

ABSTRACT

Title of Thesis: A SIMULATED LIVE INTERACTION TO EXAMINE BEHAVIORAL CORRELATES OF SOCIAL COGNITION IN INDIVIDUALS WITH SOCIAL ANHEDONIA

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Anhedonia, the inability to experience pleasure, is a core negative symptom of schizophrenia and is one of the strongest predictors for the development of schizophrenia-spectrum disorders. However, much is unknown about the processes that underlie social behavior in individuals with social anhedonia. The current study examined differences in social skillfulness, social functioning, and social cognition between these individuals and controls using a simulated live interaction, self-report measures, and assessments of social cognition. Results showed that, compared to controls, individuals with social anhedonia (1) reported lower levels of social functioning and social support, (2) were rated as having poorer overall social skill and affiliation, but (3) did not differ on three assessments of social cognition. Thus, social cognitive processes do not appear to explain the social deficits seen in individuals with social anhedonia, and future research ought to examine the role of other domains such as emotion or motivation.

A SIMULATED LIVE INTERACTION TO EXAMINE BEHAVIORAL
CORRELATES OF SOCIAL COGNITION IN INDIVIDUALS
WITH SOCIAL ANHEDONIA

By

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Chapter 1: Introduction

ORIGINS OF SCHIZOTYPY AND SOCIAL ANHEDONIA

Schizophrenia is a debilitating mental illness marked by abnormalities in the perception of reality, thought disorder, negative symptoms, and social and occupational dysfunction. In 1962, Meehl proposed a theory of a genetic neural defect called schizotaxia, the biological predisposition for the development of schizophrenia and schizophrenia-spectrum disorders (Meehl, 1962). Meehl (1962, 1989) also conjectured in this theory that individuals with the genetic neural defect called schizotaxia would have a certain personality organization called schizotypy. Individuals with schizotypy, referred to as schizotypes, fall along a continuum of personality traits and demonstrate four core characteristics: cognitive disorganization, anhedonia, interpersonal aversiveness, and ambivalence. Cognitive disorganization refers to mild thought disorder, which is a pattern of disordered thinking. Anhedonia is defined as the reduced ability to experience pleasure from social and physical stimulation. Interpersonal aversiveness consists of social fear, distrust, expectation of rejection, and feeling as if one is unlovable. Ambivalence refers to having conflicting feelings for someone or something at the same time. These traits represent the four core personality differences found in schizotypes, individuals who have a biological predisposition for the development of schizophrenia or schizophrenia-spectrum disorders. Schizotypy may be defined psychometrically (e.g., Schizotypal Personality Questionnaire (SPQ; Raine, 1991)) or based on diagnostic criteria (e.g., DSM-IV-TR (APA, 2000)).

Numerous studies have corroborated Meehl's theory of a genetic basis for schizophrenia. Research has shown that the lifetime incidence of schizophrenia in the general population is only about 1%. However, the risk for developing the disorder is compounded in those who are more closely related to an individual with schizophrenia; first cousins have about a 2% risk, while monozygotic twins have a 48% risk of developing schizophrenia (Gottesman, 1991), and results from adoption studies have also shown support for a hereditary link (Kety, Rosenthal, Wender, Schulsinger, & Jacobsen, 1975; Kety, 1976; Kety, Wender, Jacobsen, Ingraham, Jansson, Faber et al., 1994). These results illustrate that the increased risk for developing schizophrenia in those closely related to individuals with the disorder goes above and beyond environmental factors, thus lending further credence to Meehl's theory of schizotaxia.

Although about 90% of schizotypes range between high functioning and sub-threshold and will thus never develop full-blown schizophrenia (Gottesman, 1991; Kwapil, 1998), it is hypothesized that the remaining 10% will eventually decompensate (Meehl, 1990). Because the prevalence of schizophrenia in the general population (.5%-1%) is much lower than the rate of 10% in schizotypes, understanding schizotypal traits such as anhedonia can be clinically useful for identifying individuals who are at a higher risk for the development of schizophrenia or schizophrenia-spectrum disorders.

One aspect of schizotypy, anhedonia, is also included amongst the negative symptoms of schizophrenia and gained further attention. In 1976, based on Meehl's model, Chapman, Chapman, and Raulin developed the Physical Anhedonia Scale

(PhyAnh; Chapman, Chapman, & Raulin, 1976) and the Social Anhedonia Scale (SocAnh; Chapman, Chapman, & Raulin, 1976) to measure putative schizotypal traits. While the PhyAnh scale assesses for the experience of pleasure from stimulation of the physical senses, such as sight, taste, or touch, the SocAnh scale focuses on the experience of pleasure from interpersonal interactions. After the SocAnh scale was revised in 1982 in order to improve construct validity, studies utilizing this measure showed that social anhedonia is one of the strongest predictors for the later development of schizophrenia-spectrum disorders. For example, in a longitudinal study, researchers found that 24% of college students with elevated social anhedonia were diagnosed with a schizophrenia-spectrum disorder ten years later, while only 1% of individuals in a control group received this diagnosis (Kwapil, 1998; Gooding, Tallent, & Matts, 2007).

Subsequent research has found social anhedonia to serve an important role in the schizophrenia spectrum. Social anhedonia has been shown to be consistently present in clinical samples. Compared to controls and first-degree relatives, first episode psychosis patients have higher levels of social anhedonia (Katsanis, Iacono, & Beiser, 1990), and researchers have also found greater levels of social anhedonia in schizophrenia outpatients when compared to controls (Blanchard, Mueser, & Bellack, 1998). Social anhedonia in schizophrenia has also been shown to be stable across time and psychiatric symptom status, indicating that social anhedonia is an enduring individual difference in individuals with schizophrenia (Blanchard, Horan, & Brown, 2001). Moreover, consistent with Meehl's theory of genetic liability, research has also shown that relatives of individuals with schizophrenia-spectrum pathology have

greater levels of social anhedonia (Kendler, Thacker, & Walsh, 1996; Katsanis, Iacono, & Beiser, 1990; Laurent, Biloa-Tang, Bougerol, Duley, et al., 2000).

Furthermore, some researchers have found patterns of cognitive deficits in non-clinical populations with elevated social anhedonia comparable to those observed in individuals with schizophrenia, such as impairments in sustained attention (Kwapil & Diaz, 2000), working memory (Tallent & Gooding, 1999; Gooding & Tallent, 2003), and executive functioning (Gooding, Kwapil, & Tallent, 1999; Tallent & Gooding, 1999). Further, research has shown that compared to controls, those with social anhedonia have higher rates of schizophrenia-spectrum personality disorders (Kwapil & Crump, 2002) and schizophrenia-spectrum personality disorder characteristics (Blanchard et al., 2009). Mishlove and Chapman (1985) found that females with higher scores on the RSAS exhibited more schizotypal features and psychotic-like experiences. In a study using the Minnesota Multiphasic Personality Inventory, results showed that 55% of individuals who scored high in social anhedonia had profiles associated with schizophrenia-spectrum disorders (Merrit, Balogh, & DeVinney, 1993). It is clear from these cross-sectional studies that those with social anhedonia exhibit cognitive deficits similar to those found in schizophrenia and have higher rates of schizophrenia-spectrum personality disorders.

Thus, social anhedonia plays an important role in the development and manifestation of schizophrenia. Individuals with elevated social anhedonia are important to study given the evidence that they encounter difficulties of a similar nature to those with schizophrenia. Further, as discussed in the following section, individuals with social anhedonia also demonstrate social impairments. An increased

understanding of social anhedonia not only provides insight into a group of individuals with pronounced difficulties but also furthers understanding of schizophrenia-spectrum disorders.

ANHEDONIA, SOCIAL FUNCTIONING, AND SOCIAL SKILL

Despite findings of general lower social functioning in individuals with social anhedonia (Chapman et al., 1994), not much more is known about the social lives of these individuals (Kwapil, Silvia, Myin-Germeys, Anderson, Coates, & Brown, 2009). Diaz, Dickerson, and Kwapil (2002) showed that individuals with social anhedonia have poorer overall social functioning than controls. Further, preliminary research has shown that social anhedonia is distinct from other aspects of social impairment such as social anxiety (i.e., emotional discomfort or fear in social situations in which one might be evaluated or criticized). Specifically, while higher levels of social anhedonia were associated with increased time alone, greater preference for solitude, and lower positive affect (Brown, Silvia, Myin-Germeys, Kwapil, & Lewandowski, 2008; Brown, Silvia, Myin-Germeys, & Kwapil, 2007), higher social anxiety was associated with higher negative affect, greater self-consciousness, and was not associated with increased time alone (Brown, Silvia, Myin-Germeys, Kwapil, & Lewandowski, 2008). Using a week-long experience sampling method, Kwapil et al. (2009) found that in addition to being more likely to be alone, individuals with elevated social anhedonia were alone by choice and had more positive and less negative affect when alone, suggesting an actual penchant for

solitude. Further, this study found that when individuals with social anhedonia were with others, they were more likely to be in bigger, less intimate groups.

These individuals also tend to have atypical social networks; specifically, their social networks are generally smaller, consist of a larger proportion of relatives, and are perceived as less supportive and helpful than those of controls (Howard, Leese, & Thornicroft, 2000; Horan, Brown, & Blanchard, 2007). Horan et al. (2007) also found that individuals with social anhedonia tend to have a lower social coping style, meaning that these individuals tended to use less instrumental and emotional social support than controls in times of stress, such as trying to get advice or discussing feelings with someone. Although the research investigating social functioning in this group is limited, it is clear that these individuals experience problems related to social functioning, such as reporting lower levels of positive affect and having atypical social networks. Because these findings cannot be attributed to social anxiety, it is important to consider alternative explanations for these impairments in social functioning. One potential contributing factor is social skills deficits.

Though a few studies have examined social skill in individuals with physical anhedonia, (Haberman, Chapman, Numbers, & McFall, 1979; Numbers & Chapman, 1982), there are presently no studies that focus on social skill in individuals with social anhedonia. Beckfield (1985) found that male undergraduates with elevated anhedonia were significantly less competent and spoke less than controls in their audiotaped responses to descriptions of problematic situations; however, this study did not differentiate between physical and social anhedonia.

Though there is a dearth of literature on functional outcome in individuals with social anhedonia, some studies have looked at social competence in schizotypes, individuals with a certain personality organization that demonstrate four core characteristics, one of which is anhedonia. Thus, such studies in schizotypy may help guide hypotheses on functional outcome in individuals with social anhedonia. Compared to controls, schizotypal college students have greater deficits in social competence in terms of ability to generate competent responses to social situations, recognize competent responses, and self-monitor social responses (Wood, 1996). Liberman and Robertson (2005) found that high school students with elevations in schizotypal traits who underwent 8 weekly sessions of social skills training showed improvement in social competence and reduction of schizotypal traits compared to high school students in a nontreatment control group. However, further replications are needed before conclusions may be drawn.

The foregoing suggests that individuals high on social anhedonia have atypical social networks and spend more time alone compared to their peers. Although these findings are informative, the relative lack of further studies examining social functioning in this group, as well as no literature examining social skill, leaves many unanswered questions. The studies with schizotypes suggest social skill deficits may be present in social anhedonia, but this literature is also very limited. Thus, it is necessary to look at functional outcome in schizophrenia, a population whose social functioning and skill deficits are well documented.

SCHIZOPHRENIA, SOCIAL FUNCTIONING, AND SOCIAL SKILL

Social dysfunction is a core feature of schizophrenia and also one of the major criteria for receiving a diagnosis (American Psychiatric Association, 2000). Deficits in social functioning affect many areas of life, including employment, interpersonal relationships, and self-care (Beels, 1981). Social functioning impairments affect quality of life (Penn, Corrigan, Bentall, Racenstein, & Newman, 1997) and are present in practically all stages of schizophrenia, including the prodrome and residual phases (Penn, Mueser, Spaulding, Hope, & Reed, 1995). In the prodrome, deterioration of interpersonal relationships and certain changes in behavior, such as becoming more aloof, secluded, and isolated, are well-known premorbid indicators (Strauss, Kokes, Klorman, & Sacksteder, 1977). Glynn and Mueser (1986) found that social functioning was the best predictor of time spent in the community after discharge from a psychiatric institution. Further, these impairments also increase the likelihood of relapse (Johnstone, MacMillan, Frith, Benn, & Crow, 1990); individuals with better social functioning before being admitted had a more favorable outcome than those with worse social functioning pre-admission (Reker & Eikelmann, 1997; Svensson & Hansson, 1999).

While positive symptoms such as hallucinations and delusions may contribute to deficits in social functioning, these impairments are more commonly linked to negative symptoms (e.g., anhedonia, avolition, blunted affect) (Bellack et al., 1990; Dworkin, Green, Small, Warner, & Erlenmeyer-Kimling, 1990). In individuals with schizophrenia, greater levels of anhedonia are significantly related to poorer premorbid functioning and social competence (Katsanis, Iacono, Beiser, & Lacey,

1992; Garnet, Glick, & Edell, 1993). Moreover, having less frequent social contacts is associated with social anhedonia, greater negative affect, and social anxiety in individuals with schizophrenia (Blanchard et al., 1998; Pallanti, Quercioli, & Hollander, 2004), providing further evidence of the importance of social anhedonia when examining social functioning in individuals with schizophrenia.

According to Bellack, Sayers, Mueser, and Bennett (1994), “One of the most widely accepted hypotheses is that social dysfunction is a consequence of social skills deficits: errors in the performance of a variety of specific behavioral routines and cognitive operations that are necessary for effective social interaction” (371). Individuals with schizophrenia have been found to differ from both controls and other psychiatric patients on a number of social skills, including ability to identify emotional tone of others, eye contact, patterns of gaze, latency, and duration of verbal responses, and use of hand gestures (Bellack et al., 1994). Social skill impairments in individuals with schizophrenia negatively impact their social functioning by making it difficult to fulfill social roles, generate solutions to interpersonal problems, and establish and maintain relationships (Bellack et al., 1994; Bellack, Mueser, Gingerich, & Agresta, 1997; Hooley, 2010). Individuals with schizophrenia often have problems initiating conversations, providing emotional support, and successfully managing conflicts (Yager & Ehmann, 2006). Because the link between social skills and social functioning is so robust, many clinicians have looked to social skills training programs as a form of treatment for schizophrenia, and research has shown many benefits of such programs, such as reduced symptoms, less social anxiety, improved

social behavior, and lower relapse rates (Benton & Schroeder, 1990; Dilk & Bond, 1996; Wallace, 1998; Kurtz & Mueser, 2009).

It is evident that social skills deficits play a part in the overall social dysfunction of individuals with schizophrenia and specifically in those with negative symptoms such as anhedonia. However, it is still unclear exactly what kinds of processes underlie these social skills deficits. One hypothesis is that social skills deficits are related to impairments in social cognition (Pinkham & Penn, 2006).

SOCIAL COGNITION IN SCHIZOPHRENIA

Social cognition refers to the “mental operations that underlie social interactions, including perceiving, interpreting, and generating responses to the intentions, dispositions, and behaviors of others” (Green, Penn, Bentall, et al., 2008). It is thought to represent a “specialized domain of cognition developed to solve social, adaptive problems” (Penn et al., 1997). Thus, social cognition can be differentiated from neurocognition or “nonsocial cognition” in that social cognitive processes seem to draw from different brain regions and are related but independent from neurocognitive processes (Penn et al., 1997). According to Green et al. (2008), social cognition refers to a variety of psychological processes and should not be thought of as a single construct. Domains of social cognition can be divided into the following areas: Social Perception, Emotion Processing, Theory of Mind, and Attributional Bias.

Social perception refers to the way in which individuals identify social roles, societal rules, and social context (Toomey, Schuldberg, Corrigan, & Green, 2002;

Sergi & Green, 2002; Penn, Ritchie, Francis, Combs, & Martin, 2002). This includes the construct of social knowledge, which is defined as the “awareness of the roles, rules, and goals that characterize social situations and guide social interactions” (Green et al., 2008). In other words, social knowledge involves the understanding of what is socially expected in different situations or across different settings. Emotion processing refers to the ability to infer emotional information from social stimuli such as facial expressions or vocal inflections. Theory of Mind (ToM), or mental state attribution, refers to the ability to infer the intentions, dispositions, and beliefs of others (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001; Frith, 1992). Original studies in this area focused on how children with autism developed ToM, but recent research has extended ToM studies to adults with schizophrenia and schizophrenia-spectrum disorders because of the similarities in social functioning impairments (Green et al., 2008). Attributional style refers to the way in which individuals usually infer the causes of particular positive and negative events. Attributions can be external (not due to oneself) or internal (due to oneself), personal (due to others) or situational (due to situational factors).

