THE ROLE OF THEORY OF MIND AS A
MEDIATOR IN THE RELATIONSHIP BETWEEN
SOCIAL FUNCTIONING AND SCHIZOTYPY

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Introduction

Schizophrenia currently occurs in about one percent of adults worldwide and is characterized by positive symptoms, such as hallucinations and delusions, as well as negative symptoms, such as flat affect and poverty of speech. Schizophrenia is also characterized by deficits in social functioning. Although schizophrenia only occurs in one out of a hundred people, there are a number of other related disorders and personality characteristics that seem to be on a continuum with schizophrenia, with the clinical disorder at the most extreme end and normal behavior at the other (Meehl, 1962).

Schizotypal Personality Disorder (SPD) falls in the middle of the continuum and is characterized by a consistent pattern of social and interpersonal deficits as well as some cognitive and perceptual distortions, and eccentric behavior (American Psychiatric Association (APA), 1994). These social deficits and other symptoms are similar to the deficits and symptoms of people with schizophrenia, albeit less severe. Further down the same continuum, there are individuals who do not have diagnosable SPD, but do have schizotypal characteristics. These characteristics include similar, but milder, social and interpersonal deficits as well as unusual perceptual experiences and beliefs (Mason, Claridge & Jackson, 1995). This condition has been termed “schizotypy” (Meehl, 1962). The idea that schizophrenia, SPD and schizotypy are on a single continuum seems plausible, given their phenomenological similarities.
Some researchers conceptualize schizotypy as a unitary construct, or taxon (Meehl, 1962), while others are interested in dimensions of schizotypy (Mason et al., 1995). The dimensions of schizotypy identified by Mason et al. (1995) are unusual experiences, cognitive disorganization, introvertive anhedonia and impulsive non-conformity. Three of the four dimensions seem to relate highly to aspects of schizophrenia: unusual experiences are consistent with positive symptoms, cognitive disorganization is consistent with cognitive deficits commonly found in schizophrenia, and introvertive anhedonia is consistent with a tendency for some people with schizophrenia to withdraw socially. Impulsive non-conformity, in the extreme, relates to violent or self-abusive behaviors. Consensus is still lacking as to the structure of schizotypy; therefore this study will look at both the dimensions of schizotypy mentioned above, as well as schizotypy as a unitary construct.

Schizotypy is an interesting and important area of study for many reasons. One reason for studying schizotypy is that people with schizotypal characteristics have impairments requiring investigation so that interventions can be developed to help these individuals. Additionally, understanding schizotypy can help us understand aspects of schizophrenia that are present in both schizotypy and schizophrenia.

As noted above, there is evidence of social functioning impairment in schizotypy. Social functioning is the ability to interact with others effectively and contribute to society in general. Research indicates that impairments in social perception, or the ability to think about and understand social interactions, may underlie some social functioning
deficits (Addington, Saeedi, & Addington, 2006; Reed, Sullivan, Penn, Stuve, & Spaulding, 1992). The present study examined the relationship between schizotypy and social perception, as well as the effect of social perception abilities on the level of social functioning. To place the present study in context, literature on the social functioning and social perception abilities of people with schizophrenia and schizotypal characteristics is considered. Emphasis is placed on a specific social perception concept called Theory of Mind, which is the ability to understand the thoughts, intentions and feelings of others. The following review examines the variables mentioned above and demonstrates their interrelatedness.

Social Functioning and Schizophrenia

Impairment in social functioning has long been known to be a core characteristic of schizophrenia. Social functioning impairments involve many aspects of daily functioning. They affect community functioning and community status (Addington, et al., 2006; Kim, Doop, Blake, & Park, 2005; Revheim & Medalia, 2004), work functioning (Green, Kern, Braff & Mintz, 2000), and social knowledge and skills (Ihnen, Penn, Corrigan & Martin, 1998; Penn, Ritchie, Francis, Combs, & Martin, 2002; Pinkham & Penn, 2006; Vauth, Rusch, Wirtz & Corrigan, 2004). In addition to the human costs of quality of life, these deficits can force people with schizophrenia to
become financially dependant, costing the United States alone an estimated 50 billion dollars a year (Koren & Harvey, 2006; McKibbin, Patterson & Jeste, 2004).

Some studies have found social functioning deficits in individuals prior to the onset of schizophrenia (Davidson et al., 1999; Crow, Done, & Sacker, 1995) as well as in people who have a parent with schizophrenia, suggesting the possibility of genetic involvement (Farzin et al., 2006; Hans, Auerback, Styr & Marcus, 2000; Tienari, Wahlberg & Wynne, 2006). Not only do these deficits often begin early in life for people who develop schizophrenia, but they rarely improve over time, and may even worsen with the chronicity of the illness (Neumann & Walker, 1998). Because of these social functioning deficits, people with schizophrenia risk becoming increasingly isolated (Buhrmester, 1990; Neumann & Walker, 1998). As they grow more isolated, social networks may become very small and contain primarily family members (Howard, Leese & Thornicroft, 2000). Understanding what variables influence social functioning has important clinical utility. Treatments and interventions can be developed in order to ameliorate these conditions or reduce their impact.

Social Perception in Schizophrenia

Social perception has been demonstrated to be related to aspects of social functioning. Social perception involves awareness of the thoughts, feelings and
intentions of others and understanding appropriate social behavior. Some hypotheses about social perception impairment are that social perception deficits in schizophrenia may be related to underlying social schemas that are faulty (Corrigan, 1997; Penn, Combs & Mohamed, 2001), or to a lack of interest in social situations, or to an insufficient amount of social knowledge (Corrigan, 1997; Cutting & Murphy, 1990; Penn et al., 2002; Pierce, Sewell & Cromwell, 1992). Others describe social perception deficits as involving a lack of problem solving skills for social situations (Addington et al., 2006; Appelo et al., 1992; Corrigan & Toomey, 1995; Penn et al., 2002; Yager & Ehmann, 2006) or a basic inability to recognize emotions in others (Brekke, Kay, Lee & Green, 2005; Edwards, Pattison, Jackson & Wales, 2001; Evangeli & Broks, 2000; Kohler, Bilker, Hagendoorn, RE Gur, & RC Gur, 2000; K Mueser, Salyers, P Mueser, 1996). Regardless of the processes underlying social perception deficits, they have important effects on the social functioning of individuals with schizophrenia.

Social perception deficits affecting social functioning have been observed in a number of different environments, including community and vocational settings. Level of functioning in community settings has generally been shown to decrease as social perception deficits become more pronounced. Appelo et al. (1992) found that performance on a social perception task predicted observed social behavior (social activity, self-care) in a community milieu setting, although it did not predict social skills as assessed by a performance measure of social skills (e.g. assertiveness and interpersonal
warmth). Other researchers, however, have found a relationship between social skills and community functioning (Kopelowicz, Liberman, & Zarate, 2002; Preston, 2000).

Vauth et al. (2004) looked at vocational functioning in people with schizophrenia, and found that performance on a social knowledge task (assessing which goals were appropriate to particular social situations) was associated with measures of real-world social skills (ability to relate to coworkers) and personal presentation (appropriate responding to authority figures). Sergi, Rassovsky, Nuechterlein and Green (2006) found performance on laboratory social perception tasks was related to work functioning and the ability to live independently. The above studies support the idea that social perception is central to many aspects of daily functioning, and thus an important variable to study.

Theory of Mind in Schizophrenia

An important social perception construct, and one that was investigated in this study, is Theory of Mind (ToM), which is the ability to understand the thoughts, intentions and feelings of others. C. Frith (1992) used the construct of ToM to explain social functioning deficits in people with schizophrenia. He said people with
schizophrenia tend to have difficulty in correctly interpreting other people’s mental states. This lack of awareness is similar to deficits seen in people with autism, though less extreme in schizophrenia. In autism, the ToM deficit is believed to reflect a lack of awareness of others as individuals with thoughts and intentions of their own, whereas in schizophrenia it is believed to reflect an inaccuracy in the interpretation of others’ thoughts and intentions. Frith (1992) applied ToM to account for some of the major features of schizophrenia. He hypothesized that an inability to monitor others’ thoughts and intentions could lead to, among other things, delusions of persecution and disorganized speech.

Since Frith (1992) there have been a number of theories developed that seek to describe the cognitive underpinnings of ToM (Abu-Akel, 1999; Hardy-Bayle, Sarfati & Passerieux, 2003; Perner, 1991; Scholl & Leslie, 1999). One of the most influential theories was developed by Scholl and Leslie who argue that the brain has many individual capabilities that are specific to different abilities (domain-specific), ToM being one of them. Scholl and Leslie argue that impairments in ToM arise from an inability to separate important from unimportant information in the environment. For example, ToM often requires the listener to pay more attention to vocal cues of the speaker rather than to the content of what is spoken in order to interpret the true meaning of a statement.

In contrast to domain-specificity, others have suggested that ToM deficits may be due to more general cognitive impairments. However, the majority of studies have not found significant relationships between performance on ToM tasks and
neuropsychological tasks (Langdon, Coltheart, Ward & Catts, 2001; Mitchley, Barber, Gray, Brooks, & Livingston, 1998; Pickup & Frith, 2001). In a literature review, Harrington, Siegert, and McClure (2005) noted that 23 out of 27 studies that looked at neurocognitive abilities of people with schizophrenia (including general intellectual ability, memory, and executive functioning) found ToM deficits to be unrelated to performance on the neurocognitive measures. Another literature review indicated that these findings seem to hold regardless of the ToM task used (Brune, 2005).

A few studies, however, have found a relationship between ToM and neurocognitive functioning. Brune (2003), Corcoran, Mercer, and Frith (1995), Doody, Gotz, Johnstone, Frith, & Cunningham (1998) and Murphy (1998) found that ToM was related to IQ. Also, Langdon et al. (2001) found that ToM was related to executive functioning. There also remains some question as to whether ToM is related to chronicity, such that longer durations of schizophrenia lead to greater deficits (Langdon et al., 1997, 2002; Brune, 2003), or whether these deficits begin early on in, or even prior to, the illness (Pilowsky, Yirmiya, Arbelle & Mozes, 2000). Further, it may be that ToM deficits are more highly associated with severity of illness than with chronicity (Harrington et al., 2005).

Research concerning the relationships of ToM with illness severity and chronicity has spurred questions as to whether ToM impairment is a state or trait variable. A few studies have led researchers to believe that ToM is a state variable (Corcoran, et al., 1995; Frith & Corcoran, 1996; Pickup & Frith, 2001). However, the majority of studies support
the idea that ToM is a trait variable in schizophrenia (Harrington et al., 2005), finding ToM deficits present in patients in remission (Drury, Robinson, & Birchwood, 1998; Siever et al., 2002; Randall, Corcoran, Day, & Bentall, 2003) and in first-degree relatives of people with schizophrenia (Janssen, Krabbendam, Jolles, & van Os, 2003; Versmissen et al., 2008). ToM deficits have also been observed in people with schizotypy (Langdon & Coltheart, 1999).

**Theory of Mind in Schizotypy**

Indeed, a number of studies have investigated ToM in people with schizotypy, as did this study, using schizotypy as a proxy for schizophrenia. As noted previously, schizotypal characteristics are similar to those seen in people with schizophrenia, and some research supports a genetic relationship between schizophrenia and other schizophrenia spectrum disorders, including schizotypy (Tienari et al, 2003). Additionally, Claridge and colleagues argue that studying schizotypy may have preventative value in the study of schizophrenia, because it is believed that some schizotypal individuals possess a cognitive vulnerability that puts them at risk for psychosis. Clinical psychosis may only manifest in these individuals when triggered by physical, social or environmental factors (Claridge, 1987, 1994; Claridge & Beech, 1995). Although most individuals with schizotypal characteristics never develop
schizophrenia, the findings of several studies of ToM and schizotypy mirror those of previous studies of ToM and schizophrenia.

Langdon and Coltheart (1999) presented the results of two experimental studies in which they looked at “mentalizing” in subjects scoring high and low on a scale of schizotypy. Mentalizing is defined as a metacognitive ability to accurately perceive and think about one’s own and other individuals’ mental states, thus similar to the concept of ToM. Langdon and Coltheart were interested in determining whether or not mentalizing deficits were related to schizotypy, as well as a potential vulnerability to psychosis, or, in contrast, simply the result of consequences associated with chronic psychiatric illness, i.e., schizophrenia. Another purpose of the two studies was to clarify previous conflicting findings on whether deficits in mentalizing were associated with schizophrenia-like symptoms in general, or more closely related to specific symptoms, such as paranoia (Frith & Corcoran, 1996; Corcoran, et al., 1995) and behavioral signs, such as social withdrawal (Corcoran, Cahill & Frith, 1997).

