

ABSTRACT

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AND EXPRESSION IN SOCIAL
ANHEDONIA

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Social anhedonia is an important feature of schizophrenia and it is a promising indicator of latent liability for the disorder. Although social anhedonia is defined as an affective construct, only a limited number of studies have investigated the affective and behavioral correlates of the construct. Studies that have looked at these variables have been limited by a lack of appropriate measures of affiliation, control for contributions of current depressive symptoms and inclusion of both male and female participants. The current study sought to extend past research by addressing the limitations listed above. A cohort of psychometrically identified social anhedonics and normally hedonic controls were identified from a large college sample. The participants completed a clinical interview and a series of questionnaires. The clinical interviews focused on current and past mood disorders, schizophrenia and schizophrenia spectrum personality disorders. The questionnaires focused on self-reports of current depressive symptoms and general tendencies to express emotion. The participants were then presented with a series of affect eliciting films clip during

which their emotional expressions were recorded. After each film, they were asked to self report their affective state. Contrary to past studies and current hypothesizes social anhedonics did not differ from controls in terms of emotional experience or emotional expression. The lack of findings could be as a result of small sample sizes, lack of validated self-report measures of emotional experience, or the nature of the limited sample of behavior collected among other study limitations.

FILM-INDUCED EMOTIONAL EXPERIENCE AND EXPRESSION IN
SOCIAL ANHEDONIA

By

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Dedication

To my Husband, for every reason.

Your unconditional love and unyielding support carried me through the completion of this work, my degree and toward lifelong happiness.

And

To the men and women of the 2nd Battalion, 22nd Infantry, 10th Mountain Division whose hard work and dedication makes it possible for all of us to continue our education as is.

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Introduction

ANHEDONIA AND SCHIZOPHRENIA

Schizophrenia is a complex disorder characterized by profound changes in thought, language, perception, behavior and emotion. While no single symptom identifies all patients with schizophrenia (Walker, Kestler, Bollini, & Hochman, 2004), it has been noted that symptoms tend to cluster into several domains (Andreasen, Arndt, Alliger, Miller, & Flaum, 1995). One such domain consists of “negative symptoms” which includes lack of motivation (amotivation), lack of speech (alogia), disinterest in one’s environment (apathy), diminished capacity to experience pleasure (anhedonia), and reduced affective expression (flat or blunted affect; Arango, Buchanan, Kirkpatrick, & Carpenter, 2004). Social anhedonia in particular is central to contemporary conceptualizations of negative symptomatology (e.g., Andreasen, & Carpenter, 1993) and was identified in early clinical observations:

“The singular indifference of the patients toward their former emotional relations...is not seldom the first most striking symptom of the disease...the patient receives relatives’ visits without a greeting or other sign of emotion” (Kraepelin, 1919).

Current clinical rating scales of negative symptomatology have included anhedonia as a key symptom domain. The Scale for the Assessment of Negative Symptoms (SANS; Andreason, 1982) rates the severity of five negative symptoms including alogia, affective flattening, avolition-apathy, attention impairment and anhedonia-asociality. The Positive and Negative Syndrome Scale (PANAS; Opler, Kay, & Fiszbein,

1987) includes several items that are meant to measure negative symptoms that are considered primary to schizophrenia. These clinical rating scales have been widely used in schizophrenia research. Findings have indicated anhedonia and other negative symptoms are independent of psychosis and affective symptoms and not merely secondary to other symptoms of schizophrenia (See Blanchard, & Cohen, 2006 for review). The inclusion of anhedonia as a central component of widely used clinical measures is indicative of its importance in the clinical conceptualization of the disorder.

Meehl (1962) proposed that this reduced capacity to experience pleasure from social interactions (social anhedonia) was a core feature of schizophrenia and that this trait would be evident in those at genetic risk for this disorder. Meehl further postulated that these individual differences in hedonic capacity were a result of differences in positive and negative reinforcement centers in the brain. Because of differences in the distribution, number, density and/or reactivity of reinforcing neurotransmitters, individuals will differ in the level of pleasure experienced in response to the same positive stimulus. Researchers began to empirically test Meehl's conjectures decades later with self-report measures of social anhedonia. Results supported the clinical observations of early theorists indicating that patient samples reported higher levels of social anhedonia.

Elevated levels of social anhedonia have been found in first episode psychotic patients (Katsanis, Iacono, & Beiser, 1990) and in outpatient schizophrenia samples (Berenbaum, & Oltmann, 1992; Blanchard, Mueser, Bellack, & Garb, 1998) Chapman, Chapman, and Raulin, 1976) when compared to controls. A more recent study (Camisa et al., 2005) examined levels of social anhedonia in schizophrenia patients, patients with

other schizophrenia-spectrum disorders, and controls. Consistent with prior research, the highest levels of social anhedonia were found in patients diagnosed with schizophrenia, followed by patients diagnosed with other schizophrenia-spectrum disorders; the lowest levels of social anhedonia were reported by non-psychiatric controls (Camisa, et al., 2005). Studies have also indicated that in schizophrenia samples, social anhedonia is stable across a 90-day period with a stability coefficient of 0.79 (Blanchard et al., 1998), as well as over a one year period with a stability coefficient of 0.72 (Blanchard et al., 2001). These findings are consistent with the clinical observations that anhedonia is prevalent and persistent in schizophrenia as well as in schizophrenia-spectrum disorders.

In accordance with Meehl's theory of a genetic liability, research has found elevated levels of social anhedonia in the relatives of patients with schizophrenia-spectrum disorders. Specifically, Katsanis, Iacono, and Beiser (1990) found higher levels of social anhedonia in relatives of patients experiencing their first psychotic episode as compared with controls. Similarly, Kendler, Thacker, and Walsh (1996) documented elevated levels of social anhedonia in the biological relatives of schizophrenic patients compared to relatives of controls. Laurent, Biloa-Tang, Bougerd, and Duley (2000) also noted elevations in social anhedonia reported by parents and siblings of schizophrenic patients when compared to controls.

Findings using broader trait assessments of emotion in schizophrenia are consistent with the above findings assessing anhedonia. Trait positive affect (PA) is a dispositional tendency to experience positive or rewarding emotional states such as joy (Clark & Watson, 1999). Trait negative affect (NA) refers to the tendency to experience aversive emotional states such as tension and anxiety (Watson & Walker, 1996). In

current personality models, PA and NA are seen as orthogonal dimensions that are independent of each other, rather than merely polar opposites (Watson & Clark, 1992; Watson & Tellegen, 1985).

In clinical samples, elevated social anhedonia has been shown to be associated with diminished trait PA and elevated trait NA (Blanchard et. al., 2001). Using an outpatient schizophrenia sample, Blanchard, Meuser and Bellack (1998) found that patients reported less PA and greater NA when compared to controls. Group differences in trait affectivity were stable over a 90-day follow-up period. Horan and Blanchard (2003) compared patients with non-deficit syndrome schizophrenia and patients with deficit syndrome schizophrenia (or schizophrenia where at least 2 negative symptoms are primary; for a review of deficit syndrome schizophrenia see Kirkpatrick, Buchanan, Ross, & Carpenter, 2001). Patients with deficit syndrome schizophrenia reported lower trait positive affectivity as well as higher levels of social anhedonia compared to non-patient controls. These findings support Meehl's notion of a diminished capacity to experience pleasure (PA) and also indicate that individuals with schizophrenia report experiencing *more* negative affectivity. This pattern of affectivity appears to be stable across clinical states (Blanchard et. al., 1998; Blanchard et. al., 2001,).

Although clinical assessments and self-report data are informative, they are limited in several ways. First, self-report studies of affectivity fail to provide assessment across response domains such as behavior (e.g. facial expressions) or physiological responding (Lang, 1994). Second, it is unclear if these results reflect differences in opportunity or environment, such as poverty or social privation. That is, do reports of social anhedonia represent the fact that individuals who experience psychosis have fewer

opportunities to encounter pleasurable social interactions rather than a true diminished *capacity* for pleasure? Several studies have utilized emotionally evocative stimuli within a laboratory setting to begin the systematic investigation of this empirical question.

EXPERIENCE AND EXPRESSION

Berenbaum and Oltmanns (1992) were one of the first research groups to empirically examine affectivity while measuring across multiple domains in schizophrenia samples. Schizophrenia patients with and without blunted affect (i.e., flat affect or severely restricted emotional expression) were presented with an emotional stimulus that required low cognitive demands (i.e., a sweet or bitter flavored drink). The participants' facial expressions were then coded using a behavioral coding method for outward displays of emotional responding (Emotional Facial Action Coding System; Freisen, 1986). Participants were also given self-report measures of emotional experience. The controls and blunted affect patients differed significantly in their facial expressions with blunted affect patients displaying less facial expressions. However, patient groups and controls did not differ on self-report measures of emotional experience.

Heerey and Gold (2007) also explored self-reports of emotional experience in a sample of patients with schizophrenia and controls. Participants were presented with several slides containing images of pleasant, neutral or negative images and asked to rate the "pleasantness" of each slide. When compared to controls, the schizophrenia group did not differ in terms of self-reported emotional experience with similar patterns of arousal ratings and pleasantness ratings.

The findings are of interest because while Berenbaum and Oltmann (1992) suggest a desynchrony of emotional experience and expression in schizophrenic patients and the two studies (Berenbaum & Oltman, 1992; Heerey & Gold, 2007) suggest emotional experience to be intact when patients are presented with stimuli, both studies are limited in their failure to control for the use of antipsychotic medication. Therefore, is difficult to disentangle what portion of the attenuated facial response were a result of medication side effects such as facial immobility (Blanchard & Neale, 1992), and what portion of the diminished responding was a result of factors specific to schizophrenia.

Kring and colleagues (Kring, Kerr, Smith, & Neale, 1993) attempted to address the issue of medication side effects by investigating patients who were not taking antipsychotic medication. Using another standardized behavioral coding method (Facial Expression Coding System; Kring, & Sloan, 1991), the authors measured facial displays of emotion by examining both the intensity and duration of outward displays of emotion using emotion eliciting film stimuli. When compared to controls, patients with schizophrenia displayed fewer positive facial expressions in response to positively valenced stimuli (a humorous film clip) as well as fewer negative expressions in response to negatively valenced stimuli (a sadness and fear evoking film clip). However, individuals with schizophrenia experienced an equivalent or greater level of emotion when compared to controls in response to both positive and negative emotion eliciting films (Kring et al., 1993).

In addition to examining self reported emotional experience, studies of individuals with schizophrenia have expanded to examine physiological responding to affective eliciting stimuli. Kring and Neale (1996) compared patients with schizophrenia

to non-psychiatric controls in an experiment where participants were presented with film clips designed to elicit happiness, sadness or fear while being recorded for later behavioral coding of emotional responding. A measure of skin conductance was also added in order to assess physiological responding. Replicating prior reports, patients with schizophrenia displayed fewer expressions than did controls during both negative and positive film clips. Subjective and physiological responses to the film clips, however, did not illustrate the same pattern. As compared to controls, the schizophrenia group reported higher levels of negative affect during the positive and neutral clip along with higher elevations in skin conductance to all the films. For positive affect no main effect for group was found. Both the schizophrenia and control group reported higher levels of PA during the positive film clip than during the neutral film clip. Thus, patients with schizophrenia displayed less facial expressions of emotion but patients report comparable levels of PA and more NA in response to positive film clips and patients demonstrated similar psychophysiological responding.