Research has shown that individuals with schizophrenia tend to have deficits in social cognition (Green et al., 2008). Deficits in social perception may lead to impairments in the ability to process nonverbal, paraverbal, and verbal cues necessary to navigate through interpersonal interactions, such as making inferences about ambiguous social situations or identifying others’ mood state (Green et al., 2008). Individuals with deficits in ToM may have difficulties in processing perceptual context (Uhlhaas, Phillips, Schenkel, & Silverstein, 2006) and understanding such

concepts as sarcasm, irony, or white lies. Some researchers have conjectured that individuals with schizophrenia do not necessarily lack ToM but instead tend to overuse or misuse it, which may lead to hallucinations, delusions of reference, and incoherent speech (Abu-Akel, 1999). For example, Abu-Akel (1999) studied the speech of two disorganized patients with schizophrenia and found that they tended to have a hyper-ToM (over-attributing the mental states of others), such as assuming that the other person had access to their own intentions, dispositions, and knowledge. Individuals with schizophrenia also tend to have hostile attributional biases (Combs, Penn, Wicher, & Waldheter, 2007), and those with persecutory delusions tend to make external personal attributions for negative events rather than situational attributions (Garety & Freeman, 1999; Bentall, Corcoran, Howard, Blackwood, & Kinderman, 2001).

Understanding social cognition is crucial in examining the social functioning of individuals with schizophrenia. Social cognition has a direct theoretical link with social functioning given its focus on the mental processes involved in social situations. Many studies in recent years have focused on understanding the empirical association between social cognition and functioning in schizophrenia. These findings are discussed in the following section in order to identify the social cognitive factors that may play a role in social functioning impairments in individuals with social anhedonia.

SOCIAL COGNITION AND FUNCTIONAL OUTCOME IN SCHIZOPHRENIA

In recent years, social cognition has emerged as a significant determinant of functional outcome in schizophrenia (Mueser, Doonan, Penn, et al., 1996). Social cognitive deficits may lead to problems in interpersonal relationships, as others might be less likely to want to be around or be friends with someone who behaves awkwardly, a possible reason for why individuals with schizophrenia tend to have smaller social networks (Howard, Leese, & Thornicroft, 2000).

Many studies have supported a link between social cognitive impairments and poorer social functioning and social skill. Research has shown that deficits in social perception are related to poorer community functioning (Penn, Spaulding, Reed, & Sullivan, 1996; Kim, Doop, Blake, & Park, 2005; Sergi, Rossovsky, Nuechterlein, & Green, 2006), impairments in social problem solving (Corrigan & Toomey, 1995; Toomey, Wallace, Corrigan, Schuldberg, & Green, 1997; Addington, Saeedi, & Addington, 2006), and are also predictive of community status (Revheim & Medalia, 2004). For example, better performance on a social scripts task (Penn, Spaulding, Reed, & Sullivan, 1996) and greater social knowledge (Appelo, Woonings, van Nieuwenhuizen, Emmelkamp, Slooff, & Louwerens, 1992) are associated with better ward functioning, and in this second study, social knowledge predicted ward functioning above and beyond symptomology alone. However, in a 2006 review, Couture et al. reported that the link between social perception and social skill is not as robust; while one study found a relationship (Pinkham & Penn, 2006), two others did not (Appelo et al., 1992; Ihnen, Penn, Corrigan, & Martin, 1998). Overall though,

research has shown significant relationships between social perception and most measures of functional outcome (Couture et al., 2006).

Relationships between emotion processing and social functioning and social skill are also fairly robust (Couture et al., 2006). Deficits in emotion processing are significantly related to poorer community functioning (Poole, Tobias, & Vinogradov, 2000; Brekke, Kay, Kee, & Green, 2005). Mueser et al. (1996) found that deficits in emotion perception in schizophrenia inpatients were related to poorer social competence as assessed by social skill and social adjustment, such as poorer verbal fluency, eye contact, and involvement. Emotion perception deficits are also associated with poorer overall ratings of social skill, clarity, and conversation involvement (Ihnen, Penn, Corrigan, & Martin, 1998). Penn, Combs, et al. (2000) found that deficits in emotion perception remained after controlling for performance on control tasks of neurocognition, showing that these social cognitive deficits are not due to generalized cognitive impairments.

While only a few studies have looked at the relationships between ToM and social functioning and social skill (Brune, 2005b), there is some preliminary research that suggests a relationship exists. Brune (2005a) found some evidence that deficits in ToM are related to social behavior impairments on the ward. ToM is significantly related to premorbid social functioning (Schenkel, Spaulding, & Silverstein, 2005), and there is also preliminary evidence that there is a relationship between ToM and community functioning (Pollice, Roncone, Fallone, et al., 2002). Moreover, ToM deficits as assessed by the Hinting task are significantly related to social skill impairments in schizophrenia outpatients (Pinkham & Penn, 2006). However,

because this area is relatively unexplored compared to social perception and emotion processing, only preliminary conclusions may be drawn.

The link between attributional style and functional outcome has also not been well-documented, as only two studies have examined this relationship. One study found that deficits in attributional style are related to community functioning (Lysaker, Lancaster, Needs, & Davis, 2004). A second study reported that having a hostile attributional bias was predictive of aggressive behavior on the ward above and beyond previous violence history (Waldheter, Jones, Johnson, & Penn, 2005). Given the paucity of literature in this area, however, replications and further examination are necessary in order to firmly establish a relationship between attributional style and functional outcome.

Though there has been much recent interest in this area, further examination of social cognitive processes as they relate to social functioning and social skill is required in order to more clearly elucidate the role of social cognition in how individuals interact with others. Recent studies utilizing exploratory and confirmatory analytic approaches have shown increasing support for social cognition as an important mediator between neurocognition and functional outcome (Vauth, Rusch, Wirtz, & Corrigan, 2004; Brekke et al., 2005; Addington et al., 2006; Sergi et al., 2006), indicating that a further understanding of social cognitive processes offers a unique perspective into the social lives of individuals with schizophrenia.

SOCIAL COGNITION IN SOCIAL ANHEDONIA AND SCHIZOTYPY

Currently, very little is known about social cognition in social anhedonia. Because anhedonia is a prominent indicator for the development of schizophrenia-spectrum disorders, one might expect the social cognitive deficits that exist in schizophrenia to hold true for individuals with social anhedonia, though in a more attenuated form. There is some preliminary evidence that supports this relationship. In one study assessing ToM in individuals with social anhedonia, participants were read twenty short interactions between two characters and asked about the characters' intentions and dispositions. One item asks, "John has a phone call with a friend for one hour. He then says: 'My mother ought to call me in a few minutes.' What does John really mean? Cue: John adds: 'I could call you tomorrow morning.' What does John want to do?" Researchers found that individuals with elevated social anhedonia performed significantly worse than controls, indicating deficits in ToM (Monestes, Villatte, Moore, Loas, & Yon, 2008). However, no other studies examining social cognition in individuals with social anhedonia exist.

Because of the paucity of research in this area, it is important to look at social cognition in schizotypy generally. Here, the results have been quite mixed as to the relationship between social cognition and schizotypy. Research has shown that schizotypes have deficits in EP and ToM (Kerns, 2005; Kerns, 2006; Pickup, 2006; Kerns & Becker, 2008; Phillips & Seidman, 2008; Brown & Cohen, 2010). For example, Shean, Bell, and Cameron (2007) found that undergraduate students with elevations on schizotypal traits as assessed by the Schizotypal Personality Questionnaire (SPQ; Raine, 2005) had impairments in their ability to correctly

perceive and respond to expressions of affect. In this study, the SPQ subscales of No close friends and Suspiciousness were associated with poorer performance on the Diagnostic Analysis of Nonverbal Accuracy-2 (DANVA2; Nowicki Jr., 2005), a test that assesses for the ability to correctly identify emotions from facial, paralinguistic, and postural cues. Similarly, Brown and Cohen (2010) found that individuals with schizotypy were significantly less accurate when labeling emotional faces. Further, Langdon and Coltheart (1999) found that although there were no differences between high and low schizotypy groups in their ability to sequence social scripts and mechanical stories (i.e., intact social perception and sequencing skills), individuals high in schizotypy had deficits in sequencing false-belief stories (i.e., impaired ToM). Meyer and Shean (2006) found that performance on two measures of ToM, the Reading the Mind in the Eyes test and the Character Intention Task (CIT; Sarfati, Hardy-Baylé, Besche, et al., 1997), were associated with schizotypal symptoms assessed by the New Age Ideas scale of the Magical Ideation Scale.

On the other hand, two other studies did not find any relationship between schizotypy and social cognition (Jahshan & Sergi, 2007; Fernyhough, Jones, Whittle, & Waterhouse, 2008). However, the null findings may be explained by several limitations. First, Jahshan and Sergi (2007) assessed social cognition with The Awareness of Social Inference Test (TASIT; McDonald, Flanagan, Rollins, & Kinch 2003), which was developed for use in individuals with traumatic brain injuries and had never been used with schizophrenia spectrum populations. There could have been a potential ceiling effect in that this assessment of social cognition could have been too easy for an undergraduate sample. Second, the same study also utilized the

brief version of the SPQ, which may not have as clearly identified schizotypes as more extensive measures such as the Chapman Scales. Next, Fernyhough and colleagues also acknowledged several limitations in their study. One of the ToM tasks used in the study, the Cartoons task (Corcoran, Cahill, & Frith, 1997), had scores that could only range from 0-4, which may not have been sensitive enough to detect subtle differences in ToM ability in an undergraduate sample. Further, unlike previous studies of ToM that did find group differences (Pickup, 2006), this study did not have a time limit for responding in both ToM tasks. Conversely, requiring immediate responses more closely approximates behavior in real-life social situations (Fernyhough et al., 2008). Thus, although some studies have not found group differences in social cognition, various limitations preclude any conclusions to be drawn, and further research is necessary in order to establish the link between schizotypy and social cognition.

Chapter 2: Purpose of the Current Study

First, though there are robust findings of social functioning and skill impairments in individuals with schizophrenia, it is unclear whether individuals with social anhedonia exhibit these deficits as well. Given that there is preliminary data to suggest these individuals do have social impairments (Diaz et al., 2002; Brown et al., 2007; Brown et al., 2008; Kwapil et al., 2009), it is important to further elucidate the nature of social functioning and social skill deficits in this population. Thus, the present study developed a simulated live interaction task that sought to a) provide a controlled and consistent social affiliative stimulus, and b) examine participants' social responding in order to assess and compare individuals with social anhedonia and controls on measures social skill, including verbal social skill, nonverbal social skill, affiliation, and overall social skill. These ratings were supplemented by self-report measures of current social functioning and social support. To date, no study has examined social skill in individuals with social anhedonia. This research thus adds to the limited literature on social functioning deficits in this group as well as examines the relationship between impairments in social functioning and social skill. As discussed previously, enhancing current understanding of social skill and social functioning in individuals with social anhedonia provides insight into the functioning of this group, which has already been shown to exhibit some difficulties (e.g., cognitive deficits) similar to those with schizophrenia. Furthermore, the functioning of individuals with social anhedonia has a clear link to furthering knowledge in schizophrenia given that anhedonia is a core trait of schizotypy, the personality

organization of those with the biological predisposition to develop schizophrenia and schizophrenia-spectrum disorders.

Second, there is a dearth of literature regarding social cognition in individuals with social anhedonia. Though it is clear that these individuals differ in how they interact with others, there are very few studies to date that examine potential social cognitive deficits in this group. Do these individuals have impairments in emotion recognition? Do these individuals have difficulties inferring the mental states of others? The answers to these questions could help elucidate why those with social anhedonia report lower levels of social functioning and social support. The current study assesses individuals with social anhedonia and controls on measures of emotion perception and ToM. The specific social cognitive tasks chosen are of a greater difficulty than most other measures and were selected based on our use of a non-clinical population. This careful selection served to address previous limitations in the literature, in which ceiling effects and reduced sensitivity may have obfuscated important findings about the nature of social cognition in social anhedonia.

Lastly, the present study examined the question: What is the relationship among social cognition, social skill, and social functioning in social anhedonia versus controls? Understanding the links among these constructs would not only increase our scientific knowledge of an unexplored area in psychology, but it would also be an important element of understanding one of the vulnerability markers for the development of a severe and debilitating disorder. This could aid in the potential development of preventative treatments and help improve the quality of life for

individuals with a higher risk of developing schizophrenia and schizophrenia-spectrum disorders.

Specific hypotheses for the present study were as follows: 1) Individuals with social anhedonia would be rated as having poorer verbal, nonverbal, affiliation, and overall social skill in a simulated live interaction than controls, 2) Individuals with social anhedonia would have poorer social functioning, fewer numbers of social support contacts, and lower satisfaction with social support than controls, 3) Individuals with social anhedonia would exhibit greater deficits in social cognition than controls, 4) Greater deficits in social cognition would be associated with poorer social skill, and 5) Poorer social skill would be associated with impairments in social functioning.

Chapter 3: Methodology

RECRUITMENT

Eligible participants were college students between the ages of 18 and 30 years who attended the University of Maryland at College Park (UMD). Participants were recruited through a mass testing pool conducted through the university and through flyers posted around campus that invited interested individuals to complete an online screening measure. In total, 1354 individuals completed the screening measure, the Revised Social Anhedonia Scale (RSAS; Eckblad, Chapman, Chapman, & Mishlove, 1982). 998 of these individuals were recruited through the mass testing pool, and 356 were recruited through flyers. Those younger than the age of 18 were excluded from the study because they were not able to provide consent. Those older than the age of 30 were not included in the study because the topics in the simulated social interaction may not be relevant to those participants.

Participants were selected based on the level of social anhedonia assessed by the RSAS. To identify invalid responding, the Infrequency Scale (Chapman & Chapman, 1983) was imbedded into the RSAS in order to exclude individuals who endorsed three or more items in the unexpected direction. These scales are described in more detail below. Of all participants who completed the RSAS, approximately 7.7% of individuals were excluded based on invalid responding on the Infrequency Scale. Of those not excluded, all were entered into a raffle for two prizes of \$50.

Group selection was then based on individual responses to the RSAS. The social anhedonia group consisted of individuals scoring in the top 10% of RSAS scores. Though 1.96 standard deviations has traditionally been used as the cutoff

point, this study recruited participants for the social anhedonia group who scored at or above 10% in order to increase the sample size. The control group consisted of individuals scoring within 0.50 standard deviations of the sample mean of the RSAS. Of all eligible individuals who completed the screening measure, 20 males and 74 females were identified as social anhedonic, and 90 males and 183 females were identified as possible controls. These individuals were then contacted via email (if identified through mass testing) or telephone (if identified through our online survey) and invited to participate in the full study. Participants were told that the study's purpose was to investigate how people get to know one another. They were informed that they would be meeting another participant, that their interaction would be videotaped, and that they would complete several questionnaires afterwards. Individuals who agreed to participate were then emailed an initial study packet containing a consent form, the Social Adjustment Scale (SAS-SR; Weissman & Bothwell, 1976), the Social Support Questionnaire (SSQ; Sarason, Sarason, Shearin, & Pierce, 1987; Sarason, Levine, Basham, & Sarason, 1983), and the Schizotypal Personality Questionnaire (SPQ; Raine, 1991). Participants were asked to complete this packet at home in order to reduce the amount of time spent in the laboratory. When participants arrived to the laboratory, they reviewed and signed the consent form again.

Compensation during the Fall 2009 semester was \$10, but this was increased to \$35 during the Spring 2010 semester in order to enhance participation. Efforts were made to match participants on gender and race to the extent possible. The final sample included 42 individuals elevated on social anhedonia and 54 controls

MATERIALS

Assessment of Social Anhedonia

The Revised Social Anhedonia Scale (RSAS; Eckblad, Chapman, Chapman, & Mishlove, 1982) is a 40-item true/false self-report questionnaire that assesses trait levels of decreased pleasure experienced from interpersonal sources. Examples include, “I attach very little importance to having close friends” (keyed true) and “Although I know I should have affection for certain people, I don’t really feel it” (keyed true). The RSAS has shown to be a valid (Mishlove & Chapman, 1985) and internally consistent measure with coefficient alphas between 0.79 and 0.84 (Blanchard et al., 1998; Mishlove & Chapman, 1985). It has also demonstrated high test-retest reliability over both 90-day and one-year periods (Blanchard et al., 1998; Blanchard et al., 2001).

The Infrequency Scale (Chapman & Chapman, 1976) is a 17-item true/false scale that was designed as an invalidity index for the RSAS. It was administered to identify invalid responses. Individuals obtaining three or more responses in the unexpected direction were excluded from the study as this suggests invalid responding. Items include, “On some mornings, I didn’t get out of bed immediately when I first woke up” and “There have been a number of occasions when people I know have said hello to me.”

