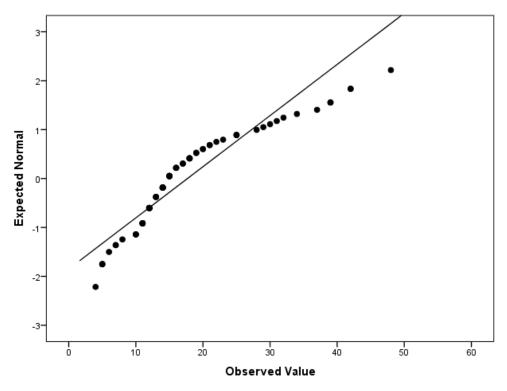
Normal Q-Q plot of CFT- Vegetables
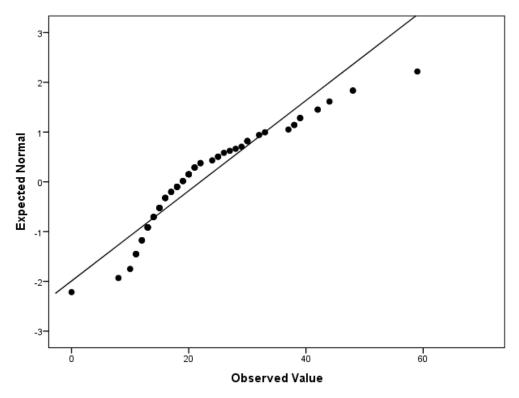
Normal Q-Q plot of CFT- Fruits

Normal Q-Q plot of TMT-B
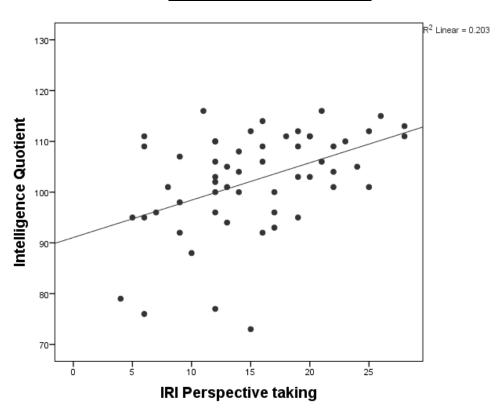
Normal Q-Q plot of age at first episode of violence
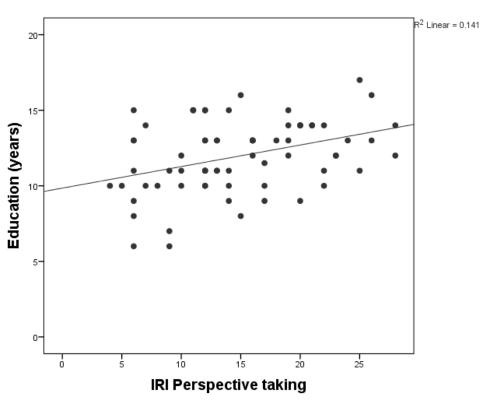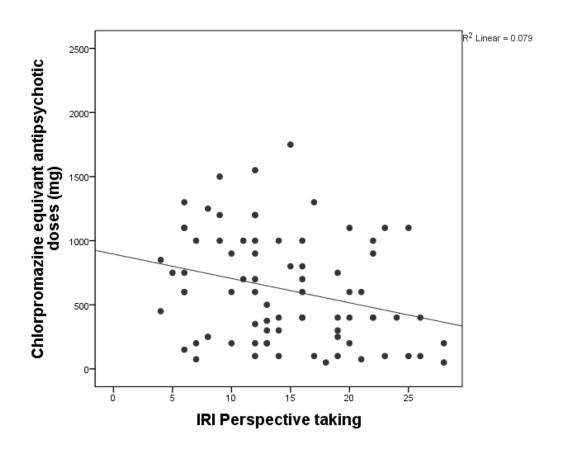
Normal Q-Q plot of age at first offence

APPENDIX 10. SCATTER PLOT FOR SIGNIFICANT CORRELATION BETWEEN IRI/MIRI AND INDEPENDENT VARIABLES
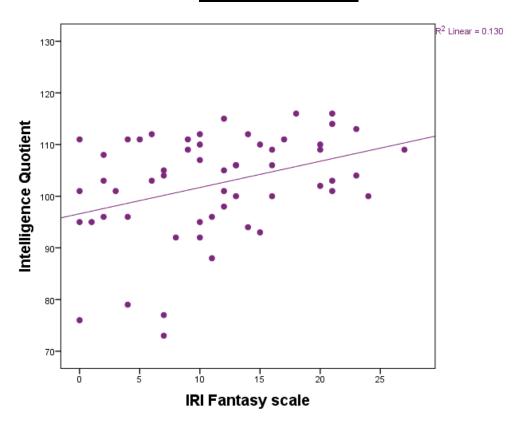
IRI PERSPECTIVE TAKING
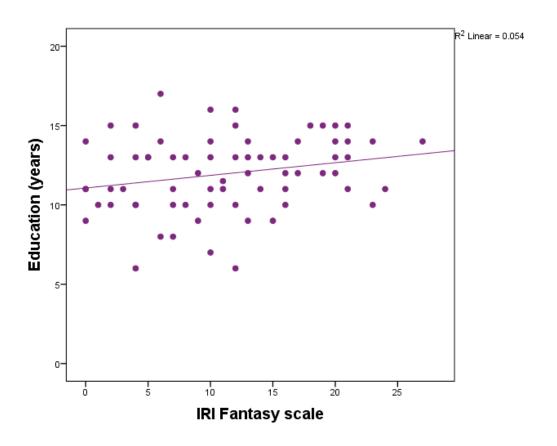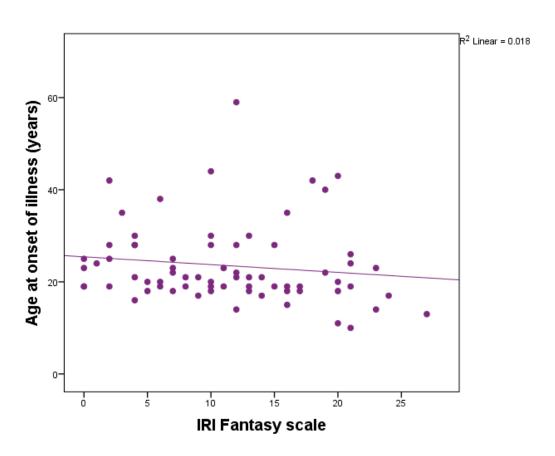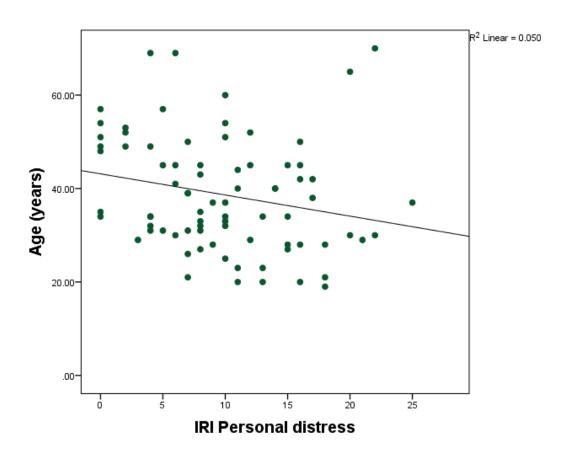
IRI FANTASY SCALE
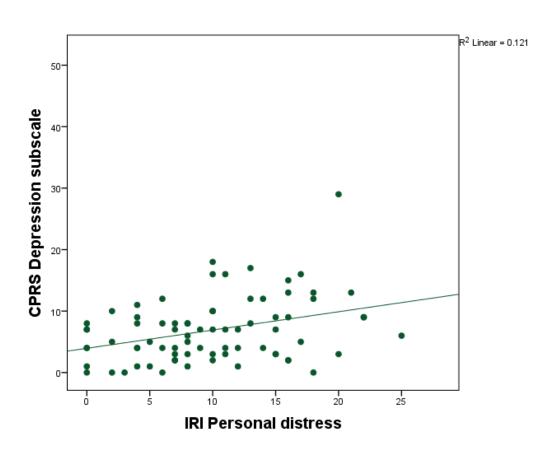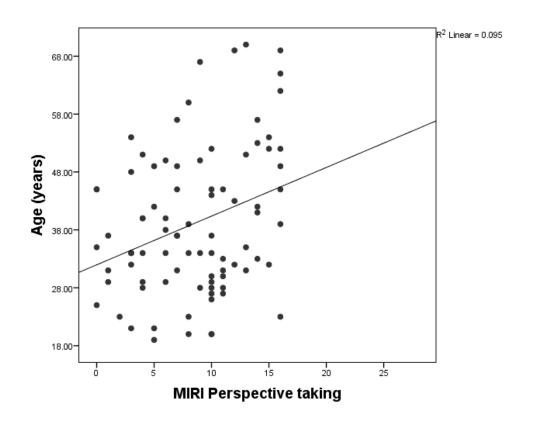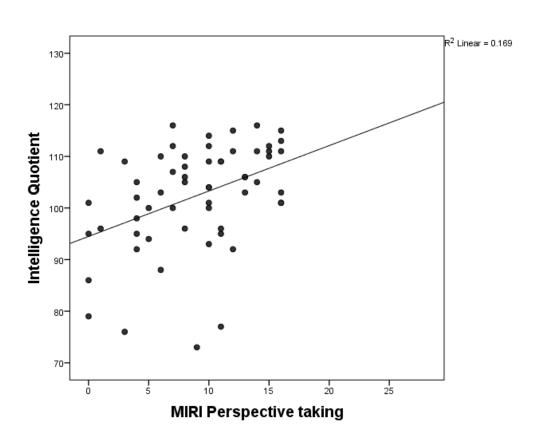
IRI PERSONAL DISTRESS
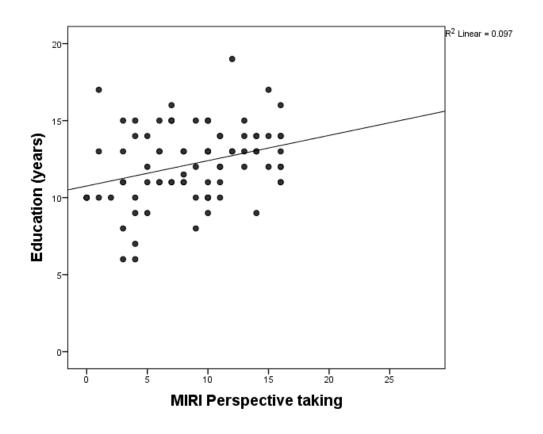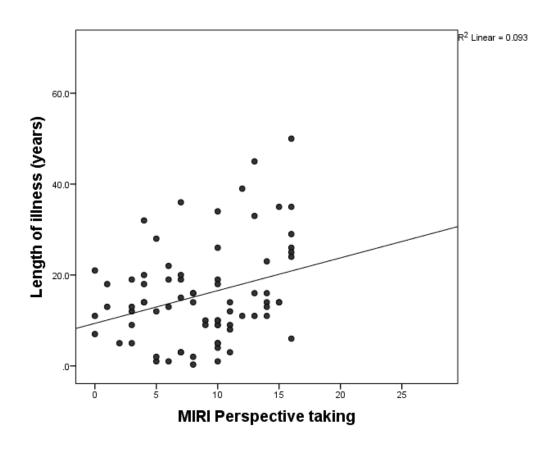
MIRI PERSPECTIVE TAKING