In experiment one, subjects who scored high on a measure of schizotypy made more errors on the mentalizing task than subjects who scored low. In the second experiment, Langdon and Coltheart (1999) found that poor mentalizers scored higher on all schizotypal factors. They did not find a significant interaction between a measure of executive planning and ToM, indicating that ToM deficit was not related to that type of cognitive deficit. Langdon and Coltheart concluded that, since their findings are similar to those observed in people with schizophrenia, poor mentalizing may be a vulnerability
factor for psychosis. They posited that a specific part of the brain, or cognitive module, is dedicated to inferring and representing mental states of others, and that this cognitive module is impaired in both schizotypy and schizophrenia.

Langdon and Coltheart followed up with two other studies. In one study (Langdon, Coltheart, Ward, & Catts 2001), subjects were presented with a stimulus and then asked to first imagine their perspective of the stimulus from another chair, and second to imagine turning the stimulus to gain a different view of the stimulus. Results showed that people with more schizotypal characteristics performed more poorly when asked to imagine changing chairs versus turning the stimulus, while people with fewer schizotypal characteristics did not show a difference in performance between the two tasks. Their results indicated that people with high schizotypal characteristics were more impaired in visual perspective-taking when it required them to put themselves in a different position, which Langdon and Coltheart compared to putting oneself in someone else’s shoes. Langdon and Coltheart (2004) further considered performance on an irony appreciation task and found people with more schizotypal characteristics to perform more poorly than people with few schizotypal characteristics, replicating the irony perception difficulties seen in schizophrenic populations.

Pickup (2006) replicated the work of Langdon and Coltheart, also considering the relationship between ToM capabilities and executive functioning, a capacity other researchers had found to be affected in schizotypy (Raine, Sheard, Reynolds & Lencz, 1992). Pickup found that high scores on a specific dimension of schizotypy, unusual
experiences (i.e. magical thinking), predicted poorer scores on a task involving ToM stories. This relationship was not due to general difficulties in reasoning, inferred through a similar stories task not involving ToM (Pickup, 2006). Pickup’s findings of an association between performance on ToM measures and unusual experiences, but not the other dimensions of schizotypy, is of interest because unusual experiences are similar to the positive syndrome of schizophrenia, the core symptoms of which are hallucinations and delusions.

A few studies have linked ToM deficits with positive, psychotic symptoms in schizophrenia (Corcoran et al., 1995; Frith & Corcoran, 1996; Harrington et al., 2005), suggesting the association between performance on a ToM measure and unusual experiences may indicate ToM deficits are characteristic of psychosis-proneness in healthy individuals. In contrast, Fernyhough et al. (2008) did not find a significant relationship between either schizotypy or persecutory ideation and ToM. In another study, Jahshan and Sergi (2006) examined ToM, neurocognition and functional status in schizotypy using an undergraduate sample selected from the 95th percentile for high scorers and the bottom 7th percentile for low scorers on a measure of schizotypy. They found significant differences in social functioning between groups, with high scorers on the schizotypy measure having more difficulties with school, peer relationships and relationships with family members, but they did not find significant group differences in emotion perception, ToM or neurocognition. However, the authors acknowledged a number of limitations to their study, including the separation of subjects into extreme
high and low schizotypy groups, and the limited nature of their measures of ToM and emotion perception. Additionally, none of the previously mentioned studies considered the role of affect in their analyses.

McCleery & Docherty (2009) examined the relationship between schizotypy, ToM, affect and social functioning. They found associations between schizotypy and social functioning, but not between schizotypy and ToM. However, they did find significant relationships of schizotypy and social functioning with affective disturbance, and they found that depression partially mediated the relationship between schizotypy and social functioning. Another recent study examined the role of affect on schizotypy and found significant differences in depression between people with high and low schizotypal characteristics (Mohanty et al, 2008). They also found that affect significantly influenced the relationship between schizotypy and social functioning. Therefore the present study also explored the role of negative affect in schizotypy and social functioning.

As demonstrated in the literature review, some studies have supported the relationship between total schizotypal characteristics and ToM impairments, while others have found a null relationship between schizotypal characteristics and ToM, or have only found a relationship between ToM and the unusual experiences dimension of schizotypy. The present study aimed to replicate the findings of associations between schizotypy and social functioning, and to assess the role of ToM in this relationship. It also aimed to
contribute to resolving some of the mixed or new findings in the literature on ToM, neurocognition and affect.

**Hypotheses**

Given the previous research on schizotypy, ToM and social functioning, the present study aimed to test the following hypotheses:

1. We hypothesized that schizotypy would be related to ToM performance and social functioning, such that as schizotypal characteristics increased, ToM scores and social functioning scores would decrease, indicating greater ToM impairments and greater social dysfunction.

2. We hypothesized that ToM performance would partially mediate the relationship between total schizotypal characteristics and social functioning, supporting the idea that ToM impairment is necessary for schizotypal characteristics to have an effect on social functioning.

3. We hypothesized that ToM performance would partially mediate the relationship between schizotypal characteristics and life satisfaction, supporting the idea that ToM impairment is necessary for schizotypal characteristics to have an effect on life satisfaction.
4. We hypothesized that neurocognitive ability would be related to schizotypy and ToM, such that as schizotypal characteristics increased, neurocognitive ability would decrease, indicating greater neurocognitive dysfunction, and that as ToM ability decreased, neurocognitive ability would decrease, also indicating greater neurocognitive dysfunction. We hypothesized that neurocognition would moderate the mediated relationship between schizotypy, ToM and social functioning.

5. We hypothesized that negative affect would be related to schizotypy and social functioning, such as that as schizotypal characteristics increased and social functioning decreased, indicating greater social dysfunction, negative affect would increase, indicating greater emotional distress. We hypothesized that affect would moderate the mediated relationship between schizotypy, ToM and social functioning.
Method

Participants

Participants included 68 KSU undergraduates, self-selected for the study. Participants were excluded from the study if they had histories suggestive of organic complaints (inhaling abuse, head injury, seizure disorder), had a psychotic disorder diagnosis, or were not native English speakers. Ten subjects were excluded from the study. Seven were excluded because they scored a 3 or higher on the Infrequency scale of the O-LIFE and one was missing data entirely on the O-LIFE. Two more were excluded because one person was diagnosed with schizoaffective disorder and the other person refused to respond to the drug use question, prohibiting us from assessing a history of inhalant use. After exclusion criteria, 58 subjects were used in the final analyses. Participants were mostly female (65.5%), Caucasian (87.9%) and of freshman status (74.1%). Participants ranged in age from 18-32 with a median age of 20 years old.

Measures

Schizotypy. The Oxford-Liverpool Inventory of Feelings and Emotions (O-LIFE) is a measure of schizotypy developed by Mason, Claridge and Jackson (1995; Appendix D). The O-LIFE is an attractive measure to use because it provides a continuous range of schizotypy. We are most interested in studying schizotypy on a continuum to determine
if ToM and social functioning vary in response to the extent of schizotypal characteristics. Mason, Claridge and Jackson used items from seven previously validated scales and conducted a factor analysis to create their measure. The O-LIFE is comprised of four subscales with 24-30 items each that assess different schizotypal traits: unusual experiences, cognitive disorganization, introvertive anhedonia and impulsive nonconformity. In relation to schizophrenia, unusual experiences maps on to positive symptoms of schizophrenia, cognitive disorganization maps onto disorganized symptoms and introvertive anhedonia maps onto negative symptoms. Impulsive nonconformity includes violent and self-abusive behaviors. The measure is designed to be used with normal populations. The O-LIFE has internal consistency above .7 for all four subscales and test-retest reliability above .7 for all four subscales as well. Confirmatory factor analysis has indicated adequate goodness-of-fit for the four factor solution. For the current sample, the internal consistency for the total score was α= .89, Unusual Experiences was α= .75, Introvertive Anhedonia was α= .61, Cognitive Disorganization was α .86, and Impulsive Nonconformity was α= .72. The Chapman Infrequency Scale (Chapman & Chapman, 1987; Appendix E) was embedded in the O-LIFE in order to identify random or invalid responders.

**Social Cognition Tests.** The Theory of Mind Stories Task consists of two sets of eight vignettes: Theory of Mind stories and physical control stories (Fletcher, et al., 1995; Appendix F). The ToM stories were based on Happe’s (1994) “Strange Stories.” They ask participants to make judgments about characters’ feelings and thoughts based on
bluffs, mistakes, white lies and persuasions. The ToM stories tap into the cognitive aspect of ToM which requires participants to use information about the situation in order to draw conclusions. The physical control stories are used as a control for general reasoning ability and are matched for difficulty with the ToM stories. They ask participants to make judgments based on physical conditions, such as the weather. Each response to the stories is rated 0= irrelevant or incorrect answers to 2= fully correct and complete answers for both the Theory of Mind and physical stories. Possible scores range from 0 to 16 for ToM stories and 0 to 16 for physical stories.

The Movie for the Assessment of Social Cognition (MASC; Dziobek et al., 2006; Appendix G) is a 15 minute movie about four people getting together for a dinner party. The video is paused 45 times and participants are asked about one character’s feelings, thoughts and intentions. Verbal and non-verbal content are used. Some items make use of what has literally been stated while other items employ non-literal meanings, such as figurative speech, in order for participants to correctly answer questions. Emotional content of both positive and negative valence is included in the characters’ speech as well as in their facial expressions. The MASC taps into both cognitive and affective aspects of ToM requiring the participant to use both information about the situation, as well as facial expressions and the emotional content of what is said in order to draw conclusions. Items are given one point if answered correctly and possible scores range from 0 to 45. Each item has four possible answers: accurate ToM, excessive ToM, insufficient ToM, and no ToM. Responses are correct when accurate ToM is used. Excessive ToM refers
to responses that read too much into the situation, such as assuming a character wants to marry another character rather than simply being interested. Insufficient ToM refers to responses that do not use adequate levels of ToM, such as identifying a character as “surprised” rather than the real emotion of “frightened”. No ToM refers to Autistic-like responses that do not use any ToM but instead use non-important information, such as noticing objects in the room. Counts of excessive ToM, insufficient ToM and no ToM responses are also calculated. For the current sample, the internal consistency was $\alpha = .87$.

The Profile of Nonverbal Sensitivity Test (PONS; DePaulo, Rosenthal, Finkelstein, & Eisenstat, 1979; Appendix H) is a 45 minute video that assesses nonverbal social perception. The video consists of 220 two-second clips of nonverbal auditory and visual stimuli. Each two-second clip involves either an audio bite, a video clip, or an audio bite with a video clip. All audio bites and video clips are of the same actress. The surroundings of the actress are not visible forcing the participant to rely on vocal cues and body language to determine the content of the situation. The sound tracks for the auditory clips are muffled so that comprehension of verbal content is not possible. The PONS taps into affective ToM requiring participants to use only the emotional tone of voice and facial expressions of the actress in order to draw conclusions. After each two-second clip, the participants are asked to choose between two descriptions of everyday situations (i.e. “expressing jealous anger” or “admiring nature”). Half of the test was
used for this study’s purposes for a resulting 110 video/audio clips and questions. Two options are given for each item and one point is given for each correct response. Possible scores range from 0 to 110.

**Social Functioning Measures.** The Quality of Life Inventory (QOLI; Frisch, Cornell, Villanueva, & Retzlaff 1992; Appendix I) is a 172-item self-report measure that assesses variables such as social connections, health, occupation and self-acceptance. Each item asks for two ratings, level of importance (range from 0= not important to 2= extremely important) and how satisfied (range from -3= very dissatisfied to 3= very satisfied). Total weighted scores are calculated by taking the products of importance and satisfaction and summing the items. This measure has been shown to have acceptable stability above .8 and internal consistency above .77 (Frisch, Cornell, Villanueva, & Retzlaff, 1992). For the current sample, the internal consistency was $\alpha= .74$.

The Social Adjustment Scale-self-report (SAS-SR; Weissman & Bothwell, 1976; Appendix J) is a 54-item self-report measure that assesses variables such as work life, home life, school life, social and leisure activities. The variables of interest in this study were peer, family and academic scales. Most items range between 1 and 5 with lower numbers indicating better functioning than higher numbers. This measure has been shown to have acceptable test-retest reliability, interrater reliability, and convergent and
discriminant validity (Weissman & Bothwell, 1976). For the current sample, the internal consistency was $\alpha=.86$. For analyses, a composite score was created by summing the standardized residuals of the peer, family, and academic scales.

Further, self-report measures of social functioning have inherent problems such as error due to social desirability effects or to lack of self-awareness. Because of these problems with self-report measures of social functioning, we tested the hypothesis that more objective questions about social functioning would be a more accurate reflection of social functioning, and hence more highly related to schizotypy and ToM than the more subjective questions. To achieve this, we used more objective items from the SAS-SR that had quantitative anchor points (e.g. “How many friends have you seen or spoken to on the phone in the last 2 weeks?” A. Nine or more, B. 5-8, C. 2-4, D. 1 friend, E. No friends). Objective questions were summed to create an objective social functioning scale.

_Mood Measures._ The Beck Depression Inventory-Second Edition (BDI-II; Beck, Steer & Brown, 1996; Appendix K) is a 21-item measure of depression that assesses different symptoms of depression such as cognitive, affective, behavioral, motivational, and somatic state. Items are rated from 0 (not at all) to 3 (severely) and possible scores range between 0 and 63, with higher scores indicating greater severity of depression. The measure has good internal consistency of above .9 and adequate convergent validity has
been demonstrated with other measures of depression (Beck et al., 1996). For the current sample, the internal consistency was $\alpha = .89$.

The Beck Anxiety Inventory (BAI; Beck, Epstein, Brown & Steer, 1988; Appendix L) is a 21-item measure of anxiety symptoms that helps discriminate between anxiety diagnoses, such as Generalized Anxiety Disorder, and non-anxiety diagnoses, such as Major Depression. Items are rated from 0 (not at all) to 3 (severely). Possible scores range from 0 to 63 with higher scores indicating greater severity of anxiety. The measure has high internal consistency at .92 and test-retest reliability over one week at .75. The BAI also has adequate convergent and discriminant validity (Beck et al., 1988). For the current sample, the internal consistency was $\alpha = .90$.

**Cognitive Tests.** The Wisconsin Card Sort Test-64 Card Version (WCST-64; Kongs, Thompson, Iverson, & Heaton, 2000a; Appendix M) is a 10-15 minute computer administered measure that assesses executive functioning. Executive functioning has been associated with performance on some ToM tasks in previous studies (Brune, 2005) and is therefore important to considered in the present analyses. The WCST-64 presents participants with four stimulus cards (one red triangle, two green stars, three yellow crosses and four blue circles) and participants are asked to match 64 cards which are presented one at a time with one of the four stimulus cards. Matches are made based on
color, number or symbol, although the type of match required is unknown to the participant. When participants correctly match 10 cards, the target match is changed and participants are forced to identify the new sorting rule. External validity of the WCST-64 with other measures of executive functioning range between .6-.85 for adults (Kongs et al., 2000b).

The Shipley Institute of Living Scale (SILS; Shipley, 1940; Appendix N) is a measure of general cognitive functioning. General cognitive functioning could potentially impact either ToM or social functioning and was therefore considered in the analyses. The measure consists of two subtests: one that is comprised of 40 multiple-choice vocabulary words and the second that is comprised of 20 sequence questions involving letters, numbers and words. The vocabulary subtest reflects verbal comprehension, acquired knowledge, long-term memory, and concept formation. The abstraction subtest assesses concept formation, abstract reasoning, cognitive flexibility, and sequencing ability. One point is given for each correct response on the vocabulary test and two points for each correct item on the abstraction test. Possible scores for each subtest range between 0 and 40. Split-half reliability is .92 for the total score and test-retest reliability has a median of .78 for the total score. The SILS has external validity ranging from .55-.8 with other measures of cognitive ability.
The Letter-Number Sequencing Task (LNS) was taken from the Weschler Adult Intelligence Scale- Third Edition (Weschler, 1997; Appendix O). This measure has 7 trials of 3 items each that require the participant to order numbers and letters in sequential order. It assesses attention, concentration and working memory. Working memory and attention may be required for many of the ToM tasks and was therefore assessed in this study. One point is given for each correct response and possible scores range from 0 to 21. LNS has a test-retest reliability ranging from .7-.8 for age groups.

Procedure

All participants were met with individually and all measures were administered in one session after they had given their informed consent. Six researchers ran participants. Each session lasted three hours for which participants received course credit.

Statistical Analyses

It was hypothesized that the relationship between schizotypy and social functioning would be best explained by the effect of ToM on social functioning. Linear regression was used to assess the mediation effects of ToM on the relationship between schizotypy and social functioning. Sobel tests were calculated to assess significance.
(MacKinnon, Fairchild, & Fritz, 2007). Although using longitudinal data in meditational analyses is a more stringent test than using cross-sectional data, cross-sectional data can still shed light on important meditational processes, indicating when a future, more in depth longitudinal study might be of use. These regression equations tested for a partial mediation effect of ToM on the relationship between schizotypy and social functioning, with the idea that entering ToM into the equation would reduce the relationship between schizotypy and social functioning. We were further interested in the relationships between schizotypy, ToM and social functioning beyond the effects of social desirability. In these analyses, linear regression was used to assess the same mediation effects after removing social desirability scores.

After regression equations were computed to determine mediation, a moderated mediation analysis was planned using hierarchical linear regression equations by including additional variables to further assess the relationships among schizotypy, ToM, and social functioning. Given previous findings, the additional variables included neurocognitive capabilities (Langdon et al., 2001; Brune, 2003) and negative affect (McCleery et al., 2009; Mohanty et al., 2008).
Results

Descriptive Statistics

Most of the variables were normally distributed; however, two univariate outliers were identified for SAS total academic and the outliers were taken in to three standard deviations from the mean in order to reduce the impact of extreme scores on subsequent analyses. Means and standard deviations are displayed (Tables 1-4). Subjects were further excluded from analyses for not having complete data (3 missing ToM Stories data, 2 missing MASC data and 1 missing PONS data) resulting in a listwise sample of 52 subjects for all the analyses except for analyses including the QOLI (with 2 missing QOLI data resulting in N=50) and Social Desirability (as noted). O-LIFE variable data are presented in Table 1. The ranges of scores were slightly smaller for the O-LIFE total score and subscales, compared with those of Mason and Claridge (2006). In addition, gender did not significantly affect any of the variables in this sample.

Neurocognitive and affective data are presented in Table 2. For purposes of analyses, a composite scale was created using standardized scores from the BDI and BAI to create a single measure of emotional distress. Theory of mind and social functioning

\footnote{The first twenty participants were given a version of the O-LIFE that did not include the social desirability items.}
data are presented in Tables 3 and 4, respectively. Scores on the Theory of Mind Stories and Physical Stories scores were similar to those reported by Pickup (2006). However, in this sample scores on the Physical Stories were significantly lower than scores on the ToM Stories. For purposes of analyses, scores on the Physical Stories were regressed out of scores on ToM Stories as recommended, to create a more pure measure of ToM ability. PONS scores were similar to those reported for the non-psychiatric control group in the study by Toomey et al. (2002), taking into account that this

Table 1. Schizotypy scale scores, n=58

<table>
<thead>
<tr>
<th>Scale</th>
<th>Mean (s.d.)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>O-LIFE: Total Score</td>
<td>32.12 (12.58)</td>
<td>11-64</td>
</tr>
<tr>
<td>O-LIFE: Unusual Experiences</td>
<td>8.69 (5.09)</td>
<td>0-24</td>
</tr>
<tr>
<td>O-LIFE: Introvertive Anhedonia</td>
<td>4.76 (3.37)</td>
<td>0-14</td>
</tr>
<tr>
<td>O-LIFE: Cognitive Disorganization</td>
<td>8.33 (2.83)</td>
<td>0-22</td>
</tr>
<tr>
<td>O-LIFE: Impulsive Nonconformity</td>
<td>8.33 (4.89)</td>
<td>3-14</td>
</tr>
<tr>
<td>O-LIFE: Social Desirability, n= 41</td>
<td>14.26 (4.89)</td>
<td>4-26</td>
</tr>
</tbody>
</table>

Note: maximum possible scores for Total Score= 104, Unusual Experiences= 30, Introvertive Anhedonia= 27, Cognitive Disorganization= 24, Impulsive Nonconformity= 23, Social Desirability= 33
study used a shorter form of the test (the half-PONS). MASC total scores were similar to those reported by Dziobek et al. (2006). However, subjects in this study performed slightly better on MASC control questions than did subjects in the study by Dziobek et al. (2006). Performance on MASC control questions did not significantly affect any of the variables.

Table 2. Neurocognitive, BDI, and BAI scale scores, n= 58

<table>
<thead>
<tr>
<th></th>
<th>Mean (s.d.)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipley Verbal Correct</td>
<td>28.07 (3.33)</td>
<td>21-34</td>
</tr>
<tr>
<td>Shipley Abstract Correct</td>
<td>31.28 (4.30)</td>
<td>18-38</td>
</tr>
<tr>
<td>Letter-Number Sequencing</td>
<td>11.21 (2.36)</td>
<td>5-18</td>
</tr>
<tr>
<td>WCST: Total Correct</td>
<td>49.67 (8.30)</td>
<td>26-57</td>
</tr>
<tr>
<td>BDI</td>
<td>9.34 (7.47)</td>
<td>0-31</td>
</tr>
<tr>
<td>BAI</td>
<td>10.86 (6.98)</td>
<td>0.30</td>
</tr>
</tbody>
</table>

Note: maximum possible scores for Shipley Verbal= 40, Shipley Abstract= 40, Letter-Number Sequencing= 21, WCST Total Correct= 64, BDI= 63, BAI= 63

Z-scores were conducted and the standardized scores of all three ToM measures were summed together to create a single, composite ToM score used in analyses. The correlations between all the dependent variables are presented in Table 5 (Appendix A.) and a smaller correlation table between schizotypy and ToM variables is presented in Table 6.
<table>
<thead>
<tr>
<th></th>
<th>Mean (s.d.)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>ToM Stories Total</td>
<td>12.46 (2.59)</td>
<td>3-16</td>
</tr>
<tr>
<td>Physical Stories Total</td>
<td>10.07 (2.43)</td>
<td>5-14</td>
</tr>
<tr>
<td>MASC: Total Score</td>
<td>34.54 (3.99)</td>
<td>23-46</td>
</tr>
<tr>
<td>MASC: No ToM</td>
<td>1.21 (1.02)</td>
<td>0-4</td>
</tr>
<tr>
<td>MASC: Insufficient ToM</td>
<td>3.39 (1.86)</td>
<td>0-8</td>
</tr>
<tr>
<td>MASC: Excessive ToM</td>
<td>6.04 (2.65)</td>
<td>2-14</td>
</tr>
<tr>
<td>MASC: Control Total</td>
<td>4.59 (1.19)</td>
<td>2-6</td>
</tr>
<tr>
<td>PONS</td>
<td>82.27 (7.07)</td>
<td>61-93</td>
</tr>
</tbody>
</table>

Note: maximum possible scores for ToM Stories= 16, Physical Stories= 16, MASC Total= 45, MASC Control= 6, PONS= 110
Table 4. Social Functioning scale scores, n= 58

<table>
<thead>
<tr>
<th></th>
<th>Mean (s.d.)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>QOLI: Total Weighted Satisfaction</td>
<td>40.66 (17.64)</td>
<td>-3-74</td>
</tr>
<tr>
<td>SAS: Total Peer</td>
<td>16.93 (8.49)</td>
<td>3-36</td>
</tr>
<tr>
<td>SAS: Total Family</td>
<td>6.81 (3.94)</td>
<td>0-17</td>
</tr>
<tr>
<td>SAS: Total Academic</td>
<td>4.54 (2.60)</td>
<td>0-12</td>
</tr>
<tr>
<td>SAS: Total Objective</td>
<td>17.37 (5.23)</td>
<td>6-31</td>
</tr>
</tbody>
</table>

Note: maximum possible scores for QOLI: Total Weighted Satisfaction= 96, SAS: Total Peer= 38*, SAS: Total Family= 33*, SAS: Total Academic= 27*, SAS: Total Objective= 45

*SAS higher scores indicate worse functioning in that area
Table 6. Schizotypy and theory of mind variables, n= 52

<table>
<thead>
<tr>
<th></th>
<th>1. MASC: Total Score</th>
<th>2. MASC: No ToM</th>
<th>3. MASC: Insufficient ToM</th>
<th>4. MASC: Excessive ToM</th>
<th>5. ToM Stories controlling for Physical Stories</th>
<th>6. PONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>O-LIFE: Total</td>
<td>-.134</td>
<td>-.087</td>
<td>-.125</td>
<td>.214</td>
<td>-.075</td>
<td>.080</td>
</tr>
<tr>
<td>O-LIFE: UE</td>
<td>-.030</td>
<td>-.194</td>
<td>-.278*</td>
<td>.275*</td>
<td>.046</td>
<td>.257</td>
</tr>
<tr>
<td>O-LIFE: IA</td>
<td>-.176</td>
<td>.084</td>
<td>.252</td>
<td>-.022</td>
<td>-.079</td>
<td>-.162</td>
</tr>
<tr>
<td>O-LIFE: CD</td>
<td>-.127</td>
<td>.015</td>
<td>-.008</td>
<td>.133</td>
<td>-.154</td>
<td>-.004</td>
</tr>
<tr>
<td>O-LIFE: IN</td>
<td>-.058</td>
<td>-.108</td>
<td>-.231</td>
<td>.189</td>
<td>-.044</td>
<td>.077</td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.05 level (2-tailed).

1. MASC: Total Score, 2. MASC: No ToM, 3. MASC: Insufficient ToM, 4. MASC: Excessive ToM, 5. ToM Stories controlling for Physical Stories, 6. PONS

Note: UE= Unusual Experiences, IA= Introvertive Anhedonia, CD= Cognitive Disorganization, IN= Introvertive Anhedonia
Scores on the SAS and QOLI were similar to those reported by McCleery (2009). However, the SAS family and academic scores were slightly restricted, indicating that the sample used in this study reported better functioning in family and academic domains than they did in the peer domain. The standardized scores of all three SAS scales (family, academic and peer) were summed together to create a single, composite total social functioning score used in analyses. Smaller tables of correlations are presented between schizotypy and social functioning variables (Table 7) and ToM and social functioning variables (Table 8).
Table 7. Schizotypy and social functioning variables, n= 58

<table>
<thead>
<tr>
<th></th>
<th>1.</th>
<th>2.†</th>
<th>3.†</th>
<th>4.†</th>
<th>5.†</th>
</tr>
</thead>
<tbody>
<tr>
<td>O-LIFE: Total</td>
<td>-.251</td>
<td>-.371*</td>
<td>-.331*</td>
<td>-.255</td>
<td>-.169</td>
</tr>
<tr>
<td>O-LIFE: UE</td>
<td>-.057</td>
<td>-.297*</td>
<td>-.266*</td>
<td>-.159</td>
<td>-.196</td>
</tr>
<tr>
<td>O-LIFE: IA</td>
<td>-.389**</td>
<td>.229</td>
<td>.199</td>
<td>-.229</td>
<td>-.228</td>
</tr>
<tr>
<td>O-LIFE: CD</td>
<td>-.266*</td>
<td>-.233</td>
<td>-.260*</td>
<td>-.205</td>
<td>-.020</td>
</tr>
<tr>
<td>O-LIFE: IN</td>
<td>-.048</td>
<td>-.122</td>
<td>-.142</td>
<td>-.120</td>
<td>-.060</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).


†Correlations have been transformed so that negative correlations indicate worse social functioning in relation to other variables.
Table 8. Theory of mind and social functioning variables, n= 52

<table>
<thead>
<tr>
<th></th>
<th>1.</th>
<th>2.†</th>
<th>3.†</th>
<th>4.†</th>
<th>5.†</th>
</tr>
</thead>
<tbody>
<tr>
<td>MASC: Total Score</td>
<td>.241</td>
<td>.298*</td>
<td>.013</td>
<td>.095</td>
<td>.112</td>
</tr>
<tr>
<td>MASC: No ToM</td>
<td>-.141</td>
<td>-.090</td>
<td>.099</td>
<td>.127</td>
<td>.111</td>
</tr>
<tr>
<td>MASC: Insufficient ToM</td>
<td>-.265</td>
<td>-.047</td>
<td>.014</td>
<td>.057</td>
<td>.038</td>
</tr>
<tr>
<td>MASC: Excessive ToM</td>
<td>-.010</td>
<td>-.326**</td>
<td>-.071</td>
<td>-.194</td>
<td>-.181</td>
</tr>
<tr>
<td>ToM Stories w/o Physical</td>
<td>.107</td>
<td>.212</td>
<td>-.181</td>
<td>-.168</td>
<td>.081</td>
</tr>
<tr>
<td>PONS</td>
<td>-.041</td>
<td>.005</td>
<td>-.273*</td>
<td>-.163</td>
<td>-.044</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).


†Correlations have been transformed so that negative correlations indicate worse social functioning in relation to other variables.
Tests of Hypotheses

1. We hypothesized that schizotypy would be related to ToM performance and social functioning, such that as schizotypal characteristics increased, ToM scores and social functioning scores would decrease, indicating greater ToM impairments and greater social dysfunction.

To test this hypothesis, Pearson correlations were conducted looking at the relationships between schizotypy, ToM and social functioning. Although most relationships were in the expected direction, few significant relationships emerged between schizotypy and ToM. The Unusual Experiences dimension of schizotypy was significantly related to MASC insufficient ToM and MASC exceeding ToM ($r = -0.278$ and $r = 0.275$, respectively; Table 6) at the 0.05 level. Relationships between schizotypy and social functioning were in the expected direction (except for Introvertive Anhedonia and SAS total family) and some significant relationships were identified for schizotypy, life satisfaction, peer functioning and family functioning. No significant relationships were found between schizotypy and academic or objective social functioning (Table 7).

2. We hypothesized that ToM performance would partially mediate the relationship between total schizotypal characteristics and social functioning, supporting the idea that ToM impairment is necessary for schizotypal characteristics to have an effect on social functioning.
Because of the unexpected lack of associations between schizotypy and ToM, such a mediation effect was highly unlikely. However, to test this hypothesis, linear regression was conducted looking at how the ToM composite score mediated the relationship between total schizotypy and total social functioning (SAS total), made up from a composite of other social functioning scales. After ToM was entered into the model, the relationship between schizotypy and social functioning was not reduced (β=0.487 to β=0.486). A test of significance was conducted (a=0.003 and b=0.052), however, significant mediation was not found (R²=0.240, adjusted R²=0.209, F(2, 50)=7.882, p<0.001, Sobel=0.116, p=0.908; Table 9).

Further analyses were conducted examining the mediation effects of the individual ToM measures on the relationship between total schizotypy and total social functioning; however no significant mediations were found. Analyses were also conducted examining the mediation of ToM in the relationships between total schizotypy and the individual social functioning scales; however, no significant mediations were found. Additionally, analyses were conducted examining the mediation effects of the ToM composite score as well as the individual ToM measures on the relationships between total schizotypy and total social functioning, after controlling for the effects of social desirability. Again, no significant correlations were found for any of the models.

Analyses were also conducted examining the mediation effects of the composite and individual ToM measures on the relationships between schizotypy factors (Unusual Experiences, Introvertive Anhedonia, Cognitive Disorganization, and Impulsive Nonconformity) and total social functioning. No significant mediations were found. Analyses were conducted examining
the mediation effects of ToM on the relationships between the schizotypy factors and the individual social functioning scales; however no significant mediations were found.

Table 9. Mediation analysis: schizotypy total and ToM composite score on total social functioning, n= 52

<table>
<thead>
<tr>
<th>IV on DV</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>.084</td>
<td>.021</td>
<td>.487</td>
<td>3.980 (.000)</td>
<td></td>
</tr>
</tbody>
</table>

| IV on Mediator | .003 | .025 | .014 | .102 (.919) |

| Mediator on DV | .052 | .121 | .052 | .424 (.672) |

<table>
<thead>
<tr>
<th>IV on DV in presence of Mediator</th>
<th>R²</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>.084</td>
<td>.021</td>
<td>.486</td>
</tr>
</tbody>
</table>

Sobel .116 (p= .908)

Additionally, analyses were conducted examining these same models after controlling for social desirability and no significant mediations were found.

3. We hypothesized that ToM performance would partially mediate the relationship between total schizotypal characteristics and life satisfaction, supporting the idea that ToM impairment is necessary for schizotypal characteristics to have an effect on life satisfaction.
To test this hypothesis, linear regression was conducted looking at whether the ToM composite score mediated the relationship between total schizotypy and life satisfaction. After ToM was entered into the model, the relationship between schizotypy and life satisfaction was not reduced (β=-0.325 to β=-0.328). A test of significance was conducted (a= 0.003 and b= 1.325), however, significant mediation was not found (R²=0.132, adjusted R²=0.095, F(2, 48)=3.634, p<0.05, Sobel= 0.119, p=0.905; Table 10).

Table 10. Mediation analysis: schizotypy total and ToM composite on life satisfaction, n= 50

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV on DV</td>
<td>-.453</td>
<td>.188</td>
<td>-.325</td>
<td>-2.405 (.020)</td>
</tr>
<tr>
<td>IV on Mediator</td>
<td>.003</td>
<td>.025</td>
<td>.014</td>
<td>.102 (.919)</td>
</tr>
<tr>
<td>Mediator on DV</td>
<td>1.325</td>
<td>1.107</td>
<td>.161</td>
<td>1.197 (.237)</td>
</tr>
<tr>
<td>IV on DV in presence of</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mediator</td>
<td>-.453</td>
<td>.187</td>
<td>-.328</td>
<td>-2.436 (.019)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.132 (2.48 3.634(p=.034)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sobel</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.199 (p=.905)</td>
</tr>
</tbody>
</table>

Further analyses were conducted examining the mediation effects of the individual ToM measures on the relationship between total schizotypy and life satisfaction, however no
significant mediations were found. Additionally, analyses were conducted examining the mediation effects of the ToM composite score as well as the individual ToM measures on the relationships between total schizotypy and life satisfaction, after controlling for the effects of social desirability. Again, no significant correlations were found for any of the models.

Analyses were also conducted examining the mediation effects of the composite and individual ToM measures on the relationships between schizotypy factors (Unusual Experiences, Introvertive Anhedonia, Cognitive Disorganization, and Impulsive Nonconformity) and life satisfaction. No significant mediations were found. Additionally, analyses were conducted examining these same models after controlling for social desirability and no significant mediations were found.

4. We hypothesized that neurocognitive ability would be related to schizotypy and ToM, such that as schizotypal characteristics increased, neurocognitive ability would decrease, indicating greater neurocognitive dysfunction, and that as ToM ability decreased, neurocognitive ability would decrease, also indicating greater neurocognitive dysfunction. We hypothesized that neurocognition would moderate the mediated relationship between schizotypy, ToM and social functioning.

Of the neurocognitive variables, only WCST total correct was significantly related to any schizotypy dimension. It was related to the Introvertive Anhedonia dimension of schizotypy ($r = -0.426$). Some of the neurocognitive variables were significantly related to ToM variables, all in
the expected directions. However, given that none of the hypothesized mediations were statistically significant, moderated mediation tests were not conducted.

5. We hypothesized that negative affect would be related to schizotypy and social functioning, such as that as schizotypal characteristics increased and social functioning decreased, indicating greater social dysfunction, negative affect would increase, indicating greater emotional distress. We hypothesized that affect would moderate the mediated relationship between schizotypy, ToM and social functioning.

   Emotional distress was significantly related to all schizotypy characteristics, except for Introvertive Anhedonia, indicating that more marked schizotypal characteristics were related to greater emotional distress. Emotional distress was also significantly related to all the social functioning variables, except for the objective measure of social functioning, indicating that greater emotional distress was related to more severe social dysfunction. These significant correlations suggest that emotional distress is an important variable in both schizotypy and social functioning. However, given that none of the hypothesized mediations were statistically significant, moderated mediation tests were not conducted.

Exploratory Analyses

As mentioned in the introduction, the role of negative affect on the relationship between schizotypy and social functioning is an important one to consider. Zero-order correlations
indicated significant relationships between schizotypy, mood, social functioning and life satisfaction (Table 5) which are theoretically relevant and therefore additional exploratory mediational analyses were conducted. Given previous research, we hypothesized that emotional distress would partially mediate the relationship between schizotypy and total social functioning, indicating that the emotional distress associated with schizotypy was partially responsible for the association between schizotypy and social functioning. It was also hypothesized that social functioning might mediate the relationship between schizotypy and emotional distress, indicating that social functioning deficits lead to an increase of emotional distress in people with schizotypy.

The first model assessed emotional distress as a mediator in the relationship between schizotypy and social functioning. After emotional distress was entered into the model, the relationship between schizotypy and social functioning was reduced (β=0.452 to β=0.013). A test of significance was conducted (a=0.093 and b=0.757) and found that emotional distress fully mediated the relationship between schizotypy total score and SAS total score (R²=0.435, adjusted R²=0.414, F(2, 55)= 21.152, p<0.001, Sobel= 3.854, p<0.01; Table 11; Figure 1). Further analyses assessed whether emotional distress mediated the relationship between schizotypy factors and SAS total score and found that emotional distress partially mediated the relationships of Unusual Experiences, Introvertive Anhedonia, and Cognitive Disorganization, but not Impulsive Nonconformity, with SAS total score. These findings support an important role of emotional distress in the relationship between schizotypy and social functioning. However, emotional distress did not significantly mediate any of the relationships between total schizotypy or any of the four schizotypy factors and life satisfaction (QOLI).
Table 11. Mediation analysis: schizotypy total and emotional distress on social functioning, n=57

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV on DV</strong></td>
<td>.072</td>
<td>.019</td>
<td>.452</td>
<td>3.792 (.000)</td>
</tr>
<tr>
<td><strong>IV on Mediator</strong></td>
<td>.093</td>
<td>.014</td>
<td>.675</td>
<td>6.847 (.000)</td>
</tr>
<tr>
<td><strong>Mediator on DV</strong></td>
<td>.757</td>
<td>.160</td>
<td>.651</td>
<td>4.735 (.000)</td>
</tr>
</tbody>
</table>
| **IV on DV in presence of Mediator** | .002 | .022 | .013 | .926 (.094) | .435 | (2.55) 21.152(p=.000)

Sobel 3.854 (p=.000)
Figure 1. Mediational analysis for schizotypy total and emotional distress on social functioning

![Diagram showing mediational analysis with emotional distress, schizotypy, and social functioning](image)

- Emotional Distress (Mood)
  - B = 0.093 (S.E. B = 0.014)
  - β = 0.675, p < 0.001
- Schizotypy (O-LIFE total score)
  - B = 0.757 (S.E. B = 0.160)
  - β = 0.651, p < 0.001
- Social Functioning (SAS total score)
  - B = 0.072 (S.E. B = 0.019)
  - β = 0.452, p < 0.001

After mediation:

- B = 0.002 (S.E. B = 0.022)
- β = 0.013, p = 0.926
- Sobel = 3.854, p < 0.001
Analyses were conducted examining the role of social functioning on the relationship between schizotypy and emotional distress, with social functioning serving as a mediator in the relationship. After social functioning was entered into the model, the relationship between schizotypy and emotional distress was reduced (β=0.675 to β=0.474). A test of significance was conducted (a=0.072 and b=0.383) and indicated that SAS total score partially mediated the relationship schizotypy and emotional distress (R²=0.456, adjusted R²=0.446, F(2, 55)= 43.612, p<0.001, Sobel= 2.957, p<0.01; Table 12; Figure 2). Further analyses assessed whether SAS total score mediated the relationship between schizotypy factors and emotional distress and found that SAS total score did partially mediate the relationships of Unusual Experiences, Introvertive Anhedonia, Cognitive Disorganization, and Impulsive Nonconformity and emotional distress. These findings support the important role of social functioning in the relationship between total schizotypy and emotional functioning and for individual schizotypy factors. QOLI, on the other hand, did not significantly mediate any of the relationships between total schizotypy or any of the four schizotypy factors and emotional distress.
Table 12. Mediation analysis: schizotypy total and social functioning on emotional distress, n=57

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<th>β</th>
<th>t (p-value)</th>
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<td>IV on Mediator</td>
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<td>.019</td>
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<td>3.792 (.000)</td>
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<td>Mediator on DV</td>
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<td>.081</td>
<td>.445</td>
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<td>.013</td>
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<tr>
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<td>.474</td>
<td>5.040 (.000)</td>
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</table>

Sobel 2.957 (p=.003)
Figure 2. Mediation analysis: schizotypy total and social functioning on emotional distress

Social Functioning
(SAS total score)

B= 0.072 (S.E. B= 0.019)
β= 0.452, p < 0.001

β= 0.445, p < 0.001

Schizotypy
(O-LIFE total score)

After mediation:
B= 0.065 (S.E. B= 0.013)
β= 0.474, p < 0.001

Sobel= 2.957, p < 0.001

Emotional Distress
(Mood)

B= 0.383 (S.E. B= 0.081)
β= 0.445, p < 0.001
Discussion

Summary of Findings

This study explored the relationship between schizotypy and social functioning, considering ToM as a mediator in the relationship. The results showed that hypotheses were partially supported: all schizotypy scales, except for Introvertive Anhedonia, were related to peer and family social functioning and life satisfaction but not academic and objective social functioning. Counter to our hypotheses, none of the schizotypy scales or social functioning scales were associated with the ToM measures in the ways we predicted. There was, however, a significant negative correlation between Unusual Experiences and insufficient ToM, and a positive correlation between Unusual Experiences and excessive ToM.

Hypothesized mediations were conducted but failed to find significant mediation for any of the models. Because none of the hypothesized models found significant mediation, the hypotheses for moderated mediation were not justified for either neurocognition or for emotional distress. Exploratory analyses found that emotional distress was highly correlated with all schizotypy scales, except for Introvertive Anhedonia, and with all the social functioning scales. Further, emotional distress was found to fully mediate the relationship between schizotypy and social functioning and social functioning was found to partially mediate the relationship between total schizotypy and emotional distress.
Interpretation of Findings

As mentioned above, we found significant relationships between schizotypy and social functioning, namely peer social functioning, family social functioning and life satisfaction. Persons with high schizotypal characteristics had worse peer social functioning, indicating that they had more arguments with friends, socialized less and felt less comfortable around others. Persons with high schizotypal characteristics had worse family social functioning as well, indicating that they had more arguments with family members, worried about family events and were more likely to feel that their family had let them down. Finally, persons with high schizotypal characteristics had lower life satisfaction, indicating that they were less happy with areas of their life that they found to be important, such as health, work, love and friends. Other studies have also found a significant relationship between schizotypy and social functioning difficulties, particularly in the domains of family and peer (Jahshan & Sergi, 2006; McCleery & Docherty, 2009). Jahshan and Sergi (2006) found that people scoring higher on a schizotypy measure indicated increased social functioning deficits for family and peer interactions. McCleery & Docherty (2009) also found worse peer and family social functioning and lower life satisfaction in college students who reported higher levels of schizotypal characteristics.

Academic social functioning was not related to schizotypy in this sample. It could be that the academic domain assessed in this measure is less interpersonally bound. The questions pertain more to the number of classes that were missed during a week or the number of times a person sought out help with their school work. While these questions may be related to social functioning, it seems that the two other sections on family and peer social functioning are more relevant and perhaps more sensitive to problems with social relating. However, the results from
this study diverge from those of other studies that have found a relationship between schizotypy and academic social functioning (Jahshan & Sergi, 2006; McCleery & Docherty, 2009). In the present study, aspects of the data might have affected the degree of relatedness. The academic scale of social functioning had restricted range which could have inhibited finding a relationship. Perhaps with a more representative range, a relationship between academic social functioning and schizotypy would have been found.

Objective social functioning was not related to schizotypy in this sample. However, the objective scale of social functioning was composed of questions from the entire measure, including questions from scales that the majority of students did not endorse. For example, the measure contained items from scales of marital and offspring social functioning which were typically not endorsed by our undergraduate sample. Perhaps if the objective scale had been composed of questions only from the sections relevant to and reported by undergraduates (i.e. peer, family and academic social functioning), then it might have been more sensitive to finding a relationship.

While some studies have found significant relationships between schizotypy and ToM (Langdon & Coltheart, 1999; 2001; 2004; Pickup, 2006), other studies, including the present one, have failed to find relationships between ToM and schizotypy either as a dichotomized variable (Jahshan & Sergi, 2006) or as a continuous construct (McCleery & Docherty, 2009). One possible reason for the discrepant findings is a possible “threshold effect,” requiring sufficient schizotypal characteristics to be present in order to see impairment. Many studies have looked at extreme scorers on measures of clinical schizotypy symptoms or at those who meet DSM-IV criteria for Schizotypal Personality Disorder (e.g. Jahshan & Sergi, 2006; Pickup, 2006). The
current study conceptualized schizotypy as a continuous construct (Claridge, 1997), as opposed to examining extreme scorers. It may be that while schizotypal characteristics are normally distributed in the population, only extreme scorers show impairments, such as in ToM ability. The sample in this study showed a somewhat restricted range on all the schizotypal scales in that it did not include any extreme high scorers. A future study is planned to recruit more extreme scorers to test this hypothesis.

Another possible explanation for the lack of associations between schizotypy and ToM in the current study is that the ToM tasks used were not sensitive enough to find subtle impairments in an undergraduate sample. Undergraduates by definition are above average in academic achievement and therefore may show fewer cognitive and social impairments than others who do not attend college. Although there was a reasonably good range on all of the ToM variables, most of the participants performed fairly well on the measures, potentially restricting ability to find significant relationships.

ToM was found to be specifically related to Unusual Experiences in both the present study and in the study by Pickup (2006). However, the findings between the two studies are discrepant. Pickup found schizotypy to be negatively related to the ToM stories task while no relationship was found between these two measures in the present study, perhaps due to the sample size or restricted range of the variables. However, the MASC task used in this study allowed for assessment of what type of ToM errors were made and the results show that people higher in Unusual Experiences committed fewer errors of insufficient ToM and more errors of excessive ToM. These findings suggest that high positive schizotypes may make errors on ToM
tasks because they are reading too much into a given situation, rather than missing situational cues.

Perhaps the difficulty does not lie in being incapable of picking up on subtle cues, such as in autism, but rather in the interpretation, and possibly over-interpretation, of those cues. Similar to the present finding, McCleery and Docherty (2009) found that higher schizotypes showed enhanced irony perception, and Langdon and Coltheart (2004) found high schizotypes to perform better on recall of story detail than low schizotypes. It could be that schizotypal characteristics are, at least to a point, beneficial in some ways but become detrimental as they become extreme, demonstrating a curvilinear relationship with ToM abilities. Indeed, one study that looked at potential protective factors in the brain construction of schizotypes that might decrease the risk of conversion to schizophrenia, found higher volume specific areas of the frontal lobe than in either schizophrenic patients or healthy controls (Hazlett et al., 2008). A future study is planned to test for a curvilinear relationship between schizotypal characteristics and functional impairment.

The current study did not find significant relationships between ToM and social functioning, although peer social functioning did correlate with MASC total and exceeding ToM scores. The relationship between ToM and social functioning has been well established in people with schizophrenia (Frith, 1992; Penn et al., 1996; Vauth et al., 2002), but perhaps is not so robust in the general undergraduate population. The findings from this study of the relationship between the MASC and peer social functioning indicate that ability to accurately read observed social situations was associated with better peer social functioning, while reading
too much into situations was associated with a reduced level of peer social functioning. Thus, accurate understanding of social situations is associated with better interpersonal relationships.

Unexpectedly, none of the neurocognitive variables were related to schizotypy, except for the association between the total number correct on the WCST and Introvertive Anhedonia. This relationship may have been a chance finding in the data, since none of the other variables were related; some previous studies have found relationships between both positive and negative schizotypy and neurocognition (Gooding, Kwapi, & Tallent, 1999; Trestman et al., 1995). Other findings on the relationship between neurocognition and schizotypy have been mixed or negative (Jahshan & Sergi, 2006; Lenzenweger & Korfine, 1994).

*Exploratory Findings*

Although most of our a priori hypotheses were not supported, the data indicated looking at some exploratory hypotheses. Emotional distress was highly related to all of the schizotypy scales, except for Introvertive Anhedonia, and to all of the social functioning scales. Therefore, meditational analyses were conducted and found that emotional distress fully mediated the relationship between total schizotypy and social functioning and partially mediated the relationships between most schizotypy factors and social functioning. Social functioning also partially mediated the relationship between total schizotypy and emotional distress. McCleery and Docherty (2009) previously found depression to be an important mediator in the relationship between schizotypy and social functioning in the realms of family social functioning and life satisfaction for both genders, and in peer social functioning for males but not females. Mohanty
et al. (2008) also found depression to be related to negative schizotypy and both depression and anxiety to be related to positive schizotypy.

While our results cannot fully determine whether emotional distress preceded social functioning deficits or the other way around, given the meditational analyses, it seems that emotional distress is perhaps a necessary component of social functioning deficits in people with schizotypal characteristics. The results show that emotional distress accounts for all of the variance in social functioning deficits, perhaps because emotional distress leads people to withdraw from others socially. Indeed, social avoidance and anhedonia are common symptoms of depression (American Psychiatric Association (APA), 1994).

Functional impairments are common in people with schizotypy (Skodol, et al., 2002). Schizotypal characteristics include holding uncommon ideas (i.e. magical thinking) and presenting with a social oddness, which might make these individuals stand out. People experiencing these characteristics may become separated from the social milieu either through personal choice, or through exclusion from others. In a circular fashion, social isolation might then lead to increased emotional distress, perhaps explaining some of the mediation of social functioning on the relationship between schizotypy and emotional distress. Indeed, the relationship between social functioning and emotional distress is not specific to schizotypy, but appears in other disorders, such as generalized anxiety disorder (Stein & Heimburg, 2004) and depression (Hirschfeld, et al., 2000), which have also shown social functioning impairments. Although the mediation analyses of social functioning on the relationship between schizotypy and emotional distress and of emotional distress on the relationship between schizotypy and
social functioning are interesting, more research is necessary to further elucidate their significance.

Limitations

A number of factors must be taken into consideration in order to appropriately interpret findings of the present study. These include the sample size, the restricted range of some of the variables and use of an undergraduate sample. The continuous conceptualization of schizotypy could also be considered a limitation.

Although our sample size was large enough to conduct the statistical analyses used, a larger sample might have improved our ability to find significant associations. However, the p-values for the planned hypotheses were so far from significance that it is unlikely clinically meaningful relationships existed. Also, a number of the variables had restricted range in this sample. Restricted range might have been due partly to the small sample size, but it could also have been due to the fact that some of the characteristics, and in particular Introvertive Anhedonia, occur at high levels in only a very small percentage of the population. Because Introvertive Anhedonia was restricted in this college sample, negative schizotypy was not well-represented, and negative schizotypy may be more highly related to some of the ToM and neurocognitive variables than the other schizotypy scales. Had we been able to sample a larger pool with a more representative range on Introvertive Anhedonia we might have found more significance.
The use of an undergraduate sample for this study also limits our ability to generalize the findings. Undergraduates tend to be young, Caucasian and from a middle-class background (Sears, 1986), which was the case in this sample. In addition, we were unable to assess some areas of social functioning, such as marital, offspring and work social functioning, because they did not pertain to our sample population. Although some of the students did have data in these domains, it was only a small subset of the sample and too small for analyses to be conducted.

Finally, many studies have conceptualized schizotypy as a categorical construct and have compared extreme high scorers with low or moderate scorers. Others have used measures that assess characteristics that rarely appear in the normal population, and that map onto the DSM-IV diagnosis of Schizotypal Personality Disorder (Langdon & Coltheart, 1999; 2004). With more extreme differences between comparison groups, significant relationships are more likely to appear. The current study may have failed in finding significance because it used the dimensional approach and did not have adequate numbers of people in the extreme tails of the dimension. However, not all studies using extreme groups have found associations between schizotypy and ToM either (Jahshan & Sergi, 2006). Furthermore, other dimensional studies have found significance (Pickup, 2006). A future study is planned to compare the results from a categorical approach with a dimensional approach that includes the full range of possible scores.
Conclusions

In summary, the hypotheses were partially supported: schizotypy was related to social functioning and emotional distress, but was not related to ToM or neurocognitive functioning. Contrary to the predictions, ToM did not mediate the relationship between schizotypy and social functioning, although findings emerged that positive schizotypy was related to excessive ToM, lending support to the idea that people with positive schizotypal characteristics may read too much into a situation. Given the findings of this study, it seems that ToM impairment may be a more important variable in schizophrenia than it is in schizotypy. Exploratory analyses found that emotional distress was a significant mediator in the relationship between schizotypy and social functioning, indicating that emotional distress is an important component of social functioning difficulties in schizotypal individuals. There were some limitations in this study including sample size and restricted range of some of the variables which may have impacted the results. Further studies are planned to assess these same relationships in extreme scorers and in a more representative sample of the entire dimension of schizotypy.
References


McKibbin, C., Patterson, T. L., & Jeste, D. V. (2004). Assessing disability in older patients with schizophrenia results from the WHODAS-II. *Journal of Nervous and Mental Disease, 192*(6), 405-413.


Appendix A. Table 5. Schizotypy, theory of mind, social functioning, neurocognitive and affective variables

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** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

OLIFE: UE= Unusual Experiences, OLIFE: IA= Introvertive Anhedonia, OLIFE: CD= Cognitive Disorganization, OLIFE: IN= Impulsive Nonconformity, MASC: No= No ToM, MASC: Less= Insufficient ToM, MASC: Exceed= Excessive ToM, ToM Stories=ToM Stories controlling for Physical Control Stories, PONS=Profile of Nonverbal Sensitivity Test, QOLI= Quality of Life Index Weighted Total, LNS= Letter-Number Sequencing, WSCT: Errors= Wisconsin Card Sort Task Perseveration Total
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** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).
QOLI= Quality of Life Index Weighted Total, LNS= Letter-Number Sequencing, WSCT: Errors= Wisconsin Card Sort Task Perseveration Total
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** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

LNS= Letter-Number Sequencing, WSCT: Errors= Wisconsin Card Sort Task Perseveration Total
Appendix B. Consent Form

CONSENT FORM

Consent Form: Personality and Social Cognition

I want to do research about the relationship between certain personality traits and social functioning, social problem-solving, and communication. I want to do this because this study can help us learn more about 1) the underpinnings of certain aspects of social cognition, and 2) how social cognition is related to social functioning in day-to-day life. In addition, the findings of this study can be helpful to researchers who work with clinical populations, since the underlying theory is that these personality traits are present to varying degrees in everyone. Approximately 100 individuals will be asked to participate, and I would like you to take part in this project. If you decide to do this, you will be asked to fill in several surveys about your thoughts, beliefs and perceptions, your ability to function in the different areas of your life and your satisfaction in these areas, your current mood and experience of emotions. In addition, you will complete tasks which look at your thinking, reasoning, memory, social perception, and social problem-solving. The entire battery of tests will take approximately 3 hours to complete.

Although there are no serious risks involved in participating in this study, you may become tired from answering questions or you may feel uncomfortable answering some of the items on the questionnaires. Please be aware that your questionnaire will not contain any identifying information about you, so your responses will remain anonymous and confidential within the limits of the law. You may also become tired during the cognitive tests, but you will be permitted to take short breaks if you so choose.

If you take part in this project you will receive 6 General Psychology research credits. Your participation will help us learn more about how personality traits are related to social cognition, and how social cognition is related to day-to-day functioning. Taking part in this project is entirely up to you, and no one will hold it against you if you decide not to do it. If you do take part, you may stop at any time.

You will get a copy of this consent form.

Sincerely,

Marielle Divilbiss, MA Candidate, Dept. Psychology, KSU
B. CONSENT STATEMENTS

I agree to take part in this project. I know what I will have to do and that I can stop at any time.

__________________________________________

_____

Signature
Appendix C. Demographics Form

Demographics

1. Sex: M F

2. DOB (dd/mm/yy):___________________________________________

   Note: Subject must be 18 years of age or older in order to participate.

3. Do you smoke cigarettes? Y N

   If yes, record approximate number of cigarettes per day:__________

4. Did you participate in the General Psychology Mass Testing Session? Y N

5. Ethnicity (please check):

   ____A. Caucasian
   ____B. African-American
   ____C. Asian-American
   ____D. Hispanic
   ____E. Other (specify)

6. Year in school (please check):

   ____A. Freshman
   ____B. Sophomore
   ____C. Junior
   ____D. Senior
   ____E. Other (specify)
7. Mother’s Education:
   ___A. Graduate Degree (e.g., Master’s, PhD, MD, LLB)
   ___B. 4-year College
   ___C. Part College, 2-year College, Trade School or other Post-Secondary
   ___D. High School
   ___E. Part High School
   ___F. 8th Grade or less

8. Father’s Education:
   ___A. Graduate Degree (e.g., Master’s, PhD, MD, LLB)
   ___B. 4-year College
   ___C. Part College, 2-year College, Trade School or other Post-Secondary
   ___D. High School
   ___E. Part High School
   ___F. 8th Grade or less

9. History of traumatic brain injury:  Y  N

10. History of significant loss of consciousness (e.g., unconscious for several minutes, required treatment, lasting consequences of injury):  Y  N

11. History of seizure disorder:  Y  N

12. Past Psychiatric Hospitalizations:  Y  N

13. Current Psychiatric Diagnosis:  Y  N
   If yes, specify diagnosis and date received:
   ______________________________________________________________________
   ______________________________________________________________________
   ______________________________________________________________________

14. Current Medications:  Y  N
   If yes, specify name, dose and approximate date prescribed:
15. Substance Use in Previous Month:

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<th>Abuse</th>
<th>Dependence</th>
<th>Frequency of use in last month (record instances of use per day, week, or month if applicable)</th>
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<td>Hallucinogens</td>
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<td>Other (specify)</td>
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Additional Notes:

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

EXCLUSION CRITERIA:

History of:

a. Traumatic brain injury

b. Significant loss of consciousness requiring medical treatment or with lasting consequences
c. Seizure disorder

Does this participant meet exclusion criteria: Y N
Appendix D. Oxford-Liverpool Inventory of Feelings and Emotions

O-LIFE

Unusual Experiences

1. Do you believe in telepathy?

2. Do you ever feel sure that something is about to happen, even though there does not seem to be any reason for you thinking that?

3. Do you ever suddenly feel distracted by distant sounds that you are not normally aware of?

4. Do you often have days when indoor lights seem so bright that they bother your eyes?

5. Does your sense of smell sometimes become unusually strong?

6. Have you felt as though your head or limbs were somehow not your own?

7. Have you sometimes sensed an evil presence around you, even though you could not see it?

8. Have you wondered whether the spirits of the dead can influence the living?

9. On occasions, have you seen a person’s face in front of you when no one was in fact there?

10. When in the dark do you often see shapes and forms even though there’s nothing there?

11. When you look in the mirror does your face sometimes seem quite different from usual?

12. Are your thoughts sometimes so strong that you can almost hear them?

13. Can some people make you aware of them just by thinking about you?

14. Do ideas and insights sometimes come to you so fast that you cannot express them all?
15. Do the people in your daydreams seem so true to life that you sometimes think they are real?

16. Do you sometimes feel that your accidents are caused by mysterious forces?

17. Do you think you could learn to read other’s minds if you wanted to?

18. Does it often happen that nearly every thought immediately and automatically suggests an enormous number of ideas?

19. Does a passing thought ever seem so real it frightens you?

20. Does your voice ever seem distant or faraway?

21. Have you ever felt that you have special, almost magical powers?

22. Is your hearing sometimes so sensitive that ordinary sounds become uncomfortable?

23. Do you ever have a sense of vague danger or sudden dread for reasons that you do not understand?

24. Do you feel so good at controlling others that it sometimes scares you?

25. Have you ever thought you heard people talking only to discover that it was in fact some nondescript noise?

26. Have you felt that you might cause something to happen just by thinking too much about it?

27. Have you occasionally felt as though your body did not exist?

28. Have you sometimes had the feeling of gaining or losing energy when certain people look at you or touch you?

29. Are the sounds you hear in your daydreams really clear and distinct?

30. Do your thoughts sometimes seem as real as actual events in your life?

_Cognitive Disorganization_

1. Are you easily distracted when you read or talk to someone?
2. Do you ever feel that your speech is difficult to understand because the words are all mixed up and don’t make sense?

3. Do you often experience an overwhelming sense of emptiness?

4. Do you often feel lonely?

5. Is it hard for you to make decisions?

6. Are you a person whose mood goes up and down easily?

7. Are you easily hurt when people find fault with you or the work you do?

8. Are you sometimes so nervous that you are blocked?

9. Do you dread going into a room by yourself where other people have already gathered and are talking?

10. Do you easily lose your courage when criticized or failing in something?

11. Do you find it difficult to keep interested in the same thing for a long time?

12. Do you frequently have difficulty in starting to do things?

13. Do you often feel that there is no purpose to life?

14. Do you often have difficulties in controlling your thoughts?

15. Do you often worry about things you should not have done or said?

16. Do you worry about awful things that might happen?

17. No matter how hard you try to concentrate do unrelated thoughts creep into your mind?

18. When in a crowded room, do you often have difficulty in following a conversation?

19. Are you easily confused if too much happens at the same time?

20. Are you easily distracted from work by daydreams?

21. Do you often feel “fed up”?
22. Do you worry too long after an embarrassing experience?

23. Would you call yourself a nervous person?

24. Do you often hesitate when you are going to say something in a group of people whom you more or less know?

Introvertive Anhedonia

1. Can you usually let yourself go and enjoy yourself at a lively party? (negative)

2. Do people who try to get to know you better usually give up after a while?

3. Do you feel that making new friends isn’t worth the energy it takes?

4. Do you find the bright lights of a city exciting to look at? (negative)

5. Do you like going out a lot? (negative)

6. Do you prefer watching television to going out with other people?

7. Do you usually have very little desire to buy new kinds of food?

8. Is it fun to sing with other people? (negative)

9. Are people usually better off if they stay aloof from emotional involvements with people?

10. Are there very few things that you have ever really enjoyed doing?

11. Are you much too independent to really get involved with other people?

12. Are you rather lively? (negative)

13. Can just being with friends make you feel really good? (negative)

14. Do you have many friends? (negative)

15. Do you like mixing with people? (negative)

16. Do you think having close friends is not as important as some people say?
17. Does it often feel good to massage your muscles when they are tired or sore? (negative)

18. Has dancing or the idea of it always seemed dull to you?

19. Have you often felt uncomfortable when your friends touch you?

20. Is trying new foods something you have always enjoyed? (negative)

21. On seeing a soft thick carpet have you sometimes had the impulse to take off your shoes and walk barefoot on it? (negative)

22. When things are bothering you do you like to talk to other people about it? (negative)

23. Do you feel very close to your friends? (negative)

24. Do you love having your back massaged? (negative)

25. Have you had very little fun from physical activities like walking, swimming, or sports?

26. Do you enjoy many different kinds of play and recreation? (negative)

27. Is it true that your relationships with other people never get very intense?

*Impulsive Nonconformity*

1. Do people who drive carefully annoy you?

2. Do you often feel like doing the opposite of what other people suggest, even though you know they are right?

3. Do you often feel the impulse to spend money which you know you can’t afford?

4. Do you often have an urge to hit someone?

5. Do you sometimes talk about things you know nothing about?

6. Are you usually in an average sort of mood, not too high and not too low? (negative)

7. Do you at times have an urge to do something harmful or shocking?
8. Do you ever have the urge to break or smash things?

9. Do you often change between intense liking and disliking of the same person?

10. Do you stop to think things over before doing anything? (negative)

11. Do you think people spend too much time safeguarding their future with savings and insurance?

12. Have you ever blamed someone for doing something you know was really your fault?

13. Have you ever cheated at a game?

14. Have you ever felt the urge to injure yourself?

15. When in a group of people do you usually prefer to let someone else be the centre of attention? (negative)

16. When you catch a train do you often arrive at the last minute?

17. Would being in debt worry you? (negative)

18. Would you take drugs which may have strange or dangerous effects?

19. Do you consider yourself to be pretty much an average kind of person? (negative)

20. Have you ever taken advantage of someone?

21. Would you like other people to be afraid of you?

22. Do you often overindulge in alcohol or food?

23. Would it make you nervous to play the clown in front of other people? (negative)

All items scored +1 for “yes”, 0 for “no” except negative items for which +1 for “no”, 0 for “yes”.
Appendix E. Chapman Infrequency Scale

Chapman Infrequency Scale

1. On some mornings, I didn’t get out of bed immediately when I first woke up. (False)

2. There have been a number of occasions when people I know have said hello to me. (False)

3. There have been times when I have dialed a telephone number only to find that the line was busy. (False)

4. At times when I feel ill or tired, I have felt like going to bed early. (False)

5. On some occasions I have noticed that some other people are better dressed than myself. (False)

6. Driving from New York to San Francisco is generally faster than flying between these cities. (True)

7. I believe that most light bulbs are powered by electricity. (False)

8. I go at least once every two years to visit either northern Scotland or some part of Scandinavia. (True)

9. I cannot remember a time when I talked to someone who wore glasses. (True)

10. Sometimes when walking down a sidewalk, I have seen children playing. (False)

11. I have never combed my hair before going out in the morning. (True)

12. I find that I often walk with a limp, which is the result of a skydiving accident. (True)

13. I cannot remember a single occasion when I have ridden a bus. (True)

Endorsement of 3 or more infrequency items suggests random or invalid response style.
Appendix F. Strange Stories Task

Strange Stories Task

There are 2 conditions in this test, consisting of two sorts of materials;
Social - stories to do with mental states (numbered 21 - 28)
Physical - stories to do with physical behaviour (numbered 11 - 18)
There are 8 examples of each of these 2 sorts. All 8 passages of one type are given
together, but the order of the 2 conditions is to be counterbalanced (subject 1 gets
Social then Physical; subject 2 gets Physical then Social, etc.).

Each passage is followed by a question, which should appear on a separate page (either
the next page or on the reverse of the story page). Subjects are given a practice
item first, and instructed, in words to this effect;
"On each page you will find a short story to read. After you've read and understood the
story, I want you to turn the page. There is a question after each story - and I'd like you to tell me the answer to this question. I don't want you to look back at the
story, so make sure you've understood it before turning over for the question."

The practice story should be given before the first Physical or Social story is given.

For each story, the subject should read the passage, and then answer the question. If
subjects cannot read, or are suspected of failing to pay attention to the whole of a
passage, they should be asked to read it aloud. If severe memory impairments are
suspected, the story may be left visible while the question is presented. These, and any
other, changes in administration should be noted.

Time to read the story, i.e. time from story presentation until subject turns the page, is to
be recorded. In addition, it may be useful to tape-record the test session for later
transcription. Score sheets for recording time and response are included.

References: The 8 social stories are taken from 24 developed by Happé, 1994 (An
advanced test of theory of mind: Understanding of story characters' thoughts and
feelings by able autistic, mentally handicapped and normal children and adults.
*Journal of Autism and Developmental Disorders*, 24, 129-154.) The set of social
and nonsocial story materials, as here, have been used in scanning and
neuropsychological studies by the same author: Fletcher, et al (1995) Other minds in
the brain: A functional imaging study of "theory of mind" in story comprehension.
'theory of mind' impairments following stroke. *Cognition*, 70, 211-240 ; Happé, F. et al
Asperger syndrome. *NeuroReport*, 8, 197-201; Happé, F.G.E., Winner, E. & Brownell,

**Practice Story**

On Christmas Eve Alice’s mother takes her to the big department store in town. They go to look in the toy department. In the toy department Mr. Brown, Alice’s next-door neighbour, is dressed up as Santa Claus, giving out sweets to all the children. Alice thinks she recognizes Mr. Brown, so she runs up to him and asks, “Who are you?” Mr. Brown answers, “I’m Santa Claus!”

Q: Why does he say this?

**Physical Stories**

11. Two enemy powers have been at war for a very long time. Each army has won several battles, but now the outcome could go either way. The forces are equally matched. However, the Blue army is stronger than the Yellow army in foot soldiers and artillery. But the Yellow army is stronger than the Blue Army in air power. On the day of the final battle, which will decide the outcome of the war, there is heavy fog over the mountains where the fighting is about to occur. Low-lying clouds hang above the soldiers. By the end of the day the Blue army has won.

Q: Why did the Blue army win?

12. A burglar is about to break into a jewelers' shop. He skillfully picks the lock on the shop door. Carefully he crawls under the electronic detector beam. If he breaks this beam it will set off the alarm. Quietly he opens the door of the store-room and sees the gems glittering. As he reaches out, however, he steps on something soft. He hears a screech and something small and furry runs out past him, towards the shop door. Immediately the alarm sounds.

Q: Why did the alarm go off?

13. Mrs. Simpson, the librarian, receives a special book which she has to catalogue and find an appropriate place for. She has to decide which section to file it under. The library is very big, and has different sections on many different subjects. The new book is about plants and their medical uses, and is heavily illustrated. However, Mrs. Simpson does not put it on the shelf with the rest of the books on botany. Neither does she put it with the books on medicine. Instead, she carefully takes it into a separate room. In this room all the books are kept in special cases, and the temperature is kept constant.
Q: Why did she do this?

14. Henry is preparing for a big dinner party. He is famous for his excellent mayonnaise. He has bought lots of fresh eggs. The recipe says, "Carefully separate the yolks of six eggs and add oil very gradually". He has already bought easily enough dessert to feed everyone. However, he now looks up the recipe for meringues. Henry will not waste anything.

Q: Why does Henry make meringues?

15. Paul is very rich, and today he is going to buy an expensive new car. He is considering whether to make a single payment, or whether to spread the cost over the year. If he pays in monthly installments, the dealer will charge five percent interest on the loan. His bank currently gives him eight percent interest on the money in his account. Even though he has easily enough money to pay the full amount, he decides to pay by monthly installments.

Q: Why does he do that?

16. Old Mrs. Robinson is very frail. One day she slips on her icy door step and falls on her side. She gets up right away, although she feels quite bruised and shaken. The next day her leg feels very stiff and she can scarcely walk. She makes her way to the doctors. As soon as the doctor hears about the fall, and sees her swollen side, he says, "Go immediately to casualty". At the casualty department they take an X-ray.

Q: Why did they take an X-ray?

17. Sarah is very long-sighted. She has only one pair of glasses, which she keeps losing. Today she has lost her glasses again and she needs to find them. She had them yesterday evening when she looked up the television programs. She must have left them somewhere that she has been today. She asks Ted to find her glasses. She tells him that today she went to her regular early morning keep fit class, then to the post office, and last to the flower shop. Ted goes straight to the post office.

Q: Why is the post office the most likely place to look?

18. John is going shopping. He buys a nice new desk lamp, for his study. He needs a light bulb for his new lamp. He goes from the furniture department to the electrical department. In the electrical department he finds that there are two brands of light bulb of the right kind. Everbrite light bulbs cost less in single packs than Literite bulbs. However, only Literite bulbs come in multi-packs of six. John buys the multi-pack, even though he only needs one bulb.
Q: Why does John buy the Literite bulbs?

Theory of Mind Stories

21. Simon is a big liar. Simon's brother Jim knows this, he knows that Simon never tells the truth! Now yesterday Simon stole Jim's ping-pong bat, and Jim knows Simon has hidden it somewhere, though he can't find it. He's very cross. So he finds Simon and he says, "Where is my ping-pong bat? You must have hidden it either in the cupboard or under your bed, because I've looked everywhere else. Where is it, in the cupboard or under your bed?" Simon tells him the bat is under his bed.

Q: Why will Jim look in the cupboard for the bat?

22. During the war, the Red army captures a member of the Blue army. They want him to tell them where his army's tanks are; they know they are either by the sea or in the mountains. They know that the prisoner will not want to tell them, he will want to save his army, and so he will certainly lie to them. The prisoner is very brave and very clever, he will not let them find his tanks. The tanks are really in the mountains. Now when the other side asks him where his tanks are, he says, "They are in the mountains".

Q: Why did the prisoner say that?

23. Brian is always hungry. Today at school it is his favorite meal - sausages and beans. He is a very greedy boy, and he would like to have more sausages than anybody else, even though his mother will have made him a lovely meal when he gets home! But everyone is allowed two sausages and no more. When it is Brian's turn to be served, he says, "Oh, please can I have four sausages, because I won't be having any dinner when I get home!"

Q: Why does Brian say this?

24. Jill wanted to buy a kitten, so she went to see Mrs. Smith, who had lots of kittens she didn't want. Now Mrs. Smith loved the kittens, and she wouldn't do anything to harm them, though she couldn't keep them all herself. When Jill visited she wasn't sure she wanted one of Mrs. Smith's kittens, since they were all males and she had wanted a female. But Mrs. Smith said, "If no one buys the kittens I'll just have to drown them!"

Q: Why did Mrs. Smith say that?

25. One day Aunt Jane came to visit Peter. Now Peter loves his aunt very much, but today she is wearing a new hat; a new hat which Peter thinks is very ugly indeed. Peter thinks his aunt looks silly in it and much nicer in her old hat. But when Aunt Jane asks Peter, "How do you like my new hat?", Peter says, "Oh, its very nice".
Q: Why does he say that?

26. Helen waited all year for Christmas, because she knew at Christmas she could ask her parents for a rabbit. Helen wanted a rabbit more than anything in the world. At last Christmas Day arrived, and Helen ran to unwrap the big box her parents had given her. She felt sure it would contain a little rabbit in a cage. But when she opened it, with all the family standing round, she found her present was just a boring old set of encyclopedias, which Helen did not want at all! Still, when Helen's parents asked her how she liked her Christmas present, she said, "It's lovely, thank you. It's just what I wanted".

Q: Why did she say this?

27. Late one night old Mrs. Peabody is walking home. She doesn't like walking home alone in the dark because she is always afraid that someone will attack her and rob her. She really is a very nervous person! Suddenly, out of the shadows comes a man. He wants to ask Mrs. Peabody what time it is, so he walks towards her. When Mrs. Peabody sees the man coming towards her, she starts to tremble and says, "Take my purse, just don't hurt me please!"

Q: Why did she say that?

28. A burglar who has just robbed a shop is making his getaway. As he is running home, a policeman on his beat sees him drop his glove. He doesn't know the man is a burglar, he just wants to tell him he dropped his glove. But when the policeman shouts out to the burglar, "Hey, you! Stop!", the burglar turns round, sees the policeman and gives himself up. He puts his hands up and admits that he did the break-in at the local shop.

Q: Why did the burglar do that?

Strange Stories Task - Examples of scoring

• Jim and the ping pong paddle

2 points ref to Jim knowing Simon lies.

Because Simon has not told the truth.
He knows Simon is a liar and will try to make him look in a different place.

1 point ref to facts (e.g. that's where it really is), or Simon hiding it without ref to implications of lying.

He thinks that Simon has hidden it in the cupboard.
0 points ref to general nonspecific info.

Because he looked everywhere else.
Because Simon told him it was there.
He knows it’s either in the cupboard or under the bed.
Because he normally kept the paddle there.

• Blue and red armies – prisoner

2 points ref to fact that other army will not believe and hence look in other place, to prisoner’s realisation that that’s what they’ll do or ref to double bluff.

It’s a double bluff - because he knows that the enemy will think he’s lying. Because the other army will think he’s lied and look in the other place. He’s pretending to lie. He knows the others will know he’d lie so he had to tell the truth.

1 point ref to outcome (e.g. to save his army’s tanks) or to mislead them.

0 points ref to motivation that misses the point of double bluff.

To lie to them.
He was scared.
He wanted to tell the truth.

• Brian and the sausages

2 points ref to fact that eliciting sympathy, being deceptive.

So that the others will feel sorry for him and make sure he’ll not go hungry. He’s hoping to gain sympathy in order to get more food than allowed.

1 point ref to his state (greedy), outcome (to get more sausages) or factual
So he gets more sausages.

Because he is hungry.
He’s greedy.

0 points ref to motivation that misses the point of sympathy elicitation/deception. Factually incorrect.
• *Mrs Smith and the kitten*

2 points ref to persuasion, manipulating feelings, trying to induce guilt/pity etc.

She would make Jill feel sorry for the kittens and make her take one.
To make Jill feel guilty and take one.
To scare Jill into buying one.
She wanted to emotionally blackmail Jill and force her to buy one.

1 point ref to outcome (to sell them or get rid of them in a way which implies not drowning), or simple motivation (to make Jill sad)

So Jill buys a kitten anyway.
There are too many of them and she can’t keep them so she wants Jill to take one.
She wants the girl to take one.