Assessment of Schizotypal Personality Traits

Schizotypal Personality Questionnaire (SPQ; Raine, 1991) is a 74-item dichotomous (yes/no) questionnaire that assesses the range of symptoms found in the

Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R; American Psychiatric Association, 1987) criteria for schizotypal personality disorder. The SPQ consists of nine subscales: ideas of reference, excessive social anxiety, odd beliefs or magical thinking, unusual perceptual experience, odd or eccentric behavior, no close friends, odd speech, constricted affect and suspiciousness. Replicated across samples, the SPQ has demonstrated high sampling validity, internal reliability (0.91), test-retest reliability (0.82), convergent validity (0.59 – 0.81), discriminant validity, and criterion validity (0.62, 0.68) (Raine, 1991). One study reported on the temporal stability of the subscales, which ranged from 0.71 to 0.85 over a period of the three weeks (Poreh, Levin, Teves, & States, 1997). SPQ subscales are significantly correlated with other measures of schizotypal personality features, such as the RSAS, the Magical Ideation Scale (Eckblad & Chapman, 1983), and the Perceptual Aberration Scale (Chapman, Chapman, & Raulin, 1978). The SPQ is useful in screening for schizotypy in the general population and is the most widely used measure of schizotypy (Wuthrich & Bates, 2006).

Assessment of Functioning

The Social Adjustment Scale (SAS-SR; Weissman & Bothwell, 1976) is a 54-item, self-report measure designed to assess instrumental and expressive role performance over the past two weeks. Derived from an interview form, the SAS-SR asks participants about their role performance, interpersonal relationships, friction, feelings and satisfaction in work, social and leisure activities, relationships with extended family, and perception of economic functioning. These items fall into four

main domains—performance at expected tasks, amount of interpersonal discord, elements of interpersonal relationships, and personal feelings and satisfactions (Weissman et al., 1978). For each item, individuals must indicate their response on a scale from 1-5, with higher scores denoting poorer functioning. Results from the SAS-SR are comparable to those obtained from relatives and outside raters. Though initially developed for use with individuals with depression, the SAS-SR has also been used in nonpatient populations. This measure reliably differentiates between psychiatrically ill and well patients, and it has few significant correlations with demographic variables (Weissman, Olfson, Gameroff, Feder, & Fuentes, 2001). The SAS-SR demonstrates good internal consistency ($\alpha = 0.74$) and test-retest reliability ($r = 0.80$). This measure is significantly correlated with other measures of social functioning (Weissman et al., 2001). Overall, the SAS-SR is considered one of the best measures of social well-being in terms of reliability and validity (Larson, 1993).

Assessment of Social Support

The Social Support Questionnaire (SSQ; Sarason, Sarason, Shearin, & Pierce, 1987; Sarason, Levine, Basham, & Sarason, 1983) assesses an individual's perceived number of social supports. Participants were asked to list all of the individuals they felt they could rely on for support in various situations and then to indicate how satisfied they are with the support they receive. This measure demonstrates high test-retest reliability ($r = 0.84$) and high internal consistency ($\alpha > 0.90$), and the SSQ has also been shown to have good convergent validity with other measures of social

support (O'Reilly, 1995; Sarason et al., 1987). When compared with a detailed structured interview, the SSQ provides comparable results (Sarason et al., 1987).

Assessment of Depression

The Beck Depression Inventory-II (BDI-II; Beck, Steer, Ball, & Ranieri, 1996) is a 21-item questionnaire that assesses cognitive, motivational, and physiological areas of depressive symptoms in adults. Each item consists of four statements graded in severity from 0 to 3. The individual is asked to endorse the statement that best describes the way he or she has been feeling in the past week, including today. A total score ranging from 0 to 63 is calculated by summing the severity ratings of the endorsed statements. Scores ranging from 0 to 13 indicate minimal depressive symptoms, scores from 14 to 19 suggest a mild level of mood disturbance, scores from 20 to 28 and 29 to 63 indicate moderate and severe levels of depressive symptoms respectively (Beck et al., 1996). The BDI-II is based off of the BDI (Beck, 1961). The BDI-II has high internal consistency, good test-retest reliability, and good convergent validity (Beck, Steer, & Brown, 1996; Beck, Steer, Ball, & Ranieri, 1996). The BDI and BDI-II are two of the most commonly used scales to assess depression in patients with schizophrenia (Kim et al., 1995; Siris et al., 2001). Given the link between depression and anhedonia, it was important to assess the level of depression in the sample. However, the BDI-II was not used to exclude participants from the study.

Assessment of Social Cognition

Emotion Perception. The Penn Emotion Recognition Test (ER40; Kohler, Turner, Gur, & Gur, 2004) is a 40-item, computer-based assessment of emotion recognition. Participants were presented with color photographs of actors evoking either high or low intensity expressions that are happy, sad, angry, fearful, or neutral, and participants had to identify which emotion matched each expression. The expressions used in this task have been validated against known characteristics of emotional expressions (Kohler et al., 2004). Expressions are balanced for actor gender and ethnicity. This measure has been used in studies involving normal populations (Kohler et al., 2004).

Theory of Mind. The Reading the Mind in the Eyes Test (Eyes Test; Baron-Cohen, Jolliffe, Mortimore, & Robertson, 1997; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001) is a 36-item assessment of Theory of Mind initially designed for high-functioning adults in the autism spectrum. Through viewing photographs of just the eye region of different actors who are displaying various emotions, participants were asked to make inferences regarding the mental states of others (e.g. interested, hostile, etc). This task has been shown to detect meaningful individual differences in the mind reading abilities of high-functioning adults with autism versus controls, and this finding has been replicated in studies of individuals with schizophrenia (Baron-Cohen, Wheelwright, Stone, & Rutherford, 1999; Kleinman, Marciano, & Ault, 2001; Kettle, O'Brien-Simpson, & Allen, 2008; Hirao et al., 2008). The Eyes Test is considered to be more difficult than traditional ToM tasks

that consist of simple stories to which the participant answers questions (Baron-Cohen et al., 1997; Baron-Cohen et al., 2001).

The Movie for the Assessment of Social Cognition (MASC; Dziobek, Fleck, Kalbe, Rogers, Hassenstab, Brand, Kessler, Woike, Wlf, & Convit, 2006) is a 46-item video-based assessment of Theory of Mind, in which participants watched a 15 minute film clip about four characters who were meeting for a dinner party and then answered questions regarding the characters' mental states. This instrument considers a variety of mental state modalities (thoughts, emotions, intentions) with positive, negative, and neutral valence. The MASC is designed to be difficult in order to detect slight differences in social cognition between groups that are high-functioning. Although originally developed to assess individuals with Asperger Syndrome, a German version of the MASC is currently being used to assess social cognition in schizophrenia. The MASC demonstrates high interrater reliability ($r = 0.99$), high internal consistency ($\alpha = 0.84$), high test-retest reliability ($ICC = 0.97$), and it is significantly correlated with other measures of social cognition, such as the Strange Stories Task ($r = 0.47, p < 0.05$) and a basic emotion recognition task ($r = 0.72, p < 0.01$).

Simulated live interaction task

The simulated live interaction task is a 3-minute, scripted, and pre-recorded video recording of an affiliative, outgoing, and attractive female. The actor introduces herself and describes what she likes to do with her friends and family (e.g.,

go to sporting events, go out to restaurants, etc.). For a more detailed description of the task, please see Procedures.

Post-experimental inquiry (manipulation check)

The post-experimental inquiry consisted of questions that were orally asked to participants at the conclusion of the study in order to assess whether they were suspicious of the procedures or aware of any deception during the study. Subjects were first asked a general, open-ended question (“*What did you think of the study?*”). This was then followed-up by a more probing question (“*Do you think there was anything more to the study than we told you about?*”). These post-experimental inquiry questions are recommended by social psychologists when assessing for awareness of deception (Mills, 1976); instead of asking a direct question (e.g., “*Did you believe the individual you were interacting with was really another participant or an actor?*”), the more indirect probes used in our post-experimental inquiry limit the number of false-positives. Participant responses were recorded verbatim and then coded 1 (fully aware of deception/suspicious) or 2 (not aware or suspicious). The goal of the post-experimental inquiry was to identify the percentage of participants who were aware of the deception used in study procedures and to evaluate whether this suspiciousness affected their behavior (Taylor & Sheppard, 1996).

Assessment of Social Skill

Two independent coders rated participants’ social skill during their videotaped interaction (Please see Procedures for detailed description of the social interaction).

Social skill was divided into four components: verbal social skill, nonverbal social skill, affiliation, and overall social skill. Other studies have used similar procedures in situations where participants were told to interact with unfamiliar individuals (e.g., a research confederate) when the goal of the interaction was to get to know one another (Penn, Hope, Spaulding, & Kucera, 1994; Pinkham, Penn, Perkins, Siegel, & Graham, 2007). Most studies assessing similar social skill variables have used a 5-point Likert scale ranging from 1 (poor) to 5 (good) (Penn et al., 1994; Penn, Kohlmaier, & Corrigan, 2000; Pinkham et al., 2007). Social skills ratings in the present study captured the core interpersonal skills involved in affiliative social interactions. Duration of each participant's speech was also recorded.

The two raters were undergraduate research assistants who were trained by graduate students on the assessment of social skill. A manual delineating the four social skill variables was created based on an adaptation of the Maryland Assessment for Social Competence (Bellack, Sayers, Mueser, & Bennett, 1994; Sayers, Bellack, Wade, Bennett, & Fong, 1995). The two raters who were blind to group assignment achieved good inter-rater reliability for verbal social skill ($\alpha = .87$), nonverbal social skill ($\alpha = .91$), affiliation ($\alpha = .92$), and overall social skill ($\alpha = .93$). Social skill ratings for each variable consisted of an average rating between the two coders in order to minimize individual coder error.

PROCEDURES

As described previously, all selected individuals who agreed to participate in the study were emailed a packet that included a consent form and the following

measures: SPQ, SAS, and SSQ. Participants completed these measures at home and brought them into the lab on the day of their scheduled appointment in order to reduce the time needed to complete the study in lab.

Upon arrival to the lab, participants were assessed individually. They were first re-consented to the study following the information outlined in the consent form. Participants were told that the study aims to explore how people get to know one another, especially when it comes to talking about things they enjoy doing with friends and family. Participants were read the following overview of study procedures:

You will be randomly paired with another participant. You will be in separate rooms, and each person will have an opportunity to introduce himself/herself to the other person via a closed-circuit video camera. Each participant's introduction will be videotaped and streamed to the other participant's television.

However, the “other participant” was always the same female confederate whose videotaped introduction was scripted and pre-taped. This was based on previous research that showed that males do not display as many affiliative behaviors when interacting with other males but do exhibit warmth and agreeableness when interacting with females (Alden, Teschuk, & Tee, 1992; Cunningham, Druen, & Barbee, 1997; Leary et al., 1994; Robins, 1987). The female confederate was recruited through a newsletter ad distributed through the University of Maryland theater department. We selected an actor who was attractive and able to present herself as natural and friendly.

Participants were then led to a room with a color television and a video camera. The experimenter then read the following statement:

We are interested in studying how people get to know one another, especially when it comes to talking about things we like to do with our friends and family. On the television screen, you will see another participant who is being videotaped live in one of the other rooms. The other participant will appear on the monitor and introduce himself/herself. Just as you will be able to see and hear him [or her] on your television screen, he [or she] will be able to see and hear you when it is your turn to talk. However, when introducing yourself, you will not be able to converse or talk back and forth with each other. The other participant has been read the same instructions— we tossed a coin, and it turns out the other participant will speak first. He [or she] will introduce himself [or herself], then soon after your television screen goes black, it will be your turn. Just relax and be yourself. Be sure to convey enough information about yourself so that the other person feels like they know you. For example, you can talk about what you like to do in your free time and what you like about your friends and family. When you are done introducing yourself, let us know you have finished. Do you have any questions?

After the experimenter read this statement and answered any questions, he or she left the main experimental room and entered the observation room. The observation room was located adjacent to the experimental room, and a one-way mirror connected the two rooms. This one-way mirror allowed the experimenter to control all

electronic equipment in both rooms. Specifically, this enabled study personnel to discretely play the confederate's DVD introduction without participants' knowledge.

From the observation room, the experimenter then began recording the participant. The confederate appeared on the monitor and introduced herself. The confederate was depicted as relaxed, friendly, and outgoing, with an enjoyment for engaging in a variety of activities with others. The confederate videotape lasted approximately three minutes, and her monologue was scripted with natural pauses added:

Hi, I'm Whitney. I have been asked to talk about what I like to do in my free time with other people, so here goes. Let's see, I have a close group of friends that I like to hang out with. We usually just hang out and watch T.V., or just joke around with each other. We'll sometimes go grab a bite to eat or run errands together. We've gone to a few football and basketball games too, and that's been pretty fun. Some people joke I should list texting my friends as one of my hobbies, but I always like to know what is going on with them. What I like most about my friends is that they have been there for me through some tough times. Actually, if any of us have a bad day, we get together and cheer each other up. They are all important to me – it's great to have someone who you can say anything with. And more than that, we're just always ourselves, so we can have a good time doing just about anything.

Now that I'm thinking about it, I guess I like being around people in general. I enjoy meeting new people because I feel like I have so much to learn from them. It's always fun to hear about what other people have experienced.

Oh, I also like spending time with my family when I get the chance. Even though they can be challenging sometimes, I miss having them around. I miss my mom's cooking, and generally just getting together. In our family, we really share a lot of interests. They've always been supportive of me – especially my brother. We've always given I each other advice and try to look out for each other. There's never a dull moment when he's around – he's hilarious.

Let's see, in addition to my friends and family, I just enjoy all the usual things like watching some sports, seeing movies, and whatnot. Usually I get together with someone to do things. So these are some things that I like to do. How about you?

After the confederate's introduction, the monitor went blank, signaling the participant that it was now his/her turn to speak. Participants then completed the BDI-II, ER40, Eyes Test, MASC, and post-experimental inquiry.

Chapter 4: Results

Analyses were conducted in several stages. First, we compared demographic and clinical characteristics between the social anhedonia (SocAnh) and control groups. Second, we examined whether there were group differences on the four social skill variables (verbal, nonverbal, affiliation, overall). Given research findings that females are often rated as having greater social skill than males, and because our two groups differed in gender composition, we examined whether there may be a group \times gender interaction. Third, we conducted a series of one-way ANOVAs to examine whether the groups differed on the three measures of social cognition (MASC, Eyes, ER40). Fourth, we computed intercorrelations among the social functioning (SAS), social support (SSQ-N, SSQ-S), social skill, and social cognitive variables for each group. Fifth, we examined whether participants were suspicious of study procedures, whether this was associated with group status, and whether this affected how they behaved (i.e., their ratings of social skill during the interaction).

Demographics. Demographic characteristics are shown in Table 1. Ninety-six individuals recruited from the University of Maryland, College Park campus during the 2009-2010 academic year participated in the study. Based on individuals' scores on the RSAS, participants were divided into SocAnh ($n = 42$) and control ($n = 54$) groups. Pearson Chi-Square analyses revealed that the groups were similar in age and race but differed in gender composition. While the control group had comparable numbers of males and females, the SocAnh group had a larger proportion of female participants (76.19%). Pearson Chi-Square revealed that the gender composition

differed significantly by group, $\chi^2(1, N = 96) = 5.97, p = .02$. Thus, because the groups statistically differed in the percentages of male and female participants, we examined the effects of gender in all subsequent analyses.

Clinical and Social Functioning Characteristics. Next, groups were compared on clinical and social functioning characteristics using a series of one-way ANOVAs (Table 2). Individuals with SocAnh had significantly higher scores on both clinical variables (SPQ, BDI-II), greater deficits in social functioning (SAS), and lower levels of social support, both in terms of number of contacts (SSQ-N) and satisfaction (SSQ-S). When examining the subscales of the SPQ, the SocAnh group reported higher scores on Social Anxiety, No Friends, Constricted Affect, and Suspiciousness, but not on Ideas of Reference, Odd Beliefs, Perceptual Experiences, Eccentric Behavior, or Odd Speech. In summary, as expected, the SocAnh group, compared to controls, demonstrated greater elevations in clinical variables such as schizotypal personality traits and depression; greater deficits in social functioning; and fewer numbers of and less satisfaction with social support.

Social Skill. To test the hypothesis that the groups would differ in ratings of social skill during the simulated live interaction, we conducted a series of one-way ANOVAs to evaluate group differences on each of the social skill variables—verbal social skill, nonverbal social skill, affiliation, and overall social skill (Table 3). There were significant group differences in ratings of affiliation, $F(1,91) = 6.04, p = .02$, and overall social skill, $F(1, 91) = 4.70, p = .03$, with controls rated as being more socially skilled than SocAnh participants on these dimensions. Ratings of verbal and nonverbal social skill approached significance, $F(1,91) = 3.26, p = .07$ and $F(1,91) =$

3.13, $p = .08$, respectively. Analyses of effect sizes revealed medium effect sizes for affiliation ($d = .50$) and overall social skill ($d = .44$) and small to medium effect sizes for verbal ($d = .37$) and nonverbal social skill ($d = .36$) (Cohen, 1969).

The two groups were also compared on duration of interaction (i.e., length of time in seconds that the participant spoke for). On average, controls spoke for 175.87 seconds, and SocAnh participants spoke for 159.04 seconds. However, this difference was not significant, $F(1, 91) = .51, n.s.$

Given research findings that females are often rated as having greater social skill than males, and because of gender differences between groups, univariate ANOVAs were conducted to assess for a group \times gender interaction. We conducted four separate 2 (gender: male or female) \times 2 (group status: control or SocAnh) ANOVAs for each social skill variable. First, we examined verbal social skill. There was a main effect of group ($F(1, 92) = 7.2, p = .01$) and of gender ($F(1, 92) = 6.56, p = .01$). Controls outperformed individuals with social anhedonia on ratings of verbal social skill, and females outperformed males. However, there was no group \times gender interaction ($F(1, 92) = 2.01, p = .16$). There was no effect of gender or a significant group \times gender interaction for any of the remaining social skill variables. With regard to all four social skill variables, there was no interaction between group and gender. Thus, the effect of group on social skill does not depend on the gender, and vice versa.

Social Cognition. Next, we tested the hypothesis that groups would differ on social cognition by conducting separate one-way ANOVAs on each of the social

cognitive measures—the MASC, the Reading the Mind in the Eyes Test, and the ER40 (Table 4).

Theory of Mind (ToM). The MASC and the Eyes Test are two assessments measuring the domain of ToM. There were no group differences on the MASC total score, $F(1, 94) = .08, p = .77$, or the Eyes Test, $F(1, 94) = .56, p = .46$. Because correlations among MASC error variables (greater ToM, less ToM, no ToM) were highly correlated, only MASC total correct scores are used.

Next, we examined the effects of gender through univariate ANOVAs. Total score correct on each social cognition measure was entered as the independent variable with group and gender as fixed variables. On the MASC, there was no main effect of group, $F(1, 95) = .01, p = .91$, but there was a main effect of gender, $F(1, 95) = 8.62, p = .00$. A one-way ANOVA revealed that females scored higher than males on the MASC, $F(1, 95) = 11.30, p = .00$. However, there was no group \times gender interaction, $F(1, 95) = 1.29, p = .26$. On the Eyes Test, there was neither a main effect of group, $F(1, 95) = .68, p = .41$, nor gender, $F(1, 95) = 2.62, p = .11$. There was no group \times gender interaction, $F(1, 95) = .08, p = .78$. Thus, the effect of group on ToM as assessed by both the MASC and ER40 did not depend on gender, and vice versa. Neither assessment exhibited a main effect of group. However, the MASC had a main effect of gender, with females outperforming males on this assessment of ToM.

Emotion perception. On the ER40, a test of emotion perception, there were no group differences, $F(1, 94) = .01, p = .94$. Because correlations among ER40

variables (number correct of anger, fear, happiness, no emotion, sadness) were highly correlated, only ER40 total correct scores are used.

ER40 score was also evaluated for a possible group \times gender interaction. Again, there was no main effect of group, $F(1, 95) = .15, p = .71$, or gender, $F(1, 95) = .72, p = .40$. There was also no interaction, $F(1, 95) = .75, p = .39$.

Intercorrelations. In the fourth stage of analyses, we computed intercorrelations within each group for the following variables: social functioning (SAS), social support (SSQ-N and SSQ-S), social skill (verbal, nonverbal, affiliation, overall), and social cognition (MASC, Eyes, ER40).

Social Functioning, Social Support and Social Skill. First, bivariate correlational analyses were conducted among social functioning, social support, and social skill variables for each group (Table 5). Among controls, social functioning as assessed by the SAS was significantly correlated with the number of social support contacts ($r = .28, p < .05$) such that greater levels of social functioning were associated with higher numbers of social support contacts. However, social functioning was not significantly correlated with satisfaction with social support ($r = -.16, p > .05$). As expected, the two social support variables (number of contacts and satisfaction) were significantly correlated with each other ($r = .33, p < .05$). When examining the relationships among these variables and social skill, it was evident that greater social support was associated with higher ratings of social skill. Specifically, greater numbers of social support contacts was associated with higher ratings of verbal ($r = .29, p < .05$) and overall social skill ($r = .31, p < .05$), while greater satisfaction with social support was associated with higher ratings of verbal ($r = .31,$

$p < .05$), nonverbal ($r = .36, p < .05$), and overall social skill ($r = .33, p < .05$).

Neither social support variable was significantly associated with affiliation. When examining the SAS, greater social functioning was not significantly correlated with higher ratings on any social skill variable. In fact, greater deficits in social functioning were significantly associated with higher ratings of affiliation ($r = -.35, p < .05$).

Among individuals with elevated SocAnh, bivariate correlations between social functioning and social support were as expected, with higher levels of social functioning significantly correlated with greater numbers of and higher satisfaction with social support. However, a different pattern of findings emerged when examining the relationship between social functioning and social skill. Namely, the only significant correlation was between verbal social skill and number of social support contacts ($r = .49, p < .01$). No other social skill rating was significantly correlated with a measure of social functioning or social support.

As expected, for both groups, ratings of social skill were highly intercorrelated. In other words, higher ratings of social skill in one domain likely translated to higher ratings in other domains.

Social Skill and Social Cognition. Second, bivariate correlational analyses were conducted between social skill and social cognition for each group (Table 6). Among controls, none of the social skill variables are significantly correlated with any of the social cognitive variables. In other words, there does not appear to be a relationship between social skill and social cognition as assessed by the MASC, Eyes Test, or ER40 for control participants. In the SocAnh group, bivariate correlational

analyses revealed similar findings for MASC total score and Eyes in relation to social skill. However, among participants elevated in SocAnh, score on the ER40 was significantly correlated with verbal social skill ($r = .32, p < .05$) such that higher scores on the test of emotion perception were associated with higher ratings of verbal social skill. Though scores on the MASC and Eyes Test, both of which are considered measures of ToM, are significantly correlated with each other among controls ($r = .41, p < .01$), this did not hold true among participants with SocAnh ($r = .11, p > .05$). In both groups, the ER40 was not correlated with either of the other social cognition measures.

Social Cognition and Social Functioning. Social cognitive variables were then compared to social functioning and social support using bivariate correlational analyses within each group (Table 7). There were no significant correlations between scores on any of the social cognition measures and social functioning or social support. Thus, in both controls and individuals with SocAnh, social cognition as assessed by the MASC, Eyes, and ER40 do not appear to be related to social functioning or social support.

Post-Experimental Inquiry. At the conclusion of the study, all participants were assessed on their level of suspiciousness of study procedures (i.e., whether or not they believed they were interacting with another participant in real-time). Participants were rated either not aware or aware of deception. 47.9% of individuals ($n = 46$) were not aware, while 52.1% ($n = 50$) indicated that they were suspicious of study procedures. Post-experimental inquiry (PEI) status was not significantly associated with group, $\chi^2(1, n = 96) = 1.66, p = .22$.

A series of one-way ANOVAs was used to determine whether the not aware versus aware participants differed on ratings of social skill. Verbal social skill was not significantly associated with PEI status, $F(1, 91) = 2.33, p = .13$. Thus, verbal ratings of social skill did not differ in participants who indicated suspiciousness versus those who were not suspicious. The other ratings of social skill, however, were statistically different between PEI status groups. Those who were suspicious were rated as having lower nonverbal social skill than those who were not suspicious, $F(1, 91) = 6.5, p = .01$. Further, affiliation and overall social skill ratings were also higher in those who were not suspicious, $F(1, 91) = 8.47, p = .01$ and $F(1, 91) = 15.32, p = .00$, respectively. Thus, though suspiciousness of study procedures did not seem to affect what participants said during their introduction, it appeared to affect the way they behaved in other ways; specifically, those who were suspicious of study procedures and potentially aware of deception exhibited poorer nonverbal social skill, affiliation, and overall social skill.

Ancillary Analyses

Due to the significant difference between groups on depression severity, it may be that group differences in social skill ratings are due to greater rates of depression in the SocAnh group and not due to fundamental differences between individuals with and without elevations in social anhedonia. Thus, exploratory analyses were conducted to further examine depression in our sample. We evaluated whether excluding individuals who self-reported depressive symptoms of a mild severity or greater (i.e., above 13 on BDI-II (Beck et al., 1996)) would affect our

previous results. 13 individuals from the SocAnh group and 9 individuals from the control group met the exclusionary criterion. Comparing the 29 SocAnh and 45 control participants who were not excluded, one-way ANOVA revealed that groups were no longer statistically different on BDI-II total score, $F(1, 72) = 2.90, n.s.$

Re-analyses of social skill variables were then conducted with a series of one-way ANOVAs (Table 8). After excluding participants who scored at or above 14 on the BDI-II, there were no longer any significant group differences on social skill, though all ratings approached significance. For verbal social skill, there was a trend towards significance, $F(1, 69) = 3.17, p = .08$, with a medium effect size ($d = -.42$). Similar trends for higher ratings among controls were found for affiliation, $F(1, 69) = 3.09, p = .08$, and overall social skill, $F(1, 69) = 2.96, p = .09$, both with medium effect sizes. Nonverbal social skill ratings had a slightly smaller effect size ($d = -.37$) and was not significant, $F(1, 69) = 2.53, p = .12$. These effect sizes are comparable to those listed in Table 3; however, the decrease in sample size after excluding about 23% of our original sample size also led to a decrease in power. Thus, though there are no longer significant group differences on social skill after excluding participants with elevations in depression, examination of effect sizes indicates that with a greater sample size, the F values would likely reach significance.

Social cognitive variables were also reexamined after exclusion of participants who self-reported mild and above severity on the BDI-II (Table 9). A series of one-way ANOVAs revealed that groups still performed similarly on all three measures of social cognition.

Chapter 5: Discussion

This study sought to investigate the behavioral correlates of social cognition in individuals with social anhedonia by examining how these individuals behave during a simulated live interaction. First, it was hypothesized that, compared to controls, individuals with social anhedonia would be rated as having poorer verbal, nonverbal, affiliation, and overall social skill. Second, it was hypothesized that individuals with social anhedonia would also have self-reported poorer social functioning, fewer numbers of social support contacts, and lower satisfaction with social support. Third, it was hypothesized that individuals with elevated social anhedonia would exhibit greater deficits in social cognition than controls on two measures of ToM and one measure of emotion recognition. Fourth, it was hypothesized that greater deficits in social cognition would be associated with poorer social skill. Lastly, it was hypothesized that poorer social skill would be associated with impairments in social functioning.

As expected, significant group differences in social skill were observed. Compared to controls, individuals with elevated social anhedonia were rated as having poorer affiliation and overall social skill. Though group differences in verbal and nonverbal social skill did not reach significance, examination of effect sizes (i.e., Cohen's *d*) indicated that a larger sample size would provide the greater power needed to detect group differences in these two variables. Though this is the first study to examine social skill in individuals with social anhedonia, these findings are

consistent with previous reports of poorer social skill in individuals with elevated schizotypy (Wood, 1996) and with schizophrenia (e.g., Bellack et al., 1994).

In line with previous findings of poorer social functioning (Diaz, Dickerson, & Kwapil, 2002) and atypical social support networks (Howard, Leese, & Thornicroft, 2000; Horan, Brown, & Blanchard, 2007) in individuals with social anhedonia, the current study also found group differences in these variables. Specifically, individuals with social anhedonia self-reported greater deficits in social functioning, fewer numbers of social support contacts, and less satisfaction with their social support. It may be that, in individuals with elevated social anhedonia, social skill deficits may contribute to their smaller social support networks and lowered satisfaction with their social support. As hypothesized by previous researchers (e.g., Bellack et al., 1994), social functioning impairments may be due to social skill deficits. Overall, these findings corroborate previous reports that individuals with elevated social anhedonia do lead social lives that are markedly different from their peers (e.g., Kwapil et al., 2009).

In terms of social cognition, however, this study did not find any group differences. Individuals with social anhedonia and controls performed similarly on both measures of ToM and one measure of emotion recognition. Only one other study to date has examined social cognition in social anhedonia. Monestes and colleagues (2008) found that individuals with social anhedonia had greater deficits in ToM than did controls. It may be that their task (answering questions about social interactions between two characters) was more sensitive to group differences than the assessments used in the current study, which would explain the inconsistent findings.

In fact, the ToM assessment used by Monestes and colleagues (2008) is open-ended, while the Eyes Test and MASC both have multiple-choice formats. Though the Eyes Test and MASC were selected for use in the current study based on their development for higher-functioning populations, it is possible that these two ToM assessments are not difficult or sensitive enough for a generally high-functioning undergraduate sample. The average percent correct on the Eyes Test and MASC assessments ranged from approximately 75%-80%, so it is unlikely that the null findings can solely be explained by possible ceiling effects. It may be that limited variance in these measures or differences in gender composition between control and social anhedonia groups may have obfuscated any social cognition differences. The latter limitation will be outlined further in the next section. A review of social cognition in individuals with elevated schizotypy reveals mixed results. While some studies have found group differences in assessments of ToM and emotion processing (Kerns, 2005; Kerns, 2006; Pickup, 2006; Kerns & Becker, 2008; Brown & Cohen, 2010), other studies have found no such differences (Jashan & Sergi, 2007; Fernyhough et al., 2008). Thus, it is still yet unclear whether individuals with elevated social anhedonia (or individuals with elevated schizotypy) exhibit deficits in social cognition.

The current study found that there were little to no associations between social cognition and social skill in either group. Only ratings of verbal social skill were positively correlated with a measure of emotion recognition in individuals with social anhedonia. No other associations between social skill and social cognition existed in the social anhedonia or control groups. Though this is the first study to examine the

association between social skill and social cognition in individuals with social anhedonia, other researchers have looked at this relationship in individuals with schizophrenia. As a review by Couture, Penn, and Roberts (2006) indicates, there are mixed results, and more research is needed. While some studies have found that deficits in certain social cognitive domains are related to poorer social skill (e.g., Mueser et al., 1996; Pinkham & Penn, 2006), other studies have not found a significant relationship (e.g., Appelo et al., 1992; Cohen, Forbes, Mann, & Blanchard, 2006; Ihnen et al., 1998). Therefore, not only is it uncertain whether social cognition is associated with social skill in those with social anhedonia but also in individuals with schizophrenia. It may be that other domains, such as emotion or motivation, underlie the social skill differences, thus explaining why there may not be associations between social cognition and social skill in the current study.

The current study also did not find support for a relationship between social functioning and social skill in both the control and social anhedonia groups. Individuals who self-reported greater levels of social adjustment were not rated as more socially skilled. In fact, controls who rated themselves as having greater social adjustment were actually rated as having poorer affiliation during the simulated live interaction. Though this is the first study to examine social skill in individuals with social anhedonia, previous studies of social functioning and social skill in schizophrenia have found a robust relationship between the two variables (Bellack et al., 1994; Bellack, Mueser, Gingerich, & Agresta, 1997; Hooley, 2010). It is unclear why no such relationship was observed in the current study. It may be that the social adjustment measure utilized in this study was not an appropriate measure for this

population. The SAS includes certain questions about school (e.g., number of classes missed, engagement in schoolwork) and family (e.g., frequency of contact with relatives) that may not necessarily indicate optimal adjustment or functioning in undergraduates as intended. In other words, these domains may be distinct from functioning in the social realm. Another possibility is that the social skill rating procedure developed for this study was an insufficient assessment of social skill. Though developed from the Maryland Assessment of Social Competence (Bellack, Sayers, Mueser, & Bennett, 1994; Sayers, Bellack, Wade, Bennett, & Fong, 1995) for use in a non-clinical population and with an addition of an affiliation rating, this study's social skill rating procedure has not been previously validated. Lastly, the lack of a robust relationship between social functioning and social skill in the current study may be due to the characteristics of the sample. Namely, all participants were undergraduate students enrolled in a selective and competitive public university. It may be argued then that this sample consisted of high-functioning individuals and that a community-based sample may yield different results.