MIRI FANTASY SCALE

MIRI PERSONAL DISTRESS

R² Linear = 0.069

R² Linear = 0.100

R² Linear = 0.135
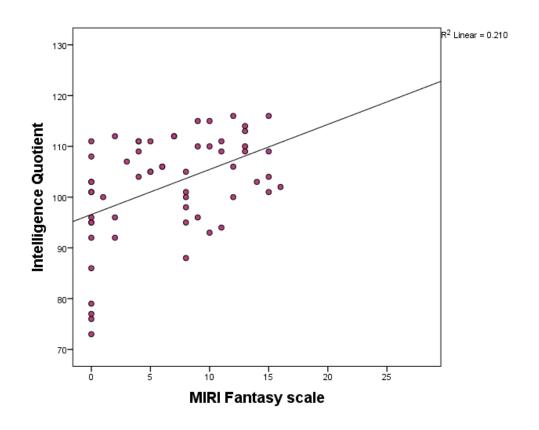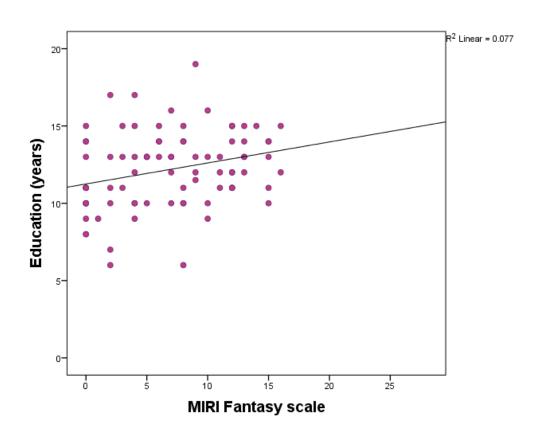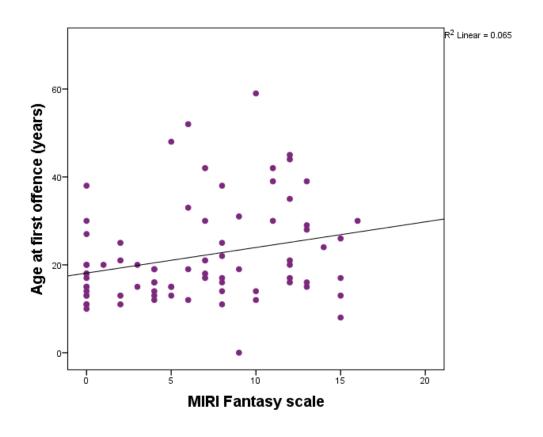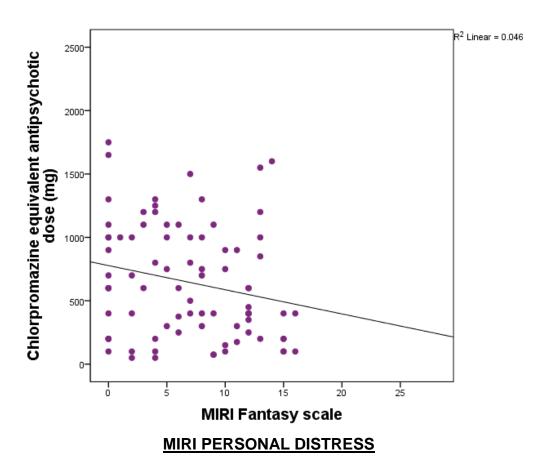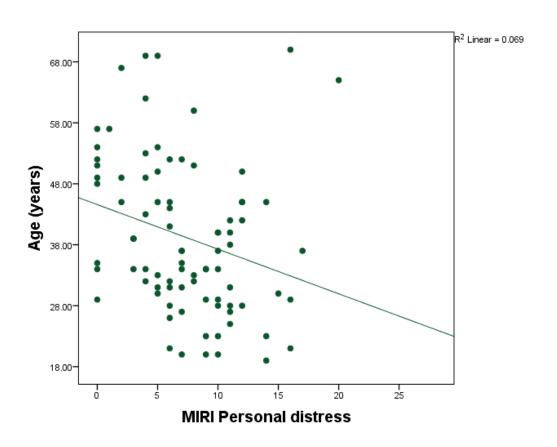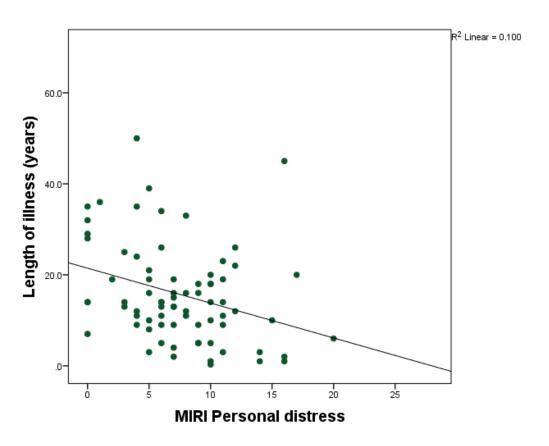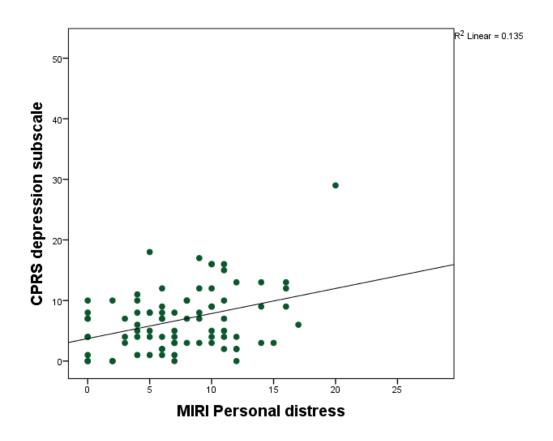
APPENDIX 11. SELF-REPORTED VIOLENCE DUE TO DELUSIONS AND RELATIONSHIP WITH IRI AND MIRI

	Having broken anything due to delusion	N	Mean Rank	Mann-Whitney U	p
IRI Perspective taking	no	37	21.55	94.50	0.56
	yes	6	24.75		
IRI Fantasy scale	no	37	21.14	79.00	0.26
	yes	6	27.33		
IRI Empathic concern	no	38	22.01	95.50	0.52
	yes	6	25.58		
IRI Personal distress	no	37	21.81	104.00	0.80
	yes	6	23.17		
MIRI Perspective taking	no	41	24.65	149.50	0.69
	yes	8	26.81		
MIRI Fantasy scale	no	41	24.34	137.00	0.46
	yes	8	28.38		
MIRI Empathic concern	no	41	25.54		
	yes	8	22.25	142.00	0.55
MIRI Personal distress	no	41	24.54		
	yes	8	27.38	145.00	0.60

Table 1 (Appendix 11) Differences on IRI and MIRI subscales between men with schizophrenia spectrum disorders, who reported having broken anything due to their delusions
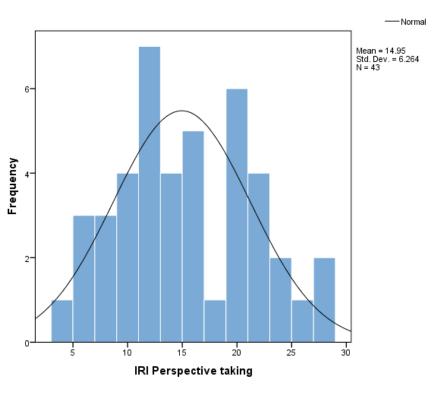
	Having hit a person due to delusion	N	Mean Rank	Mann-Whitney U	p
IRI Perspective taking	no	37	21.72	94.50	0.18
	yes	6	15.16		
IRI Fantasy scale	no	37	20.25	79.00	0.78
	yes	6	21.50		
IRI Empathic concern	no	38	20.77	95.50	0.80
	yes	6	21.94		
IRI Personal distress	no	37	20.50	104.00	0.98
	yes	6	20.44		
MIRI Perspective taking	no	41	24.32	149.50	0.48
	yes	8	21.17		
MIRI Fantasy scale	no	41	23.18	137.00	0.78
	yes	8	24.42		
MIRI Empathic concern	no	41	24.87		
	yes	8	19.63	142.00	0.24
MIRI Personal distress	no	41	21.66		
	yes	8	28.71	145.00	0.11

Table 2 (Appendix 11) Differences on IRI and MIRI subscales between men with schizophrenia spectrum disorders, who reported having hit anyone due to their delusions
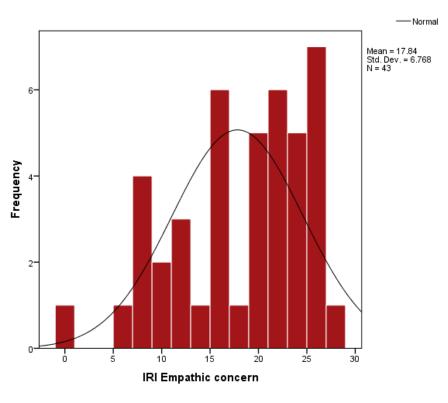
APPENDIX 12. DISTRIBUTION OF IRI COMPLETED AT TIMES 1, 2 and 3
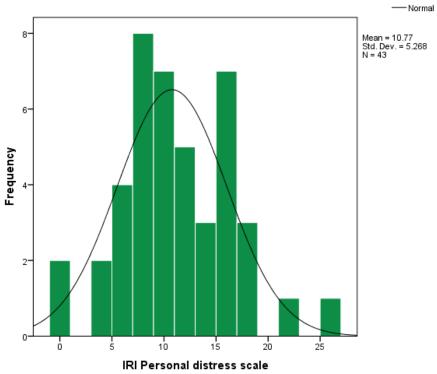
Histograms for IRI subscales scores at first, second and third times of the study (n=43):

TIME 1

Empathic Concern scale time 2

IRI Personal distress

TIME 3

IRI Perspective taking

Mean = 16
Std. Dev. = 6.81
N = 43

IRI Fantasy scale

Mean = 11.79
Std. Dev. = 7.288
N = 43

Mean = 17.35
Std. Dev. = 6.921
N = 43

IRI Empathic concern scale

Mean = 8.84
Std. Dev. = 5.269
N = 43

IRI Personal distress scale
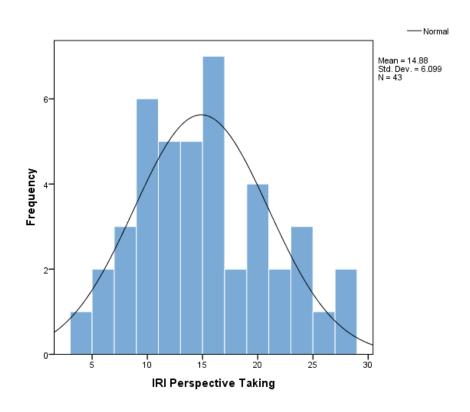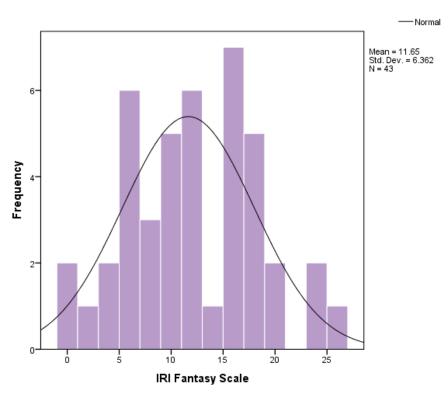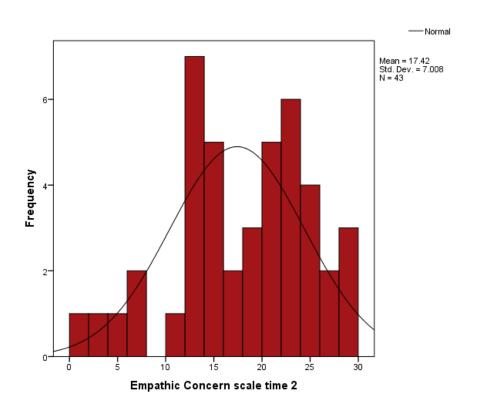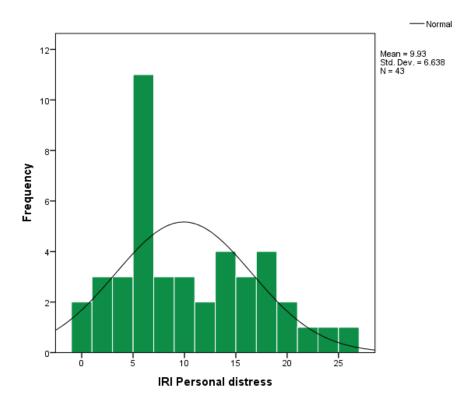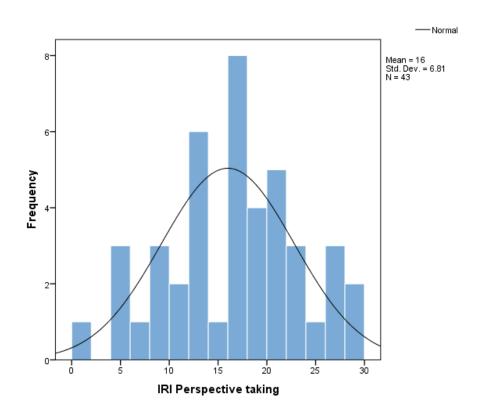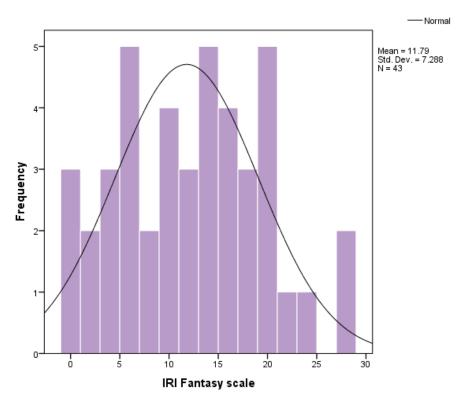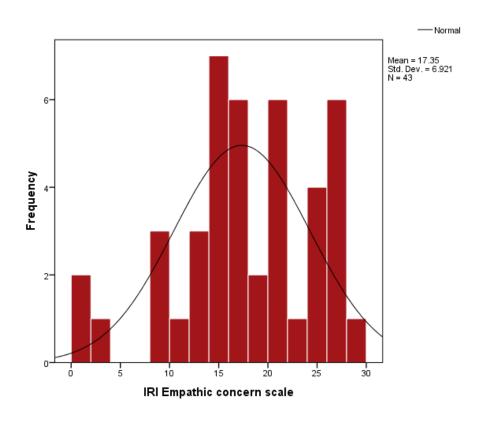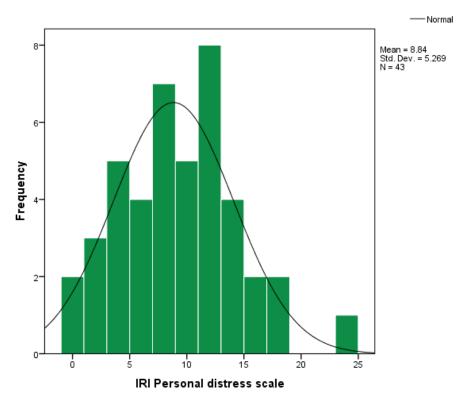
APPENDIX 13. PUBLICATIONS ARISEN FROM THIS DOCTORAL THESIS

Empathy, schizophrenia and violence: A systematic review

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Abstract

Background: A small but significant association between schizophrenia and violence is open to a number of explanations. Impaired empathy has been associated with schizophrenia, and with violence in the general population. Our aim was to conduct a systematic review of any research into relationships between schizophrenia, empathy and violence.

Methods: The electronic databases Medline, Psycinfo, Embase, Cochrane and DARE were searched using combinations of terms for schizophrenia, empathy and violence, as were selected journals and reference lists of relevant articles. Selection of studies and data extraction was done by each of us, blind to the other. Results: Six studies were identified, but sample selection, research procedures and empathy, illness and violence measures differed sufficiently between them that only descriptive analysis was possible. Apart from one single case study, sample sizes were between 24 (12 violent) and 116 (35 violent). A component of emotional empathy (emotion recognition) was measured in three of the studies, all of which showed some specific dysfunctional recognition related to violence. Cognitive empathy was measured in three studies, two linking impairments to violence and one not. Emotional responsiveness was measured in one study and no association with violence was found.

Conclusion: Although evidence is inconclusive on empathy impairment as a mediator of violence by people with chronic psychosis, its likely relevance is most apparent in the better controlled studies. Larger scale studies are indicated with rigorous control for comorbidities.

1. Introduction

A significant relationship between schizophrenia and violence is now well established (for a review see Taylor, 2008), but it is small, and this poses a challenge for clinicians to identify those people with the illness who really are more violence prone. Some have suggested that the relationship may be best explained by comorbid substance misuse (e.g. Elbogen and Johnson, 2009). Other explanations with some support include symptom drive, particularly where the illness presents in pure form — without comorbid personality disorder or substance misuse (e.g. Taylor et al., 1998). No single explanation accounts for all the variance, and Singh et al. (2011), after a systematic literature re- view, showed that there was little direct evidence to support the use of standard violence risk assessment tools for people with schizophrenia. This was partly because studies included diagnostically heterogeneous samples, but also partly due to the absence of theoretical underpinning content of schizophrenia-specific risk assessment tools. They highlighted the particular absence of neurocognitive factors, and suggested empathy as one of the areas for further study. There has been a suggestion that lack of empathy is more likely among people with schizophrenia and antisocial personality disorder (Moran and Hodgins, 2004), but there is evidence of empathy deficits in schizophrenia per se. Derntl et al. (2009), for example, suggested that all empathic abilities are impaired among people with schizophrenia compared with the general population.

Empathy is the subject of many slightly differing definitions, albeit definitions with common ground. Rogers (1959) described it as the state of being able to

perceive the internal frame of reference of another with accuracy, and with the emotional components and meanings which pertain thereto, as if one were the other person, but without ever losing the 'as if' condition. This means that empathy is a complex construct, including perceptual abilities, processing and output which each have cognitive and emotional components. These separate processes have been elaborated, and measures developed for each:

1.   The perception of emotions: is the capacity to recognise and differentiate emotions and their intensity. All sensory modes are relevant, but measurement has generally been, in respect of people who have schizophrenia, through visual tests of recognition of facial emotions (e.g., Schneider et al., 2006).

2.   Emotional responsiveness refers to the nature and extent of the emotional response of one person to another's emotional state (Baron-Cohen and Wheelwright, 2004). In a healthy situation, the responsive party responds as if they were having a similar emotional experience, and, indeed, may feel some sadness if the other   is describing, say, a bereavement, or uplift in mood when some happy event, and show this. A pathological situation may arise, as for some people in some stages of schizophrenia, if that sense of personal boundary becomes impaired. 'Motor empathy'– the ability to mimic others' facial emotion expressions – may be considered to be a subset of responsive empathy (Blair, 2005).

3.   Theory of Mind (ToM) has been defined as the ability to infer the thoughts, intentions, beliefs and emotions of others and to understand that they are different from one's own (Premack and Woodruff, 1978). Measures assume adequate perceptual ability and focus on processing, both emotional and cognitive. ToM is often differentiated from empathy. This is mainly when empathy is considered exclusively as an emotional experience (e.g., Völlm et al., 2006). Although Davis (1994) and Mehrabian and Epstein (1972) included 'emotional ToM' as one of the three components of affective empathy (with emotional recognition and emotional responsiveness), emotional ToM may be best construed as the ability to form a theory about the other person's emotional state and, thus, as another aspect of cognition. ToM is widely considered to be the equivalent of the cognitive part of empathy (Davis, 1983; Baron- Cohen, 2003). It is of interest here that evidence from functional neuroimaging (Hynes et al., 2006) and neuroanatomical studies (Shamay-Tsoory et al., 2005) supports different neural pathways for emotional ToM and cognitive ToM.

Impairment at any stage of the empathic process has been considered likely to influence people's behaviour through their misinterpretation of and/or inappropriate responsiveness to social interactions. Accurate empathy is considered a protective factor against antisocial behaviour and shows positive correlation with pro-social behaviour (Eisenberg, 2000; Strayer and Roberts, 2004). In a meta-analysis, Jolliffe and Farrington (2004) found that low cognitive empathy was strongly related to offending (21 studies) but that low emotional empathy was only weakly so (14 studies). Such relationships were stronger for violent offending, but confounded by intelligence and socioeconomic status.

According to Decety (2005), defective empathy is found accompanying several psychopathological conditions, including schizophrenia. As indicated above, Derntl et al. (2009) suggested a general empathic deficit in people with schizophrenia, but Schneider et al. (2006) found impairment more specifically in the capacity to identify emotions com- pared with healthy controls. A methodological review suggested that problems with facial emotion perception are likely in schizophrenia but its nature or specificity are not clear yet (Edwards et al., 2002). There is dissonance in the literature about the nature of the emotions with which people with schizophrenia have more difficulty; in some studies recognition of negative facial emotions specifically was found to be impaired (Walker et al., 1984; Bryson et al., 1997), in particular fear (Gaebel and Wolwer, 1992; Archer et al., 1994) and anger (Mandal et al., 1998), whilst others did not find this evidence (Wölwer et al., 1996) or even found people with schizophrenia more likely to recognise anger in others compared to healthy controls (Wallbott and Scherer, 1988).

There is evidence also that ToM may be impaired in schizophrenia (Frith, 1992; Brune, 2005; Achim et al., 2011), again with differences on the level of ToM (Frith, 1992). Some studies found that people with schizophrenia fail in first order ToM (understanding that another person can hold a false belief) (Frith and Corcoran, 1996; Drury et al., 1998), whilst others found people with schizophrenia to have a normal first order ToM but to fail higher level ToM tasks (Pickup and Frith, 2001), and still others, such as Abu-Akel and Abushua'leh

(2004), have found both first and second order ToM to be intact but failure on more complex ToM abilities.

Emotional responsiveness has been studied with self-reported questionnaires in people with schizophrenia, who reported increased personal distress but no different empathic concern compared to healthy controls (Derntl et al., 2009; Achim et al., 2011).

So, using recognised, systematic measures of empathy, associations have been separately identified between any two of the three conditions of schizophrenia, empathy and violence. Our aim was to search the literature for studies, which have tested for an association between all three of them. To our knowledge there has been no previous systematic review on this; none is listed in the Cochrane library or DARE. Our research question was whether people with schizophrenia who have been violent are more likely to have empathy impairments and/or have more severe impairment of empathy than people with schizophrenia who have not been violent.

2.   Methods

The Cochrane Library of core health databases were searched from their inception dates until 30th November 2011: Medline (1947– November 2011), Embase (1980-November 2011), PsycINFO (1806- November 2011). In addition, a hand-search was conducted (January 1st 2000–November 30th

2011) in the following journals: The British Journal of Psychiatry, Psychological Medicine, American Journal of Psychiatry, Psychiatric Services, Archives of General Psychiatry, Schizophrenia Bulletin and Philosophical Transactions of the Royal Society B: Biological Science. The reference lists of the eligible articles were also followed up. The studies were identified by using the following keywords and their thesaurus: schizophrenia and empathy (or emotional recognition or perception, ToM, emotional responsiveness) and violence (or offence, or aggression, or criminal) (see Appendix 1 for details).

The studies identified were screened by title and abstract. Initially, all potentially relevant studies were included providing they had an abstract in English. Inclusion criteria were that samples had to be of adults (18+), with schizophrenia, schizoaffective psychosis or schizophrenia spectrum disorder who had documented evidence of violence or violent offending and, that researchers had used a systematic or standard measure of at least one empathic ability. No restriction was applied on study design. Each of us read the titles and abstracts and selected the studies for final inclusion, blind to each other. There was 100% agreement on selection.

Comprehensive data extraction from the studies included in the review was done using the standardised data extraction tools from the Joanna Briggs Institute Meta-Analysis of Statistics Assessment and Review Instrument (JBI-MAStARI) as a guide. Meta-analysis was considered, but, as described below,

data were too heterogeneous for this, so a critical descriptive analysis was completed.

3. Results

After removing duplicates from seventy-eight citations, fifty-two papers were identified from the electronic databases. Fig. 1 confirms that forty-one articles failed to meet inclusion criteria on the evidence of the title and abstract, leaving eleven potentially eligible papers. Hand searching of journals and reference citation lists yielded five additional titles and abstracts. In total, 16 papers were read in full text; six of these were selected (Fig. 1).
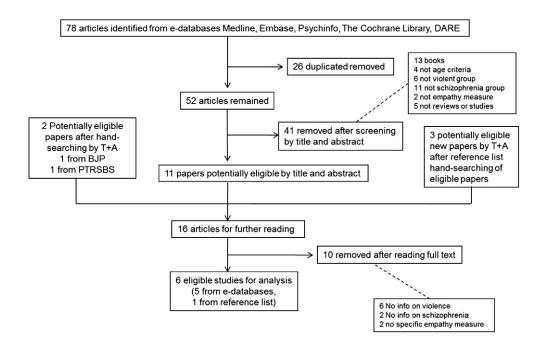
Fig. 1. Screening of search; The Cochrane Library, DARE, Medline, PsycInfo, Embase, hand search of AJP, BJP, PS, PM, PTBS and SB journals and reference list of eligible papers.

The six studies selected are shown in Table 1. All were in English. They were published in 2004 or later. One study was from Israel, and all the others from Europe or the USA. Three studies were observational cross-sectional investigations with comparison groups (Abu-Akel and Abushua'leh, 2004; Silver et al., 2005; Kumari et al., 2009) one was a cohort study (Weiss et al., 2006), one was a quasi-experimental study (Combs et al., 2007) and one a single case study (Addy et al., 2007). Three of the studies, including the single case study, were exclusively of people with schizophrenia (Abu-Akel and Abushua'leh, 2004; Addy et al., 2007; Kumari et al., 2009); three also included people with schizoaffective psychosis or schizophrenia spectrum disorder (Silver et al., 2005; Weiss et al., 2006; Combs et al., 2007). Only one study measured both emotion perception and cognitive empathy; two studies explored emotion recognition, two studies used ToM as an empathy measure and one study focussed solely on self-reported emotional responsiveness. Violence measures were variable, but generally included a mix of self-report and records data. Details of the characteristics of the studies, empathy and violence findings are shown in Tables 1, 2 and 3, and summarised briefly in the following sections.

Study	Study type	Setting and sample group	Setting and Comparison group	Co- morbidity	Cognition measure	psychosis severity
Combs et al 2007 USA	Quasi-experimental Treatment trial	Forensic psychiatry ward SZ N: 18 Treatment: SCIT	Forensic psychiatry ward SZ N: 10 Treatment: symptom management & coping skills	**Excluded**: Unknown	Cognitive flexibility	PANSS
Abu Akel & Abushua'leh 2004 USA		HSU V SZ N: 12	open ward NV SZ N: 12	**Excluded**: LD **Included**: Alcohol & Drug Misuse	None	BPRS
Silver et al 2004 Israel	Observation cross-sectional comparison	HSU V SZ N: 35	open ward NV SZ N: 35 Community HC N: 46	**Excluded**: Depression Brain damage Alcohol & drug recent misuse LD **Included**: Alcohol & drug historical abuse	General cognitive function Executive function Working memory	SAPS SANS
Kumari et al 2009 UK		HSU & MSU V SZ N: 10	open ward & OPD NV SZ N: 14 Community HC N: 14	**Excluded**: LD Alcohol & drug abuse Head injury Neurological condition	IQ	PANSS
Weiss et al 2006 (Austria &) USA	Observation cohort	Non forensic psychiatric ward V & NV SZ N: 34	-	**Excluded**: Unknown **Included**: Alcohol & drug misuse	None	PANNS
Addy et al 2007 UK	Observation Single case	MSU V SZ N: 1	-	**Excluded**: Asperger disorder LD	IQ Executive function	None

HSU: High Secure Hospital/Unit**; MSU:** Medium Secure Hospital/Unit**; OPD:** outpatient department**; HC:** healthy controls**; N:** number; **V:** violent; **NV:** non-violent; **SZ:** Schizophrenia spectrum disorder; **LD:** Learning disability; **IQ:** intelligence quotient; **BPRS:** Brief Psychiatric Rating Scale; **SAPS:** Schedule for Assessment of Positive Symptoms; SANS: Schedule for Assessment of Negative Symptoms; PANSS: Positive and Negative symptoms Scale**.**

Table 1. Characteristics of the studies and characteristics of their populations

SPECIFIC COMPONENT	N of V/NV SZ	VIOLENCE MEASURE	RESULTS	CONCLUSION	STUDY (year)
Face emotion recognition	35/35	Historical violent crimes & recent critical incidents in six months prior to study	Both V & NV performed worse than HC; V performed better than NV (CI=-0.2011 to -0.0533)[1]	Violent SZ group better at face emotion recognition than nonviolent peers	Silver et al (2005)
	18/10	N of verbal and physical aggressive incidents on ward (N= 2.9 (2)) & after 3 month SCIT (N=2.0 (1.4))	FEIT mean score: 11.5 (2.6)/19 & after 3 month treatment: 15.9 (1.5)/19	Concurrent decrease in aggression & increase in face emotion recognition skills in treated group; no change in either in untreated	Combs et al (2007)
	34V & NV	Lifetime number of aggressive acts (LHA) & Number of arrests for violent offences (NAVO)	Association of overall performance face emotion recognition & LHA (OR= 1.03, p=0.88)[3]; NAVO (OR=0.86, p=0.21)[3]	No significant association found between face emotion recognition and violent history	Weiss et al (2006)
Face emotion intensity discrimination or differentiation	18/10	N of verbal and physical aggressive incidents on ward (N= 2.9 (2)) & after 3 month SCIT (N=2.0 (1.4))	FEDT mean score: 22.6 (2.3)/30 & after 3 month treatment: 26 (1.9)/30	Concurrent decrease in aggression & increase in face emotion intensity discrimination skills	Combs et al (2007)
	35/35	Historical violent crimes & critical incidents in 6 months prior to study	V performed worse than NV (CI=0.0687 to 0.2004, p=0.0001)[1]	Violent SZ group may differentiate intensity of emotion s less well than nonviolent peers	Silver et al (2005)
Recognition of neutral face compared to emotional faces recognition	35/35	Historical violent crimes & critical incidents in 6 months prior to study	V performed better than NV; V: (F=46.91, df=1.33, p=0.0001)[2]; NV: (F=0.241,df=1.33; p=0.62)[2]	Violent SZ group may recognize neutral faces better than emotional faces compared to nonviolent peers	Silver et al (2005)
Misattribution of emotions to neutral faces	34V & NV	LHA & NAVO	LHA & NAVO associated with misattribution of sadness (OR=1.31, P=0.05)[3]; and of fear (OR=1.26, P=0.03)[3]; NAVO associated with misattribution of anger (OR=0.53, P=0.001)[3]	History of criminal violence associated with misattribution of anger sad and fear to neutral faces in people with SZ	Weiss et al (2006)
Emotional responsivenessby Empathy subscale IVE-7	10/14	History of serious physical violence Gunn Robertson scale, score>=5	V no different from NV F<1 (p>0.05)[1]	No significant difference in emotional responsiveness between V, NV & HC	Kumari et al (2009)

HC: healthy controls**; N:** number**; V:** violent**; NV:** non-violent**; SZ:** Schizophrenia spectrum disorder**; SCIT:** Social Cognition Intervention Training; **IVE-7**: Impulsiveness, Ventouresness and Empathy Scale; [1]ANOVA followed by Bonferroni Post hoc analysis of contrasts comparison of group means; [2]ANOVA with emotion (emotion vs. neutral) as within subject variable.

Table 2. Emotional empathy in schizophrenia and association with violence

Specific Component	N of V/NV	Violence measure	Results	Conclusion	Study (year)
ToM by Hinting task	18/10	N of verbal and physical aggressive incidents on ward N= 2.9 (2) & after 3 month SCIT (N=2.0 (1.4))	Hinting task mean score: 13.6 (2.3)/20 after 3 month SCIT: 19.8 (0.32)/20	Temporal coincidentally decrease of aggression & increase of ToM scores	Combs et al (2007)
ToM 1st order	1V	Recent manslaughter	Failed performance on "false belief task"	Impaired ability to understand that others can have a different belief was found in V SZ	Addy et al (2007)
	12/12	Recent V history based on clinical and criminal records	V no significantly different from NV ToM 1st order mean score: V=45/48 NV=38/48	V no different from NV in understanding that others can have different belief than theirs	Abu-Akel & Abushuah'leh (2004)
ToM 2nd order	12/12	Recent V history based on clinical and criminal records	V significantly different from NV ToM level 2 mean score: V=36/48 NV=30/48 (p=0.05)	Understanding others mental states is impaired in both V & NV, but less impaired in V	Abu-Akel & Abushuah'leh (2004)
			Positive correlation with Violence (β=1.2, SE=0.36, p=0.001)[1]	Understanding of other's mental states, increase the likelihood of V in SZ	
	1 V	Recent manslaughter	Failed performance on "false belief task"	Impaired ability to understand other's mental states	Addy et al (2007)
Emotional ToM	12/12	Recent V history based on clinical and criminal records	V nearly significantly different from NV Faus Pas mean score: V=26/48 NV=33/48 (p=0.07) & Negative correlation with V (β= -1.98; SE=0.63, p=0.002)[1]	Understanding emotions in others is impaired in both V & NV, but worse in V & decrease the likelihood of violence in SZ	Abu-Akel & Abushuah'leh (2004)
Empathic inference (ability to infer other's emotions)	12/12	Recent V history based on clinical and criminal records	Negative correlation with violence (β= -1.6; SE=0.57, p=0.003)[1]	Empathic inference ability decrease the likelihood of V in SZ	Abu-Akel & Abushuah'leh (2004)
	1 V	Recent manslaughter	Impaired empathic inference	Impaired empathic inference found in V SZ	Addy et al (2007)
ToM/ Motor empathy by RET	1 V	Recent manslaughter	Impaired ToM RET score: 18/36	Impaired ToM found in V SZ	Addy et al (2007)

ToM: Theory of mind; **V**: violent; **NV**: nonviolent; **SZ**: schizophrenia; **RET**: Revised Eye Test (Baron Cohen, 2003); **SCIT**: Social Cognition Intervention Training. Hinting task was used by Combs, 2007; ToM tasks by Corcoran & Frith 1996 were used by Addy et al., 2007; ToM stories by Wimmer and Perner, 1983,1985; Stone, 1998 were used by Abu-Akel & Abushuah'leh, 2004.

Table 3. Cognitive empathy in schizophrenia and association with violence

3.1. Emotional perception and violence in schizophrenia

The three studies, which included emotion empathy measures, used facial emotion recognition tests (Silver et al., 2005; Weiss et al., 2006; Combs et al., 2007). Between them they included 142 participants with schizophrenia, just 7 of whom were women (all in the Combs study). There was consensus between them only to the ex- tent that each found some kind of difference in emotion recognition between violent/more violent and non-violent/less violent participants. There was an inference of impairment associated with violence in the Combs study, in the absence of change in empathy or violence in the untreated group but a change in both in the treated group. In the Silver study, participants with schizophrenia, as a group, had impaired emotional recognition, but the violent men were less impaired than the non-violent ones. Weiss et al (2006) found that there was no overall relationship between emotional recognition scores and violence, but the more violent men were less likely than were the less violent men to misinterpret faces as angry.

3.2. Emotional responsiveness and violence in schizophrenia

We identified no studies with a main aim of measuring emotional responsiveness in people with schizophrenia who had been violent. One study however, had co-incidentally used such a measure in research with a primary aim of studying impulsiveness (Kumari et al., 2009). The instrument used, the Impulsiveness-Venturesomeness-Empathy questionnaire (IVE-7; Eysenck and

Eysenck, 1977; Eysenck et al., 1985) incorporates items from Mehrabian and Epstein's (1972) Emotional Empathic Tendency Scale (EETS). The Kumari group found no significant difference in emotional responsiveness between the men with schizophrenia and the healthy controls or, on this measure, between the violent and non-violent men with schizophrenia.

3.2.1. Motor empathy and violence in schizophrenia

The Revised Eye Test (RET) is used as a measure of ToM, but has also been shown to have an association with motor empathy (Richell et al., 2003), an element in emotional responsiveness. The RET consists of a series of photographs of people's facial expressions, but just showing the eye regions; the participant is asked to name the emotion in the expression from a given list. This represents the attribution of a mental state to another person. Only the single case study examined RET performance, reporting it to be 'slightly' impaired.

3.3. Cognitive empathy and violence in the context of schizophrenia

3.3.1. Theory of mind and violence in schizophrenia

Consensus among the ToM studies was similarly confined to findings of some differences between violent and non-violent people with schizophrenia, inferred from the Combs et al. (2007) study and more directly presented in the Abu-Akel and Abushua'leh (2004) study; in addition, Addy et al. (2007) found impaired

performance on false belief stories and the story task in a single case study of a man who had one lifetime episode to that point of very serious violence. Abu-Akel and Abushua'leh (2004) findings of some advantages and some disadvantages in terms of ToM performance for the violent men relative to their non-violent peers must be interpreted in the context of substantial differences be- tween the violent and non-violent groups in terms of age, history of sub- stance misuse, comorbidity and type of holding institution.

3.3.2. Emotional ToM and violence in schizophrenia

The faux pas task involves understanding others' emotions and making empathic inferences from stories about social situations; for each, the participant is asked to say if there has been a social gaffe/ faux pas, and what it is. It is considered to reflect a component of ToM. Such task performance was impaired in the Addy et al. (2007) case, and in the violent men with schizophrenia relative to their non-violent peers in the Abu-Akel and Abushua'leh (2004) study.

4.   Discussion

The answer to our research question – whether people with schizophrenia who have been violent are more likely to have empathy impairments and/or have more severe impairment of empathy than people with schizophrenia who have not been violent – is thus not easily answered by this collection of studies. The question requires a research design which can either treat both violent behaviour and empathy as traits, or both as states but, if the latter, with the data

on violence and empathy being measured over the same, close time period. It also re- quires either two representative groups of people with schizophrenia who differ only on violence measures before the testing for empathy, or robust prospective longitudinal study in which systematic measures of symptoms, violence and empathy are recorded at regular intervals. Only two of the studies come close to such designs — Silver et al. (2005) and Kumari et al. (2009). The Combs study was a trial of treatment, useful for inferences, but data were not presented in a way that a direct answer to our question was possible. The Abu-Akel and Abushua'leh (2004) study groups differed on many criteria potentially relevant to empathy other than the violence. It appeared that all the participants in the Weiss et al. (2006) study had been violent, although not necessarily criminally so, and there was no allowance for con- founders, such as cognitive impairment.

Kumari et al. (2009) compared lifetime violence ratings with the trait of emotional responsiveness, and found no difference between schizophrenia groups, or, indeed, between schizophrenia groups and controls, however empathy was not the main focus of this study, and the use of this empathy scale as a one-dimensional construct to measure empathy has been criticised elsewhere (Caci et al., 2003). Silver et al. (2005) took great trouble to match their groups, measured both lifetime violence and violence more specifically over the six months before empathy testing, and, within the limits posed by the sample size, provide an answer with respect to emotional empathy. Men with schizophrenia or similar psychosis have impaired emotional perception relative

to healthy controls, but within the schizophrenia group, violent men are less impaired in this respect than non-violent men. This seems counter-intuitive.

4.1. Empathy: a trait or a state

There is an important dilemma around whether empathy is a trait – and thus relatively fixed - or a state – and thus relatively susceptible to change, and perhaps treatment specifically. There is evidence that facial emotion recognition is stable trait across the life course (Wölwer et al., 1996), although more robust evidence is awaited to confirm this (Cowen, 2011); on the other hand changes in affect recognition have been achieved in schizophrenia patients after a face recognition training programme, so raising the hope that this part of emotional empathy can improve (Frommann et al., 2003; Wölwer et al., 2005). Longitudinal work with people with schizophrenia is helpful, because from a theoretical standpoint, it would be possible to envisage either more-or-less stable empathy deficits in association with the condition – as a core part of premorbid personality styles that are apparent in some cases and/or as part of a deteriorating underlying brain condition – or deficits which are closely related to changing phases of the illness, with the potential to improve as symptoms and preoccupation with symptoms improve, or both. In the small study of Combs et al. (2007) there was a suggestion of the latter, but, first, replication would be essential, and then much more work is needed to disentangle the possibility that forms of the illness in which the individual has been unremarkable until its onset may differ in this respect from forms of the illness in which personality difficulties, perhaps even full blown personality disorder had been established

before the onset of the illness. Both patterns of illness onset, with different implications for violence, have been observed among people with schizophrenia or similar psychosis (Taylor et al., 1998, 2008).

The literature is inconsistent on whether psychotic symptoms and empathic abilities covary. Frith and Corcoran (1996) suggested that, among patients with schizophrenia, those with paranoid symptoms performed less well on second order ToM tasks than others with behavioural signs or passivity phenomena or compared to the control group. In the Derntl et al. study (2009), negative symptoms were associated with better emotional responsiveness, although at least one study has found the opposite (Shamay-Tsoory and Aharon-Peretz, 2007). Other studies failed to find any significant association between psychotic symptoms and emotional empathic abilities (Shamay-Tsoory et al., 2007; Schneider et al., 1997: Brune, 2005).

4.2.   Measures of empathy

One of the barriers to drawing conclusions in this field lies in the wide variety of measures of empathy used and, in some cases, concerns about whether the reliability and validity of the measure is as good as it could be.

In relation to emotional empathy measures, and especially measures of emotional responsiveness, measures of skin conductance and other autonomic nervous system responses when an individual is exposed to personal distress may be useful. However, various factors may interfere with such measure;

among people with schizophrenia, for example, autonomic nervous system reactivity is likely to be influenced by psychotropic medication or psychotic state (Toichi et al., 1999). Another way to estimate the emotional response is using self-reported measures. A widely used empathy self-reported tool among schizophrenia population (Achim et al., 2011), The Interpersonal Reactivity Index (IRI) (Davis, 1983) has several advantages in this field of study, although it was not chosen in any of the studies we were able to select. Its potential advantages are: firstly, it has been also widely used with violent offenders (Jolliffe and Farrington, 2004), so something is known about how it performs with each of the schizophrenia and violence groups separately; secondly, it covers not only emotional but also cognitive empathy and thirdly, it is quick and easy to administer to patients who find it acceptable. Nevertheless, the psychometrics of the IRI among people with schizophrenia have yet to be fully elucidated, and indeed more work needs to be done on this among people who have been violent.

Some authors have, in effect, used proxy measures of empathy. A high score on the Psychopathy Checklist-Revised (PCL-R) (Hare, 1991), for example, has been used as an indicator in this respect, and an association shown with violent behaviour among people with (Moran and Hodgins, 2004) and without schizophrenia (Cooke and Michie, 1997; Blair, 2003). There is face validity in doing this but, to date; the PCL-R has not been validated as an empathy measure. The Blair argument about the very specific impairment of perceptual empathy, in failures by high PCL-R scorers to recognise fearful responses in others would be relevant here (Blair, 2003).

4.3. Measure of violence

The severity and temporal aspects of the violence measured are very different among the reviewed studies; it is disappointing from a re- search point of view that a more specific instrument is not used or at least the quantitative and qualitative aspects of violence considered separately. The small sample sizes in most studies identified limits the extent to which possibly confounding factors, such as comorbidities can be allowed for. The retrospective study (Weiss et al., 2006) does not use retrospective data about psychopathology or empathy at the time of the crime committed, and the different timings of the main measures may contribute to invalid results.

4.4. Comorbid disorders and other confounders

Other comorbidity such as history of drug and alcohol misuse may have influenced the differences between the groups. Maurage et al. (2011), for example, showed that even recovering alcoholics have emotional empathy deficits compared with healthy controls. Organic and autistic disorders, antisocial, narcissistic and Cluster A personality disorders may also contribute to dysfunctional empathy in people with schizophrenia and this is not always acknowledged and/or taken into account by the reviewed studies. These conditions have separately sometimes been associated with empathy difficulties (Smith, 2006; Kempt et al., 2012). Given evidence of rather distinct subgroups of people with schizophrenia who are violent, one without comorbidities but

another with personality disorder and/or substance misuse comorbidities (Taylor et al., 1998), or perhaps a range of groups with varying combinations of personality dis- order and substance misuse (e.g. Moran et al., 2003; Putkonen et al., 2004; Tengström et al., 2004), it would seem important in future studies either to recruit sufficiently large samples to be able to control for comorbidity or to select for a homogenous sample in this respect.

Intelligence is likely to have some impact on certain empathic abilities (Jolliffe and Farrington, 2004) and studies which do not allow for this may be misleading. Half of the reviewed studies included no measures of intelligence. Controversy remains about how intelligence would influence performance on empathy tests like ToM. Murphy (2006) found better performance in the second order ToM in patients with personality disorder than in patients with schizophrenia in a forensic cohort; however, higher IQ was found among personality disordered group than psychotic group.

There is evidence suggesting that there are no gender differences in relation to empathic abilities among people with schizophrenia (Pinkham et al., 2003; Montag et al., 2007; Derntl et al., 2009), but it is not consistent. Other studies suggest the contrary in relation to emotion recognition task; men with schizophrenia differ from their female peers in showing more visual emotion perception (Weiss et al., 2007) and less auditory emotion perception (Vaskinn et al., 2007). There are substantial differences between men and women in the likelihood if not types of violence, in the presentation of schizophrenia and,

indeed, how schizophrenia and violence relate to each other. We have highlighted a general lack of interest in re- search about women with schizophrenia and violence elsewhere (Taylor and Bragado-Jimenez, 2009). In the selected studies in our review of empathy, schizophrenia and violence, only one included just seven women (Combs et al., 2007). Although, therefore, gender differences could not explain the variation between studies in this area, much more knowledge is needed about gender effects here for the work to have practical value.

4.5. Conclusion

Although there is evidence separately linking impairments in empathy and violence, empathic impairments and schizophrenia, and schizophrenia and violence, research into the question of whether impaired empathy may be a mediating factor in violence by people with schizophrenia is scarce and leaves many additional questions unanswered, such as the best measures for such research and the critical question as to whether impairments are best construed as states, linked to other fluctuations in the schizophrenic condition, or traits and more permanent. Both empathy and violence are multifaceted concepts and schizophrenia is a complex condition with a variety of presentations, all of which partly explain the difficulties in drawing any definite conclusions here. Research to date, however, does suggest that the three-way relationship is worthy of further study. People with schizophrenia who had been violent were consistently found to differ in performance from their non-violent peers on emotional perception and cognitive empathy tasks. Differences were, though,

quite subtle and specific. The only study to offer a longitudinal design gives some grounds for optimism that insofar as there are impairments in empathy, these may be remediable, so further work in this area could have considerable implications for treatment which could reduce both risk and stigma for this special group of people.

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APPENDIX 14: PAPERS READY FOR SUBMISSION ARISEN FROM THIS DOCTORAL THESIS

Psychometric properties of the Interpersonal Reactivity Index (IRI) in people with schizophrenia

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Abstract

The Interpersonal Reactivity Index (IRI) is a self-report tool for rating empathy. Although widely used with people with schizophrenia, its psychometric properties have not been evaluated for this group. Such people may have symptoms that interfere with attention and accurate understanding or self-reporting of IRI items. We evaluated the psychometric properties of the IRI among people with schizophrenia. The original 28-item IRI was completed once by 85 male in-patients with schizophrenia, who participated in a multicentre longitudinal study; 52 of them also completed it one month later. A principal component analysis was conducted to test the internal consistency of the scale, allowing for psychopathology and estimated intelligence. A four-factor solution with 18 IRI items provided the best fit for the data, resulting in the Modified IRI for Schizophrenia (MIRI); the resultant four shortened subscales increased its internal consistency for people with schizophrenia and had similar test re-test reliability to the original IRI subscales. The cognitive empathy subscale was significantly correlated with intelligence and the personal distress subscale was significantly correlated with the depression subscale of the Comprehensive Psychopathological Rating Scale. The results indicate that the IRI is a reliable scale for use with people with schizophrenia; however, MIRI, a shorter version offers improved psychometrics and would ease the task of completion for schizophrenia sufferers.

Psychometrics of the Interpersonal Reactivity Index in people with schizophrenia

The Interpersonal Reactivity Index (IRI) is a useful and comprehensive tool for measuring self-reported cognitive and emotional empathy (Davis, 1980). It includes four subscales: perspective taking, fantasy, empathic concern and personal distress. It has been shown to have good internal consistency, convergent validity and test–re-test reliabilities; the internal reliabilities of each of its four subscales range from 0.71 to 0.77, and test re-test reliabilities from 0.62 to 0.71 (Davis, 1980). These measures refer, however, to student populations. Although widely used in studies of mental disorder, its psychometric properties have not been evaluated for schizophrenia.

A systematic review was conducted of published studies using the IRI for people with schizophrenia. The databases Embase, since 1947, Medline, since 1947, and PsycINFO, since 1806, were searched up to 1st December 2015 using terms which included the key words: psychometrics, IRI and schizophrenia - and their correspondent thesaurus. Grey literature was not searched. All studies using the IRI in adults with schizophrenia were considered eligible. We found five papers published between 2007 and 2015 which included people with schizophrenia and evaluation of IRI properties, but the latter was only done with the healthy comparison participants. Nevertheless, at least 44 studies have used the IRI to measure empathy among people with schizophrenia (e.g. Montag et al, 2007, Singh et al, 2015).

People with schizophrenia may have specific psychological deficits or characteristics which could interfere with their ability to complete this scale, including impaired cognition, concrete thinking, poor cognitive flexibility and

information processing difficulties (Lam et al., 2014). Some items have long sentences and double negatives. In our preliminary work using the IRI among patients with schizophrenia, we found a tendency to skip questions because they found them too complicated or tiring. Anhedonia with low motivation to complete a long questionnaire may further interfere with its reliability and validity. IRI scores are also likely to be influenced by gender, intelligence and educational level (David, 1983); and, specifically in schizophrenia, by length of psychotic illness, presence of psychotic symptoms (Fahim et al., 2004; Frith and Corcoran, 1996; Salvatore et al., 2007) and comorbid depressive episodes (Abramowitz et al, 2014). Differences in IRI-related findings across published studies may, in part, be influenced by some of these factors.

Our primary aim was, thus, to test the psychometric properties of the IRI among inpatients with schizophrenia. Our secondary aim was to find a reliable shorter version of the IRI for them.

Method

Participants

Participants were men diagnosed with schizophrenia, schizoaffective disorder or delusional disorder, and recruited from general and forensic psychiatric hospital inpatient units in South Wales and in Bristol, England. Consultants and nursing teams in each participating unit were consulted for permission to approach eligible patients. Exclusion criteria were history of brain injury, severe learning difficulties or major speech disorders or being considered by their clinical team to be clinically too unwell to make valid consent to the study.

Procedures

The study was approved by the NHS National Research Ethics Service's North Somerset and South Bristol Research Ethics Committee.

Consenting patients were asked to take part in two interviews, the second interview being 30 days (range 27-42 days) after the first.

Each participant was first asked about their socio-demographics, including years of education. After these fairly neutral questions, which also partly served to build some rapport with the interviewer, each completed a semi-structured interview about his mental state (The Comprehensive Psychopathological Rating Scale, Åsberg et al, 1978) before completing the IRI. Patients were offered the choice of completing the IRI as a paper and pencil exercise or having the items read to them. In all cases, the interviewer remained with the patient while he completed the IRI and checked at least one item with him to make sure that he could read and understand the material. Pre-morbid intelligence was estimated by using the Wechsler Test of Adult Reading (see below). Data on diagnoses, length of psychotic illness and comorbidities, together with antipsychotic medication doses (in chlorpromazine equivalents) current to the interview, were extracted from records.

Materials

The *Interpersonal Reactivity Index* (*IRI*) is a 28-item self-report scale (Davis, 1980) which consists of four subscales: (1) the fantasy scale (FS) measures the capacity of the individual to imagine him/herself in another situation – e.g. "*when I watch a good movie, I can easily put myself in the place of a leading character*"; (2) perspective taking (PT) measures the tendency of the individual to take another person's point of view and is considered to measure cognitive

empathy - "*I try to look at everybody's side of disagreement before I make a decision*"; (3) empathic concern (EC) is considered part of emotional empathy and includes compassion and concern for others who are in distress: "*I often have tender concern feelings for people less fortunate than me*"; and (4) personal distress (PD) measures the individual's tendency to become upset or distressed when seeing someone else who is upset: "*being in a tense emotional situation scares me*".

The *Comprehensive Psychopathological Rating Scale* (*CPRS*; Åsberg et al, 1978) provides a sensitive and reliable assessment of a wide range of psychiatric symptoms, including 40 items of psychopathology reported by the participant and 25 items of observed psychopathology rated by the interviewer. It also includes a global rating of illness severity by the observer and the observer's evaluation of the reliability of the interview on the day. Various subscales have been derived including the schizophrenia subscale (CPRS-SS; Montgomery et al., 1978), which includes the items: feeling controlled, lack of appropriate emotion, disrupted thoughts, commenting voices, depersonalisation, perplexity, inability to feel, sadness, pessimistic thoughts, other delusions, ideas of persecution and delusional mood; the negative symptoms subscale (CPRS-NS; Lindström & Lindström, 1996), which includes the items: withdrawal, reduced speech, lack of appropriate emotions, slowness of movements and indecision; and, the depression subscale (CPRS-DS; Martinsen et al, 1989), which includes the items: sadness, inability to feel, pessimistic thoughts, suicidal thoughts, worrying over trifles, indecision, inertia, concentration difficulties, falling memory, reduced sexual interest, apparent sadness and slowness of movement.

The *Wechsler Test of Adult Reading* (*WTAR*; Wechsler, 2001) was used to estimate participants' pre-morbid full scale intelligence quotient (FSIQ). Participants are asked to read out loud 50 words. The total score is the number of words read correctly according to pronunciations provided on the record form for scoring accuracy.

Analyses

Mean CPRS schizophrenia (CPRS-SS) subscale scores, CPRS-negative symptom subscale scores (CPRS-NS) and CPRS depressive subscale scores (CPRS-DS), as well as daily doses of antipsychotic medication, were calculated for time 1 and time 2 interviews. Wilcoxon tests were used to test differences in distribution of CPRS subscale scores & daily antipsychotic doses between times 1 and 2.

For responders at time 1, the 28 items of the Interpersonal Reactivity Index (IRI) were subjected to principal component analysis (PCA) using SPSS version 22. Monte Carlo PCA Parallel Analysis was used to test the scree plot. For item-total correlation, Nunnally & Bernstein (1984) criteria of a cut-off score of 0.30 was used to select valid items for a new solution - a shorter version of the IRI, named as *Modified IRI for Schizophrenia (MIRI).*

We then conducted reliability analyses of the IRI and MIRI subscales (corrected item-total correlations and Cronbach's alpha).

The intraclass correlation coefficients (ICCs) (test re-test reliability) were calculated between time 1 and time 2 mean scores for each subscale of IRI and MIRI among all participants who completed both ratings.

Correlations, using Spearman's rho coefficient, were calculated for each of the MIRI subscales at time 1 with the participants' estimated FSIQ scores, number of years of education, length of psychosis and CPRS subscales and total mean scores.

Results

Sample characteristics

Eighty-five of the 102 men, who participated in the study, completed the IRI at time 1; 52 of them also completed it after one month (time 2). The mean age of the participants was 39.6 years (age range: 26.9-52.3 years). Most of the men were white (76, 90%), single (71, 83%) and unemployed (83, 97%). All but eight patients had been admitted formally under mental health legislation. The average length of education was 12.1 years (*SD*= 2.4 years). The average length of illness was 14.9 years (*SD*= 10.5 years).

Information on estimated pre-morbid IQ was available for only 59 participants. The IQ mean was 102.3 (SD=10). No WTAR completer had an FSIQ of less than 70. There was no suggestion at interview or from records that the untested men had less than average intelligence.

Most participants (66; 78%) had a history of alcohol or illicit drug abuse or dependence, although almost all had been completely abstinent for at least six months prior to the time 1 interview. Sixteen (19%) patients had a comorbid personality disorder.

All participants were on antipsychotics at the time of the first interview, with a mean chlorpromazine equivalent level of 647.64 mg/day (*SD*=447.09 mg/day).

There were no significant differences in the distribution of CPRS subscale scores or in the daily antipsychotic doses between times 1 and 2 (see table 1).

	TIME 1		TIME 2		Wilcoxon	
	Mean	SD	Mean	SD	Z	p
CPRS schizophrenia subscale	6.55	4.06	6.49	3.85	-0.16	0.86
CRPS depression subscale	6.80	5.15	7.39	3.66	-1.29	0.19
CPRS negative symptoms subscale	2.34	2.01	2.49	1.83	-1.10	0.26
Chlorpromazine equiv. doses of antipsychotic (mg/day)	647.64	447.09	745.10	437.06	-1.47	0.14
PT-IRI	14.53	6.18	14.88	5.84	0.10	0.91
FS-IRI	11.59	7.01	11.54	5.99	-0.46	0.64
EC-IRI	17.46	6.36	17.20	6.73	-0.47	0.63
PD-IRI	9.78	6.05	9.59	6.25	-0.50	0.61
PT-MIRI	8.61	4.64	9.00	4.14	-0.08	0.93
FS-MIRI	6.78	5.01	6.52	4.24	-0.44	0.65
EC-MIRI	12.29	4.95	11.81	5.16	-0.35	0.72
PD-MIRI	7.35	4.55	7.02	4.95	-0.81	0.41

CPRS: Comprehensive Psychiatry Rating Scale.
PT: Perspective Taking, FS: Fantasy Scale; EC: Empathic Concern; PD: Personal Distress
IRI: Interpersonal Reactivity Index; MIRI: Modified IRI for Schizophrenia
Table 1 Wilcoxon test for mean score differences of CPRS subscales scores, IRI & 18-MIRI subscales scores between time 1 (N=85) and time 2 (N=52).

Principal Component Analysis (PCA)

First, we examined the data for suitability for factor analysis. Inspection of the correlation matrix revealed many coefficients of 0.3 and above. The Kaiser-Meyer-Olkin (KMO) value was 0.624, slightly exceeding the recommended 0.6 value and Bartlett's Test of Specificity reached statistical significance, supporting the factorability of the correlation matrix.

Principal component analysis revealed the presence of eight components with eigenvalues exceeding 1, explaining 20%, 12.4%, 7%, 6.6%, 6%, 4.6%, 4.2% and 4% of the variance respectively. An inspection of the scree plot showed five likely components, but the parallel analysis confirmed only four components with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the same size (28 variables x 85 respondents).

The four-component solution explained 46% of the total variance, the components 1, 2, 3 and 4 contributing 20%, 12.4%, 7% and 6.6% respectively. Oblimin rotation was then performed to help interpreting the solution. The rotated solution showed that the strength of the relationships among the four factors was low (maximum value of -0.23).

The pattern matrix showed a clear four factor structure with four components corresponding to the four subscales of the original IRI, but there was unexpected loading of some items to different factors. The items which had low to moderate loadings in two or more components (items 3, 9, 11, 22) and the items with values of less than 0.3 in the table of communalities (items 3, 5, 7, 13 and 15) were removed from the solution. In addition, item 1, which was originally part of the fantasy subscale did not load on to the new fantasy component, so was also removed.

The shortened IRI scale, with 19 items remaining, was subjected to a principal components analysis. The new solution was adequate for factorability (KMO= 0.638) with significant specificity (BTS= 0.0001). The four new factors explained 56.5 % of the total variance, with two factors accounting for most of that: fantasy subscale 20% and perspective taking subscale 13%. Scree plot and MonteCarlo parallel analysis confirmed the four-factor structure. Oblimin

rotation confirmed that the correlation among the factors was low (maximum correlation value of -0.231). In this matrix, the item 27, which belong to personal distress subscale, double loaded on to two different components, so it was removed, obtaining a modified scale of 18 items.

Principal component analysis confirmed that the 18 item solution was adequate for factorability (KMO= 0.672) with significant specificity (BTS=0.0001) (Table 3). The new four factors explained 57% of the total variance. Scree plot and MonteCarlo parallel analysis confirmed the four-factor structure; Oblimin rotation also produced four clear factors with moderate to high single loadings of items, corresponding to the original four subscales of the original IRI (see table 2). The strength of the relationships among the four factors was low (maximum value of -0.26).

	Components				Communalities
	1 (PT)	2 (PD)	3 (FS)	4 (EC)	
I believe that there are two sides to every question and try to look at them both. (PT)	**0.853**	0.031	0.150	-0.009	0.701
I try to look at everybody's side of disagreement before I make a decision. (PT)	**0.771**	0.141	0.154	0.105	0.645
Before criticizing somebody, I try to imagine how I would feel if I were in their place. (PT)	**0.741**	-.044	-.187	-0.028	0.619
When I am upset at someone, I usually try to "put myself in his shoes" for a while. (PT)	**0.705**	-0.147	-0.227	0.000	0.609
Being in a tense emotional situation scares me. (PD)	0.222	**0.731**	-0.156	-0.068	0.659
I am usually pretty effective in dealing with emergencies. (PD) (-)	-0.201	**0.666**	-0.246	0.009	0.554
I sometimes feel helpless when I am in the middle of a very emotional situation. (PD)	-0.200	**0.664**	0.120	-0.254	0.474
I tend to lose control during emergencies. (PD)	0.172	**0.649**	0.011	0.088	0.577
In emergency situations, I feel apprehensive and ill-at ease. (PD)	-0.026	**0.584**	-0.048	0.142	0.381
When I watch a good movie, I can easily put myself in the place of a leading character. (FS)	-0.095	-0.016	**-0.857**	0.067	0.728
After seeing a play or movie, I have felt as though I were one of the characters. (FS)	-0.064	-0.020	**-0.825**	0.001	0.660
When I am reading an interesting story or novel, I imagine how I would feel if the events of the story were happening to me. (FS)	0.211	0.134	**-0.749**	0.006	0.719
Becoming extremely involved in a good book or movie is somewhat rare for me. (FS) (-)	0.039	0.118	**-0.569**	-0.047	0.364
When I see someone being treated unfairly, I sometimes don't feel very much pity for them. (EC) (-)	-0.148	-0.144	-0.054	**0.765**	0.568
I often have tender, concerned feelings for people less fortunate than me. (EC)	0.108	-0.097	0.043	**0.755**	0.619
Other people's misfortunes do not usually disturb me a great deal. (EC) (-)	-0.011	0.118	0.079	**0.685**	0.475
I am often quite touched by things that I see happen. (EC)	0.173	-0.081	-0.250	**0.561**	0.509
Sometimes I don't feel very sorry for people less fortunate than me. (EC) (-)	0.043	0.294	0.031	**0.561**	0.424

(Rotation method: Oblimin with Kaiser Normalisation); (PT: *Perspective taking*, FS: *Fantasy Scale*; EC: *Empathic Concern*; PD: *Personal Distress*)

Table 2 Pattern matrix and communalities after Principal Component Analysis of 18-MIRI among 85 people with schizophrenia

Internal consistency of IRI and MIRI subscales

At time 1, Cronbach's Alpha coefficients for the IRI subscales were 0.69 (IRI-PT), 0.76 (IRI-FS), 0.76 (IRI-EC) and 0.75 (IRI-PD). The internal consistency of the four MIRI subscales was all over 0.7 (MIRI-PT: 0.79; MIRI-EC: 0.79; MIRI-FS: 0.71; MIRI-PD: 0.71). Thus, MIRI items yielded improved internal consistency for the perspective taking and empathic concern subscales, whilst the other subscales were similar in this respect.

Correlation between MIRI and IRI subscales

IRI subscales were significantly and strongly correlated with MIRI correspondent subscales, both at T1 and T2. All correlations were significant ($p < 0.001$), with Spearman rho correlation coefficients of 0.92 for fantasy and perspective taking subscales and 0.95 for empathic concern and personal distress subscales.

Test re-test reliability

Intraclass correlations coefficients for MIRI were all acceptable or good (*Perspective taking* 0.63 (0.36-0.78); *Fantasy scale* 0.74 (0.55-0.85); *Empathic concern* 0.84 (0.72-0.91); *Personal distress* 0.74 (0.54-0.85)), and similar to those for the parent instrument (*Perspective taking* 0.63 (0.36-0.79); *Fantasy scale* 0.70 (0.48-0.83); *Empathic concern* 0.86 (0.77-0.92); *Personal distress* 0.79 (0.64-0.88)).

Correlation with IQ, education level and length of illness

The relationship between MIRI subscales and IQ for the 59 participants, for whom FSIQ were available, was examined using Spearman's rho as none of

the subscales was normally distributed. The cognitive empathy subscales, MIRI-PT and MIRI-FS, were significantly correlated with participant IQ (r= 0.42, p= 0.003; r= 0.42, p= 0.01 respectively); MIRI-EC and MIRI-PD subscales were not correlated with IQ (r= 0.07, p= 0.24; r= 0.05, p= 0.66 respectively).

We found that years of education were correlated with MIRI-PT (r= 0.30, p= 0.004) and MIRI-FS (r= 0.29, p= 0.006) subscales, but not with MIRI-EC (r= 0.06, p= 0.52) and MIRI-PD (r= -0.07, p= 0.48) subscales.

Length of psychosis was significantly correlated with the MIRI-PT subscale (r= 0.24, p= 0.03) and inversely correlated with MIRI-PD subscale (r= -0.32, p= 0.003), but there was no relationship with MIRI-FS (r= 0.01, p= 0.90) or MIRI-EC (r= 0.07, p= 0.54) subscales.

Among those with a history of alcohol or drug misuse, no significant differences were found in relation with MIRI subscales. Only a trend was found for MIRI-PT, with mean scores lower than for those without this comorbidity (U= 404.5; p= 0.5).

Relationships between MIRI subscales and symptoms of illness

There was no relationship between any of the MIRI subscales and CPRS subscales except for MIRI-PD subscale, which correlated with CPRS-depression subscale (r= 0.25, p= 0.01).

Discussion

We found that the IRI did, in fact, have adequate properties among men with schizophrenia, but that its performance for this group was improved by reducing the number of items. The resultant scale, which we named the Modified Interpersonal Reactivity Index (MIRI) replicated the four subscales of the

original IRI, which performed well, but, as the calculated advantages were quite small, why change from an original which has well established norms for the general population? It reduces the burden of responding to a long questionnaire for a group who are known to have difficulties with cognition and attention, and is likely to allow more people with such problems to complete their own ratings without staff help.

Variables which must be taken into account when interpreting IRI or MIRI scores

Consistent with results from previous studies when using the original IRI among people with schizophrenia (Davis, 1980); we found that the cognitive subscales (*Fantasy scale* and *Perspective taking*) scores correlated with pre-morbid FSIQ. A correlation between the IRI-PD and the PANSS negative scale, found by Haker & Rossler (2009) among 45 patients with schizophrenia, was not apparent in our sample. Rather, a correlation between *Personal distress* and the CPRS-depressive subscale emerged, which is consistent with findings reported by Abramowitz et al. (2014), who studying IRI in people with schizophrenia, found higher self-reported personal distress among those who had a comorbid depressive disorder.

One important caution is that, in our study most of the men (76, 89%) had an offending history. While this is no longer rare among *inpatients* with schizophrenia, even in general psychiatric services, it has previously been reported (Beven et al., 2004) that men with criminal and or violent histories show lower personal distress scale scores. There is little literature on the relationship between empathy and violence in schizophrenia (Bragado-Jimenez

& Taylor, 2012) and differences between offender and non-offender groups with schizophrenia would merit more.

Strength and limitations

The IRI is regularly used in patients with schizophrenia but has not previously been evaluated for this purpose until now. Our findings are, however, limited by being exclusively with men, almost all of whom had very longstanding psychosis and were ill and or behaviourally disturbed enough to require compulsory detention in hospital. In the longitudinal component of our study, we were only able to compare scores on two occasions, a month apart, rather than applying the perhaps more robust three wave panel design over a longer period. This means that although, we can be reasonably confident about test re-test reliability in this case, we cannot make any observation as to whether this scale may be able to help detect useful clinical change over time. Finally, although the shortened scale seems robust and may offer advantages for measurement in people with severe illnesses, we had no healthy control sample, and it may be that validation of MIRI would be required in a general population to obtain normative values.

Implications

Empathy, especially cognitive empathy has been found to be impaired in people with schizophrenia. Empathy impairment has not only been associated with poor social functioning among people with schizophrenia, but with violence and offending behaviour in the general population. Many of those people with the severer forms of psychosis which could lead them into such difficulties find it difficult to complete lengthy rating schedules. We have filled an important gap in

the literature by confirming that not only the original IRI has acceptable psychometrics among people with schizophrenia but also that its performance could be improved by using just 18 of its items. The resultant 'Modified Interpersonal Reactivity Index for Schizophrenia' (MIRI) has the same subscale structure as the parent IRI and is affected by similar variables, including intelligence, length of education and length of illness. A simpler and quicker to administer scale for measuring empathy could have useful implications for risk and needs assessment and management in this group.

	IRI 2	IRI 4	IRI 6	IRI 8	IRI 10	IRI 12	IRI 14	IRI 16	IRI 17	IRI 18	IRI 19	IRI 20	IRI 21	IRI 23	IRI 24	IRI 25	IRI 26	IRI 28
IRI 2	**1.000**	.288	.001	.283	.142	.128	.440	.020	.051	.413	-.309	.451	.139	.033	-.089	.276	.106	.178
IRI 4	.288	**1.000**	.200	.183	.201	.020	.256	.080	.238	.365	.024	.229	.132	.159	.125	.176	.179	.188
IRI 6	.001	.200	**1.000**	.130	.172	.039	.084	.160	.415	.076	.212	.137	-.039	.054	.344	.001	.280	.070
IRI 8	.283	.183	.130	**1.000**	.242	.138	.209	.041	.122	.062	-.094	.327	.639	.018	-.058	.406	.157	.405
IRI 10	.142	.201	.172	.242	**1.000**	.191	.109	.145	.469	-.014	.311	.171	.152	.176	.293	.041	.155	.093
IRI 12	.128	.020	.039	.138	.191	**1.000**	.060	.369	.274	.013	.044	.112	.075	.334	.192	.119	.469	.040
IRI 14	.440	.256	.084	.209	.109	.060	**1.000**	.012	.021	.313	-.067	.300	.207	.087	.151	.137	.143	.053
IRI 16	.020	.080	.160	.041	.145	.369	.012	**1.000**	.232	.102	-.018	.267	.011	.638	.155	.179	.498	.143
IRI 17	.051	.238	.415	.122	.469	.274	.021	.232	**1.000**	-.084	.238	.098	.240	.185	.491	.106	.351	.175
IRI 18	.413	.365	.076	.062	-.014	.013	.313	.102	-.084	**1.000**	-.189	.326	.096	.130	-.047	.088	.074	.164
IRI 19	-.309	.024	.212	-.094	.311	.044	-.067	-.018	.238	-.189	**1.000**	-.274	-.242	-.045	.334	-.199	-.013	-.168
IRI 20	.451	.229	.137	.327	.171	.112	.300	.267	.098	.326	-.274	**1.000**	.221	.272	-.013	.236	.304	.279
IRI 21	.139	.132	-.039	.639	.152	.075	.207	.011	.240	.096	-.242	.221	**1.000**	-.014	-.132	.414	.160	.473
IRI 23	.033	.159	.054	.018	.176	.334	.087	.638	.185	.130	-.045	.272	-.014	**1.000**	.309	.213	.593	.184
IRI 24	-.089	.125	.344	-.058	.293	.192	.151	.155	.491	-.047	.334	-.013	-.132	.309	**1.000**	-.071	.290	.012
IRI 25	.276	.176	.001	.406	.041	.119	.137	.179	.106	.088	-.199	.236	.414	.213	-.071	**1.000**	.372	.637
IRI 26	.106	.179	.280	.157	.155	.469	.143	.498	.351	.074	-.013	.304	.160	.593	.290	.372	**1.000**	.426
IRI 28	.178	.188	.070	.405	.093	.040	.053	.143	.175	.164	-.168	.279	.473	.184	.012	.637	.426	**1.000**

Table 3 Correlation matrix for the Modified IRI (MIRI) containing 18 items selected from the original Interpersonal Reactivity Index (IRI) among 85 men with schizophrenia

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