0 points ref to general knowledge or dilemma without realization that the statement was not true

She’s a horrible woman / she hates cats/there are too many and she can’t keep them / Her house isn’t big enough.
She wants a female cat.

• *Aunt and her hat*

2 points ref to white lie or wanting to spare her feelings. Some implication that this is for aunt’s benefit rather than just for his, desire to avoid rudeness or insult.

He loves his aunt very much and he doesn’t want to hurt her feelings.

1 point ref to trait (he’s a nice boy), or relationship (he likes his aunt). Purely motivational (so she won’t shout at him) with no ref to aunt’s thoughts or feelings.
Incomplete explanation (he’s lying, he’s pretending).

To not make his aunt sad.
He loves his aunt.
So his aunt doesn’t feel silly.

0 points ref to irrelevant or incorrect facts/feelings (he likes the hat, he wants to trick her).

• *Helen and the Christmas present*
2 points ref to white lie or wanting to spare their feelings. Some implication that this is for parent’s benefit rather than just for her, desire to avoid rudeness or insult.

She doesn’t want to hurt her parents’ feelings.
She didn’t want to upset her parents by telling them the truth.

1 point ref to trait (she’s a nice girl), or relationship (he likes his parents). Purely motivational (so they won’t shout at her) with no ref to parents’ thoughts or feelings. Incomplete explanation (she’s lying, she’s pretending).

To not disappoint her parents.
To not make her parents sad.
To make her parents happy.

0 points ref to irrelevant or incorrect facts/feelings (she likes the present, she wants to trick them).

For a quiet life.

• *Mrs Peabody and the man*

2 points ref to her belief that he was going to mug her, or her ignorance of his real intention.

She thinks that the man is intending to rob her.
Because she’s always scared so assumes the worst.
She thinks he’s going to mug her.

1 point ref to her trait (she’s nervous) or state (she’s scared) or intention (so he wouldn’t hurt her) without suggestion that fear was unnecessary.

She’d rather lose her purse than be hurt.
She’s very nervous/scared.
She’s afraid [she’ll get attacked/robbed].
To protect herself from the worst.
Pure fear.

0 points factually incorrect/irrelevant answers. Ref to the man actually intending to attack her.

• *Burglar and the policeman*

2 points Ref to belief that policeman knew that he’d burgled the shop.
He thought that the policeman knew that he’d broken into the shop and saw no
point in trying to escape.
He thought he’d been caught.
He thinks the policeman knows he robbed the shop.

1 point Ref to something factually correct in story

0 points Factually incorrect/irrelevant answers.

Resigned to feeling unlucky.
He thought the policeman was following him.
He saw the policeman and thought he’d better give himself up.

Physical Stories - Examples of scoring

• **Leg and X-ray**

2 points ref to possibility that she has fractured/broken her hip/leg (e.g. they want to see if
she’s broken anything). Ref to wanting to know or trying to find out (i.e. ‘it was broken’
is not enough). Must ref to fact that they know that x-rays are about broken things or
bones.

   To see if there’s any damage to the bone.
   To see how bad the fracture could be.

1 point ref to general aim (e.g. to see what’s wrong. Because of her fall she might have
damaged something).

   Its bruised and stiff.
   To see why its stiff.

0 points ref to irrelevant or incorrect factors (e.g. that’s what doctors do). Ref to X-rays
being cures themselves (e.g. to mend her leg).

   Because she fell.
   To make it better.

• **Armies and fog**

2 points ref to both weather conditions and relative ground superiority or inability of
other army’s planes to be useful in fog (names of armies unimportant).
It was foggy and so the planes couldn’t see the ground and so it was difficult for them to shoot the soldiers. So the foot soldiers had the advantage.

1 point ref either to weather or to relative superiority on ground versus air (e.g. because it was foggy). Nothing about why weather makes it especially difficult for planes or nothing about planes being affected more than tanks. Ref to fog to justify incorrect response (e.g. the aeroplanes won because the fog meant they could hide from the tanks).

It was foggy.
The army on the ground was stronger than the army in the air.

0 points ref to irrelevant or incorrect information (e.g. they won because they had better planes).

Justifications for why tanks are better than planes.
Because that’s where they were after the war with the yellow army.
They had airplanes which can shoot tanks from the air.
The other soldiers lost.
Foot soldiers and tanks can’t see when its really foggy but planes can fly through the air.

*Post office and glasses*

2 points ref to post office being place she would most likely use her glasses (to read/write/look at stamps etc). may talk about either putting glasses on or taking them off.

You’d need your glasses there – she was probably getting her pension and she’d need them to look in her pension book.

1 point plausible alternative reason for being in post office (e.g. there are lots of people there, you might have posted them by mistake, people take lost things there).

Because of the letters that might need to be read and those sorts of things.

0 points ref to irrelevant or incorrect factors (e.g. that was the last place she went, you can buy glasses at the post office, she needed the glasses to hear better). General factors, nonspecific to post offices.

Because it has some money and she can pay.
Because she posted her glasses.
Because it was the last place.
It has post in it.
• *Burglar and alarm*

2 points ref to animal which the burglar disturbed setting off alarm by crossing beam (type of animal unimportant)

Something passed the beam.

1 point ref to burglar setting off alarm (e.g. being startled by animal and so crossing beam). Ref to animal setting off alarm without explaining it crossed the beam (e.g. he trod on a cat and it set off the alarm).

Because of an animal.

0 points ref to irrelevant or incorrect factors (e.g. animal’s screech set off alarm). Alternative reasons for alarm going off (e.g. security camera saw him).

If the robbers come in the alarm will go off and police will come and chase them. Because there’s a burglar.

• *John and light bulbs*

2 points ref to saving money.

1 point ref to convenience of having more, or future need for more than one bulb. No mention of saving money.

0 points ref to irrelevant or incorrect factors (e.g. light right bulbs are brighter).

• *Mayonnaise*

2 points ref to egg whites and no waste.

1 point ref to either egg whites or waste.

0 points ref to irrelevant or incorrect factors, or 'he's got a party'.

• *Car*

2 points ref to saving money and giving a reason.
1 point ref to saving money but no reason.

0 points ref to irrelevant or incorrect factors.

• *Librarian*

2 points ref to special book and/or why.

1 point ref to special or unrelated reason to being special.

0 points ref to irrelevant or incorrect factors.
Appendix G. Movie for the Assessment of Social Cognition

MASC

Directions: You will be watching a 15-minute film. Please watch very carefully and try to understand what each character is feeling or thinking.

Now you’ll meet each character.

The video shows these four people getting together for a Saturday evening.

The video will be stopped at various points and some questions will be asked. All of the answers are multiple choice and require one option to be selected from a choice of four. If you are not exactly sure of the correct answer, please guess.

When you answer, try to imagine what the character is thinking or feeling at the very moment the film is stopped.

The first scene is about to start. Are you ready? Again please watch very carefully because each scene will only be presented once.
Appendix H. Profile of Nonverbal Sensitivity Test

PONS

Directions: You are going to watch some short vignettes where you hear people speaking and see people interacting. Sometimes you will just hear a voice, sometimes you will just see a person and other times you will both hear and see a person. You will not be able to understand what they are saying because the speech has been garbled. Pay attention to the tone of voice and the body language to answer the questions. Each segment will be prompted with a number so you can follow along in your answer sheet. This task will take about 30 minutes.
Appendix I. Quality of Life Inventory Instructions

QOLI

DIRECTIONS: This survey asks how satisfied you are with parts of your life such as your work and your health. It also asks how important these things are to your happiness. Special definitions are used for words like “money”, “work,” and “play.” Keep these definitions in mind as you answer the questions. Answer every question, even if it does not seem to apply to you. It is your feelings and opinions that are important, so there are no right or wrong answers. Just give the answers that best describe you.

The survey asks you to describe how important and how satisfied you are with parts of your life such as work and health:

**Important** means how much this part of your life adds to your overall happiness. You can say how important something is by picking one of three choices: “Not Important” (0), “Important” (1), or “Extremely Important” (2).

**Satisfied** means how well your needs, goals, and wishes are being met in this area of life. You can say how satisfied you are by picking one of six choices from “Very Dissatisfied” (-3) to “Very Satisfied” (+3).

For each question, fill in the numbered bubble that best describes you.

EXAMPLE: This is how you would answer if WORK was “Important” for your overall happiness:

<table>
<thead>
<tr>
<th>Not Important</th>
<th>Important</th>
<th>Extremely Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>○</td>
<td>●</td>
<td>○</td>
</tr>
</tbody>
</table>

You would answer this way if you were “Somewhat Satisfied” with your WORK:

<table>
<thead>
<tr>
<th>Dissatisfied</th>
<th>Satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very (-3)</td>
<td>Somewhat (-2)</td>
</tr>
<tr>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
Appendix J. Social Adjustment Scale—Self-Report Instructions

SAS-SR

We are interested in finding out how you have been doing in the last two weeks. We would like you to answer some questions about your work, spare time and family life. There are no right or wrong answers to these questions. Check the answers that best describe how you have been in the last two weeks.
Appendix K. Beck Depression Inventory-II Instructions

BDI-II

This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the one statement in each group that best describes the way you have been during the past two weeks, including today. Circle the number beside each statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).
Appendix L. Beck Anxiety Inventory Instructions

BAI

Instructions: Below is a list of common symptoms of anxiety. Please carefully read each item in the list. Using the scale provided as a guide, indicate how much you have been bothered by each symptom during the past week, including today, by filling in the corresponding bubble next to each symptom. Give only one answer for each statement.

A= Not at all
B= Mildly (it did not bother me much)
C= Moderately (it was very unpleasant, but I could stand it)
D= Severely (I could barely stand it)
Appendix M. Wisconsin Card Sort Task—64 Card Version Instructions

WCST-64 Instructions

Administration

• Click on the WCST-64 icon on the desktop and ensure the speakers are turned on
• Select “New Client File”
  o Enter subject’s information into the appropriate boxes – be sure to include the participant’s age – this is needed to generate the score report.
• Select “Add Protocol”
• Select “Administer” to start the task

Read these instructions to the participant:

If using the keyboard:

“This test is a little unusual because I am not allowed to tell you very much about how to do it. You will be asked to match each of the cards that appear here” (point to the first response card at the bottom center of the screen) “to one of these four key cards” (point to each of the stimulus cards at the top of the screen).

“On the keyboard in front of you are four symbols which resemble the key cards” (point to each of the Keytops on the keyboard followed by they stimulus card which it represents). “To make a match, simply press the key with the symbol that you believe matches the card at the bottom of the screen” (point to the first response card at the bottom center of the screen).

“The computer will place your card under the key card that you select, and a new card will appear at the bottom of the screen. If you wish to change your answer before the card stops moving, immediately press the Escape Key. The Escape Key is the default cancel command. You may elect to change this via View/Options. You will then be permitted to select again. However, you may not change your answer after the card stops moving. If this happens don’t try to hit another key, just go on to the next card.

“I cannot tell you how to match the cards, but the computer screen will show you each time whether you are right (correct) or wrong (incorrect). I will also say the same word the computer shows on the screen ‘right (correct)’ or ‘wrong (incorrect),’” or “The computer will also say the same word it shows on the screen, ‘right (correct)’ or ‘wrong (incorrect).’”

“If you were wrong, simply try to match the next card correctly, and then continue matching the cards correctly until the test is over. There is no time limit on this test. Are you ready? Let’s begin.”
Appendix N. Letter-Number Sequencing Task Instructions

Note: when administering the stimuli, make sure you say each letter or number with one second between each.

Script:
I am going to say a list of numbers and letters. When I am through, I want you to first tell me the numbers in order from smallest to biggest. Then I want you to tell me the letters in alphabetical order.

So, for example, if I say A4, the answer is 4A. The number goes first, then the letter. If I say 8B2, you answer 28B, number first in order, then letters.

Try these:

B9 (9B); 7C (7C); 2P9 (29P); Z9A (9AZ); 8MC (8CM)

Continue practice until the participant can do a three-symbol sequence. If unable to do so after four additional trials (L9U, 8P4, WN5, R47), begin the test.

Administer all four items at each level until all items are failed at a level. Items should be read to the subject at a rate of one letter or number per second. Circle failed items. Instructions may be repeated in the beginning during the 2-symbol sequence when subjects are especially likely to misinterpret the instructions. Correct answers are in parentheses.
Appendix O. Shipley Institute of Living Scale Instructions

Instructions: In the test below, the first word in each line is printed in capital letters. Opposite it are four other words. Circle the one word which means the same thing, or most nearly the same thing as the first word. If you don’t know, guess. Be sure to circle the one word in each line that means the same thing as the first word.

Example:
LARGE  red  big  silent  wet

Instructions: Complete the following by filling in either a number or a letter for each dash (___). Do the items in order, but don’t spend too much time on any one item.

Example:   A   B   C   D   ___