LIMITATIONS

There are several limitations to the current study that deserve consideration. First, statistical analysis of gender revealed a significant group difference in gender composition. While the control group had a comparable percentage of females (51.85%) and males (48.15%), the social anhedonia group consisted of a disproportionately greater percentage of females (76.19%) than males (23.81%). The lower percentage of males in the experimental group was due in part to the low base

rate of social anhedonia in the population as well as the larger proportion of females enrolled in the Introductory Psychology course, the latter of which affected the gender composition of the mass testing pool. This group difference in gender composition is a limitation because gender has been suggested to affect other variables, such as social support (Dwyer & Cummings, 2001; Olson & Schultz, 1994; Shumaker & Hill, 1991; Wohlgemuth & Betz, 1991), social skill (Hall, 1979; Riggio, 1986), and social cognition (Banerjee, 1997; Baron-Cohen et al., 1997; Chess & Thomas, 1984; Hall, 1984; Rosenthal, Hall, DiMatteo, Rogers, & Archer, 1979), such that there is some evidence that females are superior to males in these domains. Statistical analyses using univariate ANOVA's showed that there were no group \times gender interactions for each of the social skill variables, indicating that the group differences on social skill were not due to gender. This does, however, suggest that the lack of significant group differences in some areas (e.g., social cognition) may be due to the difference in gender composition between the control and social anhedonia groups. For example, because preliminary evidence suggests that females may outperform males in some domains of social cognition, it is possible that the greater proportion of females in our social anhedonia group may have obfuscated detection of group differences. Though many efforts were made to increase male participation in the social anhedonia group, (e.g., multiple calls and emails to qualified individuals, increase in monetary compensation, flyers placed in high traffic areas of campus), we were unable to nullify the gender disparity, and it is a significant limitation of the current study.

A second limitation to the current study is the presence of a significant group difference in depressive symptomatology. Compared to controls, individuals in the social anhedonia group reported higher levels of depression. This difference clouds study findings due to the implication that elevated social anhedonia in our experimental group may reflect diminished capacity for pleasure due to depression rather than true schizotypy (Blanchard et al., 2001). Thus, we conducted ancillary analyses whereby all individuals who reported moderate depression severity or greater were excluded. Group differences on social skill variables were reexamined, and results indicated that though differences in overall social skill and affiliation no longer reached significance, effect sizes for all four variables remained comparable to the effect sizes found previously. Therefore, it appears that the significant decrease in sample size (23%) after excluding these participants led to a reduction in power and that, with a larger sample size, group differences in social skill would reemerge. This suggests that such group differences are likely due to diminished hedonic capacity as a result of schizotypy and not solely due to depression. Nevertheless, depression is common throughout the course of schizophrenia, including during the prodrome (e.g., Hafner et al., 2005). Thus, the current study's finding of elevated levels of depression in the social anhedonia group does not necessarily indicate a problem with sample characteristics.

Another methodological limitation to be considered is the believability of our study procedures. The current study incorporated a novel simulated live interaction in which participants were led to believe that they were meeting and conversing with another participant in real-time. A post-experimental inquiry was conducted with all

participants to assess their degree of suspiciousness of study procedures. Results revealed that approximately half of all participants indicated suspiciousness. In our study, suspiciousness was defined as either (1) being fully aware of deception (e.g., stating that Whitney was an actor or that her introduction was pre-recorded), or (2) reporting suspiciousness of procedures but unable to name any specific source of deception. Notably, statistical analyses showed that suspiciousness did not differ by group. Thus, participants' suspiciousness did not drive group differences seen in variables such as social skill. However, suspiciousness did affect how participants overall behaved during the social interaction. Specifically, individuals who indicated suspiciousness of study procedures were rated as having lower nonverbal social skill, affiliation, and overall social skill. However, verbal social skill was unaffected. Thus, though suspiciousness may not have affected *what* people said, it affected *how* they said it, suggesting that suspiciousness may have unconsciously influenced the degree to which individuals were engaged or invested in getting to know another individual. This is a limitation, as it raises doubts about a core assumption of the current study—that we are evaluating how individuals interact with others in the real world. That is, if a significant proportion of participants are aware of the deception used in study procedures, they may not be behaving as they naturally would.

Though we could not alter study procedures midway through the study, we did make efforts to learn what contributed to participants' suspiciousness. Through participant feedback, it was clear that there were two main factors that contributed to suspiciousness. First, some participants reported that since they could not converse back and forth with Whitney face-to-face, it appeared as though Whitney's

introduction was pre-recorded. This criticism is a valid point of concern, as our study setup does not necessarily approximate realistic conditions (e.g., speaking to someone through a video camera, hearing someone talk for 3 minutes and then having your turn, etc.). However, though the simulated live interaction may not maximize external validity, it does offer many advantages. Namely, the use of a singular, scripted, and pre-recorded confederate insured that all participants were exposed to the same social stimulus. By having greater control over other variables, the current study's procedure allowed investigators to more effectively examine the role of social anhedonia in social skill. In other words, if participants were to interact with other actual participants face-to-face, it would have been impossible to ascertain why they behaved the way they did (e.g., appearance of participant or diminished hedonic capacity). Further, even if participants were to interact with a trained confederate face-to-face, it would have been extremely difficult to ensure that the confederate was interacting with each participant the same way. Yet another advantage of a scripted, pre-recorded stimulus is its ease of transportability to other settings, allowing different investigators (and even clinicians) to use the same exact stimulus. Thus, though there are disadvantages to the current procedures that were considered during the planning phase of the study, it was determined that a scripted, pre-recorded stimulus would allow us to best reach our study goals. As a second reason cited by participants as to why they were suspicious, many individuals stated that they had participated in many psychology experiments prior to the current study and that "almost all studies involved deception." Thus, it appeared that many participants were already suspicious of study procedures even before beginning our study,

suggesting that in some cases, it may not have been the simulated live interaction itself that aroused suspicion.

DIRECTIONS FOR FUTURE RESEARCH

Though this study has helped shed light on the social behavior of individuals with social anhedonia, there is still much unknown about this topic of growing interest. The current findings suggest several directions for future research. First, since social cognition did not appear to underlie the social skill differences seen in individuals with elevated social anhedonia, future research ought to examine whether deficits in emotion or motivation play a role. It may be that disparities in affective capacity or willingness to engage, and not a cognitive impairment, explain why individuals with social anhedonia display poorer social skill than their peers. Though some studies have investigated emotional responding in individuals with social anhedonia (e.g., Leung, Couture, Blanchard, Lin, & Llerena, 2010), no studies to date have looked at how emotional deficits may affect social skill.

The aforementioned limitations also present recommendations for future research. Namely, further studies should ensure that groups do not differ in demographic variables (e.g., similar numbers of men and women) and that sample sizes are large enough to detect differences. Future research may also extend the current findings by utilizing additional stimuli, such as a male actor, to evaluate possible gender effects. Though this was a preliminary study that aimed to develop a novel simulated live interaction, further research may also focus on troubleshooting and improving laboratory stimuli and procedures in order to maximize both internal

and external validity. Overall, though the present study aimed to advance knowledge about how individuals with social anhedonia interact with others, there are still many questions left unanswered.

CONCLUSIONS

This study sought to develop and utilize a laboratory paradigm in order to examine the nature of social interactions in individuals psychometrically identified as socially anhedonic. Though previous studies have focused mainly on how individuals with social anhedonia respond to stimuli (e.g., Kerns, Docherty, & Martin, 2008; Leung et al., 2010), the present study aimed to approach the topic from a more dynamic perspective—these individuals not only react to their environment but also act upon others around them. Thus, while research has shown that individuals with elevated social anhedonia do have different social lives (Brown et al., 2008; Brown et al., 2007; Horan et al., 2007; Howard et al., 2000; Kwapil et al., 2009), could these individuals be behaving in certain ways to *elicit* a less rewarding environment?

The present study's findings suggest that this may indeed be the case. When compared to controls, individuals with elevated social anhedonia were rated as having poorer affiliation and overall social skill when speaking to a friendly and outgoing female confederate via simulated live interaction. In addition, these individuals reported greater impairments in social functioning, fewer social support contacts, and lower satisfaction with their social support. Given prior research in other fields that impairments in social skill contribute to poorer social functioning and social support

(Bellack et al., 1994; Bellack et al., 1997; Hooley, 2010; Yager & Ehmann, 2006), it is important to examine what may contribute to such social skill deficits.

Though we conjectured that social cognitive impairments may underlie the social skill deficits seen in social anhedonia, the results did not support this hypothesis. Individuals with social anhedonia performed similarly to controls on all three measures of social cognition. These findings suggest the need to examine whether other domains such as emotion or motivation may explain the functional impairment seen in social anhedonia. While the present study is not without limitations, it is the first to utilize a novel simulated live interaction paradigm to examine social behavior in this population, and its findings have helped further understanding of the social lives of individuals with social anhedonia.

Table 1: Demographic Variables for Social Anhedonia and Control Groups

	Social Anhedonia (<i>n</i> = 42)	Controls (<i>n</i> = 54)	
	M (SD)		
Age	20.05 (2.55)	19.59 (1.24)	<i>F</i> = 7.81
Gender	% (N)		
Male	23.81 (10)	48.15 (26)	$\chi^2 = 5.97^*$
Female	76.19 (32)	51.85 (28)	
Race	% (N)		
Caucasian	59.52 (25)	62.96 (34)	$\chi^2 = 3.10$
African-American	23.81 (10)	14.81 (8)	
Hispanic	4.76 (2)	1.85 (1)	
Asian	9.52 (4)	12.96 (7)	
Multi-racial	2.38 (1)	7.41 (4)	

**p* < 0.05

Table 2: Clinical and Social Functioning Variables for Social Anhedonia and Control Groups

	Social Anhedonia (n = 42)	Controls (n = 54)	F	Effect size (Cohen's d)
SPQ Total	30.02 (11.47)	23.23 (10.26)	14.54**	.62
Ideas of Reference	3.50 (2.50)	3.80 (2.07)	.41	-.13
Social Anxiety	4.88 (2.44)	3.27 (2.19)	11.19**	.69
Odd Beliefs	0.95 (1.71)	1.08 (1.41)	0.15	-.08
Perceptual Experiences	2.33 (1.93)	2.45 (1.91)	0.09	-.06
Eccentric Behavior	3.36 (2.34)	2.67 (2.01)	2.35	.32
No Friends	4.31 (2.16)	1.69 (1.75)	41.93**	1.33
Odd Speech	4.43 (2.70)	3.61 (2.08)	2.74	.34
Constricted Affect	2.69 (1.66)	1.67 (1.65)	8.85**	.61
Suspicious	3.81 (2.14)	2.61 (2.05)	7.59**	.57
BDI-II	10.71 (6.34)	8.06 (5.19)	5.10*	.46
SAS	119.25 (10.94)	127.09 (8.83)	14.63**	-.79
SSQ-N	4.08 (1.85)	5.32 (1.79)	10.87**	-.68
SSQ-S	5.04 (0.78)	5.56 (0.67)	11.76**	-.72

*p < 0.05

**p < 0.01

RSAS = Revised Social Anhedonia Scale; SPQ = Schizotypal Personality Questionnaire; BDI-II = Beck Depression Inventory; SAS = Social Adjustment Scale; SSQ-N = Social Support Questionnaire- Number; SSQ-S = Social Support Questionnaire-Satisfaction

Table 3: Social Skill (SS) Variables for Social Anhedonia and Control Groups

	Social Anhedonia (<i>n</i> = 42) M (SD)	Controls (<i>n</i> = 54) M (SD)	<i>F</i>	Effect size (Cohen's <i>d</i>)
Verbal SS	3.96 (.94)	4.28 (.78)	3.26	-.37
Nonverbal SS	3.65 (1.17)	4.02 (.84)	3.13	-.36
Affiliation	3.40 (1.25)	3.94 (.89)	6.04*	-.50
Overall SS	3.63 (1.08)	4.06 (.84)	4.70*	-.44
Duration (sec)	159.04 (83.79)	175.87 (129.41)	.51	-.15

* $p < 0.05$

Table 4: Average Percent Correct of Social Cognitive Variables for Social Anhedonia and Control groups.

	Social Anhedonia (<i>n</i> = 42)	Controls (<i>n</i> = 54)	<i>F</i>	Effect size (Cohen's <i>d</i>)
MASC Total	80.8 (6.5)	80.4 (6.8)	0.08	.06
Eyes	75.3 (8.3)	76.2 (8.6)	0.56	-.11
ER40	83.0 (7.3)	82.9 (6.1)	0.01	.01

MASC = Movie for the Assessment of Social Competence; Eyes = Reading the Mind in the Eyes Test; ER40 = Penn Emotion Recognition Test

Table 5: Pearson's Correlations¹ among Social Functioning, Social Support, and Social Skill

	SAS	SSQ-N	SSQ-S	Verbal SS	Nonverbal SS	Affiliation	Overall SS
SAS		.28*	.16	.22	-.27	-.35*	-.11
SSQ-N	.32*		.33*	.29*	.16	.17	.31*
SSQ-S	.52**	.52**		.31*	.36*	.24	.33*
Verbal SS	.17	.49**	.29		.39**	.40**	.65**
Nonverbal SS	.12	.15	.11	.55**		.74**	.85**
Affiliation	.17	.22	.21	.70**	.84**		.84**
Overall SS	.14	.27	.16	.72**	.89**	.94**	

*p < 0.05

**p < 0.01

SAS = Social Adjustment Scale; SSQ-N = Social Support Questionnaire Number; SSQ-S = Social Support Questionnaire-Satisfaction

¹Correlations for controls are above the diagonal, and correlations for SocAnh are below the diagonal.

Table 6: Pearson's Correlations¹ between Social Skill and Social Cognition

	Verbal SS	Nonverbal SS	Affiliation	Overall SS	MASC Total	Eyes	ER40
Verbal SS		.39**	.40**	.65**	.10	-.16	-.01
Nonverbal SS	.55**		.74**	.85**	-.02	-.11	.00
Affiliation	.70**	.84**		.84**	-.07	-.11	-.08
Overall SS	.72**	.89**	.94**		.01	-.14	-.02
MASC Total	.18	.07	.10	.17		.41**	.10
Eyes	-.15	.00	.07	.03	.11		.17
ER40	.32*	.08	.20	.09	.14	-.05	

*p < 0.05

**p < 0.01

MASC = Movie for the Assessment of Social Competence; Eyes = Reading the Mind in the Eyes Test; ER40 = Penn Emotion Recognition Test

¹Correlations for controls are above the diagonal, and correlations for SocAnh are below the diagonal.

Table 7: Pearson's Correlations¹ among Social Cognition, Social Functioning, and Social Support

	SAS	SSQ-N	SSQ-S	MASC Total	Eyes	ER40
SAS		-.30*	-.19	.07	.07	-.02
SSQ-N	.32*		.33*	.07	.04	-.26
SSQ-S	.52*	.52**		-.14	-.28	.05
MASC Total	-.25	.25	.02		.41**	.10
Eyes	.20	.06	-.09	.11		.17
ER40	.10	.14	.21	.14	-.05	

*p < 0.05

SAS = Social Adjustment Scale; SSQ-N = Social Support Questionnaire-Number; SSQ-S = Social Support Questionnaire-Satisfaction; MASC = Movie for the Assessment of Social Competence; Eyes = Reading the Mind in the Eyes Test; ER40 = Penn Emotion Recognition Test

¹Correlations for controls are above the diagonal, and correlations for SocAnh are below the diagonal.

Table 8: Social Skill Variables for Social Anhedonia and Control Groups after Excluding Participants who Scored at or above BDI-II Cutoff of 14

	Social Anhedonia (<i>n</i> = 27)	Controls (<i>n</i> = 44)	<i>F</i>	Effect size (Cohen's <i>d</i>)
	M (SD)	M (SD)		
Verbal SS	3.98 (.98)	4.35 (.77)	3.17	-.42
Nonverbal SS	3.65 (1.07)	4.01 (.84)	2.53	-.37
Affiliation	3.69 (1.04)	4.08 (.83)	3.09	-.41
Overall SS	3.48 (1.11)	3.90 (.91)	2.96	-.41

Table 9: Average Percent Correct of Social Cognitive Variables for Social Anhedonia and Control Groups after Excluding Participants who Scored at or above BDI-II Cutoff

	Social Anhedonia (<i>n</i> = 29)	Controls (<i>n</i> = 45)	<i>F</i>
MASC Total	80.1	80.0	.00
Eyes	75.9	75.5	.04
ER40	82.6	82.6	.00

MASC = Movie for the Assessment of Social Competence; Eyes = Reading the Mind in the Eyes Test; ER40 = Penn Emotion Recognition Test

APPENDIX A

Revised Social Anhedonia Scale

1. Having close friends is not as important as many people say.
2. I attach very little importance to having close friends.
3. I prefer watching television to going out with other people.
4. A car ride is much more enjoyable if someone is with me.
5. I like to make long distance phone calls to friends and relatives.
6. Playing with children is a real chore.
7. I have always enjoyed looking at photographs of friends.
8. Although there are things that I enjoy doing by myself, I usually seem to have more fun when I do things with other people.
9. I sometimes become deeply attached to people I spend a lot of time with.
10. People sometimes think that I am shy when I really just want to be left alone.
11. When things are going really good for my close friends, it makes me feel good too.
12. When someone close to me is depressed, it brings me down also.
13. My emotional responses seem very different from those of other people.
14. When I am alone, I often resent people telephoning me or knocking at my door.
15. Just being with friends can make me feel really good.
16. When things are bothering me, I like to talk to other people about it.
17. I prefer hobbies and leisure activities that do not involve other people.
18. It's fun to sing with other people.
19. Knowing that I have friends who care about me gives me a sense of security.
20. When I move to a new city, I feel a strong need to make new friends.
21. People are usually better off if they stay aloof from emotional involvements with most others.

22. Although I know I should have affection for certain people, I don't really feel it.
23. People often expect me to spend more time talking with them than I would like.
24. I feel pleased and gratified as I learn more and more about the emotional life of my friends.
25. When others try to tell me about their problems and hang-ups, I usually listen with interest and attention.
26. I never had really close friends in high school.
27. I am usually content to just sit alone, thinking and day-dreaming.
28. I'm much too independent to really get involved with other people.
29. There are few things more tiring than to have a long, personal discussion with someone.
30. It made me sad to see all my high school friends go their separate ways when high school was over.
31. I have often found it hard to resist talking to a good friend, even when I have other things to do.
32. Making new friends isn't worth the energy it takes.
33. There are things that are more important to me than privacy.
34. People who try to get to know me better usually give up after awhile.
35. I could be happy living all alone in a cabin in the woods or mountain.
36. If given the choice, I would much rather be with others than be alone.
37. I find that people too often assume that their daily activities and opinions will be interesting to me.
38. I don't really feel very close to my friends.
39. My relationships with other people never get very intense.
40. In many ways, I prefer the company of pets to the company of people.

APPENDIX B

Infrequency Scale

1. On some mornings, I didn't get out of bed immediately when I first woke up.
2. There have been a number of occasions when people I know have said hello to me.
3. There have been times when I have dialed a telephone number only to find the line was busy.
4. At times when I was ill or tired, I have felt like going to bed early.
5. On some occasions I have noticed that some other people are better dressed than myself.
6. Driving from New York to San Francisco is generally faster than flying between these cities.
7. I believe that most light bulbs are powered by electricity.
8. I go at least once every two years to visit either northern Scotland or some part of Scandinavia.
9. I cannot remember a time when I talked with someone who wore glasses.
10. Sometimes when walking down the sidewalk, I have seen children playing.
11. I have never combed my hair before going out in the morning.
12. I find that I often walk with a limp, which is the result of a skydiving accident.
13. I cannot remember a single occasion when I have ridden on a bus.

APPENDIX C

Schizotypal Personality Questionnaire

Please answer each item by checking Y (Yes) or N (No). Answer *all* items even if unsure of your answer. When you have finished, check over each one to make sure you have answered them.

1. Do you sometimes feel that things you see on the TV or read in the newspaper have a special meaning for you? <input type="checkbox"/> Yes <input type="checkbox"/> No
2. I sometimes avoid going to places where there will be many people because I will get anxious. <input type="checkbox"/> Yes <input type="checkbox"/> No
3. Have you had experiences with the supernatural? <input type="checkbox"/> Yes <input type="checkbox"/> No
4. Have you often mistaken objects or shadows for people, or noises for voices? <input type="checkbox"/> Yes <input type="checkbox"/> No
5. Other people see me as slightly eccentric (odd). <input type="checkbox"/> Yes <input type="checkbox"/> No
6. I have little interest in getting to know other people. <input type="checkbox"/> Yes <input type="checkbox"/> No
7. People sometimes find it hard to understand what I am saying. <input type="checkbox"/> Yes <input type="checkbox"/> No
8. People sometimes find me aloof and distant. <input type="checkbox"/> Yes <input type="checkbox"/> No

9. I am sure I am being talked about behind my back. <input type="checkbox"/> Yes <input type="checkbox"/> No
10. I am aware that people notice me when I go out for a meal or to see a film. <input type="checkbox"/> Yes <input type="checkbox"/> No
11. I get very nervous when I have to make polite conversation. <input type="checkbox"/> Yes <input type="checkbox"/> No
12. Do you believe in telepathy (mind-reading)? <input type="checkbox"/> Yes <input type="checkbox"/> No
13. Have you ever had the sense that some person or force is around you, even though you cannot see anyone? <input type="checkbox"/> Yes <input type="checkbox"/> No
14. People sometimes comment on my unusual mannerisms and habits. <input type="checkbox"/> Yes <input type="checkbox"/> No
15. I prefer to keep to myself. <input type="checkbox"/> Yes <input type="checkbox"/> No
16. I sometimes jump quickly from one topic to another when speaking. <input type="checkbox"/> Yes <input type="checkbox"/> No
17. I am not good at expressing my true feelings by the way I talk and look. <input type="checkbox"/> Yes <input type="checkbox"/> No
18. Do you often feel that other people have it in for you? <input type="checkbox"/> Yes <input type="checkbox"/> No
19. Do some people drop hints about you or say things with a double meaning? <input type="checkbox"/> Yes <input type="checkbox"/> No

20. Do you ever get nervous when someone is walking behind you? <input type="checkbox"/> Yes <input type="checkbox"/> No
21. Are you sometimes sure that other people can tell what you are thinking? <input type="checkbox"/> Yes <input type="checkbox"/> No
22. When you look at a person, or yourself in a mirror, have you ever seen the face change right before your eyes? <input type="checkbox"/> Yes <input type="checkbox"/> No
23. Sometimes other people think that I am a little strange. <input type="checkbox"/> Yes <input type="checkbox"/> No
24. I am mostly quiet when with other people. <input type="checkbox"/> Yes <input type="checkbox"/> No
25. I sometimes forget what I am trying to say. <input type="checkbox"/> Yes <input type="checkbox"/> No
26. I rarely laugh and smile. <input type="checkbox"/> Yes <input type="checkbox"/> No
27. Do you sometimes get concerned that friends or coworkers are not really loyal or trustworthy? <input type="checkbox"/> Yes <input type="checkbox"/> No
28. Have you ever noticed a common event or object that seemed to be a special sign for you? <input type="checkbox"/> Yes <input type="checkbox"/> No
29. I get anxious when meeting people for the first time. <input type="checkbox"/> Yes <input type="checkbox"/> No

<p>30. Do you believe in clairvoyancy (psychic forces, fortune telling)?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>
<p>31. I often hear a voice speaking my thoughts aloud.</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>
<p>32. Some people think I am a very bizarre person.</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>
<p>33. I find it hard to be emotionally close to other people.</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>
<p>34. I often ramble on too much when speaking.</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>
<p>35. My nonverbal communication (smiling and nodding during a conversation) is not very good.</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>
<p>36. I feel I have to be on my guard even with friends.</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>
<p>37. Do you sometimes see special meanings in advertisements, shop windows, or in the way things are arranged around you?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>
<p>38. Do you often feel nervous when you are in a group of unfamiliar people?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>
<p>39. Can other people feel your feelings when they are not there?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>
<p>40. Have you ever seen things invisible to other people?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>

<p>41. Do you feel that there is no one you are really close to outside your immediate family, or people you can confide in or talk to about personal problems?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>42. Some people find me a bit vague and elusive during a conversation.</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>43. I am poor at returning social courtesies and gestures.</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>44. Do you often pick up hidden threats or put-downs from what people say or do?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>45. When shopping do you get the feeling that other people are taking notice of you?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>46. I feel very uncomfortable in social situations involving unfamiliar people.</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>47. Have you had experiences with astrology, seeing the future, UFOs, ESP, or a sixth sense?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>48. Do everyday things seem unusually large or small?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>49. Writing letters to friends is more trouble than it is worth.</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>50. I sometimes use words in unusual ways.</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>

<p>51. I tend to avoid eye contact when conversing with others.</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>52. Have you found that it is best not to let other people know too much about you?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>53. When you see people talking to each other, do you often wonder if they are talking about you?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>54. I would feel very anxious if I had to give a speech in front of a large group of people.</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>55. Have you ever felt that you are communicating with another person telepathically (by mind-reading)?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>56. Does your sense of smell sometimes become unusually strong?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>57. I tend to keep in the background on social occasions.</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>58. Do you tend to wander off the topic when having a conversation?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>59. I often feel that others have it in for me.</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>60. Do you sometimes feel that other people are watching you?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>

61. Do you ever suddenly feel distracted by distant sounds that you are not normally aware of? <input type="checkbox"/> Yes <input type="checkbox"/> No
62. I attach little importance to having close friends. <input type="checkbox"/> Yes <input type="checkbox"/> No
63. Do you sometimes feel that people are talking about you? <input type="checkbox"/> Yes <input type="checkbox"/> No
64. Are your thoughts sometimes so strong that you can almost hear them? <input type="checkbox"/> Yes <input type="checkbox"/> No
65. Do you often have to keep an eye out to stop people from taking advantage of you? <input type="checkbox"/> Yes <input type="checkbox"/> No
66. Do you feel that you cannot get “close” to people? <input type="checkbox"/> Yes <input type="checkbox"/> No
67. I am an odd, unusual person. <input type="checkbox"/> Yes <input type="checkbox"/> No
68. I do not have an expressive and lively way of speaking. <input type="checkbox"/> Yes <input type="checkbox"/> No
69. I find it hard to communicate clearly what I want to say to people. <input type="checkbox"/> Yes <input type="checkbox"/> No
70. I have some eccentric (odd) habits. <input type="checkbox"/> Yes <input type="checkbox"/> No
71. I feel very uneasy talking to people I do not know well. <input type="checkbox"/> Yes <input type="checkbox"/> No

<p>72. People occasionally comment that my conversation is confusing.</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>
<p>73. I tend to keep my feelings to myself.</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>
<p>74. People sometimes stare at me because of my odd appearance.</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>

APPENDIX D

Social Adjustment Scale

1. What best describes your school program?

Full Time

3/4 Time

Half Time

2. How many days of classes did you miss in the last 2 weeks?

No days missed

A few days missed

I missed about half the time

Missed more than half the time but did make at least one day

I did not go to classes at all

I was on vacation all of the last two weeks

3. Have you kept up with your class work in the last two weeks?

I did my work very well

I did my work but had some minor problems

I needed help with work and needed help about half the time

I did my work poorly most of the time

I did my work poorly all the time

4. During the last 2 weeks have you been ashamed of how you do your school work?

I never felt ashamed

Once or twice I felt a little ashamed

About half the time I felt ashamed

I felt ashamed most of the time

I felt ashamed all of the time

5. Have you had any arguments with people at school in the last 2 weeks?

I had no arguments and got along very well

I usually got along well but had minor arguments

I had more than one argument

I had many arguments

I was constantly in arguments

6. Have you felt upset at school during the last 2 weeks?

I never felt upset

Once or twice I felt upset

Half the time I felt upset

I felt upset most of the time

I felt upset all of the time

7. Have you found your school work interesting these last 2 weeks?

My work was almost always interesting

Once or twice my work was not interesting

Half the time my work was uninteresting

Most of the time my work was uninteresting

My work was almost always uninteresting

8. How many friends have you seen or spoken to on the telephone in the last 2 weeks?

Nine or more friends

Five to eight friends

Two to four friends

One friend

No friends

9. Have you been able to talk about your feelings and problems with at least one friend during the last 2 weeks?

I can always talk about my innermost feelings

I usually can talk about my feelings

About half the time I felt able to talk about my feelings

I usually was not able to talk about my feelings

I was never able to talk about my feelings

Not applicable; I have no friends

10. How many times in the last 2 weeks have you gone out socially with other people? For example, visited friends, gone to movies, bowling, church, restaurants, and invited friends to your home?

More than 3 times

Three times

Twice

Once

None

11. How much time have you spent on hobbies or spare time interests during the last 2 weeks? For example, bowling, sewing, gardening, sports, reading?

I spent most of my spare time on hobbies almost every day

I spent some spare time on hobbies some of the days

I spent a little time on hobbies

I usually did not spend any time on hobbies but did watch TV

I did not spend any spare time on hobbies or watching TV

12. Have you had open arguments with your friends in the past 2 weeks?

- I had no arguments and got along very well
- I usually got along but had minor arguments
- I had more than one argument
- I had many arguments
- I was constantly in arguments
- Not applicable; I have no friends

13. If your feelings were hurt or offended by a friend in the past 2 weeks, how badly did you take it?

- It did not affect me or it did not happen
- I got over it in a few hours
- I got over it in a few days
- I got over it in a week
- It will take me months to recover
- Not applicable; I have no friends

14. Have you felt shy or uncomfortable with people in the last 2 weeks?

- I always feel comfortable
- Sometimes I feel uncomfortable but could relax after a while
- About half the time I feel uncomfortable
- I usually felt uncomfortable
- I always feel uncomfortable
- Not applicable; I was never with people

15. Have you felt lonely and wished for more friends during the last 2 weeks?

- I have not felt lonely
- I have felt lonely a few times
- About half the time I felt lonely
- I usually felt lonely
- I always felt lonely and wished for more friends

16. Have you felt bored in your spare time during the last 2 weeks?

- I never felt bored
- I usually did not feel bored
- About half the time I felt bored
- Most of the time I felt bored
- I was constantly bored

17. How many times have you been with a date in the last 2 weeks?

- More than 3 times
- Three times

- Twice
- Once
- None

18. Have you been interested in dating during the last 2 weeks? If you have not dated, would you have liked to?

- I always interested in dating
- Most of the time I was interested
- About half the time I was interested
- Most of the time I was not interested
- I was completely uninterested

The following questions concern your parents and siblings

19. Have you been in contact with any of them in the last 2 weeks?

- Yes, please go to question
- No, please go to question

20. Have you had open arguments with your relatives in the past 2 weeks?

- We always got along very well
- We usually got along very well but had some minor arguments
- I had more than one argument with at least one relative
- I had many arguments
- I was constantly in arguments

21. Have you been able to talk about your feelings and problems with at least one friend during the last 2 weeks?

- I can always talk about my feelings with at least one relative
- I usually can talk about my feelings
- About half the time I felt able to talk about my feelings
- I usually was not able to talk about my feelings
- I was never able to talk about my feelings

22. Have you avoided contact with your relatives these last 2 weeks?

- I have contacted relatives regularly
- I have contacted a relative at least one
- I have waited for my relatives to contact me
- I avoided my relatives, but they contacted me
- I have no contacts with my relatives

23. Did you depend on your relatives for help, advice, money, or friendship during the last 2 weeks?

- I never need to depend on them

- I usually did not need to depend on them
- About half the time I needed to depend on them
- Most of the time I depend on them
- I depend completely on them

24. Have you wanted to do the opposite of what your relatives wanted in order to make them angry during the last 2 weeks?

- I never wanted to oppose them
- Once or twice I wanted to oppose them
- About half the time I wanted to oppose them
- Most of the time I wanted to oppose them
- I always oppose them

25. Have you been worried about things happening to your relatives without good reason in the last 2 weeks?

- I have not worried without reason
- Once or twice I worried
- About half the time I worried
- Most of the time I worried
- I have worried the entire time

26. During the last 2 weeks, have you been thinking that you let any of your relatives down or have been unfair to them at any time?

- I did not feel that I let them down at all
- I usually did not feel that I let them down
- About half the time I felt that I let them down
- Most of the time I have felt that I let them down
- I always felt that I let them down

27. During the last 2 weeks have you been thinking that any of your relatives have let you down or have been unfair to you at any time?

- I never felt that they let me down at all
- I felt that they usually let me down
- About half the time I felt that they let me down
- I usually have felt that they let me down
- I am very bitter that they let me down

Appendix E

Social Support Questionnaire

INSTRUCTIONS: The following questions ask about people in your environment who provide you with help or support. Each question has two parts. For the **first** part, list all the people you know, excluding yourself, whom you can count on for help or support in the manner described. Give the person's initials and their relationship to you (see example). Then, write in the box the number of people you have listed. Do not list more than one person next to each of the numbers beneath the question.

For the **second** part, fill in the bubble to the left of the statement that represents how satisfied you are with the overall support you have.

If you have had **no support** for a question, fill in the bubble for "no one," but still rate your level of satisfaction.

Do not list more than nine persons per question.

Please answer all the questions as best as you can. All your responses will be kept confidential.

EXAMPLE

Who do you know whom you can trust with information that could get you in trouble?

_____ No one	1) T.M. (brother)	4) T.N. (father)	7)
	2) L.M. (friend)	5) L.M. (employer)	8)
	3) R. S. (friend)	6)	9)

How satisfied?

_____ very satisfied	_____ fairly satisfied	_____ a little satisfied
_____ a little dissatisfied	_____ fairly dissatisfied	_____ very dissatisfied

TURN PAGE OVER TO BEGIN QUESTIONNAIRE

1) Whom can you really count on to be dependable when you need help?

_____ No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

2) How satisfied?

_____ very satisfied	_____ fairly satisfied	_____ a little satisfied
_____ a little dissatisfied	_____ fairly dissatisfied	_____ very dissatisfied

3) Whom can you really count on to help you feel more relaxed when you are under pressure or tense?

_____ No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

4) How satisfied?

_____ very satisfied	_____ fairly satisfied	_____ a little satisfied
_____ a little dissatisfied	_____ fairly dissatisfied	_____ very dissatisfied

5) Who accepts you totally, including both your worst and your best points?

_____ No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

6) How satisfied?

_____ very satisfied	_____ fairly satisfied	_____ a little satisfied
_____ a little dissatisfied	_____ fairly dissatisfied	_____ very dissatisfied

7) Whom can you really count on to care about you, regardless of what is happening to you?

_____ No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

8) How satisfied?

_____ very satisfied	_____ fairly satisfied	_____ a little satisfied
_____ a little dissatisfied	_____ fairly dissatisfied	_____ very dissatisfied

9) Whom can you really count on to help you feel better when you are feeling generally down-in-the-dumps?

_____ No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

10) How satisfied?

_____ very satisfied	_____ fairly satisfied	_____ a little satisfied
_____ a little dissatisfied	_____ fairly dissatisfied	_____ very dissatisfied

11) Whom can you count on to console you when you are very upset?

_____ No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

12) How satisfied?

_____ very satisfied	_____ fairly satisfied	_____ a little satisfied
_____ a little dissatisfied	_____ fairly dissatisfied	_____ very dissatisfied

APPENDIX F

Beck Depression Inventory-II

Participant	Date / /		Assessor	BDI-II
<p>Instructions: Please read each group of statements carefully, then pick out the one statement in each group which best describes the way you have been feeling during the past 2 weeks including today! Circle the number beside the statement you have picked.</p> <p>If several statements in the group seem to apply equally well, simply circle the statement which has the largest number. Be sure that you do not circle more than one statement for Item 16 (change in sleeping pattern) and Item 18 (change in appetite.)</p>				
<p>1 Sadness</p> <ul style="list-style-type: none"> <input type="checkbox"/> 0 I do not feel sad. <input type="checkbox"/> 1 I feel sad much of the time. <input type="checkbox"/> 2 I am sad all the time. <input type="checkbox"/> 3 I am so sad or unhappy that I can't stand it. 				
<p>2 Pessimism</p> <ul style="list-style-type: none"> <input type="checkbox"/> 0 I am not discouraged about my future. <input type="checkbox"/> 1 I feel more discouraged about my future than I used to be. <input type="checkbox"/> 2 I do not expect things to work out for me. <input type="checkbox"/> 3 I feel my future is hopeless and will only get worse. 				
<p>3 Past Failure</p> <ul style="list-style-type: none"> <input type="checkbox"/> 0 I do not feel like a failure. <input type="checkbox"/> 1 I have failed more than I should have. <input type="checkbox"/> 2 As I look back, I see a lot of failures. <input type="checkbox"/> 3 I feel I am a total failure as a person. 				
<p>4 Loss of Pleasure</p> <ul style="list-style-type: none"> <input type="checkbox"/> 0 I get as much pleasure as I ever did from the things I enjoy. <input type="checkbox"/> 1 I don't enjoy things as much as I used to. <input type="checkbox"/> 2 I get very little pleasure from the things I used to enjoy. <input type="checkbox"/> 3 I can't get any pleasure from the things I used to enjoy. 				
<p>5 Guilty Feelings</p> <ul style="list-style-type: none"> <input type="checkbox"/> 0 I don't feel particularly guilty. <input type="checkbox"/> 1 I feel guilty over many things I have done or should have done. <input type="checkbox"/> 2 I feel quite guilty most of the time. <input type="checkbox"/> 3 I feel guilty all of the time. 				

6	Punishment Feelings	<input type="checkbox"/> 0 I don't feel I am being punished. <input type="checkbox"/> 1 I feel I may be punished. <input type="checkbox"/> 2 I expect to be punished. <input type="checkbox"/> 3 I feel I am being punished.
7	Self Dislike	<input type="checkbox"/> 0 I feel the same about myself as ever. <input type="checkbox"/> 1 I have lost confidence in myself. <input type="checkbox"/> 2 I am disappointed in myself. <input type="checkbox"/> 3 I dislike myself.
8	Self Criticalness	<input type="checkbox"/> 0 I don't criticize or blame myself more than usual. <input type="checkbox"/> 1 I am more critical of myself than I used to be. <input type="checkbox"/> 2 I criticize myself for all of my faults. <input type="checkbox"/> 3 I blame myself for everything bad that happens.
9	Suicidal Thoughts or Wishes	<input type="checkbox"/> 0 I don't have any thoughts of killing myself. <input type="checkbox"/> 1 I have thoughts of killing myself, but I would not carry them out. <input type="checkbox"/> 2 I would like to kill myself. <input type="checkbox"/> 3 I would kill myself if I had the chance.
10	Crying	<input type="checkbox"/> 0 I don't cry any more than I used to. <input type="checkbox"/> 1 I cry more than I used to. <input type="checkbox"/> 2 I cry over every little thing. <input type="checkbox"/> 3 I feel like crying but I can't.
11	Agitation	<input type="checkbox"/> 0 I am no more restless or wound up than usual. <input type="checkbox"/> 1 I feel more restless or wound up than usual. <input type="checkbox"/> 2 I am so restless or agitated that it's hard to stay still. <input type="checkbox"/> 3 I am so restless or agitated I have to keep moving or doing something.
12	Loss of Interest	<input type="checkbox"/> 0 I have not lost interest in other people or activities. <input type="checkbox"/> 1 I am less interested in other people or things than before. <input type="checkbox"/> 2 I have lost most of my interest in other people or things. <input type="checkbox"/> 3 It's hard to get interested in anything.
13	Indecisiveness	<input type="checkbox"/> 0 I make decisions about as well as ever. <input type="checkbox"/> 1 I find it more difficult to make decisions than usual. <input type="checkbox"/> 2 I have much greater difficulty in making decisions than I used to. <input type="checkbox"/> 3 I have trouble making any decisions.

14

Worthlessness

- 0 I do not feel I am worthless.
- 1 I don't consider myself as worthwhile or useful as I used to.
- 2 I feel more worthless as compared to other people.
- 3 I feel utterly worthless.

15

Loss of Energy

- 0 I have as much energy as ever.
- 1 I have less energy than I used to have.
- 2 I don't have enough energy to do very much.
- 3 I don't have enough energy to do anything.

16

Change in Sleeping Pattern

- 0 I have not experienced any change in my sleeping pattern.

- 1a I sleep somewhat more than usual.
- 1b I sleep somewhat less than usual.

- 2a I sleep a lot more than usual.
- 2b I sleep a lot less than usual.

- 3a I sleep most of the day.
- 3b I wake up 1-2 hours early and can't get back to sleep.

17

Irritability

- 0 I am no more irritable than usual.
- 1 I am more irritable than usual.
- 2 I am much more irritable than usual.
- 3 I am irritable all the time.

18

Change in Appetite

- 0 I have not experienced any change in my appetite.

- 1a My appetite is somewhat less than usual.
- 1b My appetite is somewhat greater than usual.

- 2a My appetite is much less than before.
- 2b My appetite is much greater than usual.

- 3a I have no appetite at all.
- 3b I crave food all the time.

19

Concentration Difficulty

- 0 I can concentrate as well as ever.
- 1 I can't concentrate as well as usual.
- 2 It's hard to keep my mind on anything for very long.
- 3 I find I can't concentrate on anything.

20

Tiredness or Fatigue

- 0 I am no more tired or fatigued than usual.
- 1 I get more tired or fatigued more easily than usual.
- 2 I am too tired or fatigued to do a lot of things I used to do.
- 3 I am too tired or fatigued to do most of the things I used to do.

21

Loss of Interest in Sex

- 0 I have not noticed any recent change in my interest in sex.
- 1 I am less interested in sex than I used to be.
- 2 I am much less interested in sex now.
- 3 I have lost interest in sex completely.

APPENDIX G

Penn Emotion Recognition Test

Test Title: er40

Current Version: 1.01

Aliases: Penn Emotion Recognition Task, ER40.

Estimated Duration:

N = 791; time unit = minutes

range	median	10%	25%	50%	75%	90%
1.6 to 10.6	3.4	2.4	2.8	3.4	4.2	5.2

Cognitive Domain Tested: emotion recognition

Test Description:

The ER40 is a measure of emotion recognition. Participants are shown a series of 40 faces, one at a time, and asked to determine what emotion the face is showing for each trial. There are 5 answer choices: happy, sad, anger, fear and no emotion. Participants respond to each trial by clicking with the mouse on the word describing the emotion each faces expresses. There are 4 female faces for each emotion (4 x 5 = 20) and 4 male faces for each emotion (4 x 5 = 20).

Note: The faces are colored pictures taken, analyzed and rated as described in [1, 2, 3]. They derive from the University of Pennsylvania Emotion Recognition Task, 96 faces version, balanced for equality and intensity of emotion, age, gender and ethnicity [2].

Rules & Variables:

The scores are based on the number of correct responses for female versus male faces; the number of correct happy, sad, anger, fear and no emotion faces; the number of false positives for happy, sad, anger, fear and no emotion faces; and the number of mild and number of intense emotion expressions correctly identified. Median response times are given for all of these categories.

Practice Trials:

Summary:

The participant practices with one emotional face displaying intense anger.

□ Presentation: 1 question.

□ Description: one question where the participant must choose "Anger".

□ Time: forced-choice - the participant must click with the mouse on one of the emotion description buttons; otherwise, the question will remain on the computer screen.

□ Feedback: correct or incorrect feedback pages are presented after the practice question. Both correct and incorrect feedback pages let the participant know that anger was the correct answer choice. If the participant chose an incorrect emotion, he/she will return to the practice question and answer it again. The incorrect feedback page is the same and will continue to show until the participant answers the practice question correctly. Once the correct answer is given, the participant will move to the test trials.

Test Trials

Summary:

The test consists of 40 questions for which the participant determines the emotion each face is showing.

Presentation: 40 questions, randomized.

Description: the participant must choose, by clicking with the mouse, one of the emotions to the right of the page labeled happy, sad, anger, fear and no emotion for each of the 40 test trials.

Time: forced-choice - the participant must click with the mouse on one of the emotion description buttons; otherwise, the question will remain on the computer screen.

Feedback: none.

Test Trials

Summary:

The test consists of 40 questions for which the participant determines the emotion each face is showing.

Presentation: 40 questions, randomized.

Description: the participant must choose, by clicking with the mouse, one of the emotions to the right of the page labeled happy, sad, anger, fear and no emotion for each of the 40 test trials.

Time: forced-choice - the participant must click with the mouse on one of the emotion description buttons; otherwise, the question will remain on the computer screen.

Feedback: none.

APPENDIX H

Reading the Mind in the Eyes Test

WORD DEFINITIONS

ACCUSING	blaming The policeman was accusing the man of stealing a wallet.
AFFECTIONATE	showing fondness towards someone Most mothers are affectionate to their babies by giving them lots of kisses and cuddles.
AGHAST	horrified, astonished, alarmed Jane was aghast when she discovered her house had been burgled.
ALARMED	fearful, worried, filled with anxiety Claire was alarmed when she thought she was being followed home.
AMUSED	finding something funny I was amused by a funny joke someone told me.
ANNOYED	irritated, displeased Jack was annoyed when he found out he had missed the last bus home.
ANTICIPATING	expecting At the start of the football match, the fans were anticipating a quick goal.
ANXIOUS	worried, tense, uneasy The student was feeling anxious before taking her final exams.
APOLOGETIC	feeling sorry The waiter was very apologetic when he spilt soup all over the customer.
ARROGANT	conceited, self-important, having a big opinion of oneself The arrogant man thought he knew more about politics than everyone else in the room.
ASHAMED	overcome with shame or guilt The boy felt ashamed when his mother discovered him stealing money from her purse.

ASSERTIVE	confident, dominant, sure of oneself The assertive woman demanded that the shop give her a refund.
BAFFLED	confused, puzzled, dumbfounded The detectives were completely baffled by the murder case.
BEWILDERED	utterly confused, puzzled, dazed The child was bewildered when visiting the big city for the first time.
CAUTIOUS	careful, wary Sarah was always a bit cautious when talking to someone she did not know.
COMFORTING	consoling, compassionate The nurse was comforting the wounded soldier.
CONCERNED	worried, troubled The doctor was concerned when his patient took a turn for the worse.
CONFIDENT	self-assured, believing in oneself The tennis player was feeling very confident about winning his match.
CONFUSED	puzzled, perplexed Lizzie was so confused by the directions given to her, she got lost.
CONTEMPLATIVE	reflective, thoughtful, considering John was in a contemplative mood on the eve of his 60 th birthday.
CONTENTED	satisfied After a nice walk and a good meal, David felt very contented .
CONVINCED	certain, absolutely positive Richard was convinced he had come to the right decision.
CURIOUS	inquisitive, inquiring, prying Louise was curious about the strange shaped parcel.
DECIDING	making your mind up The man was deciding whom to vote for in the election.
DECISIVE	already made your mind up Jane looked very decisive as she walked into the polling

	station.
DEFIANT	insolent, bold, don't care what anyone else thinks The animal protester remained defiant even after being sent to prison.
DEPRESSED	miserable George was depressed when he didn't receive any birthday cards.
DESIRE	passion, lust, longing for Kate had a strong desire for chocolate.
DESPONDENT	gloomy, despairing, without hope Gary was despondent when he did not get the job he wanted.
DISAPPOINTED	displeased, disgruntled Manchester United fans were disappointed not to win the Championship.
DISPIRITED	glum, miserable, low Adam was dispirited when he failed his exams.
DISTRUSTFUL	suspicious, doubtful, wary The old woman was distrustful of the stranger at her door.
DOMINANT	commanding, bossy The sergeant major looked dominant as he inspected the new recruits.
DOUBTFUL	dubious, suspicious, not really believing Mary was doubtful that her son was telling the truth.
DUBIOUS	doubtful, suspicious Peter was dubious when offered a surprisingly cheap television in a pub.
EAGER	keen On Christmas morning, the children were eager to open their presents.
EARNEST	having a serious intention Harry was very earnest about his religious beliefs.
EMBARRASSED	ashamed After forgetting a colleague's name, Jenny felt very embarrassed .

ENCOURAGING	hopeful, heartening, supporting All the parents were encouraging their children in the school sports day.
ENTERTAINED	absorbed and amused or pleased by something I was very entertained by the magician.
ENTHUSIASTIC	very eager, keen Susan felt very enthusiastic about her new fitness plan.
FANTASIZING	daydreaming Emma was fantasizing about being a film star.
FASCINATED	captivated, really interested At the seaside, the children were fascinated by the creatures in the rock pools.
FEARFUL	terrified, worried In the dark streets, the women felt fearful .
FLIRTATIOUS	brazen, saucy, teasing, playful Connie was accused of being flirtatious when she winked at a stranger at a party.
FLUSTERED	confused, nervous and upset Sarah felt a bit flustered when she realised how late she was for the meeting and that she had forgotten an important document.
FRIENDLY	sociable, amiable The friendly girl showed the tourists the way to the town centre.
GRATEFUL	thankful Kelly was very grateful for the kindness shown by the stranger.
GUILTY	feeling sorry for doing something wrong Charlie felt guilty about having an affair.
HATEFUL	showing intense dislike The two sisters were hateful to each other and always fighting.
HOPEFUL	optimistic Larry was hopeful that the post would bring good news.
HORRIFIED	terrified, appalled

	The man was horrified to discover that his new wife was already married.
HOSTILE	unfriendly The two neighbours were hostile towards each other because of an argument about loud music.
IMPATIENT	restless, wanting something to happen soon Jane grew increasingly impatient as she waited for her friend who was already 20 minutes late.
IMPLORING	begging, pleading Nicola looked imploring as she tried to persuade her dad to lend her the car.
INCRECULOUS	not believing Simon was incredulous when he heard that he had won the lottery.
INDECISIVE	unsure, hesitant, unable to make your mind up Tammy was so indecisive that she couldn't even decide what to have for lunch.
INDIFFERENT	disinterested, unresponsive, don't care Terry was completely indifferent as to whether they went to the cinema or the pub.
INSISTING	demanding, persisting, maintaining After a work outing, Frank was insisting he paid the bill for everyone.
INSULTING	rude, offensive The football crowd was insulting the referee after he gave a penalty.
INTERESTED	inquiring, curious After seeing Jurassic Park, Hugh grew very interested in dinosaurs.
INTRIGUED	very curious, very interested A mystery phone call intrigued Zoe.
IRRITATED	exasperated, annoyed Frances was irritated by all the junk mail she received.
JEALOUS	envious Tony was jealous of all the taller, better-looking boys in his class.

JOKING	being funny, playful Gary was always joking with his friends.
NERVOUS	apprehensive, tense, worried Just before her job interview, Alice felt very nervous .
OFFENDED	insulted, wounded, having hurt feelings When someone made a joke about her weight, Martha felt very offended .
PANICKED	distraught, feeling of terror or anxiety On waking to find the house on fire, the whole family was panicked .
PENSIVE	thinking about something slightly worrying Susie looked pensive on the way to meeting her boyfriend's parents for the first time.
PERPLEXED	bewildered, puzzled, confused Frank was perplexed by the disappearance of his garden gnomes.
PLAYFUL	full of high spirits and fun Neil was feeling playful at his birthday party.
PREOCCUPIED	absorbed, engrossed in one's own thoughts Worrying about her mother's illness made Debbie preoccupied at work.
PUZZLED	perplexed, bewildered, confused After doing the crossword for an hour, June was still puzzled by one clue.
REASSURING	supporting, encouraging, giving someone confidence Andy tried to look reassuring as he told his wife that her new dress did suit her.
REFLECTIVE	contemplative, thoughtful George was in a reflective mood as he thought about what he'd done with his life.
REGRETFUL	sorry Lee was always regretful that he had never traveled when he was younger.
RELAXED	taking it easy, calm, carefree On holiday, Pam felt happy and relaxed .
RELIEVED	freed from worry or anxiety

	At the restaurant, Ray was relieved to find that he had not forgotten his wallet.
RESENTFUL	bitter, hostile The businessman felt very resentful towards his younger colleague who had been promoted above him.
SARCASTIC	cynical, mocking, scornful The comedian made a sarcastic comment when someone came into the theatre late.
SATISFIED	content, fulfilled Steve felt very satisfied after he had got his new flat just how he wanted it.
SCEPTICAL	doubtful, suspicious, mistrusting Patrick looked sceptical as someone read out his horoscope to him.
SERIOUS	solemn, grave The bank manager looked serious as he refused Nigel an overdraft.
STERN	severe, strict, firm The teacher looked very stern as he told the class off.
SUSPICIOUS	disbelieving, suspecting, doubting After Sam had lost his wallet for the second time at work, he grew suspicious of one of his colleagues.
SYMPATHETIC	kind, compassionate The nurse looked sympathetic as she told the patient the bad news.
TENTATIVE	hesitant, uncertain, cautious Andrew felt a bit tentative as he went into the room full of strangers.
TERRIFIED	alarmed, fearful The boy was terrified when he thought he saw a ghost.
THOUGHTFUL	thinking about something Phil looked thoughtful as he sat waiting for the girlfriend he was about to finish with.
THREATENING	menacing, intimidating The large, drunken man was acting in a very threatening way.

UNEASY	unsettled, apprehensive, troubled Karen felt slightly uneasy about accepting a lift from the man she had only met that day.
UPSET	agitated, worried, uneasy The man was very upset when his mother died.
WORRIED	anxious, fretful, troubled When her cat went missing, the girl was very worried .

Record Sheet

Date of Birth:..... Today's date:.....

Degree subject/occupation:.....

P	jealous	panicked	arrogant	hateful
1	playful	comforting	irritated	bored
2	terrified	upset	arrogant	annoyed
3	joking	flustered	desire	convinced
4	joking	insisting	amused	relaxed
5	irritated	sarcastic	worried	friendly
6	aghast	fantasizing	impatient	alarmed
7	apologetic	friendly	uneasy	dispirited
8	despondent	relieved	shy	excited
9	annoyed	hostile	horrified	preoccupied
10	cautious	insisting	bored	aghast
11	terrified	amused	regretful	flirtatious
12	indifferent	embarrassed	sceptical	dispirited
13	decisive	anticipating	threatening	shy
14	irritated	disappointed	depressed	accusing
15	contemplative	flustered	encouraging	amused
16	irritated	thoughtful	encouraging	sympathetic
17	doubtful	affectionate	playful	aghast
18	decisive	amused	aghast	bored
19	arrogant	grateful	sarcastic	tentative
20	dominant	friendly	guilty	horrified
21	embarrassed	fantasizing	confused	panicked
22	preoccupied	grateful	insisting	imploring
23	contented	apologetic	defiant	curious
24	pensive	irritated	excited	hostile
25	panicked	incredulous	despondent	interested
26	alarmed	shy	hostile	anxious
27	joking	cautious	arrogant	reassuring
28	interested	joking	affectionate	contented
29	impatient	aghast	irritated	reflective
30	grateful	flirtatious	hostile	disappointed
31	ashamed	confident	joking	dispirited
32	serious	ashamed	bewildered	alarmed
33	embarrassed	guilty	fantasizing	concerned
34	aghast	baffled	distrustful	terrified
35	puzzled	nervous	insisting	contemplative
36	ashamed	nervous	suspicious	indecisive

APPENDIX I

Movie for the Assessment of Social Cognition

The MASC is a 46-item video-based assessment of Theory of Mind, in which participants must watch a 15 minute film clip about four characters, Sandra, Michael, Betty, and Cliff, who are meeting for a dinner party on a Saturday night. Sandra and Betty are friends, and Michael and Cliff are friends. Though Michael has a crush on Sandra, she likes his friend, Cliff, who is more reserved and laid-back than Michael. Participants must answer questions regarding the character's mental states at various points during the film clip.

1. What is Sandra feeling?
 - a. Her hair does not look that nice
 - b. She is pleased about his compliment
 - c. She is exasperated about Michael coming on too strong
 - d. She is flattered but somewhat taken by surprise**
2. Why is Michael saying this?
 - a. He wants to impress her with his good athletic abilities
 - b. He wants to meet Sandra alone**
 - c. He is a good tennis player
 - d. He enjoys playing tennis more than having dinner
3. Why is Sandra saying this?
 - a. Because she wants Betty to divert Michael**
 - b. She wants to set up Betty with Michael
 - c. Because Betty is her best friend
 - d. She does not want to be alone with the guys
4. What is Betty feeling?
 - a. She does not really want to go**
 - b. Saturdays are her only days off
 - c. She wants to do something else on Saturday
 - d. She feels used and she does not want to deal with Michael either
5. Why is Sandra saying this?
 - a. If Betty will not come, she will not speak to her anymore
 - b. To try to blackmail Betty into coming on Saturday
 - c. To persuade Betty in a joking way to come**
 - d. Because Betty has better things to do on Saturday
6. What does Michael think Cliff is laughing about?
 - a. Michael's funny comment**
 - b. Cliff will go to the art exhibit
 - c. Michael is a womanizer
 - d. The empty frame
7. Why is Michael saying this?
 - a. To pressure Cliff into coming

- b. He wants to give Cliff back his money
 - c. To give Cliff extra incentive to come**
 - d. He got his pay check yesterday
8. What is Cliff feeling?
- a. Not ready to make a decision
 - b. Conflicted but will likely give in**
 - c. He will miss the art opening
 - d. He looks forward to flirting with Betty
9. What is Cliff feeling?
- a. The apartment is nice
 - b. Afraid of the dog**
 - c. Distressed to be alone with Sandra
 - d. Surprised she has a dog
10. What is Sandra feeling?
- a. She is sure that they will have no dessert
 - b. She is frustrated about the burnt cake**
 - c. She is afraid that the others will laugh at her
 - d. She forgot to bring the coke
11. Why is Cliff saying this?
- a. There are cookies on the table
 - b. He does not like cake that much
 - c. To make Sandra feel better**
 - d. He is attracted to Sandra
12. What is Sandra feeling?
- a. Happy that Cliff is so sensitive
 - b. Cliff is single
 - c. Disappointed that Cliff still thinks about his ex**
 - d. Sorry for Cliff about the breakup
13. What is Cliff feeling?
- a. He likes Sweden
 - b. Nature is the most beautiful thing
 - c. He is proud and happy to be able to tell Sandra about his nice trip to Sweden**
 - d. He is in love with Sandra and wants to impress her with his story
- 13.C How did Cliff likely shave in Sweden?
- a. Outdoors with an electric shaver
 - b. As usual, in the bathroom
 - c. With a razor and cold water**
 - d. In his hotel room
14. What is Sandra feeling?
- a. She feels guilty that her dog is still alive
 - b. She is sure that Cliff loved his dog
 - c. Traveling with a dog is a bad idea
 - d. She feels sorry for Cliff**
15. What is Sandra thinking?
- a. All the flowers were probably very cheap

- b. That Cliff will think she is interested in Michael
 - c. That it was nice of him to bring flowers
 - d. She wishes he would not have brought the flowers**
16. Why is Michael saying this?
- a. Because the vase is just right for the flowers
 - b. To expose Cliff, who did not bring anything
 - c. To highlight how nice it was of him to bring the flowers**
 - d. To praise her for arranging the flowers nicely
17. Why is Michael telling this story?
- a. For Sandra to realize that he is the best guy to date
 - b. He wants to impress Sandra**
 - c. He thinks the story is interesting
 - d. The incident just happened today
18. What is Sandra thinking?
- a. That Michael talks very fast
 - b. That Michael is a show off**
 - c. That Michael is a helpful person
 - d. That Michael is not telling the truth
19. Why is Sandra asking this?
- a. To integrate Cliff in the conversation**
 - b. To see if Michael was in Sweden too
 - c. To get back to the Sweden topic
 - d. To be able to compare the two guys
20. What is Sandra feeling?
- a. Happy that Betty likes Cliff
 - b. The flowers are not really nice
 - c. Disappointed that Cliff didn't bring flowers
 - d. Embarrassed about Betty's remark**
21. Why is Cliff saying this?
- a. He wants them to know that he would bring chocolates
 - b. He is too modest to take credit for something he did not do
 - c. He did not bring anything for Sandra
 - d. He wants to diffuse the awkwardness of the situation**
22. What is Sandra feeling?
- a. Thankful that Cliff eased the tension**
 - b. Disappointed that Cliff did not bring her chocolates
 - c. Pleased that Cliff would bring something different
 - d. Chocolates are better than flowers
23. Why is Betty saying this?
- a. Because she is afraid she ruined the night
 - b. Because Sandra is her good friend
 - c. Because she was confused about who brought the flowers
 - d. To apologize for the remark**
24. What is Betty thinking?
- a. That the champagne will probably spill
 - b. That he will have no problem opening the bottle

- c. **That Michael is bragging**
 - d. She is impressed that he is such an experienced guy
25. What is Michael feeling?
- a. Embarrassed because it was the wrong toast
 - b. **Disappointed because Sandra seems to like Cliff**
 - c. Hurt that Sandra flirts with Cliff although he brought the flowers
 - d. He did not get to toast with anybody
26. What is Betty feeling?
- a. Angry, her friend forgot she doesn't like sardines
 - b. **Repelled, she doesn't like sardines**
 - c. Sardines are salty and slippery
 - d. Surprised, she didn't expect sardines
27. Why is Betty saying this?
- a. To make him cry and feel humble
 - b. **To pay him back for his nasty remark**
 - c. She thinks he is good at cutting onions
 - d. To make him cut the onions
28. What is Betty thinking?
- a. That Cliff wants to crawl back into his shell
 - b. **That Cliff is timid, she offers Sandra advice**
 - c. That the evening is not going to turn out well
 - d. That she also starts feeling attracted to Cliff
29. What is Sandra thinking?
- a. That she can't think of anything
 - b. That Cliff should start flirting with her
 - c. That Cliff is done with the cutting
 - d. **That Cliff is a nice and helpful person**
30. What is Betty feeling?
- a. Hates Michael and wants him to leave
 - b. Five cups of cream would be too much for the sauce
 - c. **Offended by Michael's comment**
 - d. Astonished that Michael knows she likes cream
31. Why is Betty saying this?
- a. To let Michael know that he will never find a partner
 - b. Because women can't resist Michael's charm
 - c. To end this conversation with Michael
 - d. **To take her revenge on Michael for the remark**
32. Why is Michael saying this?
- a. **To apologize for his comment**
 - b. To take revenge on Betty for her comment
 - c. Because he knows he is not one to talk
 - d. Because he pinches his belly
33. What is Michael feeling?
- a. **Disappointed and left out**
 - b. He is interested in Sandra
 - c. Black and white movies are old fashioned

- d. Embarrassed that he is not good at small talk
- 33.C What kind of pasta sauce are the four characters preparing?
- a. A sauce with sardines
 - b. A sauce with ground meat
 - c. **A sauce with red peppers**
 - d. A sauce with salmon
34. What is Betty feeling?
- a. **She is starting to like Michael**
 - b. Michael is a good friend of Cliff's
 - c. Annoyed, she is laughing at him
 - d. She wishes Michael would be attracted to her
35. Why are Sandra, Cliff, and Michael laughing?
- a. Because this is Betty's third glass of wine
 - b. Because Betty is embarrassingly drunk
 - c. **About Betty's comment and because she has something on her cheek**
 - d. Because "OK José" is a rhyme
36. What does Betty think the others are laughing about?
- a. About this enjoyable evening
 - b. Because she is acting very drunk
 - c. Because she has something on her cheek
 - d. **About her funny comment**
37. Why is Michael saying this?
- a. **He would like to play with Betty and assumes that Sandra will want to play with Cliff**
 - b. He rather plays with Betty than with Sandra
 - c. He has fallen in love with Betty
 - d. He will play with Betty
38. What is Sandra feeling?
- a. She will have to repeat the rules
 - b. She understands that Betty is still not getting the rules
 - c. Ashamed about Betty behaving ridiculously
 - d. **Irritated because Betty is not paying attention**
- 38C. Which chips does Betty have to play?
- a. **The white chips**
 - b. She can pick any color
 - c. The black chips
 - d. The same chips that Cliff played
39. What is Sandra thinking?
- a. That there is no suspense
 - b. That Cliff plays better than Michael
 - c. **That Michael is a show off**
 - d. That she likes Cliff better than Michael
40. What is Michael feeling?
- a. He does not like playing the game
 - b. Angry at Sandra for humiliating him

- c. **Frustrated about his bad performance**
 - d. The others are not much better players either
41. What is Michael trying to do?
- a. **To cheat**
 - b. To push two coins in a pocket
 - c. To make up for his tantrum
 - d. To put the coins back to where they were
42. Why is Michael saying this?
- a. He is bragging again
 - b. He thinks he is a good player
 - c. **He is self-deprecating**
 - d. He is the one to play
43. Why is Betty saying this?
- a. To be alone with Michael and flirt with him
 - b. Because it's not late yet
 - c. Because she feels like another drink
 - d. **To give Sandra a chance to be alone with Cliff**
44. Why is Sandra saying this?
- a. Singles are more fun than doubles
 - b. **She wants Cliff to stay with her**
 - c. She wants to play another game
 - d. She wants to ask Cliff to date her
45. What is Michael feeling?
- a. **Disappointed but accepting that it did not work out with Sandra**
 - b. Content to spend the rest of the night with Betty
 - c. The evening ended in a catastrophe
 - d. Thankful towards Sandra for the nice evening
- 46.C What are Cliff's favorite leisure time activities?
- a. Playing sports
 - b. **Engaging in various cultural activities**
 - c. Going to parties
 - d. Reading books
- 47.C Which of the four characters is involved in a relationship?
- a. **None of them**
 - b. Cliff and Sandra
 - c. Michael
 - d. Betty
- 48.C What was the weather like on that evening?
- a. **Cold and dry**
 - b. Mild and overcast
 - c. Rainy
 - d. Cold and snowy

APPENDIX J

Post-experimental Inquiry

You have now completed all of the questionnaires and assessments, and we'd like to thank you again for participating in our study about how people get to know one another.

What did you think of the study?

Did you think that there was more to this study than we told you about?

If no, please refer to debriefing script.

If yes, prompt further to see what they were suspicious about. Then refer to debriefing script.

_____ Participant was **not** aware of deception. [CODE 1]

_____ Participant was **fully** aware of deception. [CODE 2]

_____ Participant was somewhat aware of deception and/or was suspicious but could not come up with anything specific. [CODE 3]

APPENDIX K

Assessment of Social Skill

(Adapted from the Maryland Assessment of Social Competence)

Subject: _____

Rater: _____

Verbal Social Skill

Very poor Poor Neither good nor poor Somewhat good Very good

Non-Verbal Social Skill

Very poor Poor Neither good nor poor Somewhat good Very good

Affiliation

Very poor Poor Neither good nor poor Somewhat good Very good

Overall Social Skill

Very poor Poor Neither good nor poor Somewhat good Very good

Duration: _____

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