Curtis, Lebow, Lake, Katsanis, and Iacono (1999) measured both physiological responses and pleasantness ratings to emotionally eliciting stimuli (still pictures). Results indicated that individuals with schizophrenia had a pattern of startle modulation indistinguishable from controls, with potentiated startle amplitude while viewing negatively valenced slides and attenuation while viewing positive slides. However, the schizophrenia group did report positive slides to be less pleasant and negative valenced slides to be more pleasant than the control group.

Memory has been examined in an attempt to account for the apparent inconsistencies in the literature regarding self-report trait measures of emotion and

emotional responding in laboratory paradigms. Horan and colleagues (Horan, Green, Kring, & Nuechterlein, 2006) investigated the impact of memory on the disjunction between general reports of anhedonia and reports of pleasure when faced with a pleasant stimulus. They postulated that elevations in anhedonia reported in schizophrenia samples may be the result of faulty memory rather than an inability to experience pleasure. In order to test their hypothesis, patients and non-patient controls were presented with a variety of stimuli (food and film clips) meant to elicit positive emotional responding. Despite reporting more anhedonia than controls, patients did not differ in immediate emotional responding nor in a delayed recall for these experiences. These results replicate previous findings of emotional experience in schizophrenia samples. The findings also extended past studies by finding that differences in memory do not account for differences in reports of emotional experience (i.e., trait anhedonia versus emotional responding to affect eliciting stimuli).

Gard and colleagues (Gard, Kring, Gard, Horan, & Green, 2007) were interested in examining the possibility that reports of diminished trait affectivity and comparable affective responding in laboratory paradigms were a result of differences in anticipatory versus consummatory pleasure. They hypothesized that the differences were due to the failure to *anticipate* the pleasure that were derived from a pleasurable activity rather than a difference in the pleasure actually *experienced* when presented with a pleasurable stimuli. Using an experience sampling method, patients with schizophrenia and controls were asked to rate the level of pleasure currently experienced at various point of the day as well as the amount of pleasure they anticipated experiencing if they were to engage in a list of future events. Consistent with the authors' hypothesis, patients with

schizophrenia exhibited a deficit in anticipatory pleasure but not in consummatory pleasure.

Thus, there are conflicting findings in the existing literature. Self-report trait measures and clinical assessments indicate that individuals with schizophrenia may generally experience less positive affect and more anhedonia. Laboratory studies, however, suggest that individuals with schizophrenia have emotional experiences (physiological responding and self-reports) comparable to controls. Mood induction paradigms report differences in emotional expression but normative emotional experience in schizophrenics. However, when interpreting the above findings there are two major considerations that should be examined: the nature of the stimuli used, and the challenges faced in the study of individuals with a severe and persistent mental illness. Each of the considerations were reviewed below.

The nature of the affect eliciting stimuli used in schizophrenia research is relevant in the study of anhedonia. In his writings, Meehl (1962) reported that diminished hedonic capacity was not a pan deficit. Rather, Meehl proposed that anhedonia occurred primarily in the social sphere. This is notable as laboratory studies of affect in schizophrenia have not used stimuli intended to elicit interpersonal feelings of affiliation. Instead, studies have focused on stimuli to elicit positive or negative emotion with no social or interpersonal context such as flavored drinks (e.g., Berenbaum, & Oltmanns, 1992) and films eliciting amusement or disgust (e.g., Kring, & Neale, 1996). In the study of hedonic capacity in particular, films eliciting positive affect may not be adequately tapping the social hedonic deficit presumed to be pervasive in schizophrenia. Although positive affect is positively related to the social construct of extraversion (Gross, Sutton and

Ketelaar, 1998), extraversion has been found to have two psychometrically distinct emotional states. One related to social dominance and leadership (agency) and one that is purely social in nature (affiliation; Morrone-Strupinsky, & DePue, 2004). By focusing on stimuli that elicits positive affectivity, researchers are eliciting and measuring a large construct that encompasses multiple domains of emotion rather than affiliation specifically. The use of the appropriate class of stimuli is of the utmost importance when discussing a construct that is defined by one's experience and responding to *social* situations.

Past studies on anhedonia have been further complicated by other methodological choices such as the use of clinical samples. Specifically, the social impairments that characterize schizophrenia present an additional challenge in the interpretation of studies that utilize clinical samples. Studies have shown individuals with schizophrenia to have poorer social adjustment (Mueser, Bellack, Morrison, & Wixted, 1990), fewer social skills (Lieberman, 1982; Mueser, Bellack, Douglas, & Morrison, 1991), less elaborated social networks (Hammer, 1996), poorer social functioning in the community (Halford & Hayes, 1995), and poorer overall social competence (Bellack, Morrison, Wixted, & Mueser, 1990). During acute phases of schizophrenia, individuals withdraw socially and this withdrawal persists even after the active symptoms ameliorate (Bellack, Morrison, Mueser, Wade, & Sayers, 1990). Social withdrawal strains social support systems and thus further damages the already limited social reinforcement obtained by individuals with schizophrenia. Given the social privation and stigma associated with schizophrenia it is difficult to attribute differences in reports of pleasure derived from social interactions

to individual differences in the capacity to experience pleasure as the negative impact of the illness on social relationships may also contribute.

Finally, medication side effects are another confounding variable in interpreting the results of literature using clinical samples. Specifically, many of the neuroleptics used to treat schizophrenia cause extrapyramidal symptoms (EPS) or “motor side effects.” In a review of published works on medication side effects, Blanchard and Neale (1992) noted that EPS are quite common and are reported by more than half of patients. This report has a direct bearing on emotion research because some motor side effects induce “expressionless faces” and “loss of associated movements.” Researchers have attempted to address the issue of medication side effects by using unmedicated samples. Results from these studies indicate that the disparity of emotional experience and expression holds even after controlling for medication side effects (Kring & Neale, 1996). However, these studies are often limited in sample size (e.g. Kring et al, 1993; n = 20 schizophrenia group; Kring, & Neale, 1996; n = 23 schizophrenia group). They also do not take into consideration the long-term and possibly permanent drug-induced neurological alterations that certain psychotropic medications produce in a number of patients (see Blanchard & Neale, 1992; Janicak et. al., 2001).

In order to address the above limitations in the literature, it would be informative to identify individuals at-risk for schizophrenia before they have developed the disorder. The use of this “at risk” population would eliminate two major constraints in the interpretation of the aforementioned studies: the deleterious social effects of the illness and side effects of the medications. It is fitting that we return to the seminal work of Meehl (1962) for a framework upon which to base further investigations. Researchers

have utilized his theory of schizotypy in order to identify groups that may be at a higher risk for the development of schizophrenia. Researchers have studied anhedonia in particular, investigating non-clinical samples using a psychometric high-risk paradigm (Lenzenweger, 1994). The following section will review Meehl's theory of schizotypy.

ORIGINS OF SCHIZOTAXIA, SCHIZOTYPY, AND SOCIAL ANHEDONIA

Schizotaxia: A Genetic Predisposition to Schizophrenia-Spectrum Disorders

Meehl (1962) proposed that schizotaxia was a biological predisposition to the possible later development of schizophrenia and schizophrenia-spectrum disorders. Meehl predicted that the central nervous system would be the most affected physiological structure, showing signs of pervasive abnormality. Meehl (1962, 1989) further proposed that individuals with schizotaxia would develop a personality organization he called "schizotypy," after Rado's (1956) original use of the term. Anhedonia, or a deficit in the experience of pleasure, was one of the four core behavioral traits that identified schizotypes, along with interpersonal aversiveness, ambivalence and cognitive slippage. While 90% of schizotypes will fall into varying degrees of functionality, Meehl theorized that the remaining 10% of schizotypes would eventually develop schizophrenia (Meehl, 1990). If this hypothesis were correct, it would predict a much higher prevalence of schizophrenia than has been shown to occur in the general population (0.5%-1.5%; American Psychiatric Association, 2000) and schizotypal traits could be clinically useful as an indicator of high-risk individuals.

In an attempt to assess schizotypy traits (Meehl 1962, 1989) in large non-clinical samples, Chapman, Chapman, and Raulin (1976) developed self-report measures of

hedonic capacity as well as magical ideation and perceptual aberration. Anhedonia was measured with the physical anhedonia scale (PhyAnh: Chapman, Chapman & Raulin, 1976) and the social anhedonia scale (SocAnh: Chapman et al., 1976). The PhyAnh scale measures the ability to experience pleasure related to taste, sight, smell, and touch; the SocAnh scale measures the ability to experience pleasure as a result of interpersonal interactions including conversations, social companionship, and attachment.

Originally, the developers of the anhedonia scales believed the Physical Anhedonia Scale to be the more useful of the two for identifying high risk individuals, since physical anhedonia was thought to be more strongly associated with biological deficits. It was hypothesized that social anhedonia might be more likely to be affected by social desirability biases (Chapman et al., 1976). However, these assumptions were not borne out by later empirical investigations as the SocAnh scale was found to be the more useful of the two (Chapman et. al, 1994). The Revised Social Anhedonia Scale became a tool used in clinical research to quantify increased levels of social anhedonia in patient samples (see “Anhedonia and Schizophrenia” above). The findings of elevated levels of social anhedonia in clinical samples (reviewed above) are informative in describing the nature of clinical characteristics in patients with schizophrenia and schizophrenia-spectrum disorders but they do not address the validity of social anhedonia as an indicator of risk. Cross-sectional studies have investigated the validity of social anhedonia as an indicator of schizophrenia liability by examining similarities between non-clinical samples with elevated levels of social anhedonia and individuals with schizophrenia. That is, if social anhedonia is a valid indicator of schizotypy, then non-clinical individuals high in

this trait should demonstrate aberrant characteristics similar to those identified in schizophrenia, albeit in an attenuated form.

Social Anhedonia as a Cross-Sectional High-Risk Indicator

Studies using non-clinical samples have found individuals with elevated levels of social anhedonia to exhibit cognitive deficits and psychophysiological abnormalities consistent with those seen in schizophrenia. Cognitive deficits associated with social anhedonia have been found in working memory (Tallent & Gooding, 1999; Gooding and Tallent, 2003), sustained attention (Kwapil & Diaz, 2000), visual-spatial memory tasks (Cohen, Leung, Saperstein & Blanchard, 2006) and executive functioning (Gooding, Kwapil & Tallent, 1999; Tallent & Gooding, 1999). Social anhedonics are also more likely to display aberrant smooth pursuit tracking (Gooding, Miller & Kwapil, 2000) and deviant antisaccade performance (Gooding, 1999) in eye tracking tasks.

Social anhedonics have also been found to have elevated clinical ratings of schizophrenia-spectrum characteristics. Mishlove and Chapman (1985) found that females who scored higher on the revised social anhedonia scale had higher levels of schizotypal features and psychotic-like experiences. Males with higher social anhedonia scores did not differ from controls, but showed elevations in schizotypal features when they exhibited elevated levels of social anhedonia in combination with elevated scores on other measures of psychosis proneness (i.e., Perceptual Aberration, Magical Ideation). More recent studies have found social anhedonics to exceed controls on the proportion of individuals with each of the schizophrenia-spectrum personality disorders (Kwapil, 2002), and to endorse a greater number of psychotic-like experiences than controls

(Gooding, Miller, & Kwapil, 2000). Merrit, Balogh, and DeVinney (1993) utilized the Minnesota Multiphasic Personality Inventory as a measure of schizophrenia spectrum disorders and found 55% of individuals high in social anhedonia to have profiles associated with schizophrenia-spectrum disorders.

The cross-sectional studies reviewed above suggest that social anhedonics have elevations in clinically relevant schizotypal characteristics. Furthermore, social anhedonics have been shown to exhibit cognitive deficits and aberrant psychophysiological responses. Although these findings are consistent with Meehl's theory of schizotypy, they provide limited support for social anhedonia as a valid indicator of vulnerability for the development of schizophrenia-spectrum disorders over time. More recently, longitudinal research has sought to examine the predictive validity of social anhedonia; this literature is reviewed below.

Social Anhedonia as a longitudinal High Risk Indicator

In longitudinal studies, social anhedonia has been revealed to be a robust indicator of the later development of schizophrenia-spectrum disorders. A ten-year longitudinal study conducted by Chapman et al. (1994) used both the Revised Social Anhedonia Scale and a second measure of psychosis proneness (the Magical Ideation Scale) to predict which individuals would exhibit high risk for schizophrenia-spectrum disorders.

Individuals with high scores on both the Magical Ideation and Social Anhedonia Scale were at the highest risk for the development of psychotic disorders during the ten year follow-up assessment (Chapman et. al., 1994). Kwapil (1998) re-analyzed the same data to examine the predictive utility of social anhedonia. After controlling for the effects of

the other measures used, 24% of the social anhedonia group were diagnosed with schizophrenia-spectrum disorders at follow-up.

A more recent study sought to determine the predictive ability of social anhedonia in an independent college sample (Gooding, Tallent, & Matts, 2005). Group assignments were based on extreme scores on the Revised Social Anhedonia Scale. Participants were assessed five years later for psychopathology. At follow-up, 15.6% of the participants identified as socially anhedonic were diagnosed with a schizophrenia-spectrum disorder, while none of those in the control group were so identified. Such strong preliminary support seems to indicate that social anhedonia is a promising indicator of vulnerability to schizophrenia-spectrum disorders (Gooding et. al, 2005).

In sum, much of the research involving social anhedonia has focused on the clinical correlates and predictive validity of the construct. The psychometric high-risk paradigm is useful in basic emotion research as social anhedonia can identify samples to be studied prior to the onset of schizophrenia and the introduction of antipsychotic medication. However, despite developments in the study of social anhedonia, research has only recently begun to examine emotion in these putative schizotypes. The following section will review the current body of literature regarding emotion and social anhedonia, discuss its limitations, and propose a study aimed at addressing limitations and improving upon current research.

EMOTION AND SOCIAL ANHEDONIA

Despite the particular relevance of emotional responding in anhedonic individuals (i.e., lack of pleasure or positive emotions from social interaction) relatively few studies

have investigated whether social anhedonics exhibit patterns of emotional experience and expression similar to those of schizophrenics. The research on social anhedonia and emotion in non-clinical samples is reviewed below.

In a non-clinical college sample, Kring, Smith, and Neale (1994) found social anhedonia to be negatively correlated with emotional expressiveness, such that greater levels of anhedonia were related to lower self-reported ratings of emotional expression. Adams (2003) also found self-reported emotional expressivity to be negatively correlated with social anhedonia. Taken together these studies indicate that like negative symptoms of schizophrenia, social anhedonia is also related to less emotional expression. While informative, these studies merely examined the correlation between anhedonia and expression within an unselected sample. The data do not necessarily address how extreme scorers on social anhedonia (putative schizotypes) would experience or express emotion. Further, these studies relied on self-reports of emotional expression and did not directly assess behavioral expressivity.

Carreño and colleagues (Carreño, Callahan, Henneberger, Lank, & Blanchard, 2007) utilized an extreme groups design to examine expressivity in socially anhedonic individuals. The researchers found that, compared to controls, individuals with extreme scores on a measure of social anhedonia reported less emotional expressivity on a self-report measure of general emotional responding. In a large community sample, Collins, Blanchard, and Biondo (2005) utilized behavioral ratings of schizoidia to assess social anhedonics and controls. Behavioral observations indicated that, compared to controls, individuals high in social anhedonia exhibited less facial affect when participating in a social task. Taken together these studies support the idea that greater social anhedonia is

associated with diminished self-reported emotional expressivity as well as diminished behavioral expression of emotion within non-clinical samples.

With regard to emotional experience, psychometrically identified social anhedonics also exhibit lower trait positive affectivity. In an undergraduate college sample, Gooding, Davison, Putnam, and Tallent (2002) examined trait affective and physiological responding to emotionally-eliciting images in individuals identified as socially anhedonic. Results from this study indicate that in self-reported measures of trait affectivity socially anhedonic participants reported less positive as well as more negative affect. However, in response to positively and negatively valenced still pictures their physiological responding (i.e. startle response patterns using the acoustic startle paradigm) yielded no differences between the anhedonic and normally hedonic group. Consistent with Gooding et al. (2002) findings regarding negative affectivity, Horan and colleagues (Horan, Brown, & Blanchard, 2007) found that, when compared to controls, socially anhedonic individuals report greater trait negative affectivity than controls.

In summary, higher levels of social anhedonia are related to lower ratings of self-reported emotional expression and less emotionally expressive behavior. Trait positive affect also appears to be diminished in social anhedonics. However, research is inconsistent regarding negative affectivity. Furthermore, physiological responses do not differ between anhedonic and control samples. While informative, these studies fail to simultaneously measure emotional expression and experience. These studies have also neglected to use social stimuli to elicit feelings of affiliation, which is of central importance in the study of social anhedonia (Horan, Kring, & Blanchard, 2006).

However, one unpublished study (Leung, 2006) has investigated emotional expression and emotional experience using affiliative stimuli in a socially anhedonic sample.

Lueng (2006) investigated emotional expression and experience in a psychometrically identified social anhedonia group as compared to a control group. The study used self-report questionnaires to measure emotional experience and general emotional responding as well as behavioral coding to measure emotional expression in response to positive affect eliciting stimuli. Leung also utilized an additional film clip designed to elicit affiliation (Morrone-Strupinsky, & Depue, 2004). Participants in the social anhedonia group reported experiencing less trait positive affect as well as less current positive affect when asked how they felt upon arrival to the laboratory. Social anhedonics and controls reported comparable levels of trait negative affect and baseline state negative affect. In self-report measures of general emotional responding social anhedonics reported a tendency to display less positive *and* negative emotions when compared to controls. Behavioral coding of facial displays indicated that across all three film clips, the socially anhedonic group displayed fewer positive expressions than did controls. Facial displays of negative affect did differ significantly by group. Consistent with baseline self-reports of trait negative affect, no group differences were found in state negative affectivity in response to the films. However, social anhedonics reported less positive affect when compared to controls in response to all three film clips. Social anhedonics did not differ from controls in their ratings of warmth and affection in response to any film clip. This study indicates that emotional experience and expressions of positive affect may differentiate social anhedonics from controls, while emotional expressions and experiences of negative affect are similar between groups. Furthermore,

although social anhedonics reported lower levels of warmth-affection at baseline compared to controls, anhedonics did not differ from controls in terms of warmth-affection in response to any of the film conditions, including the affiliative film stimulus.

Lueng's (2006) study is unique in that it is the only extant study to investigate the possible disparity between *outward* displays of emotional expression and emotional responses in a socially anhedonic sample. However, the study was limited in four ways: homogeneity of the sample, failure to measure symptoms of psychopathology, limited stimuli content and problematic assessment of mood. First, the author used an all-female sample, which greatly limits the generalizability of the findings. Normative gender differences have been identified, namely that females tend to be more expressive of emotions when compared to males (Fujita, Deiner, & Sandvik, 1991; Kring & Gordon, 1998). Thus, it is unclear if Lueng's (2006) findings are replicable in males.

Second, the study failed to measure psychopathology including depressive symptoms and schizophrenia spectrum characteristics. The measurement of depressive symptoms is especially important because depressive symptoms are often seen in individuals with schizophrenia and in the prodrome of this disorder. Depressive symptoms have been noted in schizophrenia patients in the acute phase of the disease (Tapp, Kilzieh, Ernest, Wood, Raskind, Tandon, 2001; Yazaji, Battas, Agoub, Moussaoui, Gutknecht et al., 2002), in outpatient samples (Rocca, Bellino, Calvarese, Marchiaro, Patria et al., 2005), in patients diagnosed with a schizo-affective disorder (Pinninti, Rissmiller, Steer, & Beck, 2006; Zisook, Nyer, Kasckow, Golshan, Lehman, Montross, 2006) and in untreated psychotic patients (Hafner, Maurer, Trendler, Heiden,

Schmidt & Konnecke, 2005). Additionally, diminished emotional expression has been reported to be related to symptoms of depression. Depressed individuals report attenuated emotional experiences in response to pictures depicting pleasant scenes (Allen, Trinder & Brennan, 1999; Dunn, Dalgleish, Lawrence, Cusack, & Ogilvie, 2004; Sloan, Strauss, Quirk, & Sajatovic, 1997; Sloan, Strauss & Wisner, 2001) as well as an amusing film clip (Rottenberg, Kasch, Gross, & Gotlieb, 2002). Depressed individuals have also been found to have less emotionally expressive behavior in response to both negatively valenced film clips (Renneberg, Heyn, Gebhard & Bachmann, 2005) as well as less amusement at an amusing film clip and less sadness at a sad film clip (Rottenberg et al., 2002). Given the literature on the effects of depressive symptoms on emotional expression and experience, and given the relationship of depressive symptoms to schizophrenia, it is important to measure depressive symptoms in order to determine the extent to which depressive symptoms are related to both social anhedonia and differences in expressed and experienced emotion.

Additionally, Leung (2006) neglected to include a clinical assessment of schizophrenia-spectrum personality characteristics. Data on dimensional scores of schizophrenia-spectrum personality disorders could have replicated and supported past findings indicating that higher levels of social anhedonia are related to schizophrenia-spectrum personality disorder characteristics (Blanchard, Collins, Aghevli, Leung, & Cohen, under review; Kwapil, 2002; Merrit, Balogh, & DeVinney, 1993; Mishlove, & Chapman, 1985).

The Leung (2006) study is also limited in its lack of negative affect eliciting stimuli. The protocol was restricted to a humorous film clip, a neutral film clip and an

affiliative film clip. Thus, the results do not address emotional responses to negative affect eliciting stimuli in social anhedonics. Given prior finds of increased trait NA in social anhedonics (Gooding, Davidson, Putnam, & Tallent, 2002), it would be informative to determine if individuals high in social anhedonia show elevated responses to negative affect eliciting stimuli.

Lastly, Leung (2006) used a single-item measure of self-reported affiliation experienced during the films. This made the findings difficult to interpret. The researcher's measure for positive and negative affectivity had substantially more items (18-items for PA, 18-items for NA) and thus was more reliable than the single item affiliation scale. This may in part account for the failure to find group differences in affiliation across the films. In sum, Leung's study was limited in its use of an all female sample, lack of diagnostic assessment, limited range of stimuli, lack of diagnostic assessment, and problematic mood assessment. The proposed study seeks to address these limitations through an expansion and refinement of Leung's (2006) methodology.

This study examined emotional experience and expression in social anhedonics within a laboratory mood induction paradigm. The study recruited a sample of both men and women in order to maximize the generalizability of the findings. Second, the study added a diagnostic clinical interview that assessed symptoms of mood disorders, psychotic symptomatology, paranoid personality disorder, schizotypal personality disorder and schizoid personality disorder. Third, negatively valenced stimuli were added to the protocol to allow for assessment of emotional responding across a variety of valenced stimuli (positive, affiliative, and negative). Fourth, the study used a measure of affiliation that has an increased number of items to yield a more reliable scale. The

current study was similar to previous work in its measurement of emotional expression (facial responding) and in its use of self-report measures of emotional experience.

STUDY OVERVIEW

The current study utilized the psychometric high risk paradigm to screen over 2,300 students for the identification of social anhedonics and normally hedonic controls. The study sought to have an equal number of males and females in both groups (i.e. 20 males and 20 females). Participants were asked to come into the laboratory in order to complete a clinical assessment and film viewing. Diagnostic interviews were used to measure current and past mood disorders, psychotic disorder, and schizophrenia-spectrum personality disorder characteristics. Participants were also asked to complete self-report measures of depressive symptoms, general emotional responding (expression), trait affectivity, and baseline state affectivity. Next, participants watched several film clips intended to elicit positive and negative affect as well as a neutral and affiliative film clip. During each film clip participants were videotaped for later coding of facial expressions. After each film clip the participants were asked to complete a measure of state affectivity.

HYPOTHESIS

H₁: Social anhedonics will endorse more symptoms of psychopathology

H_{1a}: Consistent with the notion that social anhedonia will identify schizotypes (Kwapil, 2002; Mishlove, & Chapman, 1985), social anhedonics will endorse

more schizophrenia-spectrum personality characteristics as compared with controls.

H_{1b}: Replicating recent findings of elevated rates of depression in social anhedonics (Blanchard, et. al., under review) and in the prodrome of schizophrenia (Haroun, Dunn, Haroun, & Cadenhead, 2006), social anhedonics will report higher rates of current depression and lifetime major depressive episodes.

H₂: In self reported measures of trait affect, social anhedonics will report less trait positive affect and more trait negative affect when compared to controls.

H₃: Compared to controls, social anhedonics will experience less positive affect and more negative affect in response to affect eliciting stimuli.

H_{3a}: Social anhedonics will report less feelings of affiliation in response to the affect eliciting film clips when compared to controls.

H_{3b}: Social anhedonics will report less state positive affect in response to the affect eliciting film clips when compared to controls.

H_{3c}: Social anhedonics will report more state negative affect in response to the affect eliciting film clips when compared to controls.

H₄: Social anhedonics were less emotionally expressive than controls.

H_{4a}: Based on self reports, social anhedonics will report a general tendency to be less emotionally expressive compared to controls.

H_{4b}: Based on behavioral coding, social anhedonics will exhibit fewer facial expressions of emotions compared to controls when presented with affect eliciting films clips.

H₅: Exploratory analysis:

H_{5a}: Given findings of a disjunction between emotional experience and emotional expression in schizophrenia (Kring, & Neale, 1996) we examine the relationship between the experience of emotion (traits, mood) and expression (self-reported and behavioral codings) in social anhedonics and controls. This will allow us to determine if there is a desynchrony in response domains or if diminished expression in social anhedonics reflects decreased experience.

Methodology

Overview

This study sought to understand emotional experience and expression in a socially anhedonic sample. The sample was identified based on a large screening of undergraduate students enrolled in introductory psychology courses. Social anhedonics and normally hedonic controls were identified by scores on the Revised Social Anhedonia Scale (RSAS; Eckblad, Chapman, Chapman & Mishlove, 1982). Following selection and recruitment from the screening sample, participants were brought into the laboratory to complete structured diagnostic clinical interviews to assess for mood disorders, psychotic disorders and schizophrenia-spectrum personality disorder symptomatology. All participants completed self-report measures of emotional expression and experience. Participants subsequently viewed a series of film clips aimed at eliciting emotional responding. During each film, participants' facial displays were videotaped for later coding using a standardized measure of emotional expression. After each film clip the participants were asked to complete self-report measures of current emotional state.

Participants

Participants were recruited from a sample of college undergraduate students, enrolled in Psychology 100 as well as participants in the UMCP psychology subject pool. The number of individuals screened was approximately 2300. This large sample size was necessary to screen for extreme scores on the social anhedonia scale, representing approximately 5% of the sample (Blanchard et al., 2000; Horan et al., 2004).

Potential participants were identified during the screening phase with questionnaires (see Appendix A) including the Revised Social Anhedonia Scale (RSAS; Eckblad, Chapman, Chapman & Mishlove, 1982; see Appendix B), and an infrequency scale (IS: Chapman, Chapman & Raulin, 1976) in order to remove invalid respondents (see Appendix C). The screening sample was then used to identify and recruit members of both the social anhedonia and control groups to participate in the laboratory assessments.

For the laboratory-based portion of the study the participants were selected on the basis of their RSAS scores. Prior to selecting participants for the second portion of the study, all the participants whose responses are deemed invalid (more than 2 unexpected responses on the IS) were removed. This was consistent with prior studies (Chapman, Chapman, Kwapil, Eckblad, & Ziner, 1994; Kwapil, 1998) have used similar selection methods.

The RSAS scores were then z-scored separately by race and sex due to concerns about possible race and gender differences in RSAS scoring. For each group, socially anhedonic subjects were chosen on the basis of RSAS scores of 1.96 standard deviations above the mean. This standard has been adopted in prior studies utilizing the RSAS (Chapman et al., 1994, Gooding, Tallent, & Matts, 2005, Horan, Brown, & Blanchard, 2007; Kwapil, 1998). The criteria for the control group were participants with RSAS scores no more than .5 standard deviations above the mean. Given the low number of individuals who identified with a race other than “Asian, White, or Black” these were the only racial groups used in the analysis.

In order to compare social anhedonics to controls, with adequate power (power =.80) to detect medium ESs ($d = .50$), and $\alpha = .05$, the necessary sample size was found to be 31.36 cases per group for a total N of 64. This study originally proposed a sample size of 70, 35 anhedonics and 35 controls. The actual sample size consisted of 29 anhedonics and 39 controls, which provided less power (power=0.52; Faul, Erdfelder, Lang & Buchner, 2007).

Materials

Assessment of Social Anhedonia

The Revised Social Anhedonia Scale (RSAS: Eckblad et al, 1982) was administered to the participants during the initial Psychology 100 mass screening at the beginning of four semesters. The Revised Social Anhedonia Scale is a 40 item true/false inventory that assesses social anhedonia. The RSAS includes items such as, “If given the choice, I would much rather be with others than be alone.” The scale has been found to identify individuals exhibiting schizoid withdrawal, a trait-like indifference to people, as opposed to avoidant withdrawal, which can be transient and result from social anxiety (Mishlove & Chapman, 1985). The Revised Social Anhedonia Scale has also been shown to have internal consistency with coefficient alphas ranging between 0.79 and 0.84 (Blanchard, Mueser & Bellack, 1998; Mishlove and Chapman, 1985). Test-retest reliability has been shown over a 90-day period with a stability coefficient of 0.79 (Blanchard et. al, 1998), as well as over a one year period with a stability coefficient of 0.72 (Blanchard et al., 2001). The Revised Social Anhedonia Scale has been found to differentiate individuals with schizophrenia (Blanchard et al., 2001; Chapman et. al.,

1976) and their families from controls (Kendler, Thacker, & Walsh, 1996). Finally, both cross-sectional (Horan, Brown, Blanchard, 2007) and longitudinal studies (Gooding et al., 2005; Kwapil, 1998) have found positive relationships between elevated levels of social anhedonia and schizophrenia-spectrum disorders in non-clinical samples.

Use of the Infrequency Scale

The Infrequency Scale (Chapman et al., 1976 see Appendix C) was designed to identify invalid responding within the Revised Social Anhedonia Scale. The Infrequency Scale is a 13-item scale which includes items which are typically answered in the same fashion universally. For example “Driving from New York to San Francisco is generally faster than flying between these cities” and “I go at least once every two years to visit either northern Scotland or some part of Scandinavia.” Items are intermixed with the Revised Social Anhedonia Scale and are used to remove participants from inclusion into the second portion of the study. Participants with scores of 3 or more on the infrequency scale were dropped from the screening sample (Chapman et al., 1994);

Diagnostic Interviews

Diagnosis of mood and psychotic disorders were determined using the Structured Clinical Interview for DSM-IV Axis I Disorders module A and B, Non-Patient Edition – Research Version (SCID-I, First et al., 1996; see Appendix K). This instrument provided current and lifetime diagnosis for the following mood and psychotic disorders: Major Depressive Disorder, Bipolar I and Bipolar II disorder, Dysthymia, Psychotic Disorder, Schizoaffective Disorder, and Brief Psychotic Disorder. The SCID is a semi-structured interview used as a diagnostic tool for the DSM-IV. It has been widely used in studies of

psychosis proneness (e.g., Asarnow et al., 2001; Gooding and Tallent, 2001; Gooding et al., 2005). The interviews for the current study were conducted by three clinical psychology doctoral students who did not have access to information regarding group status (social anhedonic vs. control). Prior to beginning independent interviews, all graduate students were trained by an advanced doctoral student and a Ph.D. level clinician with extensive research experience. Training included independent ratings of past videotaped clinical interviews to obtain reliability, observation of live interviews, and completing interviews while observed by advanced doctoral students. Diagnoses were made based on a consensus diagnosis. Consensus Diagnosis was obtained following evaluation of videotaped interviews by an independent rater and a team discussion of all available diagnostic information. Team discussion included all students involved in the current study including two Masters level students and two senior undergraduate research assistants. This methodology has been used by other studies of social anhedonia and schizotypy (Collins, Blanchard, & Biondo, 2005; Cohen, Forbes, Mann, & Blanchard, 2006; Cohen, Leung, Saperstein, & Blanchard, 2006). Finally, inter-rater reliability has been demonstrated using previous versions of the SCID, with kappas greater than 0.60 (Williams et al., 1992).

The International Personality Disorders Examination (IPDE, Loranger et al., 1995; see Appendix L) was administered to assess schizoid, schizotypal, and paranoid personality disorders. The IPDE consists of items related to unusual thinking or beliefs, unusual perceptual experiences, suspicious or paranoid ideation, inappropriate or constricted affect, odd or eccentric behavior or appearance, impaired social relationships, and social anxiety. The IPDE is a semi-structured interview which results in both

categorical and dimensional ratings of Axis II disorders. Interviewer training and procedure for diagnostic ratings were identical to the procedures described above for the SCID and are reviewed above. A number of studies have used the IPDE for the assessment of schizophrenia-spectrum disorders in putatively psychosis-prone individuals (e.g., Cohen et al., 2006; Chapman et al., 1994). The IPDE has demonstrated inter-rater reliability with an overall kappa of 0.57 for the revised third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R, American Psychiatric Association, 1987) and 0.65 for the tenth revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10, World Health Organization, 1992).

Self-Reported Depressive Symptoms

The Beck Depression Inventory-II (BDI) was used to measure the presence and severity of depressive symptoms. The BDI-II contains 21 items, most of which are on a four-point likert scale ranging from zero to three. Participants are directed to answer each question according to their experiences in the past 2 weeks. The total scale score can range from a 0-63. Scale scores are then considered to fall into one of four ranges: 0-13 is considered minimal depression, 14-19 is considered mild depression, 20-28 is considered moderate depression and 29-63 is considered severe depression (Beck, Brown, & Steer, 1997; Beck, Steer, & Garbin, 1988).

The BDI is a widely used and valid measure of depressive symptoms in both psychiatric and non-psychiatric samples (Steer et al., 2003). It has been found to be positively correlated with other validated measures of depression and related constructs such as the Hamilton Psychiatric Rating Scale for Depression ($r = .71$; Beck et al., 1996).

It has also been found to have excellent internal consistency and high test-retest reliability (Fresco et al., 2001).

Self Reported Emotional Expressivity

The Berkley Expressivity Questionnaire (BEQ; Gross & John, 1995 see Appendix G) was used to assess participants' self-reported dispositional emotional expressivity. The BEQ is a 16 item questionnaire which includes three subscales (negative expressivity, positive expressivity and impulse strength). Examples of BEQ items are, "I have strong emotions," and "I am an emotionally expressive person" with each item scored on a 7-pointed Likert scale. The BEQ has been shown to have substantial test-retest reliability ($r = 0.86$; Gross & John, 1995). Convergent validity was established by high correlations with other expressivity scales including the Emotional Expressivity Scale ($r = .88$; Gross & John, 1997; Kring, Smith, & Neale, 1994).

The BEQ sub-scales of Positive Expressivity, Negative Expressivity, and Impulse Strength, have shown adequate internal consistency with coefficient alpha reliabilities ranging from 0.71 to 0.76 (Gross & John, 1995). These scales have sizable intercorrelations: Impulse strength correlated 0.52 with Negative Expressivity and 0.50 with Positive Expressivity, and Negative Expressivity is correlated 0.51 with Positive Expressivity (Gross & John, 1995). The subscales were totaled for a score of self-reported general emotional responding.

Assessment of Trait Affectivity

Trait affect was measured using the General Temperament Survey (GTS; Clark & Watson, 1990 see Appendix H). The current study focused on the Negative

Temperament and the Positive Temperament Scales which are two factor analytically derived affect scales from the GTS. The PA scale consists of 27 true/false items.

Individuals scoring high on PA scale describe themselves as happy, enthusiastic, and acting in ways conducive to experiencing positive emotional experiences. The NA scale consists of 28 true/false items. Individuals scoring high on the NA scale describe themselves as anxious, worrying, irritable, and generally tend to appraise the environment in a manner that fosters negative emotional experiences. The scales have high internal consistency reliabilities and good convergent and discriminant validity across a number of samples (Carver & White, 1994; Watson & Clark, 1992b). Adequate internal consistency and test-retest reliability have been demonstrated in schizophrenia populations (Blanchard et al., 2001; Blanchard et al., 1998; Horan & Blanchard, 2003).

Facial Displays of Emotion

Subject's facial expression of emotion were videotaped by a concealed camera during the viewing of film clips. Videotapes of expression were rated without sound in order to prevent contamination of ratings due to content or tone of any possible speech emitted by the participant including laughing, gasps etc. Two raters blind to group status independently rated one third of the facial expressions using the Facial Expression Coding System (FACES; Kring & Sloan, 1991 see Appendix I) in order to establish reliability between raters. The FACES is a behavioral coding system based on a 2-dimensional model of emotion, where each emotion varies on both valence (positive or negative) and intensity (weak or high intensity). The FACES has been found to be reliable (Kring & Sloan, 2007) and is considered more time-efficient than many other

measures of facial expression. Inter-rater agreement has been very high ($r = 0.70-0.99$) when the system has been used with trained undergraduate and graduate students as coders on a variety of subject populations (Aghevli, Blanchard, & Horan, 2003; Earnst & Kring, 1999; Kring & Earnst, 1999; Kring et al., 1993; Kring & Neale, 1996; Kring & Sloan, 1991). In addition, ratings have been demonstrated to converge with ratings made using other facial expression scales (Ekman & Friesen, 1976; 1978; Kring & Tomarkin, 1994). Finally, FACES was used by Leung (2006) in order to measure outward expressions of emotions.

Variable Composition

The FACES coding system involves making frequency counts for both positively and negatively valenced facial expressions. The coding system defines an emotional expression as a change from neutral to a non-neutral display, and back to a neutral display again. When a subject changes one non-neutral display to a non-neutral display of a different valence, the second display is counted as a separate discrete expression. For example, if a participant laughs followed by an expression of a negative emotion the participants emotions are rated as 2 separate emotions (positive and negative) each with their own intensity (from 1=low to 4=high). In addition, each individual expression is rated on duration (in seconds), again for each emotional expression. In the event that an expression varies in intensity over time, the highest intensity rating during the expression were counted. Non-emotional facial movements such as yawning, sneezing, or facial tics are not coded as facial expressions. Because the three FACES ratings (frequency, duration and intensity) are generally highly inter-correlated, these ratings for each subject

were standardized into z-scores, and summed across components (frequency, duration, intensity). This method were utilized separately for positive and negative expressions. Each subject were compared on the basis of the average composite positive and negative emotion scores for each type of film clip, yielding eight scores per subject: average composite positive and negative expressions on the neutral film clip, negative clip, comedic clip, and affiliative clip. This approach has been used in other similar studies of expression and experience of emotion (e.g., Earnst & Kring, 1999; Kring & Neale, 1996).

Coder Training

Three graduate students and two undergraduate students were trained by a senior graduate students as well as Dr. Jack J. Blanchard to perform the FACES ratings. Agreement between coder pairs was established during a training period, using videos of both schizophrenics and controls not included in the study. During this training period, coders discussed how to make ratings, using examples from the training tapes, and discuss their individual ratings until disparities are minimized. Once inter-rater reliability was established ($r = 0.80$), the coders independently rated tapes for all subjects in the present study. Raters completed ratings blind to group status. Frequent checks of their agreement were conducted to prevent coder drift. Following the conclusion of the study, intra-class correlations (ICCs; Shrout & Fleiss, 1979) were calculated to measure agreement and consistency between the raters. Previous studies have found ICCs for both non-clinical samples and individuals with schizophrenia to be high, typically averaging 0.9 and above (Kring et al., 1993; Kring & Earnst, 1999).

Film Clips

Film clips were used to elicit positive and negative affectivity as well as feelings of affiliation. A neutral film clip was also used to serve as the control to examine whether the other film clips can engender the anticipated emotional responses associated with each clip. The neutral film clip, (Morrone, Depue, Scherer, & White, 2000) is a 5-minute narrated segment of tropical rain forest scenes. The positive (comedy) film clip (Kring, Kerr, Smith & Neal, 1993) is a 5 minute clip that is designed to elicit positive emotion. This film is a short clip from a full length comedy, featuring a couple fixing a newly purchased home. This film clip has been widely used in previous emotion studies of individual with schizophrenia and normative populations (e.g., Kring, Kerr, & Earnst, 1999; Kring, Kerr, Smith, & Neale, 1993; Kring & Neale, 1996). The negative film clip is a 5-minute film clip that is designed to elicit sadness. It is a short clip from a full length cheerless movie in which two young boys lose their mother to an illness (Kring, Kerr, Smith & Neal, 1993). The socially affiliative film clip (Leung, 2006; Morrone-Strupinsky & Depue, 2004) portrayed the development of a close mate relationship (without sex scenes) as they encounter struggles and joys while they are expecting their first child. This film clip is about 5 minutes in length and has been empirically demonstrated to tap social affiliation (Morrone-Strupinsky & Depue, 2004).

There are several ways in which to present affiliative stimuli however, a film clip has particular advantages when working with a socially anhedonic group. First, it standardizes the social stimuli by having a structured environment, and identical presentation. This may not be the case in a laboratory based social interaction. Simulated lab based social interactions can be conducted using role playing and a live confederate

(Sayers, Bellack, Wade, Bennett, & Fong, 1995) or with an interactive previously recorded confederate (Gangestad, Simpson, Cousins, Gurver-Apgar, & Christensen, 2004; Simpson, Gangestad, Christensen, & Leck, 1999). Interaction with a confederate live or videotaped may be confounded by a multitude of variables such as the confederates' gender (Carli, LaFleur, & Loeber, 1995; Patterson, & Tubbs, 2005). Second, artificial social interactions in a laboratory setting can be seen as unpleasant and stress inducing by some participants (Horan, & Blanchard, 2003). Lastly, naturally occurring social interactions such as the experience sampling method (Myin-Greemey, Delespaul, & DeVries, 2000; Myin-Greemey, Krabbendam, Delespaul, & Van Os 2003), where participants are asked to document daily events and self-evaluated mood states at random intervals also have limitations with a socially anhedonic sample. The major disadvantage in attempting to measure emotional experience in a naturally occurring setting with social anhedonics is their lack of interest or pleasure derived from social interactions. When compared to controls social anhedonics have fewer friends (Mishlove & Chapman, 1985) and fewer interpersonal relationships (Kwapil, 1998), therefore it is likely that these individuals will have a limited number of social interactions throughout the day. Given the limitations of other forms of social stimuli and the special characteristic of this proposed sample, a film stimulus was chosen to elicit positive and negative emotions as well as affiliation.

Self-reported Emotional Experience

Immediately following each film clip, subjects completed a measure of emotional experience based on the circumplex model of emotion (Larsen & Diener, 1992; see

Appendix J). The scale was designed to measure levels of pleasantness or state PA, unpleasantness or state NA, and affiliation. For this study a sample of 15 items were chosen for inclusion in the measure of emotional experience. A 5-item PA scale, which consists of items tapping pleasant affect and a 5-item NA scale consists of items reflecting unpleasant affect were chosen. The adjectives were picked for inclusion in the scale based on the pleasantness-unpleasantness poles of the two-factor structure of affect presented in Watson and Tellegen (1985). The 5-item affiliation scale consists of items tapping into pleasant affect based on the circumplex model of emotion (Larsen & Diener, 1992) as well as factor analytical studies focused on the structure of affective responding. Specifically adjectives were chosen from the categories of “friendliness” (Zevon, & Tellegen, 1982), sociability (Watson, & Tellegen, 1985), and affiliation (Watson, & Clark, 1997) in addition to the two adjectives used in Lueng’s (2006) original study. The complete scale is a 15-item self-report questionnaire on a 5-point scale (very slightly or not at all, to extremely) where participants are asked to rate the extent to which they are experiencing each of the affective terms at the present moment.

Procedure

Once the participants were selected (see *Participants* section), they were contacted via campus phone and email, and asked to come into the laboratory for a full assessment. Upon arrival informed consent was obtained from each participant (See Appendix D). They were informed as to the general purpose of the study and the procedures that they were taking part in. Participants were also informed of their rights and given the opportunity to terminate participation in the study if so desired.

Once consent was obtained, the participants were interviewed using the SCID (First et al., 1996) module A (Mood Disorders) and B (Psychotic Symptoms; See Appendix K). The paranoid, schizoid, and schizotypal personality disorder portions of the International Personality Disorder Examination (Loranger et al., 1995) were also administered during the interview. Finally, the Berkeley Expressivity Questionnaire was administered to each participant.

After the completion of the above tasks, participants were asked to complete a measure of trait affectivity (GTS; See Appendix H) as well as a baseline assessment of state affectivity (See Appendix J). They were then presented with a brief introduction to the first film followed by the film on a 27" color TV monitor. At the completion of the film the participant will again be asked to complete a measure of state affectivity. The participants were then asked to take a 5-minute break. This procedure was repeated four times until all the films have been presented and state affectivity has been measured for each film clip. During each viewing, participants' facial responses were also being videotaped by a concealed camera for later coding (described in *Measures* section). Upon completion of all tasks participants were compensated with \$40 for their participation.

Results

OVERVIEW

Statistical analyses were conducted in several stages. First, group differences in lifetime and current diagnosis of depression and schizophrenia spectrum disorders were examined. Analysis then examined group differences in trait affect and self-reported emotional expressivity. Third, repeated measures analyses were performed to examine whether there were emotional deficits in the experience of emotion within social anhedonics across the film stimuli, as compared to controls. Next, repeated measures analyses were performed to examine whether there were any group differences in behavioral ratings of facial expressions across the different film stimuli. Finally, correlational analyses between behavioral ratings of facial expressions and self-reported emotional expressivity were examined among both social anhedonics and controls.

DEMOGRAPHICS

Table 1 displays the group distributions of race, sex, and academic year. Chi Square analysis indicated no group differences in race ($X^2(2, N=68) = 3.22, p > .05$), sex ($X^2(1, N=68) = .541, p > .05$), or education ($X^2(3, N=68) = 4.08, p > .05$). The mean score on The Revised Social Anhedonia Scale for the control group was 5.79 (SD= 2.89) and for the social anhedonia group was 20.17 (SD= 4.82).

Clinical Characteristics

Descriptive data on clinical characteristics including diagnoses, symptoms, and functioning can be found in Table 2. Chi-Square analysis revealed no group differences

in rates of lifetime reports of major depression diagnosis ($X^2(1, N=68) = 2.35, p < .05$). Of note however are the differences in rates of lifetime depression across groups. Over two times as many (28%) social anhedonics have had a major depressive episode compared to rates in the control group (13%). Self-reported current depressive symptoms reported in the BDI further support this non-statistically significant trend. More current depressive symptoms were reported by anhedonics compared to controls ($t [66] = 2.30, p < .05$). Scores for both groups however, fell within the “minimal depression” range of the BDI-II (Beck, Steer, Ball, & Ranieri, 1996). (Additionally, The BDI was found to be internally consistent ($\alpha = .92$) across both groups.)

No participants met DSM criteria for schizotypal, schizoid or paranoid personality disorder. T-tests were conducted on dimensional scores for these personality disorders to determine if there were elevations of characteristics in these spectrum disorders. T-tests indicated that social anhedonics and controls did not differ in dimensional scores of schizotypal ($t [65] = 1.52, p > .05$), schizoid ($t [65] = 1.68, p > .05$), or paranoid ($t [65] = 1.31, p > .05$) personality disorder characteristics. Effect sizes for schizotypal ($d = .02$) and paranoid ($d = .10$) personality disorder characteristics were very small while the effect size for schizoid characteristics was somewhat larger ($d = .32$), falling between a “small” and “medium” effect size as defined by Cohen (1992).

Treatment history for psychological problems was examined in both groups. There were no group differences in prior outpatient treatment, $X^2(1, N=68) = 3.24, p > .05$, nor were there group differences in the use of pharmacological treatment of psychological disorders $X^2(1, N=68) = 1.62, p > .05$.

T-tests were used to examine group differences in functioning of social

anhedonics and controls. With regard to overall functioning, social anhedonics had lower ratings on the GAF than did controls, $t(66) = -3.68, p < .01$. Compared to controls, social anhedonics were also rated as having poorer social functioning on the SOFA, $t(66) = -3.70, p < .01$,

In summary, compared to controls, participants in the social anhedonia group reported elevations in current depressed mood as well as poorer functioning. However, there were no group differences in current diagnoses of depression. Contrary to expectations, there were no group differences in schizophrenia-spectrum personality disorders or in dimensional ratings of these disorders (though the effect size of schizoid personality disorder characteristics was notable, $d = .32$).

TRAIT AND STATE AFFECTIVITY

Note

At the inception of this study, measures of trait affectivity and state affectivity were not completed by 12 participants (6 anhedonics and 6 controls). For the analysis presented in this section as well as “self-reported emotional experience” a sample size of 56 was used, which included 23 anhedonics and 33 controls. This decrease in sample size decreased the power of the analysis to .44.

Trait Affect

Descriptive statistics for trait and state mood measures are presented in Table 3. The GTS trait scales of positive and negative temperament were each found to be internally consistent with alphas of .85 and .84 respectively. T-tests indicated that, compared to controls social anhedonics reported lower trait positive affect ($t[54] = -2.22$,

$p < .05$) as well as higher trait negative affect ($t [54] = 3.10, p < .05$). These results indicate that while social anhedonics are characterized by a general dispositional tendency to experience lower positive emotions as compared to controls, social anhedonics have a *higher* general dispositional tendency to experience negative emotions.

Group differences were examined for self-report ratings of baseline positive, negative, and warm and affectionate mood as assessed upon arrival to the laboratory and each subscale had adequate alphas ($\alpha = .92; \alpha = .84; \alpha = .94$). There were no group differences in state PA ($t [54] = -.73, p > .05$), state NA ($t [54] = -.08, p > .05$), or warmth and affection ($t [54] = -.27, p > .05$). These results indicate that although social anhedonics reported trait differences in affectivity, social anhedonics did not differ from controls in their reports of emotional experience at the time of the current experiment.

SELF-REPORT INDICES OF EMOTIONAL EXPRESSIVITY

Group Comparison of Expressivity

Group comparisons in the self-reported disposition to express emotion were examined using the three subscales of the BEQ. Descriptive statistics are presented in Table 4. The two groups did not differ in scores of positive expressivity ($t [66] = -.44, p > .05$), negative expressivity ($t [66] = -1.04, p > .05$) or impulse strength ($t [66] = -.31, p > .05$). Contrary to expectations, these results indicated that there were no differences in self-reported dispositions to express emotion in social anhedonics and controls. Intercorrelations and Chronbach's alpha for the BEQ scales are presented in Table 5. As can be seen all three subscales had adequate internal consistency. All three subscales

were also intercorrelated to varying degrees with r 's ranging from .34 to .70.

SELF-REPORTED EMOTIONAL EXPERIENCE

Film Responding

Due to methodological changes described above, this analysis includes only 56 participants. Descriptive statistics and alphas for self-reported mood following the film clips are presented in Table 6. In order to assess the ability of the film stimuli to elicit affect, two (group: social anhedonics vs. controls) x four (film condition: neutral-comedy-affiliative-sad) x two (gender) repeated measures ANOVAs were conducted separately for positive emotion, negative emotion, and warmth and affection.

For state positive emotion, the repeated measures ANOVA showed a significant main effect for film condition ($F [3, 49] = 8.41, p < .01$), but no significant main effect for group ($F [1, 49] = 1.64, p > .05$) or gender ($F [1, 49] = .633, p > .05$). There were no significant interactions between film, group, or gender (all p 's $> .05$). Differences in state PA are illustrated in Figure 1. Posthoc pairwise comparisons indicated that, subjects reported significantly higher levels of state PA during the comedy film clip and the affiliative film as compared to the sad film ($p < .05$). Compared to the neutral film, subjects reported significantly lower levels of state PA during both the sad film clip ($p < .05$). Pairwise comparisons indicated that there were no differences in positive emotional experience between the neutral and positive clip ($p > .05$), or the neutral and the affiliative clip ($p > .05$). Furthermore, there were no differences in self-reports of positive affect when the positive comedy clip was compared to the affiliative clip ($p > .05$), or the neutral film clip ($p > .05$). These results indicate that the sad film clip significantly

reduced positive affect when compared to the neutral clip and that the other clips did not differ in regards to state positive affectivity. The findings specifically, the lack of affect the positive film clip had on state positive affect is quite puzzling. It is possible that the lack of sensitivity in the abbreviated measure of state affect failed to capture the full topography of positive affectivity.

For state negative affect, there was a significant main effect for film condition ($F [3, 49] = 10.03, p < .01$), but the main effect for group ($F [1, 49] = .502, p > .05$) and gender were non-significant ($F [1, 49] = 1.39, p > .05$). There were no significant interactions between film, group, or gender (all p 's $> .05$). Posthoc pairwise comparisons showed that, as compared to the neutral film, subjects reported significantly lower levels of negative affect during both the comedy ($p < .01$) and affiliative ($p < .01$) films. Additionally, subjects reported greater negative affect when watching the sad film clip as compared to the neutral clip ($p < .01$), the comedy clip ($p < .01$), and the affiliative clip ($p < .01$). Differences in self-reported negative affect also did not differ after the affiliative clip as compared to the comedy clip ($p > .05$). These results indicate that the sad film clip produced significantly greater negative affect when compared to all other film clips. The affiliation and comedy clips also produced less state negative affect than did the neutral clip. Differences in state negative affect are illustrated in Figure 2.

For warmth and affectionate ratings in response to the films, there was a significant main effect for film condition ($F [3, 49] = 2.82, p < .05$), but no significant main effect for group ($F [1, 49] = .80, p > .05$) or main effect for sex ($F [1, 49] = .26, p > .05$). There were no significant interactions between film, group, or gender (all p 's $> .05$). Posthoc pairwise comparisons showed that, as compared to the neutral film, subjects

reported higher warmth and affection during the affiliative film ($p < .01$). Participants also reported higher warmth and affection during the affiliative film as compared to the sad film clip ($p < .01$). The affiliative clip was not different from the comedy clip in terms of self-reported warmth and affection ($p > .05$). Also with regard to warmth and affection no differences were found when the neutral clip was compared to the comedy clip ($p > .05$), or the sad clip ($p > .05$). Finally, the comedy clip and the sad clip did not differ from each other in experience of warmth and affection ($p > .05$). These findings indicate that although social anhedonics and controls did not report differences in the level of warmth and affection experienced across the film conditions, the affiliative film did produce a significant increase in affiliative state for both groups of subjects, as compared to the neutral and sad film. Differences in self rated warmth and affection are illustrated in Figure 3.

Emotional Expression

Equipment errors with the digital recording resulted in unrecorded digital video discs (DVDs) for one control subject. Thus, subsequent facial expressions analyses included 29 social anhedonics and 38 controls. Descriptive statistics for behavioral ratings of facial emotional expression are presented in tables 7 and 8.

Interrater Agreement

Interrater agreement for FACES ratings was calculated using an intra-class correlation. The agreement between the two raters was calculated across subjects for each of the three separate behavioral components (frequency, duration and intensity). ICCs for

rater agreement ranged from .82 to 1.00, indicating excellent agreement between raters (see Table 9), with the exception of the ICC for mean intensity of positive emotion (ICC = .63).

Intercorrelations among FACES Variables

In order to assess the interrelationships between the individual FACES variables, correlations for frequency, mean duration, and mean intensity were computed separately for social anhedonics and controls and were further divided between positive and negative expression (see Tables 10 & 11). Correlations for the individual positive variables in the neutral, positive, affiliative, and sad films all achieved significant levels, ranging from .45 to .99 for the social anhedonics and .36 to .94 for the controls. Correlations for the individual negative variables ranged from .57 to .95 for the social anhedonics and all reached statistical significance. With the exception of the relationship between negative expressions intensity and negative expression duration in the positive film clip ($r = .18, p > .05$) the negative variables were also all correlated within the control group ranging from .32 to .94. Overall these correlations indicate that in the current study, the domains of emotional expression were correlated with each other within each valence.

Expressions of Emotion in Response to Film Conditions

Positive Expressions

A two (group: social anhedonics vs. controls) x four (film condition: neutral-comedy-affiliative-sad) x two (gender) repeated measures ANOVA was conducted separately for frequency, duration and intensity to assess differences in facial expressivity

between social anhedonics and controls in response to each of the three film conditions. For the number of positive expressions displayed (i.e., frequency count), results showed a significant main effect for film condition ($F [3, 61] = 39.33, p < .01$), but no main effect for group ($F [1, 61] = 1.18, p > .05$) or gender ($F [1, 61] = 1.32, p > .05$). There were no significant interactions between film, group, or gender (all p 's $> .05$). To examine main effect for film, posthoc analyses showed that, as compared to the neutral ($p < .01$), affiliative ($p < .01$) and sad films ($p < .01$) subjects displayed the greatest number of positive facial expressions during the comedy film. The number of positive facial expressions displayed during the affiliative film, was greater than the neutral film ($p < .01$). There were no differences in the number of positive expressions during the neutral clip as compared to the sad clip ($p > .05$). There were also no differences in the number of positive emotions when the sad clip was compared to the affiliative clip ($p > .05$). These results indicate that the comedy clip yielded the highest number of positive emotional expressions when compared to all the other film clips. Although the affiliation clip resulted in more positive facial displays than the neutral clip, there were no differences between the affiliative and sad clip. This later finding might reflect the blend of emotions in the sad clip (an issue to be expanded upon in the discussion section below).

For the mean duration of positive expressions displayed, there was a significant main effect for film condition ($F [3, 61] = 15.19, p < .01$), but the main effect for group ($F [1, 61] = 1.00, p > .05$) and gender ($F [1, 61] = .789, p > .05$) were not significant. There were no significant interactions between film, group, or gender (all p 's $> .05$). Posthoc analyses indicated that subjects displayed longer duration of positive facial expression during the comedy clip compared to the neutral film clip ($p < .01$), the sad film

clip ($p < .01$) and the affiliative film clip ($p < .01$). There were no differences in the duration of positive expressions when the neutral clip was compared to affiliative clip ($p > .05$) or the sad clip ($p > .05$). There were also no differences in the duration of positive emotions when the sad clip was compared to the affiliative clip ($p > .05$). These results suggest that across the groups, subjects tended to display positive facial expressions that were longer in duration during the comedy film followed by the affiliative, the sad film clip and then the neutral film.

With regard to the mean intensity of positive expressions displayed, there was a significant main effect for the film condition ($F [3, 61] = 64.53, p < .01$), but the main effect for group ($F [1, 61] = 2.73, p > .05$) and for gender ($F [1, 61] = .873, p > .05$) were not significant. There were no significant interactions between film, group, or gender (all p 's $> .05$). Posthoc analyses conducted to explore the main effect of film, showed that compared to the neutral film clip the intensity of positive emotion was higher in the affiliative film ($p < .01$), comedy film clip ($p < .01$), and the sad film clip ($p < .01$). The post hoc analysis did not however indicate differences in the comedy film clip and the sad ($p > .05$) or affiliative film clip ($p > .05$). Additionally the affiliative clip and the sad clip also did not differ from each other in terms of the intensity of positive emotion ($p > .05$). These results indicate that both positive clips (the comedy and affiliative clips) were able to increase the intensity of positive emotion expressed when compared to the neutral clip.

In order to examine if the patterns exhibited above were also seen within the subsample of participants who completed both trait measures along with behavioral measures of all analysis was run again. The same patterns were found. Regarding the

number of positive emotional expression there was a main effect for film ($F [3, 49] = .36.95, p < .05$) but no main effect for group, gender or significant interactions (all p 's $> .05$). This was also true for the duration of positive expression ($F [3, 49] = 15.19, p < .05$) and for the intensity of positive emotion ($F [3, 49] = 64.87, p < .05$).

Negative Expressions

For the number of negative expressions displayed, results showed a significant main effect for film condition ($F [3, 61] = 15.33, p < .01$), but no main effect for group ($F [1, 61] = .49, p > .05$) or gender ($F [1, 61] = 2.33, p > .05$). There were no significant interactions between film, group, or gender (all p 's $> .05$). Posthoc analyses also showed that, as compared to both the neutral ($p < .01$), and affiliative ($p < .05$) films, subjects displayed the greatest number of negative facial expressions during the sad film. The number of negative expressions however, did not differ between the sad clip and the comedy film clip ($p > .05$). The number of negative facial expressions displayed during the neutral film was greater than the affiliative film ($p < .01$) and the comedy film ($p < .01$). The number of negative emotions also did not differ between the comedy clip and the affiliative clip ($p > .05$). These results indicate that the sad clip was able to produce the highest number of negative emotional expressions when compared to both the affiliative and neutral clips. The finding that the number of negative expressions in the sad clip did not differ from the number of negative emotions in comedy clip was not entirely surprising given the low rates of negative emotional expression across all films.

For the mean duration of negative expressions displayed, there was a significant main effect for film condition ($F [3, 61] = 4.72, p < .01$), but the main effect for group (F

[1, 61] = .64, $p > .05$) and gender ($F [1, 61] = 1.97, p > .05$) were not significant. There were no significant interactions between film, group, or gender (all p 's $> .05$). Posthoc analyses indicated that subjects displayed longer duration of negative facial expression during the sad clip compared to the neutral film clip ($p < .01$), the comedy film clip ($p < .05$) and the affiliative film clip ($p < .01$). Additionally, the results indicated that the display of negative facial expressions was longer during the neutral film clip compared to the comedy clip ($p < .05$) and the affiliative clip ($p < .01$). There was no difference in the duration of negative emotional displays when the comedy and the affiliative clip were compared to each other ($p > .05$). These results suggest that, of all four films, subjects tended to display negative facial expressions that were longer in duration during the sad film followed by the comedy, affiliative, and finally the neutral film, though there were no group differences between social anhedonics and controls in the duration of negative expressions across the film conditions.

With regard to the mean intensity of negative expressions displayed, there was a significant main effect for the film condition ($F [3, 61] = 12.05, p < .01$), but the main effect for group ($F [1, 61] = .86, p > .05$) and gender ($F [1, 61] = 2.15, p > .05$) were not significant. There were no significant interactions between film, group, or gender (all p 's $> .05$). Posthoc analyses showed that the intensity of negative emotions during the neutral film clip were higher than the affiliative film ($p < .01$), and the comedy film clip ($p < .01$). The neutral clip was surpassed in the intensity of negative expressions by the sad film clip ($p < .01$). The sad film clip however was no different in terms of intensity of negative emotion when compared to comedy clip ($p > .05$) or the affiliative clip ($p > .05$). Lastly, the comedy clip and the affiliative did not differ from each other in this facet of

negative emotional expressivity ($p > .05$). These results indicate that although the level of intensity of negative expressions was not significantly different between the two groups, the sad film was able to elicit more intense negative expressions compared to the neutral clip but not compared to the comedy or affiliative clip.

In order to examine if the patterns exhibited above were also seen within the subsample of participants who completed both trait measures along with behavioral measures of all analysis was run again. The same patterns were found. Regarding the number of negative emotional expression there was a main effect for film ($F [3, 49] = 12.72, p < .05$) but no main effect for group, gender or significant interactions (all p 's $> .05$). This was also true for the duration of negative expression ($F [3, 49] = 3.90, p < .05$). For the intensity of positive emotion there was a main effect for film ($F [3, 49] = 9.25, p < .05$) as well as a film by sex interaction ($F [3, 49] = 3.72, p < .05$).

In summary, findings from the present study indicate that social anhedonics and controls do not differ with regards to expressed facial emotions. However, results demonstrate that subjects expressed more positive facial expression (in frequency, duration and intensity) during the comedy film. Subjects expressed increased negative emotion to the sad film clip but also displayed more negative emotion to the neutral film clip when compared to the comedy and affiliative film clip.

OBSERVED AND SELF-REPORTED EXPRESSION OF EMOTION

The relationship between behavioral coding of facial affect and self-reported expressivity was examined further. Zero-order correlations were carried out separately for each group to assess whether FACES scores were related to self-reported general

disposition to express emotion (see Table 12). In order to reduce the number of variables entered into the analysis, frequency, duration, and intensity were each summed across the four film conditions to yield one total composite score for each domain of expression. Given that both positive and negative facial expressions were examined in response to all film stimuli, the following correlation analysis included the BEQ positive and negative expressivity subscale and each subscale was compared to the congruent FACES subscales (i.e. BEQ positive subscale was correlated to FACES positive duration, intensity and frequency).

Within both the anhedonic group and control group the BEQ Positive Expressivity score was not statistically significantly correlated with any behavioral measure of positive emotional expression (see Table 12). The BEQ Negative Expressivity subscale was also not correlated to the behavioral measures of negative emotional expression, within each group (see Table 12). These findings indicate that within both social anhedonics and controls self-reported measures of positive and negative emotion were not statistically significantly related to behavioral measures of positive and negative emotional expression. Given the lack of group differences, and in an attempt to increase power, analyses were replicated collapsing across the two groups. This did not alter the lack of correlations as seen in Table 13.

Exploratory Analysis

Although the study's primary *a priori* hypotheses were addressed in the above analyses, supplementary data analysis was conducted to more fully explore the data set. Overall we sought to examine associations between dispositional individual differences in affect and domains of emotional responding, social functioning, and symptomatology.

Traits and Emotional Responding: As a first step, the present data permit for an examination of the relationship between trait affectivity and emotional responding to affect eliciting stimuli. Specifically, do individual differences in trait affect predict emotional responding within a laboratory context. In a series of studies and a meta-analysis Lucas and Baird (2004) found that individuals high in trait positive affect were also more likely to report more positive experiences (namely happiness) when presented with neutral stimuli. This was not the case when participants were presented with positive affect eliciting stimuli. It was reported that only a slight difference in emotional reaction to pleasant stimuli was reported when comparing individuals high in positive affect to those with less positive affect (Lucas & Baird, 2004). In order to investigate if similar patterns were seen in the current sample the relationship between trait affectivity and baseline emotional experience was investigated. Furthermore, in order to explore the role of trait affectivity in emotional experience as a result of affect eliciting stimuli, the relationship between trait affectivity and emotional experience after each affect eliciting film was examined. In order to increase power the following analysis were conducted on the total sample.

In order to investigate if participants' trait affectivity (as measured by the GTS) was related to baseline mood, correlational analyses were conducted. Results indicated that trait positive affect was not related to positive emotion experienced at baseline before the start of the laboratory portion of the study ($r = -.03, p > .05$). However, trait negative affect was significantly related to the participants' negative mood at baseline ($r = .39, p < .01$) such that higher trait NA was related to higher baseline negative mood.

The analysis then progressed to investigate if trait affectivity was predictive of emotional experiences to emotionally evocative stimuli. The analysis began by investigating the neutral film clip, as the neutral film clip is purported to not alter affect. Consistent with the findings at baseline, negative emotional experience following the neutral film clip was correlated with trait negative affect ($r = .31, p < .05$) such that individuals with a higher tendency to experience negative emotion also experienced more negative emotion after viewing the neutral stimulus. Trait positive emotion was found to be unrelated to positive emotional experience following the film ($r = -.03, p > .05$). Correlational analysis then progressed to examine whether trait positive and negative affect were related to self-reports of emotional experience when exposed to the affect eliciting stimuli (sad, comedy, and affiliative film clips). None of the correlations reached statistical significance with the exception of state negative affect following the affiliative clip (see Table 14). With regard to mood following the affiliative clip, trait negative affect was significantly correlated with negative mood after this movie ($r = .32, p < .05$).

To further investigate this relationship the group was separated by sex to see if the content of the film may have elicited different responses. Since the film had only been validated for use with female participants yet no main effect was found for sex in emotional responding, group differences by sex were not expected. Interestingly, when the sample was divided by sex there was a striking difference between the groups. Within male participants trait negative affect was strongly correlated with negative mood following the affiliative clip ($r = .61, p < .01$). This relationship was not seen within the females of the sample ($r = -.19, p > .05$). Finally, to understand if the affective state the participants were in at baseline contributed to the relationship found between trait

negative affect and state negative affect following the affiliative clip, baseline negative affect was controlled for. When this was done the relationship was no longer statistically significant ($r = .09, p > .05$).

Traits and Social Functioning: Greater trait positive affectivity has also been associated with many aspects of functioning including better overall quality of life (Fredrickson, 2006). Alternatively, greater negative affectivity has been associated with increased pathology including increased levels of depression (Watson & Walker, 1996) and poorer psychological functioning (Dua, 1993). In the current sample the relationship between trait affectivity and general functioning was analyzed by investigating the relationship between trait affectivity and ratings from the GAF and SOFA. Additionally, the relationship between trait affectivity and pathological symptomatology was investigated.

In the social anhedonia group, trait positive affect was positively correlated with the GAF ($r = .43, p < .05$) but not the SOFA ($r = .40, p > .05$). After controlling for trait negative affect, the significant relationship positive affect and the GAF disappeared ($r = .39, p > .05$). These results indicate that trait negative affect accounts for the significant amount of variance found in the GAF within the social anhedonia group. Also within the anhedonia group, trait negative affect does not have a statistically significant relationship with the GAF ($r = -.32, p > .05$) or the SOFA ($r = -.27, p > .05$). Interestingly within the control group both trait positive and trait negative affect fail to have a statistically significant relationship with the GAF or the SOFA ($p > .05$; See Table **). Given the lack of power when investigating within group relationships, the analysis was completed using the entire sample.

In the total sample, trait positive affect was positively correlated with the GAF ($r = .41, p < .01$) as well as the SOFA ($r = .40, p < .01$). This relationship held even after trait negative affect was controlled for ($r = .29, p < .05$; $r = .28, p < .05$). Trait negative affect was negatively related to both the GAF ($r = -.41, p < .01$) and the SOFA ($r = -.40, p < .01$). This relationship held even after trait positive affect was controlled for ($r = -.29, p < .05$; $r = -.28, p < .05$). As expected greater trait positive affect was related to better functioning in multiple domains while greater trait negative affect was related to poorer functioning. The fact that these relationships held even after controlling for the opposite valenced trait affectivity indicated that each trait is uniquely contributing to the relationship between trait affect and functioning.

Traits and Symptomatology

With regards to spectrum personality disorder characteristics, each group was investigated independently. In the social anhedonia group, trait negative affect and trait positive affect were not related to schizotypal ($r = .23, p > .05$; $r = -.10, p > .05$), schizoid ($r = .19, p > .05$; $r = .01, p > .05$), or paranoid personality disorder characteristics ($r = .10, p > .05$; $r = -.31, p > .05$). Dimensional ratings of depressive symptoms however were correlated with trait negative affect ($r = .76, p < .01$) but were unrelated to trait positive affect ($r = -.24, p > .05$). Finally the BDI was negatively correlated with the GAF ($r = -.37, p < .05$) but not statistically significantly related to the SOFA ($r = -.31, p > .05$).

In the control group, trait negative affect and trait positive affect were not related to schizotypal ($r = -.15, p > .05$; $r = .30, p > .05$), schizoid ($r = -.23, p > .05$; $r = .05, p > .05$), or paranoid personality disorder characteristics ($r = -.13, p > .05$; $r = -.02, p > .05$). Dimensional ratings of depressive symptoms however were correlated with both trait negative affect ($r = .64, p < .01$) and trait positive affect ($r = -.35, p < .05$). Finally, in the control group, the BDI was not correlated with the GAF ($r = -.13, p > .05$) or the SOFA ($r = -.14, p > .05$). Again given the limited group sizes the analysis moved to investigate clinical characteristics in the total sample.

In the total sample, trait negative affect and trait positive affect were not related to schizotypal ($r = -.05, p > .05$; $r = .15, p > .05$), schizoid ($r = .01, p > .05$; $r = .19, p > .05$), or paranoid personality disorder characteristics ($r = .05, p > .05$; $r = -.02, p > .05$). Dimensional ratings of depressive symptoms however were correlated with trait affect. Trait positive affectivity was inversely related to reports of depressive symptomatology ($r = -.40, p < .01$). Self-reports of trait negative affectivity were highly related to greater depressive symptomatology ($r = .72, p < .01$). Finally the BDI was also negatively correlated with the GAF ($r = -.37, p < .01$) and the SOFA ($r = -.33, p < .01$). Total sample findings indicate that neither trait negative or trait positive affect was related to dimensional ratings of schizophrenia spectrum personality disorders. Trait affectivity was related however, to reports of current depressive symptomatology such that trait negative affect was related to more current depressive symptoms while trait positive affect had the opposite relationship with depressive symptoms.

Discussion

This study sought to investigate the affective correlates of social anhedonia by examining the experience and expression of emotion in individuals believed to be at heightened risk for developing schizophrenia-spectrum disorders (social anhedonics). The current study design extends prior laboratory research with the use of a novel social affiliative film stimulus to examine affective reactions associated with social anhedonia, the assessment of schizophrenia-spectrum psychopathology, and the study of both men and women. It was hypothesized that, compared to controls, social anhedonics would demonstrate greater symptoms of psychopathology (in particular, schizophrenia-spectrum personality disorder characteristics). With regard to emotion, it was predicted that social anhedonics would report diminished trait positive affect and greater trait negative affect, in comparison to controls. It also was hypothesized that, compared to controls, social anhedonics would report attenuated state positive affect and warmth-affection ratings in response to an affiliative film, and have greater negative affect in response to negative mood-inducing films. With regard to facial expression, it was hypothesized that social anhedonics would self-report less emotional expressivity and display fewer positive facial expressions across the film stimuli (based on behavioral coding), as compared to controls.

With regard to psychopathology, participants were assessed for schizoid, schizotypal, and paranoid personality disorders. There were no group differences in personality disorder diagnoses or in dimensional scores of personality disorder characteristics. This was an unexpected finding and the data failed to support the hypothesis that social anhedonics would evidence greater schizophrenia-spectrum characteristics. Prior studies have consistently found elevated dimensional scores of

schizoid, schizotypal, and paranoid personality disorder characteristics in social anhedonics (e.g., Gooding, Tallent & Matts, 2007; Horan, Brown & Blanchard, 2007). Consequently the current findings were unexpected and somewhat puzzling. It is possible that the limited sample size made it difficult to detect group differences in a variable that tends to have a restricted range in college samples. Power analyses of group differences suggested small effect sizes for paranoid and schizotypal personality disorder characteristics ($d < .11$). However the effect size for schizoid characteristics was more sizable ($d = .32$) and suggests that the current study may have been underpowered to detect this effect.

Diagnostic interviews also revealed no group differences in lifetime rates of depression disorders. However, there was a trend for social anhedonics to have had higher rates of depressed episodes (27.5%) than controls (12.8%) and social anhedonics reported significantly greater current depressive mood than controls on the BDI. Prior college studies have reported mixed results concerning depression and social anhedonia. Kwapil (1998) found more severe depressive symptoms in socially anhedonic participants compared to controls during an initial baseline assessment (Kwapil, 1998), while another study failed to find differences between a social anhedonia group and a control group in history of depression (Mishlove & Chapman, 1985). A recent study of social anhedonia in community participants has found elevations in lifetime mood disorders of depression and dysthymia, 31.4% versus 9% in control participants (Blanchard et al., 2009). In sum, the elevated depressed mood and trend for episodes of depression in social anhedonia suggests at least a modest link between depression and hedonic capacity.

There are at least two interpretations of the findings relating social anhedonia and depression. First, anhedonia in some individuals may be the reflection of current depressed mood rather schizophrenia-spectrum liability, referred to as “secondary anhedonia” by Meehl (2001). Anhedonia is part of the DSM criteria for depression and cross-sectional studies have found that depressed individuals score high on the social anhedonia scale (Berenbaum & Oltmanns, 1992; Katsanis et al., 1990; Blanchard et al., 1994). Second, this interpretation of depression as purely a nuisance characteristic in the study of schizotypy is problematic. Depression and other affective symptomatology are frequent in high-risk samples and in the prodrome of schizophrenia (e.g., Lencz, Smith, Auther, Correll, & Cornblatt, 2004; Owens, Miller, Lawrie, & Johnstone, 2005), and adolescent Axis I disorders have been shown to be predictive of schizophrenia-spectrum personality disorders in adulthood (Cohen, Crawford, Johnson, & