

ABSTRACT

Title of Document: PARSING HEDONIC CAPACITY IN
SCHIZOTYPY: A MULTI-METHOD
ASSESSMENT OF CONSUMMATORY AND
ANTICIPATORY PLEASURE

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This study was an attempt to examine anhedonia (or a reduced capacity to experience pleasant emotion) in individuals with elevated schizotypy. Anhedonia deficits in schizophrenia have been well-documented in studies utilizing self-report and clinician interviews; however, research has also shown that when presented with emotionally evocative stimuli, individuals with schizophrenia respond in a normative manner. One explanation for these paradoxical findings is that individuals with schizophrenia do not lack the capacity to experience pleasure (termed consummatory pleasure), but instead have a deficit in anticipating how pleasurable an event will be outside of the context of an immediately experienced event (known as anticipatory pleasure). Research is beginning to indicate that anticipatory pleasure deficits are evident in the schizophrenia population; however, a number of confounding variables are associated with this population which render conclusions about hedonic capacity difficult. A complimentary approach to examining individuals with schizophrenia is

to identify nonclinical individuals with elevations in traits that are considered to be within the schizophrenia spectrum, namely, schizotypal traits. Utilizing the schizotypy concept first described by Paul Meehl, this study examines hedonic capacity using a multi-method approach (consisting of self-report, clinical interview, and an emotionally evocative stimulus) in schizotypy within a sample of undergraduate college students. Results were able to confirm that individuals with schizophrenia spectrum psychopathology both self-report and are rated as experiencing impairments in the ability to anticipate future pleasure. No group differences in anticipatory pleasure were identified on the laboratory stimulus, raising questions about our understanding of the nature of the anticipatory pleasure deficit in schizophrenia spectrum psychopathology.

PARSING HEDONIC CAPACITY IN SCHIZOTYPY: A MULTI-METHOD
ASSESSMENT OF CONSUMMATORY AND ANTICIPATORY PLEASURE

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Dedication

I dedicate this manuscript to my wonderful and loving husband, Steve Wu. You have been amazingly supportive and patient throughout this process and I truly do not believe I could have done it without you.

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Chapter 1: Hedonic experience in schizophrenia

Introduction

Schizophrenia is a serious mental illness that affects approximately 1% of people worldwide (APA, 2000). It is recognized in every culture (World Health Organization, 1979) with a clinical presentation that includes delusions, hallucinations, disorganized speech, grossly disorganized or catatonic behavior, and negative symptoms (including flattened affect, apathy, and reduced speech output; APA, 2000). There are profound functional impairments associated with the illness, including joblessness (for a review, see Marwaha & Johnson, 2004) and homelessness (for a review, see Folsom & Jeste, 2002). This impairment results in serious economic consequences and it is estimated that the annual cost of the illness in the United States is approximately \$32.5 billion (Rice & Miller, 1998). This cost is comparable to the annual cost of depression, which is a far more prevalent illness (Hu, 2006).

One of the primary predictors of poor functional outcome in schizophrenia is the presence of negative symptoms (e.g., Blanchard, Horan, & Collins, 2005; Dickerson, Ringel, & Parente, 1999; Horan & Blanchard, 2003; Moller, Bottlender, Wegner, Wittmann, & Straub, 2000; Suslow, Schonauer, Ohrmann, Eikelmann, & Recker, 2000). This group of symptoms is conceptualized as a deficit in normal functioning (Huglings-Jackson, 1931) and includes a reduced capacity to experience pleasure (anhedonia), diminished emotional expression (flat affect), poverty of speech

(alogia), lack of drive (avolition), and apathy (McGlashan and Fenton, 1992). Of these symptoms, anhedonia in particular appears to play a prominent and detrimental role in the prognosis and course of the schizophrenia illness.

The symptom of anhedonia has long been recognized as important to the understanding of schizophrenia. Descriptions of anhedonia in schizophrenia can be traced back to Kraepelin (1917) and Bleuler (1911) in their writings on the schizophrenia syndrome. Each described anhedonia as being a critical and basic feature of the illness that negatively impacted the emotional lives of individuals with schizophrenia. Later, in Meehl's (1962) concept of schizotypy, it was posited that anhedonia was an important marker of genetic vulnerability for schizophrenia. As such, he felt that it could be observed both in individuals with schizophrenia and in individuals who were at risk for the development of the illness.

The importance of studying anhedonia is evident when its relationship to long-term functioning in schizophrenia is considered. Even prior to the development of overt psychosis, anhedonia is associated with poor functioning, as this relationship has been observed among individuals believed to be at high-risk for developing schizophrenia, but who have not yet developed the disorder (Freedman, Rock, Roberts, Cornblatt, & Erlenmeyer-Kimling, 1998). Similar results have been found in retrospective studies of individuals with a diagnosis of schizophrenia, where current high levels of anhedonia have been found to be associated with worse premorbid functioning (Katsanis, Iacono, Beiser, & Lacey, 1992). Once the illness has developed this relationship between anhedonia and poor functioning continues as it is related to a worse prognosis amongst individuals experiencing their first episode of

psychosis (Paillere-Martinot, Aubin, Martinot, & Colin, 2000) and poor social functioning during the middle stages of the illness (Blanchard, Mueser, & Bellack, 1998). Thus, the relationship between anhedonia and functional outcome can be found prior to and throughout the course of the illness.

Both self-report questionnaires and clinical interviews have been developed for the measurement of anhedonia. The most commonly used self-report measures of anhedonia are the Chapman Scales of Psychosis Proneness, which conceptualize anhedonia as a deficit that can be divided into both physical and social anhedonia (i.e. Physical Anhedonia Scale; PhA Chapman, Chapman, & Raulin, 1976; Revised Social Anhedonia Scale; RSAS; Eckblad, Chapman, Chapman, & Mishlove, 1982). Physical anhedonia refers to a reduced capacity to derive pleasure from physical sensations, whereas social anhedonia refers to a reduced capacity for experiencing pleasure during social interactions. Both the PhA and RSAS attempt to capture these deficits by presenting participants with true/false statements such as “If given the choice, I’d much rather be alone than be with others” (keyed false) and “The beauty of sunsets is greatly overrated” (keyed true). These questions refer to general traits, rather than to the specific experience of the individual in response to a pleasurable stimulus.

Clinical interview measures have also been developed to capture the anhedonia concept. Two notable scales are the Scale for the Assessment of Negative Symptoms (SANS; Andreasen, 1983) and the negative symptom subscale of the Positive and Negative Syndrome Scale (PANSS: Kay, Fiszbein, & Opler, 1987). The SANS attempts to capture a range of hedonic experiences by querying the interviewee about recreational interests (e.g., “Have you felt interested in the things you usually

enjoy?”), interest in sex (e.g., “Have you noticed any changes in your sex drive?”), and social relationships (e.g., “How would you feel about visiting with your family/parents/spouse, etc.?”). The PANSS, on the other hand focuses mainly on the interviewee’s level of social engagement (e.g., “Do you join in activities with others?”). Both the SANS and the PANSS ask for individuals to report on what their experiences have been like in the recent past, typically within the past week to month.

Numerous studies utilizing these self-report measures and clinical interviews to examine levels of anhedonia have found that individuals with schizophrenia report significant reductions in their capacity to experience pleasure (e.g., Blanchard et al, 1998; Herbener & Harrow, 2002; Horan, Reise, Subotnik, Ventura, & Nuechterlein, 2008; Katsanis et al, 1992; Paillere-Martinot, et al., 2000). The experience of anhedonia, therefore, is consistently observed in this population when using trait and interview measures.

These accounts are further supported by other literature that suggests that individuals with schizophrenia and individuals at risk for schizophrenia experience higher levels of negative affect (i.e., feelings of anger, anxiety, or agitation) and lower levels of positive affect (i.e., happiness, pleasure) than healthy controls (for a review, see Horan, Blanchard, Clark, & Green, 2008). Thus, not only does this population report experiencing lower levels of pleasure than healthy controls, but they also experience higher levels of negative emotions.

These increased levels of anhedonia have been found to be stable over a ten-year period (Herbener & Harrow, 2002) and remain steady despite fluctuations in other symptoms such as depression (Blanchard, Horan, & Brown, 2001) and

psychotic symptoms (Horan et al., 2008). This is consistent with other research that confirms the independence of negative and positive symptoms in schizophrenia (Blanchard et al., 2005; Nakaya, Suwa, & Ohmori, 1999). The implication of these findings is that the reduction in hedonic capacity that is seen in schizophrenia is not merely secondary to other symptoms such as depression or paranoia; instead, these traits represent an enduring deficit that is endogenous to the schizophrenia illness. This independence is further supported by studies that show that negative symptoms are generally not responsive to antipsychotic medication, which should target symptoms of depression and psychosis which may contribute to social isolation (Buchanan, Breier, Kirkpatrick, Ball & Carpenter, 1998; Filbey, Holcomb, Nair, Christensen, & Garver, 1999; Malspina, Goetz, Yale, Berman, Friedman, Trembeau, et al., 2000). Thus, it appears that the symptom of anhedonia is not due to these individuals removing themselves from pleasurable activities due to depression or paranoia.

Given the above, it is clear that anhedonia is an important indicator of outcome and prognosis in schizophrenia, and further, that it is a stable trait that is widely endorsed by individuals with this illness. It is also apparent that both individuals at risk for developing schizophrenia and individuals who already have developed the disorder report elevations of anhedonia on self-report measures, and that these deficits are not secondary to other symptomatology. What is less clear is if these reports reflect an actual reduction in hedonic capacity or if they can be accounted for by other factors. Because this body of evidence has relied on self-report and clinical interview measures of anhedonia and not on laboratory based measures of

“in the moment” experience, it remains possible that individuals with schizophrenia may respond to pleasurable stimuli in a normative fashion. A number of different possibilities could lead to such a scenario. For instance, individuals with schizophrenia may be unable to retrospectively report on their past emotional reactions to a situation. Additionally, it is possible that individuals with schizophrenia report a reduction in hedonic capacity because they lack opportunities to engage in pleasurable activities in their environment (i.e. due to limited income, neighborhood conditions etc). As a result they may not have any pleasurable events to report, and would therefore receive pathological ratings. However, this population may have the capacity to experience pleasure from activities when they occur, and therefore may actually lack opportunity rather than hedonic capacity. To address these potential issues surrounding retrospective versus “in the moment” ratings of anhedonia, the research on how this population responds to emotionally evocative stimuli will be reviewed below.

Hedonic experience in schizophrenia

Studies have utilized a wide range of evocative stimuli to assess “in the moment” hedonic capacity, including flavored drinks, role play tasks, and emotionally evocative videos, words, pictures, faces, and noises. In these studies, participants are asked to self-report on their experience of pleasure resulting from these various stimuli presented in a laboratory setting. Unlike results from research utilizing trait measures (i.e. RSAS) or retrospective reports obtained via clinical interview (i.e. SANS, PANSS) of anhedonia in which individuals with schizophrenia consistently show deficits, studies assessing in-the-moment responses to pleasant

stimuli have found that participants with schizophrenia report levels of enjoyment that are comparable to healthy controls (Aghevli, Blanchard, & Horan, 2003; Berenbaum & Oltmanns, 1992; Burbridge & Barch, 2007; Kring Kerr, Smither, & Neale, 1993). These studies, indicating that individuals with schizophrenia are capable of experiencing normative levels of pleasure are further supported by other research where the physiological responding of individuals with schizophrenia to emotionally evocative stimuli is assessed.

Emotional responding occurs across a variety of domains (Lang, 1995), including subjective experience (which can be assessed via self-report), physiological reaction, and behavioral action. Self-report ratings of in-the-moment pleasure do not inform us about how individuals with schizophrenia experience emotion across all of these domains, and thus the previously noted studies are limited in this regard. Measures of physiological responding attempt to capture the functioning of the Autonomic Nervous System (the so called “fight or flight” system). Typically, researchers have sought to assess a participant’s heart rate, startle response, and skin conductance. Results have found no differences between these individuals and healthy controls in either self-reports of pleasure or physiological reactions to stimuli (Curtis, Lebow, Lake, Katsanis, & Iacono, 1999; Kring & Neale, 1996; Schlenker, Cohen, & Hopmann, 1995). It is important to note that despite this normal physiological and subjective response to these stimuli, when behavior responses were measured individuals with schizophrenia were found to display fewer facial expressions (Kring & Neale, 1996). Thus, it appears that when presented with emotionally evocative stimuli, individuals with schizophrenia show a normal

response in both the physiological and subjective domains, but do not respond in a normative fashion in the behavioral domain. This may explain why this population is consistently rated as showing blunted or flat affect on clinician interview ratings (e.g., Blanchard, Kring, & Neale, 1994; Gur, Kohler, Ragland, Siegel, Lesko, Bilker, et al., 2006; Neale, Blanchard, Kerr, Kring, & Smith, 1998). These studies clearly indicate that despite reporting less pleasure on trait ratings and clinical-interviews of anhedonia, and displaying fewer facial expressions, individuals with schizophrenia do experience in-the-moment pleasure in a manner that is similar to healthy individuals when measured by self-report and physiological indicators.

The question now becomes why it is that despite being able to experience pleasure in a normative fashion that these individuals consistently report elevated levels of anhedonia on self-report trait measures such as the RSAS, and are consistently rated as anhedonic on clinical-interview measures such as the SANS and the PANSS. Recently, researchers have speculated that the anhedonia deficit lies not in the experience of current events, but in the prediction of how pleasurable a future event will be. This theory calls for a distinction to be made between anticipatory and consummatory pleasure and predicts that individuals with schizophrenia will evidence impairment in anticipatory, but not consummatory pleasure. As this theory has recently gained much prominence in the field, it will be reviewed in some detail next.

Explanations for the discrepancy between self-report and experience

Anticipatory and Consummatory Pleasure in Schizophrenia

In his research on depression, Klein (1984) stressed a need for a distinction between anticipatory and consummatory pleasure. Klein described consummatory pleasure as the pleasure one gets while actually experiencing a pleasurable event. Anticipatory pleasure, on the other hand, is the pleasure one can anticipate from a future pleasurable event. He further argued that this distinction is supported by the role anticipatory pleasure plays in motivation, in that the inability to anticipate that an experience will be pleasurable will lead to a lack of motivation to pursue that experience. This distinction is an important one when considered in light of the stark deficits in motivation that individuals with schizophrenia evidence, which is a serious problem in this population and is associated with functional impairment over the course of the illness (e.g., Nakagami, Xie, Hoe, & Brekke, 2008).

Kring (1999) applied the concept of consummatory and anticipatory pleasure to schizophrenia to help explain the previously discussed discrepancies observed between reports of anhedonia on self-report trait measures and clinical interviews, and normative reports of in-the-moment ratings of pleasure. Kring argues that consummatory pleasure is largely intact amongst individuals with schizophrenia, which could explain why this population provides ratings of in-the-moment pleasure that are comparable to healthy controls. In contrast to this intact ability to experience consummatory pleasure, she hypothesizes that these individuals are unable to accurately anticipate how much they will enjoy a particular experience in the future.

It is because of this deficit that individuals with schizophrenia report lower levels of pleasure when queried with clinical interviews or with self-report trait measures.

Consistent with this theory, research has begun to suggest the existence of an anticipatory pleasure deficit in schizophrenia. Gard, Kring, Gard, Horan, and Green (2007), investigated the construct in a group of outpatients with schizophrenia. In this study, participants were asked to list and rate pleasurable activities using a daily diary / experience sampling method. In addition, trait ratings of anticipatory and consummatory pleasure were assessed using a new scale, the Temporal Experience of Pleasure Scale (TEPS; Gard, Gard, Kring, & John, 2006). The TEPS lists a number of anticipatory, future-based experiences (e.g., “I get so excited the night before a major holiday I can hardly sleep”), and a number of present based, consummatory experiences (e.g., “The sound of crackling wood in the fireplace is very relaxing.”). Participants are asked to rate on a Likert-scale their agreement with each statement. Results of this study found that when compared to controls, individuals with schizophrenia showed impairment in anticipatory pleasure but not consummatory pleasure. This distinction suggests that anticipatory and consummatory pleasure are separate constructs. In addition, consistent with Klein’s (1984) conceptualization, anticipatory pleasure was related to motivation, in that reductions in anticipatory pleasure were found to be associated with reduced motivation.

Since the initial studies examining the TEPS self-report measure, a number of studies have examined anticipatory and consummatory pleasure deficits utilizing this measure. As a part of a larger study, Wynn, Horan, Kring, Simons, and Green (2010) compared how 48 individuals with a diagnosis of schizophrenia and 41 control

individuals responded on the measure. They found individuals in the schizophrenia group self-reported significant less anticipatory pleasure than did individuals in the control group. No significant group differences were found on the consummatory subscale of the TEPS; which is consistent with the pattern found by Gard and colleagues (2007) in their initial study of the measure.

More nuanced results have been found in studies that have attempted to examine subpopulations within the schizophrenia illness. The clinical presentation of schizophrenia can vary widely resulting in a variety of different symptom combinations (Johnstone, 1992; Raffard & Baynard, 2012), and responses to treatment (Case, Stauffer, Ascher-Svanum, Conley, Kapur, Kane ... & Kinon, 2011; Mohr, Cheng, Claxton, Conley, Feldman, Hargreaves ... & Neumann, 2004). One approach that has been successfully employed to reduce the amount of phenotypic heterogeneity associated with human illness is by identifying illness subtypes (Jablensky, 2006; Persons, 1987). Two studies utilizing the TEPS self-report measure have attempted to clarify these results by identifying subgroups of participants who exhibit elevations in negative symptoms.

Chan, Wang, Huang, Shi, Wang, Hong & Kring (2010) divided 55 individuals with a diagnosis of schizophrenia into negative symptom (N = 21) and non-negative symptom (N = 34) subtypes based on their responses to the Positive and Negative Symptom Scale. Results indicated that individuals in the negative subtype reported less anticipatory pleasure on the TEPS than individuals in the non-negative subtype. No significant differences were found on the consummatory subscale. What is less clear, however, is whether individuals in the non-negative symptom

schizophrenia subcategory would have reported less anticipatory pleasure than participants without a diagnosis of schizophrenia, as no control group was included in this study.

One other study has examined anticipatory and consummatory pleasure deficits on the TEPS. Strauss, Wilbur, Warren, August, and Gold (2011) compared 86 individuals with a diagnosis of schizophrenia to 59 controls and found that contrary to the previous reviewed results, individuals with schizophrenia reported less consummatory pleasure on the TEPS; whereas no differences were found on the anticipatory pleasure subscale. In an attempt to clarify these results by reducing phenotypic heterogeneity, the authors divided the schizophrenia group into individuals with elevations in negative symptoms and those with low levels of negative symptoms as assessed by the Scale for the Assessment of Negative Symptoms. This did not have any effect on the outcome of the results.

It is evident that examinations of anticipatory and consummatory pleasure utilizing the TEPS self-report measure have yielded inconsistent results. Some studies have found support for the idea that individuals with schizophrenia self-report a reduced capacity for anticipating future reward (Gard et al., 2007; Wynn et al., 2010) and others have found that these same individuals report a reduced capacity for experiencing consummatory pleasure (Strauss et al., 2011). At least one study has suggested that these deficits are more pronounced amongst individuals with elevations in negative symptoms (Chan et al., 2010), however, these findings have not proven to be universal (Strauss et al., 2011). Two potential strategies exist for clarifying these results. First, as most of the studies of anticipatory pleasure deficits

have relied solely on the TEPS, utilization of a broader range of assessments may help to provide stronger support for this construct. Second, extension of this research to non-clinical samples may also prove useful in explaining the nature of hedonic capacity deficits in schizophrenia. Each of these strategies will be reviewed in turn.

Alternative Methods for the Assessment of Anticipatory and Consummatory Pleasure

The inconsistency from the results with the TEPS may be improved by incorporating a variety of approaches to measuring anticipatory and consummatory pleasure deficits. This poses a challenge as few options are currently available for the measurement of these constructs, and measures that are currently used for the study of anhedonia are all limited in this respect. The previously mentioned TEPS focuses primarily on physical experiences of pleasure and thus may not accurately capture social, vocational, or recreational experiences. Current clinical-interview assessments that measure anhedonia (i.e., the Scale for the Assessment of Negative Symptoms, SANS, Andreasen, 1982; the Positive and Negative Syndrome Scale, PANSS; Kay, Fiszbein, & Opler, 1987) focus on experiences that the interviewee has had within the past week to month and do not make distinctions between anticipatory and consummatory pleasure. This distinction has become a concern for the field of schizophrenia research and a consensus workgroup at the National Institute of Mental Health recently recommended that future measures of negative symptoms attempt to capture both aspects (Kirkpatrick, Fenton, Carpenter, & Marder, 2006).

In response, a recently developed measure known as the Comprehensive Assessment Interview for Negative Symptoms (CAINS; Forbes, Blanchard, Bennett, Horan, Kring, & Gur 2010) has been developed. The scale covers a number of

negative symptom domains, including anhedonia, amotivation, alogia, blunted affect, and asociality. Important to the study of anhedonia, this measure assesses hedonic capacity across a variety of domains, including social, physical, occupational/vocational, and recreation. In addition, the CAINS attempts to measure both anticipatory and consummatory pleasure across each of these domains of experience. To capture these experiences, interviewees are asked to recall pleasurable experiences from their past week as an indication of consummatory pleasure. Then they are asked to generate a list of upcoming events as a measure of anticipatory pleasure. At this time, the CAINS is the only clinical rating scale to incorporate such a distinction. The further development of this measure and other clinical interview measures that incorporate a distinction between anticipatory and consummatory pleasure is hoped to facilitate the investigation of the emotional experience of this population.

Extension of Research to Non-Clinical Samples

Another possible strategy for clarifying the inconsistencies found on the TEPS and also for improving our understanding of anticipatory pleasure deficits in schizophrenia is to broaden the research to include non-clinical samples. While studies investigating anhedonia in schizophrenia are of inherent interest, a number of confounding variables make it difficult to draw conclusions about the nature of hedonic capacity in this population.

One confounding factor is that participants in schizophrenia studies are typically taking antipsychotic medication, which may affect study results. Reviews of the literature have highlighted number of cognitive and motor side-effects related to

these medications (Blanchard & Neale, 1992). Of particular importance to the topic of anhedonia in schizophrenia is the fact that these medications are known to both exacerbate and induce negative symptoms (Blanchard & Neale, 1992) which renders conclusions about anhedonia difficult, if not impossible, to make when individuals are medicated.

Other factors which make the study of anhedonia difficult in the schizophrenia population are the array of social and environmental deprivations due to a variety of factors, including poverty (e.g., Cohen, 1993) and amotivation (e.g., Nakagami et al., 2008). Given the potentially limited engagement with their environment, it cannot be ruled out that this population does not report hedonic experiences because they simply lack the opportunity to engage in activities that might be enjoyable.

Finally, another serious limitation in studying anhedonia in individuals with schizophrenia is the vast heterogeneity that is possible based on the diagnostic standards outlined in the DSM-IV (APA, 2000). Important to the study of hedonic capacity deficits in schizophrenia, this heterogeneity can result in drastically different presentations of the illness so that some individuals with the diagnosis may not endorse any feelings of anhedonia. This range of confounding variables makes the isolation of hedonic capacity deficits difficult in the schizophrenia population. Any one of these variables would make conclusions about the nature of anhedonia in schizophrenia difficult; however, the fact that they are all often present in concert makes causative conclusions nearly impossible.

A potential solution to these problems is to study individuals who are expected to share a trait that is of interest in schizophrenia, but do not have the

complications associated with the full illness. To this end, numerous studies (e.g., Chapman, Chapman, Kwapil, Eckblad, & Zinser, 1994; Kwapil, 1998; Gooding Tallent, & Matts, 2005) have utilized Meehl's concept of schizotypy to study individuals who are believed to possess an underlying genetic liability to the disorder. A review of this concept and its relevance to the discussion of hedonic capacity in schizophrenia will be discussed next.

Chapter 2: Hedonic experience in schizotypy

Schizotypy

Meehl (1962) theorized that a genetic liability, termed schizotaxia, underlies risk for the development of schizophrenia. He proposed that this genetic risk is necessary, but not sufficient, for the development of schizophrenia, which means that individuals with this risk factor can have a clinical presentation that ranges from nearly normal to flagrant psychosis. Regardless of the ultimate diagnosis and level of impairment, Meehl posited that a number of common signs of schizotypy would be evident amongst these individuals: cognitive slippage, anhedonia, ambivalence, and interpersonal aversiveness. He termed the personality organization comprised of these four traits “schizotypy.” Several studies since Meehl’s initial conceptualization have found support for the schizotaxia construct. One of the first major studies to examine the validity of the concept of schizotypy was conducted by the Chapmans (Chapman et al, 1994). This was a 10-year longitudinal study designed to examine the validity of the Chapman psychosis proneness scales. They found that individuals who evidenced elevations on both the Magical Ideation scale and the RSAS were at a much greater risk of developing a psychotic disorder at follow-up. Studies since this initial investigation have found, to varying degrees, support for each of Meehl’s original markers of schizotypy (e.g., Gooding et al, 2005; Horan, Brown, & Blanchard, 2007; Kwapil, 1998; Meyer, & Hautzinger, 2002).

The application of Meehl's concept of schizotypy has been approached in a number of different ways. Since individuals with this genetic liability for schizophrenia fall along a range of clinical impairment from virtual normalcy to severe psychosis, a number of possibilities exist for the examination of this construct. One possibility is to look for a constellation of symptoms that indicate the presence of schizotypy. This is the strategy utilized by the DSM-IV (APA, 2000) in its description of personality disorders. The personality disorders associated with schizophrenia are often referred to as "schizophrenia spectrum disorders," and are believed to represent a less severe form of psychopathology than the schizophrenia illness. Three DSM personality disorders are typically employed in the study of schizotypy. The two diagnoses that most closely match the schizotypy concept are Schizotypal Personality Disorder and Schizoid Personality Disorder (e.g., Gooding et al., 2005; Kirkpatrick, Messias, & LaPorte, 2008; McClure, Barch, Flory, Harvey, & Siever, 2008; McClure, Koenigsberg, Reynolds, Goodman, New, Trestman et al., 2009; Nicolson, Brookner, Lenane, Gochman, Ingraham, Egan et al., 2003). Evidence also suggests that Paranoid Personality Disorder can be utilized in this context, however, this diagnosis is less frequently employed (e.g., Fogelson, Nuechterlein, Asarnow, Payne, Subotnik, Jacobson et al., 2007). Thus, a number of personality disorders have been applied to capture non-psychotic schizophrenia spectrum pathology.

An alternative approach to the use of personality disorders as an indicator of schizotypy is to seek individuals high on the core traits of schizotypy that Meehl first described. This strategy is known as the psychometric high-risk paradigm (Chapman

& Chapman, 1985) and involves selecting individuals based on psychometrically identified deviant characteristics (e.g., Meehl's core traits of schizotypy). This approach can identify individuals with schizotaxia but who do not have either a diagnosis of a schizophrenia spectrum disorder or a family history of psychosis. Studies of emotion in schizotypy that have utilized the psychometric high risk paradigm have used the trait of social anhedonia to identify schizotypes (e.g., Gooding, Davidson, Putnam, Tallent, 2002; Gooding et al., 2005).

Meehl's concept of schizotypy, therefore, can serve as a suitable complementary approach to studying individuals with schizophrenia. This population is free from many of the confounding variables associated with schizophrenia, such as an impoverished lifestyle resulting from a lifetime of psychosis and medication effects. As described above, a number of equally valid strategies can be employed to identify individuals with schizotypy. First, individuals with a constellation of symptoms (such as a DSM personality disorder) can be identified. Second, utilizing a psychometric high risk paradigm, individuals can be selected who are high on one of the core traits of schizotypy (e.g., cognitive slippage, anhedonia, ambivalence, and interpersonal aversiveness). Using these strategies, the question of how individuals with sub-clinical schizophrenia-spectrum pathology experience emotion can be examined. These studies will be reviewed next.

Hedonic capacity in schizotypy

Anticipatory and Consummatory Pleasure in Schizotypy

An understanding of how individuals with schizotypy experience emotion can serve to further our understanding of hedonic capacity in schizophrenia. Identification

of anticipatory anhedonia deficits within non-clinical populations would help to establish anticipatory anhedonia as a vulnerability marker for schizophrenia. In Meehl's original conceptualization of schizotypy, both social and physical anhedonia were identified as being markers of genetic vulnerability to schizophrenia. The concept of anhedonia as a marker for schizophrenia is similar to the concept of an endophenotype, where complex illnesses can be deconstructed to individual signs and symptoms in order to further the understanding of the illness as a whole (Gottesman & Gould, 2003). Indeed, anhedonia has proven to be useful in this capacity with studies indicating that the symptom of anhedonia is present prior to the onset of overt psychosis (Freedman et al., 1998) and that individuals with elevations in anhedonia have been found to be at risk for the development of schizophrenia spectrum disorders (Horan et al., 2007; Kwapil, 1998). Thus, identification of anticipatory pleasure deficits in a non-clinical sample would serve to extend our understanding of these deficits as markers for vulnerability to schizophrenia spectrum psychopathology.

Research from the schizophrenia literature indicates that these individuals appear to experience emotion in a normative manner despite providing reliable trait self-reports of anhedonia. This literature may suffer important weaknesses given that a number of potentially confounding variables (e.g., medication effects) are present within that population. An exploration of the manner in which individuals at theoretical risk for the development of schizophrenia is, therefore, necessary.

Only a single study has examined anticipatory and consummatory pleasure deficits in this population. Martin, Becker, Cicero, Docherty, and Kerns (2011)

selected individuals based either on elevations in social anhedonia (as measured by the R-SAS) or elevations in scales assessing perceptual aberration and magical ideation and compared them to controls on self-reports of both anticipatory and consummatory pleasure. They found that individuals with elevations in social anhedonia had lower scores on both the anticipatory and consummatory subscales of the TEPS. This same pattern was not seen when comparing individuals with magical ideation and perceptual aberrations to controls. Individuals in that group did not evidence any significant impairment on either the anticipatory or consummatory pleasure scale when compared to controls.

The results from this study further highlight the inconsistencies found on the TEPS self report measure. As previously reviewed, when looking at individuals with a diagnosis of schizophrenia, studies have found that elevations in negative symptoms are associated both with a reduced capacity for anticipatory pleasure (Chan et al., 2010) and a reduced capacity for consummatory pleasure (Strauss et al., 2011). It must be noted, however that each of these studies and the study by Martin et al. (2011) has identified elevations in negative symptoms in different ways. Standardization of the method used to delineate subgroups may improve the consistency of these results.

As the Martin et al. (2011) study is the only one to address the question of anticipatory and consummatory pleasure in schizotypy, literature examining the broad concept of anhedonia in schizotypy warrants review. A number of different methodologies exist for examining this question. First, as seen in research on the schizophrenia population, a number of laboratory-based paradigms can be utilized to

this end (i.e. presenting participants with emotionally evocative stimuli). Examinations employing these methods can allow for standardized comparisons between individuals but sometimes lack external validity. Another option for the study of emotional responding is the use of naturalistic, experience-based paradigms. These methods can provide a better indication of real-world functioning, but lack standardization. Therefore, it is necessary to review both types in order to fully understand the emotional experience of this population. Both types of research have been conducted to examine how individuals with schizotypy experience emotion and will be reviewed in turn.

Laboratory Based Paradigms

A number of different emotionally evocative stimuli have been used in laboratory-based studies of emotion. Two common stimuli that have been employed in the study of emotion in schizotypy are pictures and words. In one study, Gooding, Davidson, Putnam, and Tallent (2002) selected psychometrically identified socially anhedonic and healthy control participants from a pool of undergraduate students. They presented participants with a number of positive, negative, and neutral pictures from the International Affective Picture System (IAPS; Lang, Greenwald, & Bradley, 1993). Unique to this study, the authors made a concerted attempt to identify a number of socially relevant pictures, by culling pictures of individuals interacting. This subset of pictures was included because pleasure related to social interactions should, theoretically, be impaired amongst individuals with social anhedonia. Participants were asked to rate both the valence and intensity of their emotional response to these pictures while their physiological responding was simultaneously

recorded. Results indicated that individuals characterized as having high levels of social anhedonia did not display a deficit in emotional responding when compared to healthy controls. These results need to be interpreted cautiously, however. While the authors did make an attempt at identifying socially relevant slides, it must be noted that the slides identified as having social content may not actually have been reflective of social interactions. In particular, the positive valence social slides employed in this study reflected scenes of heterosexual erotica, which, while capturing an interaction between two people, but may not reflect the more subtle interaction that generally characterizes most social exchanges. Despite this limitation, the results from this study indicate that when individuals with schizotypy are presented with an emotionally evocative stimulus, they respond in a normative fashion. Such results, however, have not been universally found.

In a similar paradigm used by Gooding et al. (2002), Kerns, Docherty, and Martin (2008) presented emotionally charged pictures from the IAPS (Lang et al., 1993) to 339 undergraduate students. Rather than being grouped based on high or low levels of anhedonia, ratings of social and physical anhedonia were analyzed as a continuous variable in this study. Participants were asked to make ratings of how pleasant or unpleasant they found each picture. Elevated ratings of anhedonia were associated with reductions in self-reported ratings of pleasure when viewing pictures. These results are in contrast to both those found by Gooding et al. (2002) reviewed above and the previously discussed findings found in individuals with schizophrenia (e.g., Burbridge & Barch, 2007), where self-reported trait ratings of anhedonia were not found to be associated with reduced in-the-moment pleasure.

Another study examining how individuals with schizotypy respond to emotionally charged pictures has been published. In a study of undergraduate students who were psychometrically identified as being high on a schizotypic traits, Cohen, Iglesias, and Minor (2009) presented participants with emotionally evocative pictures from the IAPS (Lang et al., 1993) and asked them to provide both verbal description of their emotional reaction and Likert-scale ratings of their emotions upon viewing these pictures. The authors found that while individuals with schizotypy rated these pictures as being more unpleasant than controls, there were no differences between the groups in terms of prosody, the emotional tone of the voice, as they described their emotional reaction to the pictures. The results from the prosody ratings indicated that individuals with schizotypy can display normative emotional modulations of their voice. This may indicate that individuals with schizotypy are, at least while verbally describing emotional material, able to express emotional prosody in a normative fashion.

Other stimuli have been utilized in the examination of emotional reaction. Many words exist that have an emotional valence and these have been employed to elicit emotional response in laboratory studies. Mathews and Barch (2006) investigated how individuals with social and physical anhedonia responded to emotionally charged words. In this study, they presented participants with a list of words (e.g., “terror,” “laughter,” “love”) and asked them to provide ratings of emotional valence and arousal for each. Individuals who were psychometrically identified as having either high social or physical anhedonia reported feeling a less

intense emotional reaction to the high and low arousal negative words and the low-arousal positive words than control individuals.

Taken together, these studies indicate that individuals with schizotypy may experience a reduction in self-reported pleasure in response to laboratory based stimuli (e.g., Cohen et al., 2009; Kerns et al., 2002; Mathews & Barch, 2006). These results are not universal however, as Gooding et al. (2002) did not find any difference between individuals with social anhedonia and healthy controls when viewing emotionally evocative stimuli. In understanding the inconsistent findings of these studies, it may be important to note that differences may exist between the samples used in these studies. Only individuals with high levels of social anhedonia were included in the Gooding et al. (2002) study. In contrast, the Kerns et al (2002) included individuals with elevations on a combination of social and physical anhedonia and the Mathews and Barch (2006) included individuals with high scores on either social or physical anhedonia. Given that the stimuli used in both the Kerns et al (2002) and the Mathews and Barch (2006) studies could be evocative of physical pleasure, it is possible that including individuals with physical anhedonia made it more likely that deficits in pleasure would be found. It remains unknown if this difference had any effect on the outcomes of these studies and it is questionable whether more homogenous samples would reveal more consistent results. In addition, these studies do not provide an indication of how this population responds to stimuli in the real world where individuals are confronted with stimuli from a variety of modalities. Thus, an important question remains as to what effect these potential

deficits in experiencing emotion have on the real-world emotional experience of individuals with schizotypy.

One study has attempted to address how individuals with schizotypy respond emotionally outside of the laboratory. Quirk, Subramanian, and Hoerger (2007) presented individuals who scored high on a broad measure of schizotypy with a number of hypothetical social interactions and had them rate their preference for engaging in each. In addition, these authors corroborated these reports with those of close friends and relatives. The authors found that schizotypic individuals found social situations that were less structured and more ambiguous to be less enjoyable than healthy controls. For social interactions that were not ambiguous, there were no differences between the two groups. The reports of both the individuals with schizotypy and the reports of their corroborators agreed. This study indicates that individuals with schizotypy do not experience a reduction in pleasure for all social interactions. Instead, this study may indicate that this reduction in pleasure is mediated, at least in part, by situational variables so that these individuals experience less pleasure in situations that are less structured. Thus, it may be the case that when a more nuanced approach is taken to understanding which situations individuals with schizotypy do and do not enjoy that they do not show universal deficits in emotion.

While the study by Quirk et al. (2007) is an important bridge between real-world emotional experience and a laboratory based paradigm, it still cannot provide information on how individuals with schizotypy actually experience emotion in a real-world setting - as it asks participants to predict their reaction to a number of hypothetical situations. A number of studies have attempted to answer this question

by having individuals with schizotypy report on their daily experiences. These studies will be reviewed next.

Naturalistic Studies

Studies utilizing naturalistic methods, such as daily diary approaches, may allow for a more nuanced investigation of how individuals with schizotypy respond emotionally to their environment. These studies typically require participants to record their daily activities along with what their emotional experience was during that activity. A number of studies on the schizotypy population have taken such an approach. Generally, these studies find that individuals with social anhedonia report more negative affect, less positive affect, and are more likely to report spending time alone than individuals without social anhedonia (Brown, Silvia, Myin-Germeys, & Kwapil, 2007; Kerns et al., 2008; Kwapil et al., 2009). These differences could not be accounted for by either high levels of social anxiety or increases in distress and depression (Brown, et al., 2007; Kerns, et al., 2008). Such results indicate that individuals with schizotypy do not find being alone to be distressing; moreover, they may even choose to be alone (Brown, et al., 2007). It is important to note, however, that these studies are limited in the sense that they relied on the self-reports of daily events. It cannot be ruled out, for instance, that one of the reasons that individuals with schizotypy reported experiencing less pleasure was because they had fewer pleasurable events in their daily lives. If such a situation were true, deficits in reported pleasure would be due to a reduction in opportunity rather than a reduction in capacity.

The results of these studies provide some indication that individuals with schizotypy are more likely to rate stimuli as being less positive than controls, and to experience more negative emotions and fewer positive emotions than healthy controls. These results are not conclusive however, as there are some indications that this population is capable of experiencing emotion in a normative fashion (e.g., Gooding et al. 2002, Quirk et al., 2007). It is important to note, however, that a number of weaknesses inherent in these studies make it difficult to draw conclusions from this literature. First, most of these studies do not make a distinction between anticipatory and consummatory pleasure. The one study (Martin et al., 2011) that has been conducted within this population lent further confusion to the literature by concluding that individuals with elevations in negative schizotypy evidenced impairments on both the anticipatory and consummatory subscale of the TEPS self-report measure, which is inconsistent with the findings from studies utilizing clinical populations. As this is a single, limited study, further research is needed to clarify these results.

Another important weakness exists in the literature examining the hedonic capacity of individuals with schizotypy. As reviewed, the studies in this area tend to fall into one of two categories: either laboratory-based paradigms or naturalistic paradigms. Laboratory based paradigms have a strength in that they provide all participants with a standardized stimulus; however, they suffer from a weakness in that they do not always capture real-world experience. Naturalistic paradigms, on the other hand, provide a better estimation of what individuals experience in their everyday lives; however, there may be wide variability in what individuals report. In

some situations, this could mean that naturalistic approaches are a better estimation of what sorts of opportunities individuals have for pleasurable experiences rather than what their capacity for pleasure is. What is needed, then, is a paradigm that can combine the strengths of each of these approaches into a standardized stimulus with high external validity. Unfortunately, most of the stimuli utilized in studies of emotional responding lack external validity. Given the importance of this topic, a more detailed explanation is required and this is reviewed below.

Weaknesses with current emotionally evocative stimuli

Studies of the hedonic capacity of individuals with schizophrenia spectrum pathology tend to rely on only a few types of stimuli. One common stimulus that is often utilized is film clips of movies (e.g., Kring & Neale, 1996). Generally, films are selected that cover a range of genres, including comedies, horror movies, and dramas. Other common approaches include the use of pictures (e.g., the IAPS), flavored drinks, and sounds (e.g., Aghevli et al., 2003; Berenbaum & Oltmanns, 1992; Burbrige & Barch, 2007; Gooding et al., 2002; Horan et al., 2007). These stimuli tend to focus on different valences of emotion, so that positive, negative, and neutral emotions are elicited. While these findings have provided important information regarding the range of emotions that this population can experience, it does not provide much information about whether the anhedonia deficit is universal or specific to a single domain. Importantly, these stimuli may be ill-suited to the examination of how individuals with schizophrenia spectrum pathology experience social

interactions. This distinction is important when one considers Meehl's original conceptualization of schizotypy.

Meehl (1962) specified a critical role for social deficits in his theory. He did not conceptualize anhedonia to be a pan-deficit; instead, he felt that it would only be present in certain areas of functioning. When researchers have attempted to focus on the social anhedonia deficit, the stimuli have not adequately represented interpersonal interactions in a manner that would allow for the examination of the social nature of the deficit (Blanchard, 1998). The film clips, and sounds used in previous research, are all limited in that none of these stimuli are social in nature. To attempt to resolve this problem, researchers have taken a number of different approaches, including the use of pictures that capture social interactions, having individuals track social interactions in a daily-diary approach, and finally, by having participants engage in role-plays to simulate a social interaction.

In an attempt to target social anhedonia, Gooding et al. (2002) selected photographs from a standardized photograph database (i.e., the IAPS) that included scenes of people interacting. As previously noted, however, the social pictures utilized in this study included pictures of heterosexual erotica, which may not be subtle enough to detect differences between the groups. That is, it may be the case that even for individuals who do not experience a lot of pleasure when interacting with others, viewing erotica remains arousing. In addition, it must be noted that sexual encounters involve pleasurable aspects that are both physical and social. Therefore, it remains unclear which feature participants were more attuned to during the study. Given that social interactions are dynamic and interactive, it appears

unlikely that still photographs could be modified for the investigation of social interactions.

A number of alternative methods have been employed to try to target social hedonic capacity. One method has been to target interactions individuals with schizophrenia spectrum psychopathology experience in their daily lives. As previously reviewed, researchers (e.g., Gard et al., 2007) have attempted to do this by utilized a daily diary approach to investigate the social anhedonia deficit in a real-world setting. This method, however, lacks standardization as participants do not have the same experiences. In addition, differences in the number of events listed by participants may be determined, in part, by lack of opportunity, rather than by actual differences in desire to be affiliative. Another option is to try to simulate social interactions in the laboratory via role plays (e.g., Aghevli et al., 2003), a methodology that is typically used as a measure of social functioning. These interactions suffer serious weaknesses both in that it is clear that these interactions are contrived and that they are often negative in nature (and typically center on the resolution of conflict); therefore, role plays may also be inadequate for the study of social anhedonia. In conclusion, most of the stimuli that have been utilized to this point have been inadequate at targeting the social aspects of the anhedonia deficit. While many researchers have sought to address these deficits, none of these approaches have been able to adequately replicate a spontaneous social interaction.

An alternative to the stimuli that have traditionally been used to study emotional responding in schizophrenia is to create a standardized social stimulus that can approximate real-world interacting. Other researchers interested in how

individuals select dating partners and potential mates have faced similar challenges that necessitated a standardized social interaction. These researchers have solved the problem by developing video-taped, simulated social interactions (i.e., Gangestad, Garver-Apgar, Simpson, & Cousins, 2007; Puts, Gaulin, & Verdolini, 2006; Simpson, Gangestad, Christensen, & Leck, 1999). These interactions are designed so that participants believe the taped individual to be live and in another room. This creates a situation in which participants can respond naturally as they would to another person. Studies that have employed these videos have found that participants felt these interactions were believable and individual differences were observed in response to the social interaction (Gangestad et al., 2007; Puts et al., 2006; Simpson et al., 1999).

An approach such as this may, therefore, be appropriate for the study of emotional response in schizophrenia-spectrum pathology. In addition, utilization of this type of simulated social interaction could also be adapted for the investigation of how individuals with schizotypy anticipate and experience pleasurable events, by having participants rate their anticipated pleasure before viewing the tape. This remains an important area of research as the experience of anticipatory and consummatory pleasure remains largely unknown in schizotypy.

Chapter 3: The current study

Summary of the current problem

In summary, deficits in functional outcome associated with the schizophrenia illness have been found to be closely linked to self reports of anhedonia. Anhedonia can be reliably measured both via trait self-reports (i.e., Revised Social Anhedonia Scale) and clinician interview measures (e.g., the Scale for the Assessment of Negative Symptoms; Positive and Negative Symptoms Scale). Despite the consistent findings of elevated anhedonia in schizophrenia, further examination of the anhedonia deficits has revealed that when individuals with schizophrenia are presented with pleasurable stimuli, they experience as much in-the-moment pleasure as healthy controls. This discrepancy between self-reports of anhedonia and intact in-the-moment experiences of pleasure has been hypothesized to be due to the inability of this population to predict how much enjoyment they will derive from future pleasurable experiences (anticipatory anhedonia). This theory holds promise for explaining the nature of the anhedonia deficit in this population, however, inconsistencies in the literature exist regarding the nature of this construct. As attempts to reduce phenotypic heterogeneity have yet to clarify the hedonic experience of individuals with schizophrenia spectrum psychopathology and most of the studies examining this construct have relied on a single measurement (the TEPS self-report), utilization of multiple methods within a sample of individuals with a constellation of symptoms associated with the schizophrenia illness remains an important initial investigation.

Given the chronic nature of schizophrenia, there are a number of confounding variables associated with this population that make conclusions about anhedonia difficult. An alternative approach is to study individuals with schizotypy, who are theorized to share a common genetic vulnerability to schizophrenia. The only study (Martin et al., 2011) to examine anticipatory pleasure deficits has done little to clarify the nature of the hedonic capacity deficits within this population. In addition, this study also suffered the aforementioned weakness of relying on a single, self-report measure to assess the construct of anticipatory anhedonia. Other literature examining the larger question of hedonic capacity in this population is also somewhat conflicting. Some studies indicate that under certain circumstances individuals with schizotypy can experience normative levels of pleasure (e.g., Gooding et al., 2002; Quirk et al., 2007), whereas other research has found reductions in pleasure in response to both laboratory stimuli (Kerns et al., 2008; Mathews & Barch, 2006) and in response to daily events (e.g., Brown et al., 2007; Kerns et al., 2008). This literature, however, has been limited in a number of ways. First, the stimuli utilized in laboratory-based lacks external validity in the sense that it is often a poor representation of social interactions. Second, attempts to assess the day-to-day functioning of these individuals may be reflective of fewer opportunities for hedonic experience rather than an actual deficit in hedonic capacity.

The current study

The current study was an attempt to clarify the nature of the anhedonia deficit in individuals at putative risk for schizophrenia spectrum psychopathology. This study was designed to address some of the previously noted limitations in the

research. First, given the array of confounding variables associated with the schizophrenia illness, this study explored the capacity to experience anticipatory and consummatory pleasure in a sample of undergraduate college students high on schizotypic traits. A matched control sample was also selected for comparison purposes. Second, given that anhedonia has also been linked to depression (in addition to schizophrenia spectrum psychopathology), analyses were conducted to statistically control for current levels of depression in order to eliminate current depression as a possible explanation for obtained results. Finally, in order to fully capture both anticipatory and consummatory pleasure, this study utilized a multi-method approach by examining self-report measures, clinician interview ratings, and experiential methods designed to target affiliation. These methods allowed for assessment of both naturalistic real-world experience and also in-the-moment responding to a standardized stimulus. Such an assessment has not yet been attempted in the literature and represents a novel approach to the study of hedonic capacity. Using these methods, the following hypotheses were addressed:

- 1) Group differences in psychopathology, trait affect, and overall functioning were examined. Consistent with previous research on individuals with schizophrenia and schizotypy, the schizotypy group was expected to evidence higher levels of personality disorder psychopathology relative to controls. In addition, these individuals were expected to report more trait negative affect, and less trait positive affect. Finally, individuals in the schizotypy group were also expected to evidence worse overall functioning.

- 2) In order to replicate previous findings the two groups were compared in terms of their scores on the Revised Social Anhedonia Scale. Consistent with previous findings, individuals in the schizotypy group were expected to report elevations in anhedonia relative to the comparison group.
- 3) Group differences in anticipatory and consummatory pleasure were assessed using a multi-method approach.
 - a. Consistent with research on individuals with schizophrenia , individuals in the schizotypy group were expected to evidence significantly lower ratings of self-reported anticipatory pleasure when compared to controls. In contrast, the two groups were not expected to differ in terms of self-reported consummatory pleasure.
 - b. Within the clinical interview, it was predicted that individuals in the schizotypy group would be rated as having impairments in anticipatory pleasure when compared to individuals in the control group. In contrast, the groups were not expected to differ in terms of clinician-rated consummatory pleasure.
 - c. Finally, individuals in the schizotypy group were expected to show significant reductions in anticipatory pleasure prior to viewing the simulated social interaction. Again, the two groups were not predicted to differ in terms of evoked consummatory pleasure.

- 4) Any significant group differences on the three measures of anticipatory and consummatory pleasure were expected to remain significant when levels of depression were controlled for.

Finally, a within-groups comparison was made between all of the anticipatory pleasure measures and between all of the consummatory pleasure measures. First, as both the self-report assessment and clinician-administered interview ostensibly capture the same construct, it was predicted that they would be correlated with one another. Second, the laboratory based paradigm was designed to elicit real-world hedonic reactions; therefore it was expected that the ratings of anticipatory and consummatory pleasure in response to the laboratory paradigm would be related to the anticipatory and consummatory pleasure subscales on both the self-report and interview assessments.

Chapter 4: Methods

Overview

This study was conducted in two phases. In the first, potential participants were screened and appropriate ones identified using the Schizotypal Personality Questionnaire-Brief Form (SPQ-B; Raine & Benishay, 1995). In order to ensure that participants were not answering the screening questionnaire in a random and invalid manner, the Infrequency Scale (Chapman & Chapman, 1976) was included. In addition, demographic information was collected at the time of screening.

Following the selection of the schizotypy and control groups in the screening phase, participants were invited to the laboratory for the testing phase of the study. Testing involved a number of measures designed to assess symptomatology and hedonic states and took place in three phases. During the first, participants were asked to complete a number of self-report measures, which allowed for an assessment of symptomatology and trait-hedonic capacity. Next, participants completed two clinical interviews. The first assessed personality disorder psychopathology and the second allowed for a survey of which pleasurable activities participants engaged in during the past week and what kind of activities they had planned for the future. Finally, participants were asked to view the video of the simulated social interaction and provide both anticipatory and consummatory ratings of pleasure.

Participants

Participants for the current study were recruited from the undergraduate student population at the University of Maryland, in College Park, MD. Power calculations using G*Power 3 (Faul, Erdfelder, Lang, & Buchner, 2007) indicated that a total of 72 participants (N = 36 in each group) would be adequate power to detect meaningful difference between the two groups. Power calculations were based on 85% power and were made with an estimated effect size of .36, which was based on the group differences of self-reported anticipatory pleasure in a previous study (Gard et al., 2007).

Participants were screened for eligibility using the University of Maryland Psychology Mass Testing pool. As a requirement for the Psychology 100 courses taught at the University, students must take part in a research study. To this end, students completed the SPQ-B online in exchange for research credit as a part of Mass Testing.

For the purposes of this study, a formal diagnosis of schizotypal personality disorder was not necessary for inclusion. Instead, participants were selected based on elevations in schizotypal personality disorder traits. The SPQ-B is often used to detect schizotypy and has been used in a variety of non-clinical samples (e.g., Compton, Chien, & Bollini, 2007; Fonseca-Pedrero, Paino-Pineiro, Lemos-Gilradlez, Villazon-Garcia, & Muniz, 2009) and undergraduates (Aguirre, Sergi, & Levy, 2008). Internal reliability for the SPQ-B has been found to be adequate with coefficient alphas for the total scale between .90 and .91 (Raine, 1991).

For the selection of individuals in the schizotypy group, consistent with Raine and Benishay's (1995) methodology, individuals were included in the schizotypic group if they scored within the 90th percentile or greater on the SPQ-B. A variety of approaches have been taken to establishing cut-off scores for the control group on the SPQ-B. First, individuals can be chosen based on their score on the SPQ-B. Several studies (e.g., Aguirre et al., 2008; Jahshan & Sergi, 2007) have taken this approach and identified individuals with a cut-off score of 2 or less on the SPQ-B as belonging to the control group. This strategy typically results in a sample of individuals with scores of the bottom 8%. Alternatively, another strategy consists of establishing a percentile cut-off and selecting the control sample from below this point. This is the approach taken by Quirk et al. (2007) where the cut-off on the SPQ was set at the 50th percentile rank.

In choosing between these two strategies, an additional consideration must be taken into account. Sex, age, and racial differences have been documented in both schizotypy and on the SPQ-B (Goulding, McClure-Tone, Compton, 2009; Mata, Mataix-Cols, & Peralta, 2005; Miettunen, & Jaaskelainen, 2010). These differences necessitate matching control participants to individuals in the schizotypy group on these variables. Given this restriction, it becomes apparent that a cut-off of a score of 2 or less on the SPQ-B (resulting in approximately 8% of the sample) would render matching the control sample impractical. On the other extreme, choosing a cut-off of the 2nd quartile (the approach taken by Quirk et al., 2007) is likely too liberal of an approach as it is possible that this would include individuals who possess schizotypic traits. Therefore, an approach that lie somewhere in the middle appeared to be the

best compromise between these two solutions. This study considered individuals lying within the first quartile of SPQ-B scores to be eligible for the control group. Individuals from within this first quartile were matched to participants in the schizotypy group based on sex, race, and age.

Eligible participants were contacted via phone and email and asked to participate in the study. Participants who agreed were offered either research credit as a fulfillment for the requirements of their Psychology 100 course or a payment of \$10/hour. A total of 79 participants were recruited for the current study (40 individuals in the schizotypy group and 39 in the control group).

Measures

Schizotypal Personality Questionnaire-Brief: The Schizotypal Personality Questionnaire-Brief (SPQ-B; Raine & Benishay, 1995; Appendix A) is a 22-item self-report assessment of Schizotypal Personality Disorder. It is adapted from the original Schizotypal Personality Questionnaire (SPQ; Raine, 1991), which is a 74 item self-report questionnaire. The scale is designed to assess a number of dimensions related to the diagnosis of schizotypal personality disorder, including ideas of reference, odd beliefs or magical thinking, unusual perceptual experiences, odd thinking and speech, suspiciousness or paranoid ideation, inappropriate or restricted affect, odd or eccentric behavior or appearance, lack of close friendships, and social anxiety. Internal reliability ratings of the scale have been found to range from 0.71 to 0.78 (Chronbach's alpha; Raine & Benishay, 1995).

The Infrequency Scale: The Infrequency Scale (Chapman & Chapman, 1976; Appendix B) was included to screen out individuals who answer in a random or non-

attentive manner. This scale consists of 17 True/False items that are almost invariably answered in one direction. Participants who respond to 3 or more items in the unexpected direction will be excluded from the study as it suggests invalid responding throughout the measures. This approach has been used in other studies of non-clinical populations (Blanchard, Gangestad, Brown, & Horan, 2000; Collins, Blanchard, & Biondo, 2005; Chapman et al, 1976).

Demographic and Contact Information: As a part of the Mass Testing screen, participants were asked to provide information regarding sex, racial and ethnic identity, year in school, and contact information.

Clinical Measures

The Center for Epidemiological Studies Depression Scale: In order to ensure the proper assessment of schizotypic traits, they must be distinguished from those that could be secondary to mood disorders. Despite the consistency of the finding that anhedonia is a prominent symptom of schizophrenia, questions have been raised about the uniqueness of anhedonia to schizophrenia. Despite the similarities between the anhedonia seen in depression and that seen in schizophrenia, abundant evidence exists for the conceptualization of anhedonia in schizophrenia as being trait-like and independent of the fluctuations of other symptomatology. Alternatively, anhedonia in depression is more consistent with a state-model in which the symptom is present only in combination with other signs of the illness (e.g., Blanchard et al., 2001; Herbener & Harrow, 2002). In addition, multiple studies have found that depression and anhedonia can be measured independently of one another amongst individuals with a diagnosis of schizophrenia (e.g., Kirkpatrick, Buchanan, Breier, & Carpenter,

1994; Loas, Noisette, Legrand, & Boyer, 1996; Malla, Takhar, Norman, Manchanda, Cortese, Haricharan, Verdi, Ahmed, 2002). Therefore, there appears to be ample evidence to consider depression and anhedonia to be independent of one another within schizophrenia provided that care is taken to carefully define and measure the two constructs.

For the current study, the Center for Epidemiological Studies Depression Scale (CES-D; Radloff and the National Institute of Mental Health, 1972; Appendix C) was used as a covariate for anhedonic symptomatology. The CES-D was developed as a screening measure for depressive symptoms consists of 20 symptoms which participants are asked to rate for intensity and frequency within the past week. Reliabilities reported in the literature have been good (alpha coefficients of 0.85 for the general population and 0.90 for clinical samples; Randolff, 1972). In addition, Weissman and colleagues (Weissman, Sholomskas, Pottenger, Prusoff, & Locke, 1977) found that the CES-D is capable of differentiating between individuals who are acutely depressed and controls. Since diagnostic status is not relevant to this study, the measure will be used as a continuous variable.

The International Personality Disorders Examination: Personality disorder psychopathology was assessed using the International Personality Disorders Examination (IPDE; Loranger, Andreoli, Berger, Buchheim, Channabassevanna, Coid, et al., 1995; Appendix D) interview. For the purposes of the current investigation, only those sections related to the schizophrenia-spectrum disorders (schizoid, schizotypal, and paranoid sections) were included. For this study, diagnostic status is less relevant than level of psychopathology, thus the number of

symptoms endorsed was applied as a continuous variable within each of the personality disorder dimensions (e.g., schizoid, schizotypal, and paranoid). The IPDE is a commonly used measure and has been used in other non-clinical samples (e.g., Chapman et al., 1994; Collins et al., 2005). Inter-rater reliability for dimensional scores has been found to be high (ranging from .79 to .94; Loranger, et al., 1995).

The Social Adjustment Scale, Self-Report: The Social Adjustment Scale, Self Report (SAS-SR; Weissman, Prusoff, Thompson, Harding, Myers, 1978; Appendix E) is a 54-question self report measure that assesses a variety of functional domains including academic, vocational, family relationship, and peer relationship functioning during the past two weeks. The relationship between the SAS-SR and other informant ratings has been found to be high (.74; Weissman & Bothwell, 1976). Internal consistency coefficients have not been conducted in the United States on the SAS-SR; however, a coefficient alpha of .73 was found in a Japanese study (Suzuki, Sakurai, Yasuda, Harai, Kitamura, Takahashi, et al., 2003). The SAS-SR is appropriate for non-clinical samples and has utilized in studies of undergraduate students (Jahshan & Sergi, 2007; Aguirre et al. 2008).

Measures of Trait Affect

The Positive and Negative Affect Schedule: The Positive and Negative Affect Schedule (PANAS; Watson, Clark, Tellegen, 1988; Appendix F) is a 20-item measure used to assess differences in positive and negative mood. The scale assesses positive affect (PA), which is defined as the extent to which a person feels enthusiastic, alert, and active; and negative affect (NA) which reflects a person's negative mood states, including anger, contempt, distress, and guilt. The correlation between the two scales

is low ($r = -.12$ to $-.23$), suggesting that the two scales measure independent constructs and thus, can be examined separately. It has also shown strong discriminant and convergent validity, indicating the measure is sufficiently discernable from related constructs such as depression and state anxiety (Watson et al., 1988). In addition, this scale was initially tested and developed on an undergraduate population, and thus is appropriate for a non-clinical sample (Watson et al., 1988). For the purposes of this study, participants were asked to rate how they feel “on average.”

Revised Social Anhedonia Scale: The Revised Social Anhedonia Scale

(RSAS: Eckblad et al., 1982; Appendix G) was used as an indicator the level of social anhedonia present in each participant. The RSAS is a 40 item True/False self report measure designed to assess decreased hedonic capacity for pleasure derived from interpersonal interactions. Items from the RSAS include items such as “if given the choice, I would much rather be with others than be alone” (keyed false) and “although I know I should have affection for certain people, I don’t really feel it” (keyed true). Concurrent validity of the RSAS has been demonstrated through findings that high RSAS scores are related to interview-based ratings of current social withdrawal and loneliness, as well as self-reported diminished need for enjoyment of social interactions (Mishlove & Chapman, 1985). The RSAS has high test-retest reliability (Blanchard et al, 1998), and has been shown to be internally consistent (Blanchard et al, 1998; Mishlove & Chapman, 1985). In addition, it has been extensively used in undergraduate samples (e.g., Eckblad et al., 1982).

Measures of Consummatory and Anticipatory Pleasure

The Temporal Experience of Pleasure Scale: The Temporal Experience of Pleasure Scale (TEPS; Gard, et al., 2006; Appendix I) was developed as a trait measure of an individual's capacity for the experience of both anticipatory and consummatory pleasure. It has been employed in both clinical (Gard et al., 2007) and non-clinical (Gard et al., 2006) samples. Both the anticipatory and consummatory scales have been found to have good internal consistency (alphas of .72-.74 for the anticipatory scale and .64-.71 for consummatory) as has the full scale (alphas of .78-.79; Gard et al., 2006).

The Comprehensive Assessment Interview for Negative Symptoms: The Comprehensive Assessment Interview for Negative Symptoms (CAINS; Forbes et al., 2010, Appendix H) is an experimental semi-structured interview for the measurement of negative symptoms in schizophrenia. The scale was developed in response to the NIH consensus statement calling for the development of new measure of negative symptoms that is capable of making the distinction between anticipatory and consummatory pleasure (Kirkpatrick et al., 2006). The scale covers a number of negative symptom domains, including anhedonia, amotivation, alogia, blunted affect, and asociality; however, for the purposes of this study, only the anhedonia scale was employed. The CAINS assesses hedonic capacity in a variety of different domains, including social, physical, occupational/vocational, and recreation. For each of these categories, individuals are provided with extensive prompting. For each activity, participants provided a rating of how much they enjoyed this activity on a 4 point Likert scale, with a score of 4 indicating the highest level of enjoyment.

Ratings for consummatory pleasure are made by asking participants to predict which activities they anticipate in the coming week that will be pleasant. Again, the CAINS identifies four different hedonic categories (social, physical, occupational/vocational, and recreational). After identifying a particular event, participants are asked to make a prediction of how pleasant or enjoyable they anticipate a given event to be using the same Likert scale employed for the measure of consummatory pleasure. Preliminary psychometric analyses of the prototype version indicated that reliability for the anhedonia scale was good (Cronbach's alpha of .75; Forbes, et al., 2010).

Standardized Simulated Social Interaction: In order to account for individual differences in reporting of both the quantity and intensity of experienced and anticipated pleasant events in the CAINS, a standardized affiliative simulation was included in the protocol. As previously reviewed, adequately affiliative social stimuli are not currently available. Stimuli such as flavored drinks, pictures, words, and sounds are not social in nature. Role-play interactions can vary depending on the responses that the confederate provide and also tend to focus on the resolution of conflict. A better alternative to these approaches is to use a standardized simulated, social interaction. Similar methodologies have been employed in the study of mate-selection and competition for mates (i.e., Gangestad et al., 2007; Puts et al., 2006; Simpson et al., 1999). The current study included a video-taped interaction of a young woman describing her likes and friendships while maintaining a positive and friendly conversational tone (Appendix J). This script was developed in order to try to evoke affiliation. This paradigm has been previously used to examine group differences in

affiliation between individuals selected for elevations in social anhedonia and controls (Llerena, Park, Couture, & Blanchard, 2012).

Given that a central focus of this study was to examine anticipatory and consummatory pleasure using a multi-method approach, this video will be adapted to allow participants to provide these ratings. As a videotaped simulated social interaction has never before been used in a study examining both anticipatory and consummatory hedonic capacity, there is currently no protocol to guide as to how to accomplish this; however, a variety of options exist. First, participants could be told that they will be viewing a tape of a college student describing what she enjoys and provided a brief description of her (including what her major is and year in school). They would then be asked to rate, using a Likert scale, how enjoyable they believe this experience would be. It may be possible, however, that using such a procedure would lead some participants to make neutral ratings since a minimalist description may not provide these individuals with enough information to make an anticipatory rating of pleasure.

Another option is to inform participants that they will be viewing a video tape of a female college student who will be describing what she enjoys doing, a brief biography of who she is, and then provide them with a still photograph of the confederate. Participants will then be asked to rate how enjoyable they anticipate viewing this video will be. This approach, however, might lead participants to merely rate how attractive they find the confederate to be.

A hybrid approach in which both strategies are combined into a multi-stepped rating of anticipatory pleasure likely provides the best solution. For the current study,

participants were informed that we were interested in how individuals' perceptions of social interactions change as more information becomes available to them. In the first phase, participants were told that they were going to be watching a video of a female college student describing what she enjoys doing and who she enjoys spending time with. They were then be asked to make ratings using a scale with a range of 0-4 (with 4 indicating the highest intensity rating) of how much they believed they would enjoy watching this video-tape. In addition, participants will be asked to anticipate how much they would like to meet the confederate, again using the 0-4 scale. After they completed these ratings, participants were then shown a brief still photograph and provided with a brief description of the confederate and asked to complete the same ratings (anticipated pleasure of viewing the video tape and then how much they would like to meet the confederate). These ratings comprise the anticipatory pleasure ratings for the simulated social interaction.

After participants viewed the video tape, they were again asked to make hedonic capacity ratings for the tape using another 0-4 scale. This time, they were asked how much they enjoyed viewing the video tape and were again be asked how much they would like to meet the confederate. These ratings comprised the consummatory pleasure ratings for the simulated social interaction.

Procedures

Participants were screened using the SPQ-B and divided into two groups. Individuals who scored within the top 90th percentile were considered eligible for the schizotypy group. Individuals who scored within the bottom quartile and matched the demographic characteristics of individuals in the schizotypy group were considered

eligible for the control group. Potential participants were contacted via telephone and/or email and asked to participate in the research study. Those who agreed to join the study were asked to come to the laboratory for testing. Upon arrival at the lab, participants were provided informed consent that had been approved by the University of Maryland, College Park Institutional Review Board. At that time they were also informed that all interviews were going to be videotaped for the purposes of review. Interviewers for the laboratory-based assessment were kept blind to group status. Once in the laboratory, participants were asked to provide self-report ratings for the TEPS, PANAS, and CESD. After completion of these rating scales, the video recorder was turned on and the participants were interviewed using the IPDE and CAINS.

Finally, participants were shown a videotaped interview with a female peer. They were told that they would be viewing a video-taped interview of an undergraduate student on campus. They were then told that we were interested in how people get to know one another and how perceptions change as more information becomes available to them. First, they were provided with the following description:

“You will now be viewing an interview of a female sophomore, English major college student as she describes what it is that she likes to do and who she enjoys spending time with. Please rate on a scale from 0-4, with 0 being no pleasure at all and 4 being the most pleasurable experience you can imagine, how pleasant you feel that viewing her interview will be. Finally, on a scale from 0-4, please rate how much you think that you would like to meet the student.”

Participants were then asked to make the same ratings after viewing a still photograph of the confederate. Next they were shown the simulated social interaction and asked to provide ratings how pleasurable it was to watch the video, and then how much they would like to meet the confederate. Following these procedures, participants were compensated for their time and debriefed.

Training and reliability of raters

The lead study author and one other clinical rater with masters level graduate training in clinical psychology conducted and rated all interviews for the current study. The additional rater received training that included review of relevant assessment manuals and observation and rating of previously recorded IPDE and CAINS interviews. In addition, the additional rater was observed conducting interviews to ensure competency on the assessments. Agreement between the two raters was found to be excellent for both the IPDE (ICC = 0.91) and CAINS (ICC = 0.92) respectively.

Statistical methods

Hypothesis 1: The schizotypy group and the control group were compared to examine the presence of clinically relevant differences including clinical symptoms and social functioning. It was hypothesized that individuals in the schizotypic group will evidence worse psychopathology than the control group. The two groups were examined for differences in Axis II psychopathology on the IPDE (Schizotypal, Schizoid, and Paranoid scores). Group differences in dimensional scores on the IPDE were examined using a series of ANOVAs . Differences in depression (BDI) severity

were examined between the two groups, again using an ANOVA analysis. Finally, the schizotypy group was also expected to exhibit worse overall functioning.

Differences between the two groups in terms of their social functioning (SAS-SR) scores were examined via ANOVA.

Hypothesis 2: Next, in an attempt to replicate previous findings, self-reported social anhedonia (RSAS) were compared to determine if the schizotypal group has greater anhedonia. Scores were compared using a univariate ANOVA.

Hypothesis 3: Groups were examined for differences on the three measures of anticipatory and consummatory pleasure. First, for anticipatory and consummatory pleasure subscales of both the self-report assessment, the TEPS and the clinical-interview assessment the CAINS, group differences were examined using a univariate ANOVA. For the laboratory paradigm (the simulated social interaction), group differences for anticipatory and consummatory interest in watching the video were analyzed using a mixed-design ANOVA with a within-subjects factor of scores on interest in watching the video at time points 1, 2, and 3 and a between-subjects factor of group (i.e., schizotypy and control). Similarly, for group differences in anticipatory and consummatory interest in meeting the confederate were analyzed using a mixed-design ANOVA with a within-subjects factor of scores on interest in meeting the confederate at time points 1, 2, and 3 and a between-subjects factor of group (i.e., schizotypy and control).

Hypothesis 4: Any significant group differences on any of the 3 measures of anticipatory and consummatory pleasure (i.e., the TEPS, the CAINS, and the

simulated social interaction) will be analyzed with depression scores on the CES-D covaried using an ANCOVA test.

Hypothesis 5: Finally, it is expected that all measures of anticipatory and all measures of consummatory pleasure will be related to one another. To examine this hypothesis, Pearson's product moment correlations were calculated between all three measures of anticipatory pleasure and then all three measures of consummatory pleasure.

Chapter 5: Results

Missing Data:

Due to equipment difficulties, two participants were unable to view and make ratings on the simulated social interaction. Similarly, due to incomplete testing packets, two participants did not complete the TEPS self-report measure and the depression measure the CES-D.

Missing data due to participants omitting items on self-report assessments were evident on the following measures: the simulated social interaction (1 individual in control group on the “interest in meeting” item at time point 1 and 1 in the schizotypy group for both items at time point 2), the depression measure (the CES-D; 1 individual in the control group on item #8 and 1 in the schizotypy group on item #5), the self-report measure of social anhedonia (the RSAS; 2 individuals in the schizotypy group on items #33, 36, and 38), the self-report measure of anticipatory and consummatory pleasure (the TEPS; 1 individual in the control group on item #5), and on the measure of psychosocial functioning (the SAS-SR; 1 individual in the schizotypy group on item #19). These missing items were handled in one of two ways. On the simulated social interaction, the average rating across both groups for the missing item was substituted. For the CES-D, the R-SAS, the TEPS, and the SAS-SR, non-pathological ratings were substituted for the missing item.

Descriptive Data:

1,443 individuals took part in the Mass Testing protocol from the Psychology 100 pool. A total of 79 individuals (40 high in schizotypy and 39 individuals in the

control group) were recruited for this study from that sample (see table 1). There were no significant group differences in terms of racial or ethnic group ($X^2(4) = 2.54$, ns), sex ($X^2(1) = 0.01$, ns), or age ($F(1, 77) = 0.01$, ns). As expected based on the recruitment and selection strategy, the two groups did show significant differences in terms of their scores on the screening measure, the SPQ-B with individuals in the schizotypy group scoring higher ($M = 16.55$, $SD = 1.65$) than controls ($M = 3.21$, $SD = 1.49$; $F(1, 77) = 1423.22$, $p < 0.01$).

Table 1

Demographic Characteristics of the Schizotypy (N = 40) and Control (N = 39) Groups

	Schizotypy Mean (SD)	Control Mean (SD)
Age	18.95 (0.99)	18.97 (1.06)
	% (N)	% (N)
Racial/Ethnic Group		
Caucasian	50% (20)	64.1% (25)
African-American	10% (4)	10.3% (4)
Asian/Pacific Islander	25% (10)	15.4% (6)
Latino/Latina	7.5% (3)	7.7% (3)
Other	7.5% (3)	2.6% (1)
Sex		
Male	37.5% (15)	38.5% (15)
Female	62.5% (25)	61.5% (24)

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

Hypothesis 1:

It was predicted that individuals in the schizotypy group would evidence increased levels of psychopathology and worse general functioning than the individuals in the control group (see table 2). The groups were first examined for differences in personality disorder psychopathology on the IPDE using a one-way

ANOVA. Individuals in the schizotypy group evidenced higher levels of schizotypic personality disorder traits ($F(1, 77) = 22.46, p < 0.01, d = 0.97$), schizoid personality disorder traits ($F(1, 77) = 5.36, p = 0.02, d = 0.48$), and paranoid personality disorder traits ($F(1, 77) = 8.74, p < 0.01, d = 0.67$). Next, the groups were examined for differences in levels of depression by comparing their scores on the CES-D.

Individuals in the schizotypy group were found to have significantly higher scores on the CES-D when compared to individuals in the control group ($F(1, 75) = 40.43, p < 0.01, d = 1.45$).

The groups were also examined for differences in overall functioning using the SAS-SR (higher scores indicate poorer functioning on this scale). Individuals in the schizotypy group had higher total scores on the SAS-SR ($F(1, 75) = 10.99, p < 0.01, d = 0.72$) indicating that this group exhibited worse general functioning than controls. On the individual subscales, individuals in the schizotypy group scored significantly higher on the school ($F(1, 77) = 4.78, p = 0.03, d = 0.49$), spare time ($F(1, 77) = 29.81, p < 0.01, d = 1.23$), and family subscales ($F(1, 77) = 4.23, p = 0.04, d = 0.46$) of the SAS-SR. All differences were in the expected direction, that is individuals in the schizotype group reported more dissatisfaction and worse functioning on these subscales. No significant differences were found between the two groups on the work ($F(1, 77) = 1.91, ns$), spouse ($F(1, 77) = 1.74, ns$), family unit ($F(1, 77) = 0.98, ns$), or the financial subscales ($F(1, 77) = 0.001, ns$). Analyses were not conducted on the children subscale as no participants in this study reported having any children.

Finally, the groups were examined for differences in self-reported positive and negative affect as measured by the PANAS. No significant differences were found between the two groups on self-reported positive affect ($F(1, 77) = 1.04$, ns). Significant differences between the two groups were found, however, on the negative affect subscale with individuals in the schizotypy group self-reported more negative affect than individuals in the control group ($F(1, 77) = 24.89$, $p < 0.01$, $d = 1.13$).

Table 2
Descriptive Statistics for Psychopathology and Functioning Measures

Measure	Schizotypy Group <i>Mean (SD)</i>	Control Group <i>Mean (SD)</i>	Effect Size <i>Cohen's d</i>
<i>IPDE</i>			
<i>Schizotypal PD</i>	2.00 (1.89)	0.44 (0.82) **	1.07
<i>Schizoid PD</i>	1.78 (1.83)	1.03 (1.25) *	0.48
<i>Paranoid PD</i>	1.63 (2.24)	0.49 (0.88) **	0.67
<i>CES-D</i>	18.18 (8.86)	7.21 (5.96) **	1.45
<i>SAS-SR Total</i>			
<i>Work Subscale</i>	57.28 (8.72)	51.18 (8.27) **	0.72
<i>School Subscale</i>	4.85 (2.84)	5.72 (2.73)	0.31
<i>Spare Time Subscale</i>	11.45 (2.06)	10.28 (2.66) *	0.49
<i>Family Subscale</i>	18.70 (3.42)	14.84 (2.81) **	1.23
<i>Spouse Subscale</i>	11.58 (2.46)	10.46 (2.35) *	0.46
<i>Family Unit Subscale</i>	0.73 (3.43)	0.00 (0.00)	0.30
<i>Financial Subscale</i>	0.15 (0.95)	0.00 (0.00)	0.22
<i>PANAS</i>			
<i>Positive Affect</i>	1.73 (1.18)	1.72 (1.21)	0.01
<i>Negative Affect</i>	28.10 (6.90)	29.62 (6.26)	0.23
	18.48 (5.37)	13.46 (3.29) **	1.13
<i>RSAS</i>	11.43 (4.53)	6.79 (2.25) **	1.30

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

Hypothesis 2:

It was predicted that individuals in the schizotypy group would evidence higher levels of anhedonia, on a self-report measure of social anhedonia (the RSAS; see table 2). Consistent with this prediction, individuals in the schizotypy group reported higher levels of social anhedonia than the control group ($F(1, 77) = 32.79, p < .01, d = 1.30$).

Hypothesis 3:

Group differences in anticipatory and consummatory pleasure were assessed using a multi-method approach consisting of self-report, semi-structured interview, and in response to a laboratory paradigm. It was predicted that on each measure individuals in the schizotypy group would evidence less anticipatory, but not consummatory pleasure.

Self-Report Measure

Next, it was predicted that individuals in the schizotypy group would report less anticipatory but similar consummatory pleasure compared to individuals in the control group on a self-report measure (the TEPS). These group differences were examined via a one-way ANOVA (see table 3). Results were consistent with the hypothesis in that the groups differed significantly on the anticipatory subscale ($F(1, 75) = 3.93, p = .05, d = 0.45$) with individuals in the schizotypy group reporting lower levels of anticipatory pleasure. No group differences were found on the consummatory subscales ($F(1, 75) = .68, ns$).

Table 3
Group Differences on the TEPS

	Schizotypy Group <i>Mean (SD)</i>	Control Group <i>Mean (SD)</i>	Effect Size <i>Cohen's d</i>
<i>Anticipatory Subscale</i>	45.82 (6.57)	48.80 (6.63) *	0.45
<i>Consummatory Subscale</i>	35.76 (5.57)	36.80 (5.41)	0.19

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

Clinician Rated Interview

It was predicted that group differences would be evident on a clinician-administered interview (the CAINS) with individuals in the schizotypy group reporting lower rates of anticipatory pleasure relative to controls (see table 4). No group differences were predicted for the consummatory subscale. The CAINS provides queries for assessing anticipatory and consummatory pleasure across four categories of hedonic functioning: social, physical, vocational, and recreational. For consummatory pleasure, each participant gives a rating based on the frequency of pleasurable experiences in the past week and the intensity of pleasure in the past week. For anticipatory pleasure, participants provide a rating for the peak amount of pleasure they anticipate for upcoming events. Previous examinations of the CAINS have collapsed the anhedonia ratings into either a global anhedonia scale (Forbes et al., 2010) or combined the anhedonia subscale with other subscales of the CAINS (Horan, Kring, Gur, Reise, & Blanchard, 2011). As the focus of the current study was to explore group differences on anticipatory and consummatory pleasure, index scores collapsing across first the anticipatory and then the consummatory items were generated.

Collapsing both the frequency and intensity ratings for each of the four hedonic domains (i.e., social, physical, vocational, and recreational) generated a single consummatory subscale. Internal consistency analysis of this scale indicated that reliability was lower than expected ($\alpha = 0.52$). Attempts to improve internal consistency by creating two subscales consisting of only consummatory frequency ($\alpha = 0.35$) or intensity ($\alpha = 0.53$) items did not result in substantive improvement and it was decided to use the single subscale consisting of both frequency and intensity ratings.

For the anticipatory subscale, collapsing across the four hedonic domains yielded an unacceptably low reliability indicator ($\alpha = 0.34$). The protocol for conducting the CAINS interview requires participants to list all upcoming events and then to rate how pleasurable they expect each experience to be; thus these data were also available for analysis. Recent psychometric studies of the CAINS have indicated that frequency measures of hedonic capacity are more reliable than are intensity ratings (Horan, et al., 2011); therefore it was decided to create a scale consisting only of the number of reported future rewards. Reliability analysis resulted in less than expected internal consistency ($\alpha = 0.59$), however, this was comparable with the reliability of the consummatory subscale, and also superior to the results of the original scoring method. Therefore, the CAINS anticipatory subscale based on frequency of expected future events was used in analyses.

Differences in the rating system between the revised anticipatory and consummatory subscales necessitated recoding of the consummatory subscale. The original rating system of the CAINS generated higher ratings for reductions in

hedonic capacity. In contrast, the modified anticipatory rating system is based on the number of reported future pleasurable experiences; thus higher ratings indicate a greater hedonic capacity. In order to make the two index scales comparable, ratings on the consummatory subscale were reverse scored, so that higher ratings on both subscales now indicate greater hedonic capacity.

Table 4
Group Differences on the CAINS with Collapsed Anticipatory and Consummatory Subscales

	<i>Schizotypy Group Mean (SD)</i>	<i>Control Group Mean (SD)</i>	<i>Effect Size (Cohen's d)</i>
<i>CAINS</i>			
<i>Anticipatory</i>	7.33 (3.10)	8.92 (3.83)*	0.46
<i>Consummatory</i>	7.50 (2.91)	8.71 (3.41)	0.38

* $p = 0.05$; ** $p < 0.01$

Using the collapsed anticipatory and consummatory subscales (see table 4), it was found that consistent with predictions, individuals in the control group were rated as having a significantly greater capacity for anticipatory pleasure than individuals in the schizotypy group ($F(1, 77) = 4.16, p = 0.05, d = 0.46$). No differences were found between the two groups on ratings of consummatory pleasure ($F(1, 77) = 2.92, ns$); however, the moderate effect size of 0.38 indicates that given more power, this difference would likely become significant.

In conclusion, as predicted, when index scores of anticipatory and consummatory pleasure were constructed, significant group differences were found on the anticipatory index of the CAINS (with individuals in the schizotypy group

reporting less anticipatory pleasure than individuals in the control group). No group differences were evident on the consummatory index scale.

Laboratory Paradigm

Differences between the two groups on emotional experience during the simulated social interaction were examined. Anticipatory pleasure was assessed in two different ways prior to the participants actually viewing the videotape. At time point 1, participants were presented with a verbal description of the simulated social interaction and were asked to provide two ratings of anticipatory pleasure using a 0-4 Likert scale: how much they believe they will enjoy watching the video and how much they think that they would like to meet the confederate. At time point 2, the participants were provided with a photo and a description of the actress in the simulated social interaction and were asked to make the same ratings as at time point 1. These four ratings (two at time point 1 and two at time point 2) constituted the anticipatory pleasure ratings for the simulated social interaction.

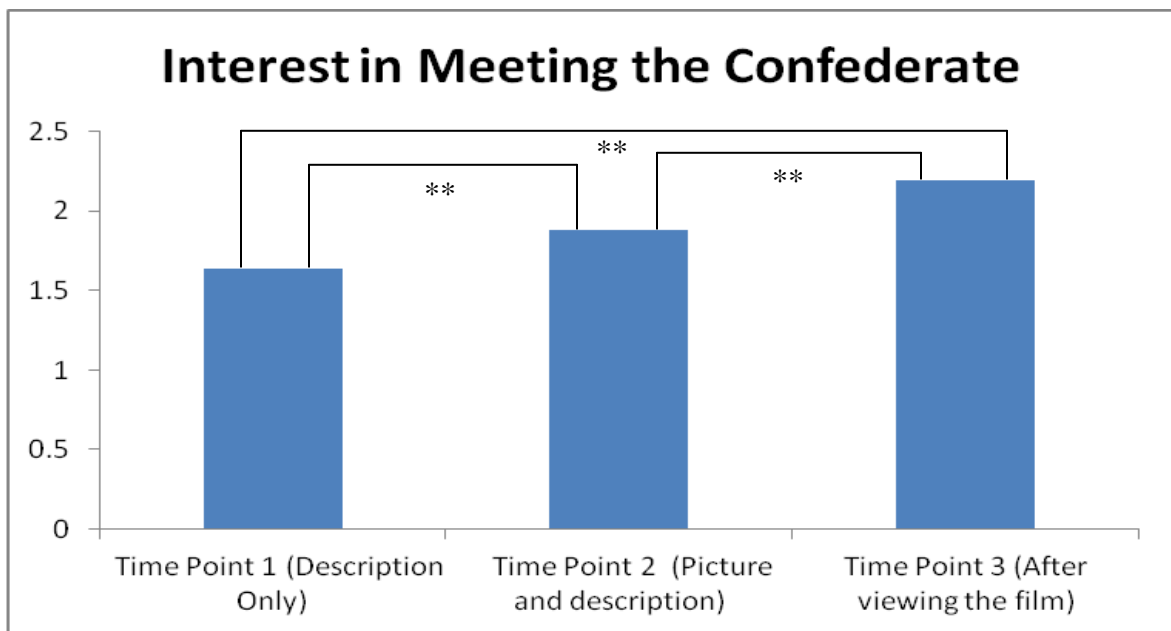
Consummatory pleasure ratings were comprised of two Likert scale ratings taken after the participants viewed the video at time point 3. Using the same 0-4 scale utilized for the anticipatory ratings, participants were asked first how much they enjoyed viewing the video and then how much they would like to meet the woman in the video. These two ratings then constituted the consummatory pleasure ratings.

Data for interest in meeting the confederate were analyzed using a mixed-design ANOVA with a within-subjects factor of scores on interest in meeting the confederate at time points 1, 2, and 3 and a between-subjects factor of group (schizotype, control). Mauchly's test of sphericity indicated that the assumption of

sphericity had been violated ($X^2(2) = 30.02, p < .01$), and the degrees of freedom were therefore corrected using Greenhouse-Geisser estimates of sphericity ($\epsilon = .75$). The main effect for group was not significant ($F(1, 74) = 0.29, ns$), indicating that there were no significant differences between the groups in terms of their interest in meeting the confederate. The main effect of time, however, was significant ($F(1.49, 74) = 19.88, p < .01$; see Figure 1). There was no significant group x time point interaction ($F(1.49, 74) = 2.18, ns$).

Figure 1

Ratings of “Interest in Meeting” Across Time Points (Collapsing across groups, $N = 77$)



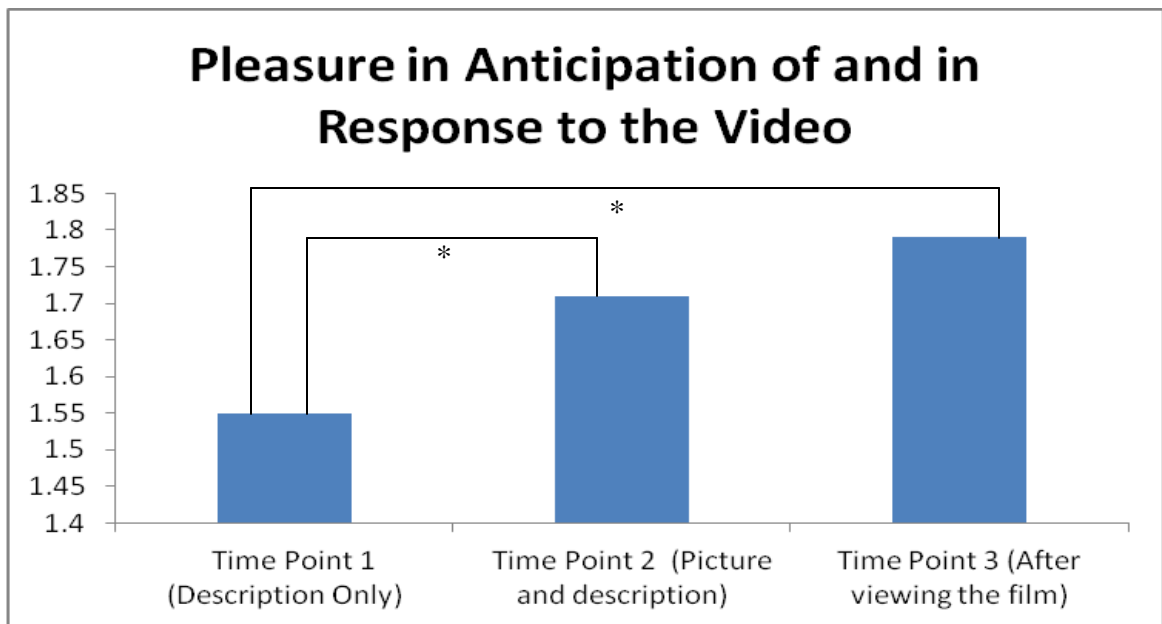
* $p = 0.05$; ** $p < 0.01$

Post hoc comparisons indicated that at time point 2 (during which participants were provided with a picture of the confederate, $M = 1.88, SD = 0.11$), participants expressed more interest in meeting the confederate than at time point 1 (when they were provided with a verbal description of the confederate; $M = 1.64, SD = 0.10; p <$

.01). There was also a significant difference between time point 1 ($M = 1.64$, $SD = 0.10$) and time point 3 (after watching the video; $M = 2.19$, $SD = 0.12$; $p < .01$). Finally, there was a significant difference between time point 2 ($M = 1.88$, $SD = 0.11$) and time point 3 ($M = 2.19$, $SD = 0.12$; $p < .01$). These results indicate that generally, participants found that they were more interested in meeting the confederate as they were presented with more information about the confederate (from time point 1 to time point 2) and that generally, participants were more interested in meeting the confederate after viewing the video than prior to viewing the video.

Figure 2

Ratings of “Pleasure” Across Time Points (Collapsing across groups, $N = 77$)



* $p = 0.05$; ** $p < 0.01$

Data for pleasure anticipated and experienced prior to and after watching the video were analyzed using a mixed-design ANOVA with a within-subject factor of scores on pleasure in watching the video at time periods one, two, and three, and a between-subjects factor of group (schizotype, control; see Figure 2). Mauchly’s test of sphericity indicated that the assumption of sphericity had been violated ($X^2 (2)$

19.19, $p < .01$), and the degrees of freedom were therefore corrected using Greenhouse-Geisser estimates of sphericity ($\epsilon = .81$). The main effect of group was not significant ($F(1.62, 74) = 0.09$, ns). The main effect of time period on ratings of pleasure was significant ($F(1.62, 74) = 4.41$, $p = 0.02$). The group x time point interaction was not significant ($F(1.62, 74) = 0.10$, ns).

Post hoc comparisons revealed that individuals anticipated significantly more pleasure at time point 2 (after seeing the picture; $M = 1.71$, $SD = 0.10$) than they did at time point 1 (prior to seeing the picture; $M = 1.55$, $SD = 0.09$; $p = 0.03$). In addition, participants rated the experience of watching the video at time point 3 ($M = 1.79$, $SD = 0.11$) as more pleasurable than they anticipated at time point 1 ($M = 1.55$, $SD = 0.09$; $p = 0.04$). There were no significant differences between time points 2 and 3.

In order to conduct exploratory analyses examining the convergent validity of the various measures of hedonic capacity, composite subscales comprised of the anticipatory and consummatory ratings from the simulated social interaction were created. Items pertaining to anticipatory pleasure (i.e., the ratings of anticipated pleasure and desire to meet the confederate at time points 1 and 2) were collapsed into an anticipatory rating index scale. Similarly, items pertaining to consummatory pleasure (i.e., the ratings of experienced pleasure and desire to meet the confederate at time point 3) were collapsed into a consummatory pleasure index rating scale. Reliability analyses indicated good internal consistency ratings for both the anticipatory ($\alpha = 0.89$) and the consummatory ($\alpha = 0.85$) index scores.

Table 5

Group Differences on the Simulated Social Interaction (SSI) with Collapsed Anticipatory and Consummatory Subscales

	<i>Schizotypy Group Mean (SD)</i>	<i>Control Group Mean (SD)</i>	<i>Effect Size (Cohen's d)</i>
<i>SSI</i>			
<i>Anticipatory</i>	6.99 (3.22)	6.58 (2.78)	0.14
<i>Consummatory</i>	3.92 (1.76)	4.00 (1.85)	0.04

**p = 0.05, **p < 0.01*

Using the collapsed anticipatory and consummatory subscales of the simulated social interaction (see table 5), no significant differences were found between the two groups on the anticipatory ratings of the simulated social interaction ($F(1, 75) = 0.36$, ns) or consummatory ratings of the simulated social interaction ($F(1, 75) = 0.04$, ns).

In conclusion, in contrast to what was predicted no significant group differences were evident on the simulated social interaction either when utilizing the original scoring method or by generating index anticipatory and consummatory scales.

Hypothesis 4:

As there were significant group differences on a measure of depression (the CES-D), group differences in hedonic capacity were re-examined with depression controlled for using an analysis of covariance (ANCOVA) test. Significant differences in hedonic capacity were expected to remain significant. The only significant group differences were found on the anticipatory subscales of the TEPS

and on the collapsed anticipatory subscale of the CAINS. These will be examined in turn.

For the TEPS, when controlling for depression, the differences between the groups on the anticipatory ($F(1, 72) = 2.16, ns$) subscale of the TEPS were non-significant. Similarly, on the CAINS, when controlling for depression scores on the CES-D, the differences between the groups on this scale became non-significant ($F(1, 74) = 2.42, ns$). Thus, prior group differences in anticipatory pleasure were no longer evident when covarying for depression.

Hypothesis 5:

In order to examine the convergent validity of the three measures of hedonic capacity employed in the current study, the relationship between all three measures was examined. It was predicted that anticipatory subscales of each measure would be correlated with the anticipatory subscales of the other two measures. Likewise, it was predicted that the consummatory subscale of each measure would be correlated with the consummatory subscales of the other two measures. These analyses were conducted collapsing across groups in order to preserve power. First, as the TEPS is a self-report measure of hedonic capacity and the CAINS is a clinician-rating of hedonic capacity, it was expected that the two measures would be correlated. Next, both the TEPS and the CAINS were expected to show a relationship with the simulated social interaction. As the simulated social interaction was designed to mimic real-world experience, ratings of anticipatory and consummatory pleasure in response to the video were expected to correlate to ratings on both the TEPS and the CAINS.

An analysis of the relationship between the TEPS and the CAINS (see table 6) showed that there was a significant, positive relationship between the anticipatory subscales of the TEPS and the CAINS ($r = 0.41, p < 0.01$); indicating that as individuals reported a greater capacity to anticipate future reward, they were also rated by clinicians as evidencing a greater capacity for experiencing future reward. In addition, the consummatory subscales of both the TEPS and CAINS evidenced a significant, positive correlation ($r = 0.36, p < 0.01$) indicating that both self-reports and clinician ratings of consummatory hedonic capacity were in agreement. Thus, self-reports of both anticipatory and consummatory pleasure were corroborated by clinician rating.

Table 6
Correlation Between the TEPS and the CAINS (Collapsing across groups)

	<i>TEPS</i>	
	<i>Anticipatory</i>	<i>Consummatory</i>
<i>CAINS</i>		
<i>Anticipatory</i>	0.41**	0.29*
<i>Consummatory</i>	0.29*	0.36**

* $p = 0.05$; ** $p < 0.01$

Analyses also indicated (see table 6) that the consummatory subscale of the TEPS had a positive relationship with the anticipatory subscale of the CAINS ($r = 0.29, p = 0.01$) and that the TEPS anticipatory subscale had a significant, positive relationship with the CAINS consummatory subscale ($r = 0.29, p = 0.01$).

The relationship between self-reports on the TEPS and response to the simulated social interaction laboratory stimulus were examined next (see table 7). Self-reports of anticipatory pleasure on the TEPS were positively correlated with both

the anticipatory ($r = 0.28, p = 0.16$) and consummatory ($r = 0.32, p < 0.01$) measures of the simulated social interaction. No significant relationships were found between the consummatory subscale of the TEPS and either the anticipatory ($r = 0.12, ns$) nor consummatory ($r = 0.11, ns$) measures of the simulated social interaction. Thus it appears that in this sample, self-reports of anticipatory pleasure were more in agreement with both anticipatory and consummatory pleasure responses to a laboratory stimulus than were self-reports of consummatory pleasure.

Table 7
Relationship Between the TEPS, CAINS, and the SSI (Collapsing across groups)

		TEPS		CAINS	
		Ant.	Con.	Ant.	Con.
SSI	Anticipatory	0.28*	0.12	0.20	0.40**
	Consummatory	0.32**	0.11	0.07	0.35**

* $p = 0.05$; ** $p < 0.01$

The relationship between clinician ratings of hedonic capacity on the CAINS and response to the simulated social interaction laboratory stimulus were examined (see table 7). The anticipatory ratings on the CAINS did not evidence any significant relationships with either the anticipatory ($r = 0.20, ns$) or the consummatory ($r = 0.07, ns$) measures of the simulated social interaction. Significant positive relationships were found between the consummatory subscale of the CAINS and both the anticipatory ($r = 0.40, p < 0.01$) and consummatory ($r = 0.35, p < 0.01$). Thus, clinician ratings of consummatory pleasure were found to relate to both anticipation of pleasure and experience of pleasure in response to a standardized stimulus; clinician ratings of anticipatory pleasure, however, were not.

Exploratory analyses:

A number of post hoc analyses were included as a part of the current study. As each of these analyses were intended to be exploratory and conducted with the intention of informing future, larger studies, each of the following analyses were conducted collapsing across groups in order to preserve power. In addition, the subscales of each of the measures of anticipatory and consummatory pleasure were utilized in the following analyses. First, as significant sex differences have been reported on measures of schizotypy and hedonic capacity (e.g., Miettunen & Jaaskelainen, 2008; Miller & Burns, 1995), it was decided to examine the TEPS, CAINS, and simulated social interaction for significant sex differences. It was expected that any significant sex differences would favor females, with women reporting a greater capacity for experiencing pleasure than men. Second, the clinical correlates of the three measures of anticipatory and consummatory hedonic capacity were examined. The relationships between each of the measures of anticipatory and consummatory pleasure and ratings of social anhedonia, depression, overall psychosocial functioning, trait positive and negative affect, and ratings of schizophrenia spectrum psychopathology were considered. No a priori hypothesis about the nature of these relationships was posited.

Sex Differences.

First, sex differences on the measures of anticipatory and consummatory pleasure were examined (see table 8). Significant group differences were found on both the anticipatory ($F(1, 75) = 8.24, p < 0.01, d = 0.65$) and consummatory ($F(1, 75) = 5.10, p = 0.03, d = 0.52$) subscales of the TEPS. On both subscales, the sex

differences were in the expected direction with women self-reporting greater capacity for pleasure than men. Significant group differences were also found on both the anticipatory ($F(1, 77) = 4.39, p = 0.04, d = 0.50$) and consummatory ($F(1, 77) = 5.32, p = 0.02, d = 0.47$) subscales of the CAINS. Again, on both subscales, the sex differences were in the expected direction with women being rated as having a greater capacity for pleasure than men. No significant differences were found on either the anticipatory ($F(1, 75) = 0.90, ns$) or consummatory ($F(1, 75) = 0.14, ns$) measures of the simulated social interaction.

Table 8
Sex Differences on Measures of Anticipatory and Consummatory Pleasure

	<i>Males Mean (SD)</i>	<i>Females Mean (SD)</i>	<i>Effect Size (Cohen's d)</i>
<i>TEPS</i>			
<i>Anticipatory</i>	44.62 (7.71)	48.96 (5.52)*	0.65
<i>Consummatory</i>	34.52 (5.82)	37.35 (5.03)*	0.52
<i>CAINS</i>			
<i>Anticipatory</i>	7.07 (3.13)	8.76 (3.34)*	0.52
<i>Consummatory</i>	7.07 (3.69)	8.73 (3.11)*	0.47
<i>Simulated Social Interaction</i>			
<i>Anticipatory</i>	6.36 (3.19)	7.06 (2.90)	0.23
<i>Consummatory</i>	3.86 (2.01)	4.02 (1.67)	0.09

* $p = 0.01$, ** $p < 0.05$

Relationship Between Hedonic Capacity and Clinical Measures

Next, an exploratory analysis of the relationship between each of the measures of hedonic capacity and various measures of psychopathology was considered. Each of the three measures of anticipatory and consummatory pleasure (i.e., the TEPS, the CAINS, and the SSI) was compared to a self-report measure of social anhedonia (the RSAS), a self-report measure of depression (the CES-D), self-report trait positive and

negative affect as measured by the PANAS, and clinician ratings of schizophrenia spectrum psychopathology (the IPDE). Each will be considered in turn.

First, the relationships between the TEPS and the clinical measures will be reviewed (see table 9). Analyses indicated that the anticipatory subscale of the TEPS evidenced significant, negative relationships with a self-report measure of social anhedonia, the RSAS ($r = -0.48, p < 0.01$), trait positive affect as measured by the PANAS ($r = 0.33, p < 0.01$) and schizotypal ($r = -0.23, p = 0.04$), schizoid ($r = -0.49, p < 0.01$), and paranoid ($r = -0.27, p = 0.02$) personality disorder traits on the IPDE. No significant relationships were found between the anticipatory subscale and a self report measure of depression, the CES-D ($r = -0.20, ns$), general psychosocial functioning as measured by the SAS ($r = -0.16, ns$) or trait negative affect ($r = -0.20, ns$).

Table 9
Relationships Between the TEPS and Clinical Measures

	<i>TEPS</i>	
	<i>Anticipatory</i>	<i>Consummatory</i>
<i>RSAS</i>	-0.43**	-0.20*
<i>CES-D</i>	-0.20	-0.02
<i>SAS total</i>	-0.16	-0.05
<i>PANAS</i>		
<i>Positive Affect</i>	0.33**	0.22
<i>Negative Affect</i>	-0.20	-0.08
<i>IPDE</i>		
<i>Schizotypal</i>	-0.23*	-0.15
<i>Schizoid</i>	-0.49**	-0.40**
<i>Paranoid</i>	-0.27*	-0.12

* $p = 0.01$, ** $p < 0.05$

The consummatory subscale of the TEPS evidenced significant, negative relationships with the RSAS ($r = -0.29, p = 0.02$) and schizoid personality disorder traits ($r = -0.40, p < 0.01$). No significant relationships were found between this subscale and the CES-D ($r = 0.02, ns$), the SAS total ($r = -0.05, ns$), trait positive ($r = 0.22, ns$) or negative affect ($r = -0.08, ns$), or ratings of schizotypal ($r = -0.15, ns$) or paranoid ($r = -0.12, ns$) personality disorder.

Next, the relationship between the CAINS subscales and the clinical measures was considered (see table 10). Analyses indicated that the CAINS anticipatory subscale was negatively correlated with self-reported social anhedonia on the RSAS ($r = -0.24, p = 0.04$), general psychosocial functioning as assessed by the SAS ($r = -0.26, p = 0.03$) and schizoid personality disorder traits ($r = -0.29, p = 0.01$). No significant relationships were found between the CAINS anticipatory subscale and the CES-D ($r = -0.07, ns$), trait positive ($r = 0.11, ns$) or negative affect ($r = -0.13, ns$) or schizotypal ($r = -0.09, ns$) or paranoid ($r = -0.16, ns$) personality disorder traits.

The consummatory subscale of the CAINS was not found to have any significant correlation with any of the clinical measures: the RSAS ($r = -0.13, ns$), the CES-D ($r = -0.01, ns$), the SAS total ($r = -0.16, ns$), trait positive ($r = 0.14, ns$) or negative affect ($r = 0.01, ns$), or ratings of schizotypal ($r = 0.02, ns$), schizoid ($r = -0.22, ns$), or paranoid ($r = -0.07, ns$) personality disorders. Although the relationship between the CAINS consummatory subscale and schizoid personality disorder traits was not significant, it should be noted that this correlation did not significantly differ from the correlation between the CAINS anticipatory subscale and schizoid personality disorder traits, which was significant ($t(76) = -1.11, ns$). This indicates

that given enough power, the relationship between the CAINS consummatory subscale and schizoid personality disorder traits would become significant.

Table 10
Relationship Between the CAINS and Clinical Measures

	CAINS	
	<i>Anticipatory</i>	<i>Consummatory</i>
<i>RSAS</i>	-0.24*	-0.13
<i>CES-D</i>	-0.07	-0.01
<i>SAS total</i>	-0.26*	-0.16
<i>PANAS</i>		
<i>Positive Affect</i>	0.11	0.14
<i>Negative Affect</i>	-0.13	0.01
<i>IPDE</i>		
<i>Schizotypal</i>	-0.09	-0.02
<i>Schizoid</i>	-0.28*	-0.22
<i>Paranoid</i>	-0.16	-0.06

* $p = 0.05$, ** $p < 0.01$

Finally, the anticipatory measures of the simulated social interaction did not evidence any significant relationships with any of the clinical measures (see table 11). The relationships between the subscale and a self-report measure of social anhedonia, the RSAS ($r = 0.01$, ns), the measure of depression, the CES-D ($r = 0.09$, ns), a broad measure of psychosocial functioning, the SAS ($r = 0.09$, ns), trait positive ($r = 0.16$, ns) or negative affect ($r = -0.01$, ns) and trait measures of schizotypal ($r = 0.00$, ns), schizoid ($r = -0.20$, ns), and paranoid ($r = -0.09$, ns) personality disorders were all non-significant.

Table 11*Relationship Between the Simulated Social Interaction and Clinical Measures*

	SSI	
	<i>Anticipatory</i>	<i>Consummatory</i>
<i>RSAS</i>	0.01	-0.02
<i>CES-D</i>	0.09	-0.03
<i>SAS total</i>	0.08	0.06
<i>PANAS</i>		
<i>Positive Affect</i>	0.16	0.19
<i>Negative Affect</i>	-0.01	-0.08
<i>IPDE</i>		
<i>Schizotypal</i>	0.00	0.04
<i>Schizoid</i>	-0.18	-0.15
<i>Paranoid</i>	-0.09	-0.16

p* = 0.05, *p* < 0.01

Similarly, all relationships between the consummatory measures of the SSI and the RSAS ($r = -0.02$, ns), the CES-D ($r = -0.03$, ns), the SAS total ($r = 0.06$, ns), trait positive ($r = 0.19$, ns) or negative ($r = -0.08$, ns) affect, and trait measures of schizotypal ($r = 0.04$, ns), schizoid ($r = -0.15$, ns), and paranoid ($r = -0.16$, ns) personality disorders were all non significant.

Chapter 6: Discussion

This study was an attempt to clarify the nature of the anhedonia deficit in individuals at putative risk for schizophrenia spectrum psychopathology. Specifically, this study sought to examine anticipatory and consummatory pleasure using a multi-method approach including self-report measures, clinician interview ratings, and experimental methods designed to evoke affiliation. These methods were chosen to allow for the assessment of both naturalistic, real-world experience and also in-the-moment responding to a standardized stimulus. Confirmation of anticipatory pleasure deficits in the current study would both replicate previous literature and also extend our understanding of these deficits into non-clinical populations. Each of the proposed hypotheses are summarized and examined below.

Hypothesis 1:

First, it was proposed that individuals in the schizotypy group would evidence worse functioning and higher levels of psychopathology than the comparison group. Analyses revealed that consistent with previous studies (e.g., Jahshan & Sergi, 2007), the schizotypy group did evidence worse functioning, both overall and also specifically in terms of academic functioning, satisfaction with spare time, and satisfaction with family relationships. Consistent with previous literature, individuals in the schizotypy group also reported elevations in trait negative affect; however, inconsistent with previous results, no significant group differences were evident between the groups in terms of trait positive affect (for a review, see Horan et al., 2008). Finally, also consistent with previous research, individuals in the schizotypy

group evidenced higher levels of depressive, schizotypic, schizoid, and paranoid psychopathology (Aguirre et al., 2008; Fonseca-Pedrero et al., 2010).

Hypothesis 2:

Individuals in the schizotypy group were also expected to report higher levels of social anhedonia on the Revised Social Anhedonia Scale. Consistent with previous research indicating that schizotypal personality traits are associated with elevations on the RSAS (e.g., Compton, Goulding, Bakeman, & McClure-Tone, 2009), the current study found that individuals in the schizotypy group endorsed significantly higher levels of self-reported social anhedonia than the control group.

Hypothesis 3:

Self-Report Measure

Individuals in the schizotypy group were predicted to report reductions in anticipatory pleasure as measured by the self report questionnaire, the TEPS. No differences were predicted between individuals in the schizotypy and control group on the consummatory pleasure subscale. Consistent with both of these predictions, results indicated that individuals in the schizotypy group scored significantly lower on the anticipatory subscale than controls. No differences were found between the two groups on the consummatory subscale.

Only one other study has examined self-reported anticipatory and consummatory pleasure as measured by the TEPS in a non-clinical sample. Martin, Becker, Cicero, Docherty, and Kerns (2011) found that individuals with elevations on social anhedonia had lower scores on both the anticipatory and consummatory

subscales of the TEPS. This same pattern was not seen when comparing individuals with other markers of schizotypy (such as magical ideation and perceptual aberrations) to controls. Individuals in the group selected for elevations on perceptual aberrations and magical ideation did not evidence any significant impairment on either the anticipatory or consummatory pleasure scale when compared to controls. The results from Martin et al. (2011) are inconsistent with the current findings which found that individuals with elevations in schizotypy evidenced impairment in anticipatory pleasure but not consummatory pleasure.

One explanation for the discrepancy found between the results of the current study and that of Martin et al. (2011) is that the heterogeneity that is associated with schizophrenia spectrum psychopathology. In order to understand this, one has to understand the structure of symptoms in schizotypy. Like schizophrenia, the features of schizotypy can be divided into positive and negative factors (Fanous, Gardner, Walsh, & Kendler, 2001). This bifurcation mirrors the distinction between the positive and negative symptoms of schizophrenia. Negative symptoms are conceptualized as a deficit in normal functioning, whereas positive symptoms are the psychotic features of schizophrenia that are not seen in people without the diagnosis (Hughlings-Jackson, 1931). As previously reviewed, there are a number of approaches one can take in the identification of individuals with non-clinical schizophrenia spectrum psychopathology. First, one can select participants based on elevations on a symptom of interest, such as one of Meehl's core traits of schizotypy. In his original conceptualization of schizotypy, Meehl included two traits (perceptual aberration and magical ideation) which are considered to be positive features of

schizotypy (Kwapil, Barrantes-Vidal, & Silvia, 2008). A second approach to the identification of individuals with schizophrenia spectrum psychopathology is to look for a constellation of characteristics that indicate the presence of schizotypy. This is the approach taken in the current study. This strategy results in a combination of both positive and negative traits of schizotypy.

In the Martin et al. (2011) participants in the schizotypy groups were selected based on either elevations in positive (magical ideation and perceptual aberration) or negative (social anhedonia) schizotypy. Accordingly, they found that impairments in both self-reported anticipatory and consummatory pleasure were associated with only the negative features of schizotypy (i.e., social anhedonia), whereas the positive features of schizotypy were not associated with impairments in either. Further research is needed in non-clinical samples to determine whether reductions in the heterogeneity of schizophrenia spectrum psychopathology help to clarify the nature of hedonic capacity deficits in this population.

Studies utilizing the TEPS self-report measure in clinical samples have similarly found inconsistencies in the pattern of anticipatory and consummatory pleasure deficits. Studies typically find that individuals with schizophrenia evidence impairments on the anticipatory but not the consummatory subscale of the TEPS when compared to controls (Gard et al., 2007; Wynn et al., 2010).

There are some indications that this pattern of results holds when the phenotypic heterogeneity associated with the schizophrenia illness is reduced. Chan and colleagues (2010) attempted to understand the nature of anticipatory pleasure deficits in relation to negative symptom psychopathology. Accordingly, they found

that individuals with elevations in negative symptoms self-reported anticipatory pleasure deficits when compared to individuals without elevations in negative symptoms. No significant differences were found on the consummatory subscale. The authors did not include a control group in this study, so it is unknown how each of these groups would have compared to individuals without a diagnosis of schizophrenia.

This pattern, however, has not been universally found. Strauss, Wilbur, Warren, August, and Gold (2011) for instance, found that individuals with schizophrenia did not show any significant reduction in anticipatory pleasure on the TEPS when compared to controls, however, significant differences were found on the consummatory subscale with individuals in the schizophrenia group self-reporting a reduced hedonic capacity. In order to clarify these results, the authors attempted to reduce the heterogeneity associated with the schizophrenia psychopathology by dividing the clinical sample into individuals with elevations in clinician rated anhedonia compared to individuals without elevations in negative symptoms. Again, no significant group differences were found on the anticipatory subscale of the TEPS.

Understanding the nature of hedonic capacity deficits in relation to specific psychopathology was not an aim of the current study. Reductions in the phenotypic heterogeneity have resulted in inconsistent results within clinical populations (Chan et al., 2010; Strauss et al., 2011). In addition, the one study examining self-reports on the TEPS indicated that individuals with elevations in negative psychopathology had impairments on both the anticipatory and consummatory subscales (Martin et al., 2011). It must be noted, however, that each of these studies identified individuals

with negative psychopathology in differing ways. For instance, Martin and colleagues (2011) selected individuals based on elevations in a single negative symptom, social anhedonia. In contrast, both Chan et al. (2010) and Strauss et al. (2011) selected for individuals based on general elevations in negative symptoms, but each utilized a different assessment measure. Consistency in the methodology may help to reduce the variability in these results.

In conclusion, the current study found support for the idea that individuals with schizophrenia spectrum psychopathology self-reported anticipatory but not consummatory pleasure deficits on the TEPS. There are a number of challenges with interpreting these results, however, because of the inconsistencies found in the current literature from both clinical (Chang et al., 2010; Gard et al., 2007; Strauss et al., 2011; Wynn et al., 2010) and non clinical (Martin et al., 2011) samples. This variability in the research suggests that caution is warranted in interpreting these results. A number of strategies to confront this challenge may be useful. First, reduction of the heterogeneity of the psychopathology may help in clarifying these results; however, it must be noted that in one study (Strauss et al., 2011), this strategy proved to be ineffective. Second, future research should continue employing a variety of methodological approaches to measuring anticipatory pleasure deficits within this population. The inconsistency in the pattern of impairment seen on the TEPS suggests that reliance on a single methodology may lead the field to draw incorrect conclusions about the nature of the anhedonia deficit in schizophrenia.

Clinician Rated Interview

A fourth hypothesis for the current study was that individuals in the schizotypy group would report lower levels of anticipatory pleasure than controls on a clinician-rated interview (i.e., the Comprehensive Assessment Interview for Negative Symptoms). Consistent with hypotheses, individuals in the schizotypy group were rated as having a reduced capacity for anticipating future rewards when compared to individuals in the control group. No group differences were found on the consummatory index scale; however, the moderate effect size of associated with the group differences on the consummatory subscale indicates that given more power, this difference would become significant. So while these results are consistent with those found on the TEPS self-report measure, (where significant group differences were found on the anticipatory, but not the consummatory subscale), it cannot be ruled out that significant differences in consummatory pleasure can also be identified on the CAINS interview.

Despite the significant group differences on the anticipatory index scale, some degree of caution is warranted in interpreting these results. The internal consistency ratings for the anticipatory ($\alpha = 0.59$) and consummatory ($\alpha = 0.52$) index scales raise some concern about how related the four domains of hedonic capacity measured by the CAINS (i.e., social, physical, vocational, and recreational) are to one another. Two other studies have examined the internal consistency of the CAINS interview. First, Forbes et al. (2010) reported that the internal consistency of the anhedonia subscale was substantively better than that found in the current study ($\alpha = 0.74$); however, the authors did not report on the reliability of either the anticipatory or

consummatory subscale, which would likely yield different results. In addition, substantive changes to the anchors for the anhedonia scale (described in Horan et al., 2011) may have also contributed to some of the differences between the current study and that of Forbes et al.

A second study by Horan and colleagues (Horan et al., 2011) reported that particularly with the anhedonia intensity items, item intercorrelation was poor. In contrast, the current study found worse internal consistency for the frequency items ($\alpha = 0.35$), rather than the intensity items ($\alpha = 0.53$). It must be stated, however, that the sample utilized by Horan et al. was substantially larger than that included in the current study (281 compared to 79), therefore stability estimates found by Horan and colleagues may be more accurate than those found in the current study. In addition, both the previous studies utilized clinical samples with no control group. It is currently unknown whether these differences may have affected the overall internal consistency of the measure in the current study, but the relative poor performance of the reliability of the anhedonia subscale in the current study does suggest that some caution must be exercised in interpreting these results.

Despite this limitation, significant group differences in anticipatory pleasure on the semi-structured interview were evident in this sample. These results mirrored those that were found on the TEPS self-report measure. Although group differences on the consummatory subscale of the CAINS interview were not apparent, it seems likely that given enough power such a difference would become evident. No other published studies have utilized the CAINS interview with a non-clinical sample. The only two published reports on the CAINS (Forbes et al., 2010; Horan et al., 2011)

both utilized clinical samples and the scoring methods used in these studies differ from that employed in the current study. Future research is needed to clarify the current study, both to examine whether the CAINS interview is sensitive to significant group differences in both anticipatory and consummatory pleasure and to examine this pattern of results in a clinical sample. Future research also needs to address the less than expected internal consistency of the anhedonia subscales of the CAINS, particularly since the current study and the two prior studies (Forbes et al., 2010; Horan et al., 2011) that have examined this question have all found different results. Further revisions of the CAINS interview may yield better internal consistency and help clarify the nature of anticipatory pleasure deficits in schizophrenia-spectrum psychopathology.

Laboratory Paradigm

It was predicted that individuals in the schizotypy group would report less anticipatory pleasure when presented with the simulated social interaction. Unexpectedly, this study found no significant group differences on any of the individual items examining either anticipatory or consummatory pleasure. Further analyses using collapsed index anticipatory and consummatory scales also did not yield significant group differences.

The only other study to utilize this paradigm was able to identify significant group differences in response. Llerena and colleagues (2012) found that individuals who were selected for elevations in social anhedonia were found to be less behaviorally affiliative and reported feeling less change in affiliation and positive emotion in response to the simulated social interaction. Methodological differences

between the current study and that of Llerena et al. (2012) may have resulted in the lack of significant differences. Specifically, in the initial study, participants were selected based on levels of self-reported social anhedonia, whereas in the current study, participants were selected based on self-reports of schizotypal personality disorder. As previously reviewed, social anhedonia has been identified as a negative feature of schizotypy (Kwapil et al., 2008), whereas features of schizotypal personality disorder are more associated with positive schizotypy (Lenzenweger, 1994). It may be the case, then that the schizotypy group in the current study was too heterogeneous to allow for the identification of anticipatory pleasure deficits in the laboratory paradigm. Future studies which aim to reduce this heterogeneity may be more able to identify anticipatory anhedonia using a standardized laboratory paradigm.

A final explanation for the null results found on the simulated social interaction is the possibility that while anticipatory pleasure deficits can be assessed on self report and interview-based assessments, they cannot be induced in a laboratory setting. If such an explanation does indeed prove to be the case, this would be similar to the previously reviewed phenomenon where individuals with schizophrenia spectrum disorders both self-report anhedonia and are rated as anhedonic on clinical interviews but evidence normative hedonic responding when presented with emotionally evocative stimuli (e.g., Burbridge & Barch, 2007; Curtis et al., 1999; Kring & Neale, 1996).

This possibility raises the question of whether the deficit that is being captured by both the TEPS and the CAINS is an actual anticipatory pleasure deficit. It may be

that when individuals are asked to predict what their experience is going to be to a concrete, immediate stimulus (such as with the simulated social interaction) that they are able to do so, but when asked to predict what their experience will be to distal, unforeseen events (such as on the TEPS and the CAINS) they are less able to do so.

Future research is needed to pursue different laboratory paradigms that could be utilized to try and evoke anticipatory or consummatory pleasure deficits. As noted, the simulated social interaction was not successful in provoking differential emotional reactions between the schizotypy and control groups. Modifications to the protocol could be made that may make this strategy more successful. First, the simulated social interaction was presented after the two interviews (the IPDE clinical interview and the CAINS anhedonia subscale) which occurred, on average, approximately one hour into a 90 minute protocol. This order was not counter-balanced across participants. It is possible, therefore, that the lack of group differences may have reflected a fatigue effect on the participants. Future studies may wish to present the simulated social interaction at an earlier point in the protocol.

Second, the range of the scale utilized for anticipatory and consummatory ratings on the simulated social interaction was from 0-4 (with a score of a 4 representing “the most pleasurable experience you can imagine”). It is possible that given this range the lack of group differences reflects a limited range. For the current study, the 0-4 scale was chosen because it is consistent with the range that is presented to participants on the CAINS interview. Increasing the range may increase the possibility that significant group differences can be identified. Future research should consider this.

Modifications could also be made to improve the salience of the simulated social interaction. Since the process of watching a videotape of a woman describing what she likes to do and who she likes to spend time with is likely not an experience that most participants have ever had, it may have been difficult for them to gauge how much they anticipated enjoying that experience. Modification of the procedure to reflect the original presentation of the simulated social interaction may help to make this stimulus more realistic. Originally, this paradigm was presented so as to deceive participants into believing that the confederate was present in the laboratory and that they would be communicating with her via video screen. Anticipatory and consummatory pleasure ratings could be taken prior to and after the purported interaction. This protocol may be more realistic for participants and thus may make it easier for them to make anticipatory ratings.

It may also be possible that the simulated social interaction is not suitable to generating group differences in anticipatory and consummatory pleasure. If this is the case, paradigms utilized by other researchers may be more successful in evoking anticipatory pleasure deficits in a laboratory setting. Other studies have asked participants to predict their emotional experience in response to major life events such as failing a driver's test (Ayton, Pott, & Elwakili, 2007) or attaining tenure (Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998), or in response to routine life experiences such as a favorite football team winning or losing a game (Wilson, Wheatley, Meyers, Gilbert, and Axsom, 2000). It is possible that incorporating some of these different stimuli and scenarios into the study of anticipatory anhedonia may help to illuminate the nature of the deficit.

In summary, the simulated social interaction used in the current study was unable to elicit group differences in anticipatory pleasure. Further research is needed to clarify whether this paradigm was unsuccessful due to the use of a non-clinical sample or whether anticipatory pleasure deficits cannot be induced in the laboratory. As the protocol was ineffective in the current study, future research should consider either modifying the simulated social interaction, or seeking another laboratory stimulus for examining hedonic capacity in schizophrenia spectrum psychopathology. It remains important to clarify what the TEPS and CAINS are capturing, or the field runs the risk of incorrectly characterizing the nature of the anhedonia deficit in schizophrenia spectrum psychopathology.

Hypothesis 4:

Since the symptom of anhedonia is common to both depression and schizophrenia, and since the schizotypy group was found to have higher levels of depression than the control group, significant group differences on anticipatory or consummatory pleasure were analyzed co-varying for depression scores on the CES-D. It was predicted that significant group differences would remain so once depression was controlled for. Significant group differences were found on the anticipatory subscales of both the TEPS and the CAINS, with individuals in the schizotypy group evidencing impairment on the anticipatory, but not the consummatory subscale for both measures. When depression was controlled for, these results were no longer significant.

The relationship between anhedonia, depression, and schizophrenia is a complex one. On the one hand, the symptom of anhedonia within schizophrenia has

been found to be more consistent with a trait-model and remains present even when symptoms of depression abate (Blanchard et al., 2001; Herbener & Harrow, 2002; Malla et al., 2002). On the other hand, there are indications that depressive symptomatology is a feature of schizophrenia spectrum psychopathology. Depression has been found to be associated with broad symptoms of schizotypy (Spitznagle & Suhr, 2004) and with social anhedonia specifically (Blanchard, Collins, Aghevli, Leung, & Cohen, 2009). In addition, symptoms of depression have been found to be present in individuals at risk for the development of schizophrenia (e.g., Lencz, Smith, Auther, Correll, & Cornblatt, 2004) and prior to the onset of psychosis in individuals who have later developed the disorder (e.g., Hafner, Heiden, & Maurer, 2008; Owens, Miller, Lawrie, & Johnson, 2005). It therefore appears that depression, while it can be measured independently of anhedonia in schizophrenia spectrum psychopathology, is also a part of the experience of individuals with these disorders.

Relevant to the current discussion, a study examining the relationship between anticipatory pleasure deficits and depression was able to conclude that these two constructs are independent of one another. Chentsova-Dutton and Hanley (2010) examined the relative impact of levels of depression and self-reported anticipatory anhedonia on the TEPS on reported desire to eat chocolate. Participants were recruited based on their scores on the Beck Depression Inventory (Beck, Steer, & Brown, 1996) into either the control group or the depression group. Participants were then provided with a variety of chocolate samples as well as some bland food samples and asked to make anticipatory and consummatory ratings for each of the foods. Analyses were conducted across groups with level of depression entered as an

independent variable. The authors found that self-reported anticipatory pleasure as assessed by the TEPS, but not level of depression was predictive of participants' hedonic responses. In addition, individuals in the depression group evidenced a lower tendency to over predict the enjoyment of eating chocolate. Thus, there is some evidence that even amongst individuals identified as being depressed, levels of depression do not necessarily impact the ability of individuals to anticipate future reward.

The results from the current study finding that symptoms of depression are related to self-reported anticipatory anhedonia can be explained in one of two ways. First that the group differences on the anticipatory subscale of the TEPS are solely due to depression and not related to schizotypic symptoms. A second explanation is that the symptoms of depression and schizotypy are related to one another and both are a part of schizophrenia-spectrum psychopathology. A definitive explanation cannot be determined from the current methodology. Clarification of the nature of the relationship between depression and anticipatory pleasure deficits can only be determined by examining the pattern of how these symptoms wax and wane in relation to one another over time. Future longitudinal research is needed to examine the temporal course of impairments on the TEPS in comparison to the waxing and waning of depressive and schizotypic symptoms.

The relationship between depression and symptoms of anticipatory anhedonia in the current study raise a number of interesting clinical questions about whether the symptoms of anhedonia or the symptoms of depression are most important to address in individuals with schizophrenia spectrum psychopathology. Research does not

currently address this question; however, treatments for depression such as behavioral activation are consistent with the clinical stance taken in treatment paradigms such as the Recovery Model for serious mental illnesses. It is conceivable, therefore, that treatments aimed at treating either anticipatory anhedonia or depression would be effective in addressing the other. At the current time, however, it is not clear what the nature of the deficit being captured by the TEPS self-report measure and the CAINS semi-structured interview. Until a better understanding of these deficits can be attained, it is not entirely clear what interventions aimed at addressing these deficits would be targeting.

Hypothesis 5:

The convergent validity of the three measures of anticipatory and consummatory pleasure was considered. Specifically, the relationships between the TEPS, CAINS, and simulated social interaction were examined to explore the manner in which these different methods of assessing hedonic capacity were related to one another. First, the TEPS, a self-report assessment of trait hedonic capacity and the CAINS, a clinician-rated interview assessing capacity for hedonic capacity were analyzed. As both ostensibly rate the same construct, it was expected that they would be correlated with one another. Second, the relationship between the two measures of anticipatory and consummatory pleasure and the simulated social interaction was examined. The simulated social interaction was designed to elicit real-world hedonic reactions and so it was hypothesized that responses on this paradigm would be related to self-reported capacity to experience pleasure on the TEPS and clinician-rated capacity on the CAINS.

First, the TEPS self-report measure and the clinical interview CAINS both showed evidence of a good relationship with one another. Importantly, the anticipatory subscales of both were positively correlated with one another. This indicates that as individuals are self-reporting a greater capacity for anticipatory pleasure, they are also being rated as such by an interviewer. Similarly, the consummatory subscales of both were positively correlated with one another. In addition, the results showed that the anticipatory subscale of the TEPS has a positive relationship with the consummatory subscale of the CAINS and that the consummatory subscale of the TEPS had a positive relationship with the anticipatory subscale of the CAINS. The relationships between the anticipatory and consummatory subscales of both the TEPS and the CAINS is somewhat troubling as they suggest that anticipatory and consummatory pleasure are not unitary constructs that can be cleanly discriminated. This points to the challenge of measuring and assessing each of these constructs, which will need to be addressed as these conceptualizations are further refined.

The only other study that has examined the relationship between the TEPS self-report measure and the CAINS interview was conducted using a clinical sample of limited size. Forbes et al. (2010) collapsed across both the anticipatory and consummatory subscales of the CAINS to create a global anhedonia subscale. The results of this study found that amongst individuals with schizophrenia, the global CAINS anhedonia subscale was negatively correlated with both the anticipatory and consummatory subscales of the TEPS. (Recall that in the original scoring method for the CAINS interview, score elevations indicates a reduced capacity for experiencing

pleasure, whereas in the current study, the manner in which the anticipatory subscale of the CAINS was constructed resulted in score elevations indicating a greater capacity for experiencing pleasure.) These results are relatively consistent with the results of the current study; however, given the methodological differences between the current study and that of Forbes et al. (2010), conclusions about the relationship between the TEPS self-report measure and the CAINS interview can only be considered tentative at this time. Further research is necessary to elaborate on the nature of the relationship between self-reports and clinician ratings of anticipatory and consummatory pleasure.

The relationship between the two ratings of hedonic capacity and the laboratory paradigm was less consistent. First, the TEPS self-report measure and the simulated social interaction only evidenced significant relationships between the anticipatory subscale of the TEPS and the simulated social interaction anticipatory and consummatory measures. The simulated social interaction did not evidence any relationship with the TEPS consummatory subscale. Conversely, ratings during the simulated social interaction were only related to the consummatory subscale of the CAINS interview, but no relationship was found between the anticipatory subscale of the CAINS and ratings taken during the simulated social interaction.

This pattern of results was unexpected and the reasons for it remain unclear. It is possible that the hedonic experience that participants had during the simulated social interaction could be represented by two separate factors. One of the factors was most related to the items of the self report measure, the TEPS and the other appears to have been more closely related to the CAINS interview. If such an explanation proves

to be valid, it speaks to the difficulties of assessing hedonic capacity amongst individuals with schizophrenia spectrum psychopathology.

The manner in which the self report TEPS and the CAINS interview assess hedonic capacity are quite different. The TEPS presents participants with a list of statements designed to assess either consummatory (e.g., “the smell of freshly cut grass is enjoyable to me”) and anticipatory (e.g., “when ordering something off the menu, I imagine how good it will taste”) pleasure. The CAINS, on the other hand, relies on participants to report their real-world consummatory (i.e., what they have done in the past week) and anticipatory (i.e., what they are looking forward to in the near future) experiences. The simulated social interaction utilized in the current study represents a novel stimulus to the participants (as it is presumed that none of them will have had any prior experience with it). Ratings on the TEPS may be similar to the ratings taken during the simulated social interaction in that participants are asked to assess their experience with a novel, out-of-context experience. Conversely, since the CAINS relies on individuals to report on specific, real-world experiences, this may be similar to the process that participants experience in rating the more concrete, tangible aspects of the simulated social interaction.

What is clear from the differential pattern relationships between the TEPS, the CAINS, and the simulated social interaction is that hedonic capacity is not a unitary construct that can be captured by a single methodology. Overlap between the anticipatory and consummatory subscales of the self report TEPS and CAINS interview indicates that anticipatory and consummatory pleasure are not entirely distinct constructs. In addition, the unexpected pattern of relationships found between

the TEPS, CAINS, and simulated social interaction, further illustrates the idea that the anticipatory and consummatory pleasure constructs are not easily measured with current methodologies. Future research will need to further refine our understanding of these concepts and to explore ways to accurately assess them.

Exploratory analyses

Two sets of post hoc exploratory analyses were conducted. First, the measures of anticipatory and consummatory pleasure were examined for sex differences. Second, the external validity of all three measures were examined by comparing the relationships of each of the three measures of hedonic capacity with various clinical measures. Each set of analyses will be examined in turn.

Sex differences

Sex differences on the measures of hedonic capacity were examined. As studies that have examined sex differences on hedonic capacity measures have generally found that women report a greater capacity for hedonic experience than men (Miettunen & Jaaskelainen, 2008), it was predicted that any significant sex differences on measures of hedonic capacity would favor women so that women would report a greater capacity for experiencing both consummatory and anticipatory pleasure.

Only one other study has examined sex differences on a measure of anticipatory and consummatory pleasure. Consistent with the result of the current study, Gard et al., (2006) found that in a general non-clinical sample of undergraduate college students that women self-reported a higher capacity for both consummatory and anticipatory pleasure on the TEPS self-report measure.

No published studies have examined sex differences on the CAINS interview, however, consistent with results from the TEPS, women scored higher on both the anticipatory and consummatory pleasure scales of the self report TEPS. On the CAINS interview, sex differences were evident on both the anticipatory and consummatory subscales with women being rated as having a greater capacity for experiencing pleasure than men. No published study has examined sex differences on the CAINS, but these results were consistent with what was predicted. Finally, on the simulated social interaction, no significant sex differences were evident.

As significant sex differences were evident on both the TEPS self-report measure and the CAINS interview, but not on the simulated social interaction, it is tempting to suggest that this lack of difference indicates a weakness in the laboratory stimulus utilized in the current study; however, this may not be the case. Other examinations of hedonic capacity in laboratory settings have found men and women to process emotionally evocative material in a similar fashion (e.g., Calvo, & Avero, 2009). Even so, it is possible that the lack of evident sex differences found on this paradigm are an artifact of the fact that the confederate was an attractive, female college student. Originally, it was planned to have recordings of both a male and female actor; however, differences in acting ability between the two confederates raised concerns about the confounding effect of utilizing both videos. Thus, only the video containing the female confederate was utilized in this study. Future research utilizing this paradigm may benefit from having videos featuring both male and female actors.

Clinical correlates of the measures of anticipatory and consummatory pleasure

Exploratory analyses were conducted to examine the relationship between the three measures of anticipatory and consummatory pleasure and measures of clinical functioning. The consummatory and anticipatory subscales of each measure was compared to a self-report measure of social anhedonia, the RSAS, a self report rating of depression, the CES-D, a global rating of psychosocial functioning, the SAS, and clinician ratings of schizotypal, schizoid, and paranoid personality disorder traits on the IPDE. As these were exploratory analyses that were intended to inform future, larger studies, analyses were conducted across groups. In addition, no a priori hypotheses were posited about the nature of these relationships.

TEPS CLINICAL CORRELATES

The TEPS self-report measure anticipatory subscale evidenced significant negative relationships with the RSAS, trait positive affect, and traits of schizotypal, schizoid, and paranoid personality disorder (indicating that as participants self-reported less capacity for anticipating future reward, they received ratings indicating worse impairment on each of those measures). The consummatory subscale of the TEPS was found to have significant negative correlations with the RSAS and schizoid personality disorder traits. As the current study predicts that the anhedonia deficit seen in schizophrenia spectrum psychopathology is a deficit in anticipating future reward rather than experiencing in-the-moment pleasure, it is encouraging that the majority of the relationships seen between the TEPS and the clinical measures were found to be with the anticipatory, rather than the consummatory subscale.

As the TEPS is a relatively new assessment, few studies have examined the relationship between this measure and clinical functioning. Studies utilizing clinical samples to examine the external validity of the TEPS have found that that impairment on the anticipatory subscales of the TEPS is more predictive of poor clinical functioning than impairments on the consummatory subscale (e.g., Gard et al., 2007).

Only two available studies (Chesntsova-Dutton & Hanley, 2010; Gard et al., 2006) have examined the TEPS self-report measure utilizing non-clinical samples. As a part of a larger study, Chentsova-Dutton and Hanely (2010) examined the relationship between the TEPS and the Beck Depression Inventory (Beck et al., 1996), a self-report measure of depression. Similar to the current study, Chenstova-Dutton and Hanely did not find any significant relationships between ratings of depression and either subscale of the TEPS.

Gard and colleagues (2006) compared the TEPS to a wider range of clinical measures than did Chenstova-Dutton and Hanely (2010). Relevant to the current discussion, they included a measure of self-reported depression, the Beck Depression Inventory, and a measure of trait positive and negative affect, the PANAS. Unlike both the current study and that of Chenstova-Dutton and Hanely (2010), Gard and colleagues (2006) found that the anticipatory pleasure subscale of the TEPS was negatively correlated with the BDI, indicating that as individuals self-reported more depression, they also self-reported a reduced capacity for anticipating future reward. No relationship was found between the TEPS consummatory subscale and the BDI. In addition, Gard and colleagues (2006) found no relationship between the TEPS and either trait positive or negative affect. These results differ from the current study,

which found a significant relationship between the anticipatory subscale of the TEPS and positive affect on the PANAS. Methodological differences exist between this study and the current study. Namely, whereas participants in the current study were selected based on scores on a measure of schizotypal personality disorder, participants in the Gard and colleagues (2006) study were not selected based on any clinical characteristics. It could be, then that a more consistent pattern of results would emerge across more consistent methodologies.

In conclusion, the current study found that, in general, the TEPS anticipatory subscale evidenced more significant relationships with the clinical measures than did the consummatory subscale. In addition, the relationships that do exist between this measure and the clinical measures utilized in the current study all support the validity of this measure. These results are generally corroborated by studies that have examined the external validity of the measure in clinical samples (Gard et al., 2007); however, a number of inconsistencies do exist in the literature examining the external validity of the TEPS (i.e., Gard et al., 2006). More consistent sampling methods may result in a more consistent pattern of results.

CAINS CLINICAL CORRELATES

Next, the relationship between the CAINS and the clinical measures was examined. Results indicated that the anticipatory subscale, was negatively correlated with self-reports of social anhedonia, global psychosocial functioning, and ratings of schizoid personality disorder traits. No relationships were found between the CAINS consummatory subscale and any clinical measure. These results mirror those found on the TEPS, where significant results on the CAINS were only found on the

anticipatory subscale but not the consummatory subscale. Again, these results are encouraging as it is predicted that anhedonia impairments will be most evident on measures of anticipatory, not consummatory pleasure.

As this is the first time the CAINS has been utilized in a non-clinical sample, comparisons of the current study to other studies will need to be approached cautiously. Two studies have examined the clinical correlates of the CAINS. First, Forbes and colleagues (2010) compared the CAINS with a number of clinical measures. Relevant to the current study, they included a measure of depression in schizophrenia (the Calgary Depression Scale; Addington, Addington, & Schissel, 1990) and a measure of social functioning (the Social Functioning Scale; Birchwood, Smith, Cochran, Wetton, & Copestake, 1990). Recall that Forbes and colleagues reported on a combined anticipatory and consummatory anhedonia scale rating, and not the two subscales separately. Nevertheless, the findings in that study mirror those of the current study. Specifically, they found that the anhedonia scale did not evidence any significant relationship with the measure of depression and that the measure of social functioning was negatively correlated the measure of social functioning.

Horan and colleagues (2011) also examined the clinical correlates of the CAINS. Relevant to the current discussion, they also explored the relationship between the CAINS and the Calgary Depression Scale. In that study, however, the anhedonia subscale was combined with two other subscales (avolition and asociality) to generate an “experience” subscale. The authors found that this global experience subscale was correlated with depression scores so that as individuals were rated as

more impaired on the CAINS experience subscale, they were also rated as having more depression. Because the anhedonia subscale in that study was combined with both the avolition and asociality subscales, it is unclear which subscale specifically the ratings of depression were related to; therefore, it cannot be said with certainty that in that study elevations of depression were related to deficits in anticipating future reward.

Because the CAINS is a relatively new measure and because few studies have explored the relationship between this measure and assessments of clinical functioning, further research is needed. In addition, methodological differences in the scoring of the CAINS and in the samples utilized make conclusions difficult at this point. It is promising, however, that in the current study, the relationships that were found between the CAINS and the clinical measures were evident on the anticipatory subscale. Future research utilizing larger samples should further explore the relationship between the CAINS interview and measures of clinical functioning.

CLINICAL CORRELATES OF THE SIMULATED SOCIAL INTERACTION

On the simulated social interaction, neither the anticipatory nor consummatory measures were found to have any significant relationship with any of the clinical measures. This is in contrast to both the TEPS self-report measure and the CAINS interview, which both evidenced significant relationships with clinical measures.

No other study has utilized this paradigm to examine anticipatory pleasure. Further, no published study has examined the relationship between this laboratory paradigm and measures of clinical relevance. Given the lack of significant relationships between the simulated social interaction and the clinical measures, it is

tempting to suggest that the simulated social interaction was ineffective in this context, but as noted, this paradigm was effective in eliciting differential emotional responses between individuals with elevations in social anhedonia and controls in a previous study (Llerena et al., 2012). In addition, it is clear that laboratory paradigms examining hedonic capacity have found that elevations in social anhedonia (Cohen et al., 2009; Kerns et al., 2008; Matthews & Barch, 2006) are associated with reductions in reported pleasure in response to a laboratory stimulus.

The manner in which the simulated social interaction was presented in the current study differs from the manner in which it was initially intended to be presented. As reviewed, the video was initially presented so as to deceive the participants to believe that the confederate was present in the laboratory and responding to the participants via a live video feed. It is possible that differences in the manner in which the video was presented led to the null results found in the current study. It remains unknown whether presenting the simulated social interaction in the manner in which it was initially intended would increase the external validity of this paradigm. Again, given the importance of verifying anticipatory pleasure deficits in the laboratory, future research will be needed to develop a paradigm capable of evoking these deficits. Ideally, these paradigms will also evidence robust relationships with measures of clinical importance.

Limitations and Future Directions

Results from the current study are encouraging as they were able to confirm the presence of both self-reported and clinician rated anticipatory pleasure deficits by utilizing a multi-method approach in a sample of individuals with schizophrenia

spectrum psychopathology. Specifically, this study was able to extend in a non-clinical sample previous findings that individuals with schizophrenia self-report anticipatory anhedonia utilizing the TEPS (Chan et al., 2010; Gard et al., 2007; Wynn et al., 2010). In addition, results from this study were also able to extend our understanding of this deficit by identifying group differences in anticipatory pleasure on a clinician-rated interview, the CAINS. These results further support the idea that anhedonia, and specifically anticipatory anhedonia as captured by the TEPS and the CAINS may serve as a marker of vulnerability for schizophrenia. Identification of these deficits in a non-clinical sample suggests that they are likely not entirely due to a variety of confounding variables (e.g., poverty, medication, and lack of a stimulating environment) that are often associated with the clinical presentation of schizophrenia and could account for the presence of anhedonia. Thus, the current study offers some indication that the deficits captured by both the TEPS self-report measure and the CAINS interview are meaningful and endogenous traits of schizophrenia spectrum psychopathology.

While the results of this study do support the idea that the deficits captured by the TEPS self-report measure and the CAINS interview represent meaningful impairments, this study also raises a number of concerns about the nature of what these measures are capturing. A number of results raise caution as it appears that our understanding of anticipatory and consummatory pleasure deficits is not complete. First, anhedonia deficits were not entirely confined to anticipatory pleasure, as it appears likely that given enough power, individuals in the schizotypy group would have been rated as having consummatory pleasure deficits on the CAINS interview.

This finding is particularly important given the inconsistencies in the pattern of anticipatory and consummatory pleasure that are seen on the TEPS. Second, the current study failed to identify either anticipatory or consummatory pleasure deficits using a laboratory paradigm. As the field runs the risk of mischaracterizing the hedonic experience of individuals with schizophrenia spectrum psychopathology without confirming this experience with a laboratory paradigm, this task remains of crucial importance. It may be the case that anticipatory pleasure deficits are not apparent on concrete, immediate events (such as on the simulated social interaction) and are most evident on assessments of distal future events (such as with the TEPS and the CAINS). Finally, the substantial over-lap between the anticipatory and consummatory subscales of the TEPS self-report measure and the CAINS interview as well as the unusual pattern of relationships between the subscales of the simulated social interaction and the measures of hedonic capacity suggest that there are a number of challenges inherent in measuring anticipatory and consummatory pleasure deficits. Further research is needed to explore and refine these constructs.

In addition to the challenges that were faced in assessing anticipatory and consummatory pleasure in the current study, a number of limitations must be mentioned. First, the current study utilized an undergraduate college sample, which raises potential concerns about the high level of functioning associated with this population. For instance, education level has been found to be negatively correlated with risk for psychopathology in general (de Roon-Cassini, Mancini, Rusch, & Bonanno, 2010; Newman, Moffitt, Caspi, & Silva, 1998) and specifically with schizophrenia and schizophrenia spectrum disorders (Davidson, Reichenberg,

Rabinowitz, Weiser, Kaplan, & Mark, 1999; Reichenberg, Weiser, Caspi, Knobler, Lubin, Harvey, ... & Davidson, 2006; Reichenberg, Weiser, Rapp, Rabinowitz, Caspi, Schmeidler, ... & Davidson, 2005). Therefore, while studies that utilize college samples can be useful in clarifying and extending studies of clinical samples, care must be taken to not over-generalize these results. This limitation could potentially be addressed by sampling from individuals with schizophrenia-spectrum psychopathology but who are from a more diverse socioeconomic background, such as in the Maryland Longitudinal Study of Schizotypy (Blanchard, Aghevli, Wilson, & Sargeant, 2010; Blanchard, Collins, Aghevli, Leung, & Cohen, 2009). A second limitation of the current study is the lack of diversity found in the current sample. 57% of the current sample was comprised of Caucasians. Racial effects were not examined in the current study due to lack of power and it is not currently known what effect, if any greater diversity would have on the current results.

A number of options could be utilized in the future to help clarify the nature of anticipatory deficits in schizophrenia spectrum psychopathology. First, as reviewed, reduction of the heterogeneity associated with these disorders may prove to be useful in identifying anticipatory pleasure deficits. As the current study selected individuals based on elevations in schizotypal personality disorder, (which is considered to be a sign of positive schizotypy; Lenzenweger, 1994) it is possible that a different sample selection would be more likely to result in significant differences on a laboratory paradigm. A second approach that could help improve our understanding of the hedonic capacity of this population would be to utilize a wider variety of laboratory stimuli. This may be particularly useful in helping to clarify

whether anticipatory pleasure deficits are only evident on either distal or proximal events. A variety of paradigms exist which may be useful in informing the discussion on anticipatory anhedonia. For instance, paradigms utilizing food (Chentsova-Dutton & Hanley, 2010; Kahneman & Snell, 1992), major life events (Ayton et al., 2007; Gilbert et al., 1998), or in response to routine life experiences (Wilson et al., 2000) could be more appropriate paradigms. Utilization of a combination of both distal and proximal, and concrete and amorphous stimuli may yield the best results.

Despite these limitations, the current study was able to both replicate and extend previous findings of anticipatory pleasure deficits in schizophrenia spectrum psychopathology. These deficits were confirmed using both self-report and clinician rated interviews. In addition, impairments in anticipating future reward were associated with relevant clinical measures. The presence of these impairments in a non-clinical sample strengthens the idea that anticipatory anhedonia may mark a vulnerability to schizophrenia spectrum psychopathology that is independent of confounds such as medication effects and a non-stimulating lifestyle. Clarification is still needed regarding the nature of this deficit as it was not confirmed utilizing a laboratory paradigm.

Appendices

APPENDIX A

The Schizotypal Personality Questionnaire-Brief Form (SPQ-B)

1. People sometimes find me aloof and distant.
2. Have you ever had the sense that some person or force is around you, even though you cannot see anyone?
3. People sometimes comment on my unusual mannerisms and habits.
4. Are you sometimes sure that other people can tell what you are thinking?
5. Have you ever noticed a common event or object that seemed to be a special sign for you?
6. Some people think that I am a very bizarre person.
7. I feel I have to be on my guard even with friends.
8. Some people find me a bit vague and elusive during a conversation.
9. Do you often pick up hidden threats or put-downs from what people say or do?
10. When shopping, do you get the feeling that other people are taking notice of you?
11. I feel very uncomfortable in social situations involving unfamiliar people.
12. Have you had experiences with astrology, seeing the future, UFOs, ESP, or a sixth sense?
13. I sometimes use words in unusual ways.
14. Have you found that it is best not to let other people know too much about you?
15. I tend to keep in the background on social occasions.
16. Do you ever suddenly feel distracted by distant sounds that you are not normally aware of?
17. Do you often have to keep an eye out to stop people from taking advantage of you?
18. Do you feel that you are unable to get “close” to people?
19. I am an odd, unusual person?
20. I find it hard to communicate clearly what I want to say to people.
21. I feel very uneasy talking to people I do not know well.
22. I tend to keep my feelings to myself.

APPENDIX B

The Infrequency Scale

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

APPENDIX C

Center for Epidemiologic Studies Depression Scale (CES-D)

Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way during the past week: Rarely or none of the time (less than 1 day); Some or a little of the time (1-2 days); Occasionally or a moderate amount of time (3-4 days); Most or all of the time (5-7 days)

1. I was bothered by things that usually don't bother me.
2. I did not feel like eating; my appetite was poor.
3. I felt that I could not shake off the blues even with help from my family or friends.
4. I felt I was just as good as other people. (R)
5. I had trouble keeping my mind on what I was doing.
6. I felt depressed.
7. I felt that everything I did was an effort.
8. I felt hopeful about the future. (R)
9. I thought my life had been a failure.
10. I felt fearful.
11. My sleep was restless.
12. I was happy. (R)
13. I talked less than usual.
14. I felt lonely.
15. People were unfriendly.
16. I enjoyed life. (R)
17. I had crying spells.
18. I felt sad.
19. I felt that people dislike me.
20. I could not get "going."

APPENDIX D

International Personality Disorders Examination

The questions I am going to ask concern what you are like most of the time. I'm interested in what has been typical of you throughout your life, and not just recently. If you have changed and your answers might have been different at some time in the past, be sure to let me know.

Interpersonal Relationship

Now I would like to talk to you about the people in your life.

Who are the most important people in your life?

In what way are they important?

During your life what kind of problems or difficulties have you had getting along with other people?

Lacks close friends or confidants other than first-degree relatives (Schizoid, Schizotypal)

Do you have any close friend or people you confide in?

If yes: Tell me about them.

If no: Tell me more about it.

Neither desires nor enjoys close relationships, including being part of a family (Schizoid)

Not asked when response to previous item indicates that subject has no close friends or confidants.

Do you enjoy close relationships or being part of a close family?

If yes: Tell me about it.

If no: Do you wish that you could?

If yes: Tell me more about it.

Asked only when subject claims no close friends or confidants.

Do you wish that you had close relationships or were part of a family?

If yes: Tell me about it.

If no: Tell me about it.

Almost always chooses solitary activities (Schizoid)

Do you almost always choose the kind of activities that you can do all by yourself rather than with other people?

If yes: Give me some examples.

Excessive social anxiety that does not diminish with familiarity and tends to be associated with paranoid fears rather than negative judgments about self
(Schizotypal)

Do you often feel nervous or uncomfortable when you're with people?

If yes: *How much do these feelings bother you?*

Do you still feel that way after you get to know people?

If yes: *Are you afraid something might happen to you?*

If yes: *Tell me more about it.*

If no: *Then why do you think you feel that way?*

Is reluctant to confide in others because of unwarranted fear that the information will be used maliciously against him or her (Paranoid)

Do you usually keep personal things and your concerns and problems to yourself rather than discuss them with others?

If yes: *Why are you reluctant to confide in others?*

Is preoccupied with unjustified doubts about the loyalty or trustworthiness of friends or associates (Paranoid)

Do you ever find yourself not trusting your friends or people you know?

If yes: *Why?*

Do you ever feel that way without a good reason?

If yes: *Tell me about it.*

Has this happened with more than one person?

If yes: *How many?*

Persistently bears grudges, i.e., is unforgiving of insults, injuries, or slights
(Paranoid)

Have you ever held a grudge or taken a long time to forgive someone?

If yes: *Tell me about it.*

Did you try to avoid or refuse to talk to the person?

How long did you continue to act that way?

Has this ever happened with anyone else?

If yes: *With how many people?*

Perceives attacks on his or her character or reputation that are not apparent to others and is quick to react angrily or to counterattack (Paranoid)

Has anyone ever attacked your character or reputation?

If yes: *Tell me about it.*

How did you react when you first found out?

Do other people know about these attacks?

If yes: *How did you find out that they do?*

If no: *Then how did you learn about them?*

Reads hidden demanding or threatening meanings into benign remarks or events (Paranoid)

Do you ever find hidden meanings or threats in what people say or do?

If yes: *Give me some examples.*

Suspects, without sufficient basis, that others are exploiting, harming, or deceiving him or her (Paranoid)

Has it been your experiences that people often lie to you, or try to use you or take advantage of you?

If yes: *Give me some examples.*

Has anyone ever deliberately tried to harm you, or make life difficult for you?

If yes: *Give me some examples.*

Ideas of reference (excluding delusions of reference) (Schizotypal)

When you enter a room of people do you often wonder whether they might be talking about you, or even making unflattering remarks about you?

If yes: *Give me some examples.*

When you're in a public place or walking down the street, do you often wonder whether people might be looking at you, talking about you, or even making fun of you?

If yes: *Give me some examples.*

Affects

Now I am going to ask some questions about your feelings. Again I'm interested in the way you have been most of your life and not just recently. If you have changed and are different from the way you used to be, be sure to let me know.

How do you usually feel?

How do you usually feel deep down inside?

What problems do you have with your feelings?

Appears indifferent to the praise or criticism of others? (Schizoid)

When you're praised, do you show any reaction so that the people around you know how you feel?

If yes: *Tell me about it.*

What about when you're criticized?

If yes: *Tell me about it.*

Takes pleasure in few, if any, activities (Schizoid)

Are there any activities that you enjoy?

If yes: *Tell me about them.*

If no: *Tell me more about it.*

Has little, if any, interest in having sexual experience with another person
(Schizoid)

Now a few questions about your sexual behavior. There are some people who have little or no desire to have sexual experiences with another person. Are you like that?

If yes: Tell me more.

Has recurrent suspicions, without justification, regarding fidelity of spouse or sexual partner (Paranoid)

Have you ever been concerned about whether a sexual partner was unfaithful to you?

If yes: Tell me about it.

Odd beliefs or magical thinking that influence behavior and is inconsistent with subcultural norms (Schizotypal)

Are you more superstitious than most people?

If yes: Does it have an effect on your life?

If yes: Tell me about it.

Do you believe that you can make some things happen just by thinking about them?

If yes: Give me some examples of what you mean.

Do you believe in telepathy or ESP?

If yes: Do you have it or has anyone ever used it to communicate with you or predict something in your life?

If yes: Tell me about it.

Some people say that there is a "6th sense," a special way to discover what's going on. Do you think there is such a thing?

If yes: Do you have it or has anyone ever used it to find out things about you?

If yes: Tell me about it.

Do you believe in the supernatural?

If yes: Does it play a role in your life?

If yes: Tell me about it.

Do you believe in charms or omens?

If yes: Do they play a role in your life?

If yes: Tell me about it.

Do you believe in witchcraft, magic, or the occult?

If yes: Do they play a role in your life?

If yes: Tell me about it.

Do you have any ideas that other people might consider strange or unusual?

If yes: Tell me about it.

Unusual perceptual experiences, including bodily illusions (Schizotypal)

Do you often mistake objects or shadows for people, or noises for voices?

If yes: Give me some examples.

Were you using alcohol or drugs at the time?

When you look into a mirror do you ever see your face change before your eyes?

If yes: Tell me about it.

Were you using alcohol or drugs at the time?

Are there times when your body doesn't feel separate from things around you?

If yes: Tell me about it.

Were you using alcohol or drugs at the time?

Are there times when your arms or legs feel like they're not connected to the rest of you?

If yes: Tell me about it.

Were you using alcohol or drugs at the time?

Are there times when you feel that your body is not really your own?

If yes: Tell me about it.

Were you using alcohol or drugs at the time?

When you look at a person, do you ever see that person's face change its shape or appearance right there before your eyes?

If yes: Tell me about it.

Were you using alcohol or drugs at the time?

Are there times when you experience a certain taste or odor for no apparent reason?

If yes: Tell me about it.

Were you using alcohol or drugs at the time?

Have you ever sensed the presence of a force or person, maybe even a dead person, who was not actually there?

If yes: Tell me about it.

Were you using alcohol or drugs at the time?

APPENDIX E

Social Adjustment Scale-Self Report

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

Work outside the home

Please check the situation that best describes you

I am:

- | | |
|---------------------|---------------|
| 1) A worker for pay | 4) Retired |
| 2) A housewife | 5) Unemployed |
| 3) A student | |

Do you usually work for pay more than 15 hours per week?

- | | |
|--------|-------|
| 1) Yes | 2) No |
|--------|-------|

Did you work any hours for pay in the last two weeks?

- | | |
|--------|-------|
| 1) Yes | 2) No |
|--------|-------|

Check the answer that best describes how you have been in the last two weeks

1) How many days did you miss from work in the last two weeks?

- 1) No days missed
- 2) One day
- 3) I missed about half the time
- 4) Missed more than half the time but did make at least one day
- 5) I did not work any days
- 6) On vacation all of the last two weeks

Work

If you have not worked any days in the last two weeks, go on to Question 7

2) Have you been able to do your work in the last 2 weeks?

- 1) I did my work very well
- 2) I did my work well but had some minor problems
- 3) I needed help with work and did not do well about half the time
- 4) I did my work poorly most of the time
- 5) I did my work poorly all the time

- 3) Have you been ashamed of how you do your work in the last 2 weeks?
 - 1) I never felt ashamed
 - 2) Once or twice I felt a little ashamed
 - 3) About half the time I felt ashamed
 - 4) I felt ashamed most of the time
 - 5) I felt ashamed all the time

- 4) Have you had any arguments with people at work in the last 2 weeks?
 - 1) I had no arguments and got along very well
 - 2) I usually got along well but had minor arguments
 - 3) I had more than one argument
 - 4) I had many arguments
 - 5) I was constantly in arguments

- 5) Have you felt upset, worried, or uncomfortable while doing your work during the last 2 weeks?
 - 1) I never felt upset
 - 2) Once or twice I felt upset
 - 3) Half the time I felt upset
 - 4) I felt upset most of the time
 - 5) I felt upset all of the time

- 6) Have you found your work interesting these last two weeks?
 - 1) My work was almost always interesting
 - 2) Once or twice my work was not interesting
 - 3) Half the time my work was uninteresting
 - 4) Most of the time my work was uninteresting
 - 5) My work was always uninteresting

School

- 7) What best describes your school program? (Choose one)
 - 1) Full time
 - 2) $\frac{3}{4}$ time
 - 3) Half time

Check the answer that best describes how you have been the last 2 weeks.

- 8) How many days of classes did you miss in the last 2 weeks?
 - 1) No missed days
 - 2) A few days missed
 - 3) I missed about half the time
 - 4) Missed more days than half time but did make at least one day
 - 5) I did not go to classes at all
 - 6) I was on vacation all of the last two weeks.

- 9) Have you been able to keep up with your class work in the last 2 weeks?
- 1) I did my work very well
 - 2) I did my work well but had minor problems
 - 3) I needed help with my work and did not do well about half the time
 - 4) I did my work poorly most of the time
 - 5) I did my work poorly all the time
- 10) During the last 2 weeks, have you been ashamed of how you do your school work?
- 1) I never felt ashamed
 - 2) Once or twice I felt ashamed
 - 3) About half the time I felt ashamed
 - 4) I felt ashamed most of the time
 - 5) I felt ashamed all of the time
- 11) Have you had any arguments with people at school in the last 2 weeks?
- 1) I had no arguments and got along very well
 - 2) I usually got along well but had minor arguments
 - 3) I had more than one argument
 - 4) I had many arguments
 - 5) I was constantly in agreements
 - 8) Not applicable; I did not attend school.
- 12) Have you felt upset at school during the last 2 weeks?
- 1) I never felt upset
 - 2) Once or twice I felt upset
 - 3) Half the time I felt upset
 - 4) I felt upset most of the time
 - 5) I felt upset all of the time
 - 8) Not applicable; I did not attend school
- 13) Have you found your school work interesting these last 2 weeks?
- 1) My work was almost always interesting
 - 2) Once or twice my work was not interesting
 - 3) Half the time my work was uninteresting
 - 4) Most of the time my work was uninteresting
 - 5) My work was always uninteresting

Spare Time

Everyone answer questions 14-22

Check the answer that best describes how you have been in the last 2 weeks

- 14) How many friends have you seen or spoken to on the telephone in the last weeks?
- 1) Nine or more friends
 - 2) Five to eight friends
 - 3) Two to four friends
 - 4) One friend
 - 5) No friends
- 15) Have you been able to talk about your feelings and problems with at least one friend during the last 2 weeks?
- 1) I can always talk about my innermost feelings
 - 2) I usually can talk about my feelings
 - 3) About half the time I felt about to talk about my feelings
 - 4) I usually was not able to talk about my feelings
 - 5) I was never able to talk about my feelings
 - 8) Not applicable; I have no friends
- 16) How many times in the last two weeks have you gone out socially with other people? For example, visited friends, gone to movies, bowling, church, restaurants, invited friends to your home?
- 1) More than 3 times
 - 2) Three times
 - 3) Twice
 - 4) Once
 - 5) None
- 17) How much time have you spent on hobbies or spare time interests during the last 2 weeks? For example, bowling, sewing, gardening, sports, reading?
- 1) I spent most of my spare time on hobbies almost every day
 - 2) I spent some spare time on hobbies some of the days
 - 3) I spent a little spare time on hobbies
 - 4) I usually did not spend any time on hobbies but did watch TV
 - 5) I did not spend any spare time on hobbies or watch TV
- 18) Have you had open arguments with your friends in the last 2 weeks?
- 1) I had no arguments and got along very well
 - 2) I usually got along well but had minor arguments
 - 3) I had more than one argument
 - 4) I had many arguments
 - 5) I was constantly in arguments
 - 8) Not applicable; I have no friends

19) If your feelings were hurt or offended by a friend during the last two weeks, how badly did you take it?

- 1) It did not affect me or it did not happen
- 2) I got over it in a few hours
- 3) I got over it in a few days
- 4) I got over it in a few weeks
- 5) It will take me months to recover
- 8) Not applicable; I have no friends

20) Have you felt shy or uncomfortable with people in the last 2 weeks?

- 1) I always felt comfortable
- 2) Sometimes I felt uncomfortable but could relax after a while
- 3) About half the time I felt uncomfortable
- 4) I usually felt uncomfortable
- 5) I always felt uncomfortable
- 8) Not applicable; I was never with people

21) Have you felt lonely and wished for more friends during the last 2 weeks?

- 1) I have not felt lonely
- 2) I have felt lonely a few times
- 3) About half the time I felt lonely
- 4) I usually felt lonely
- 5) I always felt lonely and wished for more friends

22) Have you felt bored in your spare time during the last 2 weeks?

- 1) I never felt bored
- 2) I usually did not feel bored
- 3) About half the time I felt bored
- 4) Most of the time I felt bored
- 5) I was constantly bored

Are you a single, separated, or divorced person not living with a person of the opposite sex; please answer below:

- 1) YES, answer question 23 & 24
- 2) NO, go to question 25

23) How many times have you been with a date these last 2 weeks?

- 1) More than 3 times
- 2) Three times
- 3) Twice
- 4) Once
- 5) Never

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

- 1) I was always interested in dating
- 2) Most of the time I was interested
- 3) About half of the time I was interested
- 4) Most of the time I was not interested
- 5) I was completely uninterested

Family

Answer Questions 25-30 about your parents, brothers, sisters, in-laws, and children not living at home. Have you been in contact with any of them in the last two weeks?

- 1) Yes, Answer questions 25-30
- 2) No, Go to question 31

25) Have you had open arguments with your relatives in the last 2 weeks?

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

26) Have you been able to talk about your feelings and problems with at least one of your relatives in the last 2 weeks?

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

27) Have you avoided contacts with your relatives these last two weeks?

- 1) I have contacted relatives regularly
- 2) I have contacted a relative at least once
- 3) I have waited for my relatives to contact me
- 4) I avoided my relatives, but they contacted me
- 5) I have no contacts with any relatives

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

- 1) I never need to depend on them
- 2) I usually did not need to depend on them
- 3) About half the time I needed to depend on them
- 4) Most of the time I depend on them
- 5) I depend completely on them

- 29) Have you wanted to do the opposite of what your relatives wanted in order to make them angry during the last 2 weeks?
- 1) I never wanted to oppose them
 - 2) Once or twice I wanted to oppose them
 - 3) About half the time I wanted to oppose them
 - 4) Most of the time I wanted to oppose them
 - 5) I always opposed them
- 30) Have you been worried about things happening to your relatives without reason in the last 2 weeks?
- 1) I have not worried without reason
 - 2) Once or twice I worried
 - 3) About half the time I worried
 - 4) Most of the time I worried
 - 5) I have worried the entire time
 - 8) Not applicable; my relatives are no longer living

EVERYONE answer Questions 31 and 32, even if your relatives are not living

- 31) During the last two weeks, have you been thinking that you have let any of your relatives down or have been unfair to them at any time?
- 1) I did not feel that I let them down at all
 - 2) I usually did not feel that I let them down
 - 3) About half the time I felt that I let them down
 - 4) Most of the time I have felt that I let them down
 - 5) I always felt that I let them down
- 32) During the last two weeks, have you been thinking that any of your relatives have let you down or have been unfair to you at any time?
- 1) I never felt that they let me down
 - 2) I felt that they usually did not let me down
 - 3) About half the time I felt they let me down
 - 4) I usually have felt that they let me down
 - 5) I am very bitter that they let me down

Are you living with your spouse or have you been living with another person in a permanent relationship?

- 1) YES, Please answer questions 33- 41
 - 2) NO, Go to question 42
- 33) Have you had open arguments with your partner in the last 2 weeks?
- 1) We had no arguments and we got along well
 - 2) We usually get along well but had minor arguments
 - 3) We had more than one argument
 - 4) We had many arguments
 - 5) We were constantly in arguments

- 34) Have you been able to talk about your feelings and problems with your partner during the last 2 weeks?
- 1) I could always talk freely about my feelings
 - 2) I usually could talk about my feelings
 - 3) About half the time I felt able to talk about my feelings
 - 4) I usually was not able to talk about my feelings
 - 5) I was never able to talk about my feelings
- 35) Have you been demanding to have your own way at home during the last 2 weeks?
- 1) I have not insisted on always having my own way
 - 2) I usually have not insisted on having my own way
 - 3) About half the time I insisted on having my own way
 - 4) I usually insisted on having my own way
 - 5) I always insisted on having my own way
- 36) Have you been bossed around by your partner these last 2 weeks?
- 1) Almost never
 - 2) Once in a while
 - 3) About half the time
 - 4) Most of the time
 - 5) Always
- 37) How much have you felt dependent on your partner these last 2 weeks?
- 1) I was independent
 - 2) I was usually independent
 - 3) I was somewhat dependent
 - 4) I was usually dependent
 - 5) I depended on my partner for everything
- 38) How have you felt about your partner during the last 2 weeks?
- 1) I always felt affection
 - 2) I usually felt affection
 - 3) About half the time I felt dislike and half the time affection
 - 4) I usually felt dislike
 - 5) I always felt dislike
- 39) How many times have you and your partner had intercourse?
- 1) More than twice a week
 - 2) Once or twice a week
 - 3) Once every two weeks
 - 4) Less than once every two weeks but at least once in the last month
 - 5) Not at all in a month or longer

40) Have you had any problems during intercourse, such as pain these last two weeks?

- 1) None
- 2) Once or twice
- 3) About half the time
- 4) Most of the time
- 5) Always
- 8) Not applicable; no intercourse in the last two weeks

41) How have you felt about intercourse during the last 2 weeks?

- 1) I always enjoyed it
- 2) I usually enjoyed it
- 3) About half the time I did and half the time I did not enjoy it
- 4) I usually did not enjoy it
- 5) I never enjoyed it

Children

Have you had unmarried children, stepchildren, or foster children living at home during the last two weeks?

- 1) YES, Answer questions 42-45
- 2) NO, Go to question 46

42) Have you been interested in what your children are doing- school, play, or hobbies during the last 2 weeks?

- 1) I was always interested and actively involved
- 2) I usually was interested and involved
- 3) About half the time interested and half the time not interested
- 4) I usually was disinterested
- 5) I always was disinterested

43) Have you been able to talk and listen to your children during the last 2 weeks?
Include only children over the age of 2.

- 1) I always was able to communicate with them
- 2) I usually was able to communicate with them
- 3) About half the time I could communicate
- 4) I usually was not able to communicate
- 5) I was completely unable to communicate
- 8) No applicable; no children over the age of 2

44) How have you been getting along with the children during the last 2 weeks?

- 1) I had no arguments and got along very well
- 2) I usually got along well but had minor arguments
- 3) I had more than one argument
- 4) I had many arguments
- 5) I was constantly in arguments

45) How have you felt toward your children these last 2 weeks?

- 1) I always felt affection
- 2) I mostly felt affection
- 3) About half the time I felt affection
- 4) Most of the time I did not feel affection
- 5) I never felt affection toward them

Family Unit

Have you ever been married, ever lived with another person in a permanent relationship, or ever had children? Please check:

- 1) YES, Please answer questions 46-48
- 2) NO, Go to question 49

46) Have you worried about your partner or any of your children without any reason during the last 2 weeks, even if you are not living together now?

- 1) I never worried
- 2) Once or twice I worried
- 3) About half the time I worried
- 4) Most of the time I worried
- 5) I always worried
- 8) Not applicable; partner and children not living

47) During the last 2 weeks have you been thinking that you have let down your partner or any of your children at any time?

- 1) I did not feel I let them down at all
- 2) I usually did not feel that I let them down
- 3) About half the time I felt I let them down
- 4) Most of the time I have felt that I let them down
- 5) I let them down completely

48) During the last 2 weeks, have you been thinking that your partner or any of your children have let you down at any time?

- 1) I never felt that they let me down
- 2) I felt that they usually did not let me down
- 3) About half the time I felt they let me down
- 4) I usually felt they let me down
- 5) I feel bitter that they have let me down

Financial

Everyone please answer question 49

49) Have you had enough money to take care of your own and your family's financial needs during the last 2 weeks?

- 1) I had enough money for needs
- 2) I usually had enough money with minor problems
- 3) About half the time I did not have enough money but did not have to borrow money
- 4) I usually did not have enough money and had to borrow from others
- 5) I had great financial difficulty

APPENDIX E

The Positive and Negative Affect Scale (PANAS)

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you generally feel this way, that is, how you feel on average. Use the following scale to record your answers.

- 1 = very slightly or not at all
- 2 = a little
- 3 = moderately
- 4 = quite a bit
- 5 = extremely

_____	interested	_____	irritable
_____	distressed	_____	alert
_____	excited	_____	ashamed
_____	upset	_____	inspired
_____	strong	_____	nervous
_____	guilty	_____	determined
_____	scared	_____	jittery
_____	enthusiastic	_____	active
_____	proud	_____	afraid

APPENDIX F

Revised Social Anhedonia Scale

1. Having close friends is not as important as many people say. (*True*)
2. I attach very little importance to having close friends. (*True*)
3. I prefer watching television to going out with other people. (*True*)
4. A car ride is much more enjoyable if someone is with me. (*False*)
5. I like to make long distance phone calls to friends and relatives. (*True*)
6. Playing with children is a real chore. (*True*)
7. I have always enjoyed looking at photographs of friends. (*True*)
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. (*False*)
9. I sometimes become deeply attached to people I spend a lot of times with. (*True*)
10. People sometimes think that I am shy when I really just want to be left alone. (*True*)
11. When things are going really well for my close friends, it makes me feel good, too. (*False*)
12. When someone close to me is depressed, it brings me down also. (*False*)
13. My emotional responses seem very different from those of other people. (*True*)
14. When I am alone, I often resent people telephoning me or knocking on my door. (*True*)
15. Just being with friends can make me feel really good. (*False*)
16. When things are bothering me, I like to talk to other people about it. (*False*)
17. I prefer hobbies and leisure activities that do not involve other people. (*True*)
18. It's fun to sing with other people. (*False*)
19. Knowing that I have friends who care about me gives me a sense of security. (*False*)
20. When I move to a new city, I feel a strong need to make new friends. (*False*)
21. People are usually better off if they stay aloof from emotional involvement with most others. (*True*)
22. Although I know I should have affection for certain people, I don't really feel it. (*True*)
23. People often expect me to spend more time talking with them than I would like. (*True*)
24. I feel pleased and gratified as I learn more and more about the emotional lives of my friends. (*False*)
25. When others try to tell me about their problems and hang-ups, I usually listen with interest and attention. (*False*)
26. I never had really close friends in high school. (*True*)
27. I am usually content to just sit along, thinking and daydreaming. (*True*)
28. I'm much too independent to really get involved with other people. (*True*)
29. There are few things more tiring than to have a long, personal discussion with someone. (*True*)

30. It made me sad to see all my high school friends go their separate ways when high school was over. (*False*)
31. I have often found it hard to resist talking to a good friend, even when I have other things to do. (*False*)
32. Making new friends isn't worth the energy it takes. (*True*)
33. There are things that are more important to me than privacy. (*False*)
34. People who try to get to know me better usually give up after a while. (*True*)
35. I could be happy living all alone in a cabin in the woods or mountains. (*True*)
36. If given the choice, I would much rather be with others than be alone. (*False*)
37. I find that people too often assume that their daily activities and options will be interesting to me. (*True*)
38. I don't really feel very close to my friends. (*True*)
39. My relationships with other people never get very intense. (*True*)
40. In many ways, I prefer the company of pets to the company of people. (*True*)

APPENDIX G

Comprehensive Assessment Interview for Negative Symptoms (Anhedonia Subscale)

In this interview, I am going to ask you some questions about who you have been spending time with, activities you have been engaged with, and different feelings and emotions you have had over the past week.

A) Social Interactions

a. Friends

Do you have any living family members?

IF YES:

Where do they live?

Have you been in contact with or visited with any family members in the past week?

Did you talk on the phone or exchange e-mail or letters with any of them?

Have they tried to contact you or visit you in the last week?

IF THERE IS CONTACT:

What things have you done with your family?

How often have you done [activity] in the past week?

How much time did you spend together?

b. Romantic Relationships

Have you been in a romantic relationship in the past week? With a boyfriend/girlfriend/spouse/partner or anyone you are dating [in a close romantic relationship with]?

IF YES:

Have you been in contact with or seen [romantic partner] in the last week?

IF CONTACT:

What kinds of things have you done with [partner]?

How often have you done [activity] in the past week?

c. Friends

Let's talk about friends now – do you have any friends?

By friends, I mean people you can really rely on or count on—who you can talk to about most anything.

IF YES:

Have you been in contact with (friend) in the last week?

IF YES:

In the past week, what have you done with your friends?

How often have you done [activity] in the past week?

How much time did you spend together?

[NOTE: ratable experiences involve at least a minimal level of interaction from which pleasure is derived]

FOLLOW UP:

What about that was pleasurable?

(Give the participant the 0-4 Likert scale)

Ok, focusing on (event), I would like you to rate how pleasurable it was for you using this scale.

On this scale, higher numbers mean more pleasure. A 4 is the highest rating meaning a very strong pleasure or the most pleasure you ever experienced; a 3 means fairly strong pleasure; a 2 means somewhat pleasurable; a 1 means mildly pleasurable; and a 0 means that you had no pleasure at all.

Ok, focusing on (event), I would like you to rate how unpleasurable it was for you using this same scale.

On this scale, a higher number means less pleasurable. A 4 is the highest rating meaning very strong displeasure or the strongest displeasure you have ever experienced; a 3 means fairly strong displeasure; a 2 means somewhat displeasurable; a 1 means mildly displeasurable; and a 0 means that you had no displeasure at all.

B) Pleasure EXPECTED (anticipated) from social activities

LEVEL 1: Looking forward to the next few weeks (when thinking about the future) is there anything you are looking forward to doing with other people?

IF ANSWER IS SPONTANEOUSLY PROVIDED:

How much pleasure do you think you will experience?

Are there other experiences with people you expect to be pleasurable in the coming weeks?

IF ANSWER IS "NO":

LEVEL 2: Is there anything you look forward to doing with other people, for example, with your family, friends [roommate, partner, co-workers, neighbors, roommate, etc.] that you think will be pleasurable?

IF STILL NO ANSWER (refer to examples given from past week)

LEVEL 3: Earlier you mentioned (experience). Do you expect to do this in the next few weeks?

Do you expect it will be pleasurable? (ask for elaboration) e.g., what about it are you looking forward to?

[NOTE: ratable experiences involve at least a minimal level of interaction from which pleasure is derived]

FOLLOW UP:

Thinking forward to the experiences you have just described, for example (provide brief summary) which of these do you think will be the most pleasurable or enjoyable for you?

Ok, focusing on (event), I would like you to rate how pleasurable it was for you using this scale.

Ok, focusing on (event), I would like you to rate how unpleasurable it was for you using this same scale.

C) Physical Sensations

Did you have any pleasurable experiences from meals or exercise (PAUSE), listening to music (PAUSE), sexual activity (PAUSE), or anything like that? [If needed: smells, drinks, sights outside, fresh air.]

[NOTE: Interviewer SHOULD PAUSE after each mention of sense: music, meals, etc., so person can answer]

What about that was pleasurable?

How many days did you enjoy/get pleasure from these experiences/sensations (for each)?

FOLLOW UP:

Any other pleasurable physical sensations?

[NOTE: ratable experiences involve at least a minimal level of interaction from which pleasure is derived]

FOLLOW UP:

Thinking back on the experiences you have just described, for example (provide brief summary) which of these was the most pleasurable or enjoyable for you?

(Give the participant the 0-4 Likert scale)

Ok, focusing on (event), I would like you to rate how pleasurable it was for you using this scale.

Ok, focusing on (event), I would like you to rate how unpleasurable it was for you using this same scale.

D) Pleasure EXPECTED (anticipated) from Physical Sensations

LEVEL 1: Looking forward to the next few weeks (when thinking about the future) are there any physical activities, feelings, or experiences you are looking forward to?

IF ANSWER IS SPONTANEOUSLY PROVIDED:

How much pleasure do you think you will experience?

Are there other experiences with physical activities or sensations you expect to be pleasurable in the coming weeks?

IF ANSWER IS "NO":

LEVEL 2: Is there anything you're looking forward to such as meals, exercise, listening to music, sexual activity, or anything like that you think will be pleasurable?

IF STILL NO ANSWER (refer to examples given from past week)

LEVEL 3: Earlier you mentioned (experience). Do you expect to do this in the next few weeks?

Do you expect it will be pleasurable? (ask for elaboration) e.g., what about it are you looking forward to?

[NOTE: ratable experiences involve at least a minimal level of interaction from which pleasure is derived]

FOLLOW UP:

Thinking forward to the experiences you have just described, for example (provide brief summary) which of these do you think will be the most pleasurable or enjoyable for you?

Ok, focusing on (event), I would like you to rate how pleasurable it was for you using this scale.

Ok, focusing on (event), I would like you to rate how unpleasurable it was for you using this same scale.

E) Work/Vocational/School activities

Have you been working or going to school? Any volunteer work, or are you anyone's primary caretaker?

[NOTE: ratable experiences involve at least a minimal level of interaction from which pleasure is derived]

FOLLOW UP:

What about that was pleasurable?

How often did you do [go to school/work/volunteer] in the past week?

FOLLOW UP:

Thinking back on the experiences you have just described, for example (provide brief summary) which of these was the most pleasurable or enjoyable for you?

(Give the participant the 0-4 Likert scale)

Ok, focusing on (event), I would like you to rate how pleasurable it was for you using this scale.

Ok, focusing on (event), I would like you to rate how unpleasurable it was for you using this same scale.

F) Pleasure EXPECTED (anticipated) from Work/Vocational/School Activities

LEVEL 1: Looking forward to the next few weeks (when thinking about the future) is there anything at (work, school, or volunteering) that you are looking forward to?

IF ANSWER IS SPONTANEOUSLY PROVIDED:

How much pleasure do you think you will experience?

Are there other experiences with people you expect to be pleasurable in the coming weeks?

IF ANSWER IS "NO":

LEVEL 2: Earlier you mentioned (experience). Will you be doing that in the coming weeks?

Do you expect it will be pleasurable? (ask for elaboration) e.g., what about it are you looking forward to?

[NOTE: ratable experiences involve at least a minimal level of interaction from which pleasure is derived]

FOLLOW UP:

Thinking forward to the experiences you have just described, for example (provide brief summary) which of these do you think will be the most pleasurable or enjoyable for you?

Ok, focusing on (event), I would like you to rate how pleasurable it was for you using this scale.

Ok, focusing on (event), I would like you to rate how unpleasurable it was for you using this same scale.

G) Recreation/Hobbies/Pastimes

What do you do in your free time?

What hobbies or recreational interests do you have?

Have you participated in any hobbies or leisure activities such as sports, going to church, walking or other such activities during the past week?

Do you spend time reading or watching TV?

Do you spend time on the internet?

What programs do you watch on TV?

FOLLOW UP:

What about that was pleasurable?

How often did you do [hobby/pastime] in the past week?

FOLLOW UP:

Thinking back on the experiences you have just described, for example (provide brief summary) which of these was the most pleasurable or enjoyable for you?

(Give the participant the 0-4 Likert scale)

Ok, focusing on (event), I would like you to rate how pleasurable it was for you using this scale.

Ok, focusing on (event), I would like you to rate how unpleasurable it was for you using this same scale.

H) Pleasure EXPECTED (anticipated) from Vocational Activities

LEVEL 1: Looking forward to the next few weeks (when thinking about the future) what types of things in your free time like hobbies are you looking forward to?

IF ANSWER IS SPONTANEOUSLY PROVIDED:

How much pleasure do you think you will experience?

Are there other experiences with people you expect to be pleasurable in the coming weeks?

IF ANSWER IS "NO":

LEVEL 2: Is there any hobby or fun activity you are looking forward to, for example, watching sports or TV, games, computer time, reading?

IF STILL NO ANSWER (refer to examples given from past week)

LEVEL 3: Earlier you mentioned (experience). Will you be doing that in the coming weeks?

Do you expect it will be pleasurable? (ask for elaboration) e.g., what about it are you looking forward to?

[NOTE: ratable experiences involve at least a minimal level of interaction from which pleasure is derived]

FOLLOW UP:

Thinking forward to the experiences you have just described, for example (provide brief summary) which of these do you think will be the most pleasurable or enjoyable for you?

Ok, focusing on (event), I would like you to rate how pleasurable it was for you using this scale.

Ok, focusing on (event), I would like you to rate how unpleasurable it was for you using this same scale.

APPENDIX H

The Temporal Experience of Pleasure Scale (TEPS)

1. When something exciting is coming up in my life, I really look forward to it.
2. The sound of crackling wood in the fireplace is very relaxing.
3. When I think about eating my favorite food, I can almost taste how good it is.
4. I love the sound of rain on the windows when I'm lying in my warm bed.
5. The smell of freshly cut grass is enjoyable to me.
6. I enjoy taking a deep breath of fresh air when I walk outside.
7. I don't look forward to things like eating out at restaurants. (R)
8. A hot cut of coffee or tea on a cold morning is very satisfying to me.
9. I love it when people play with my hair.
10. I really enjoy the feeling of a good yawn.
11. When I'm on my way to an amusement park, I can hardly wait to ride the roller coasters.
12. I get so excited the night before a major holiday I can hardly sleep.
13. I appreciate the beauty of a fresh snowfall.
14. When I think of something tasty, like a chocolate chip cookie, I have to have one.
15. Looking forward to a pleasurable experience is in itself pleasurable.
16. I look forward to a lot of things in my life
17. When ordering something off the menu, I imagine how good it will taste.
18. When I hear about a new movie starring my favorite actor, I can't wait to see it.

APPENDIX I

Simulated Social Interaction

"Hi, I'm _____. 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 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?"

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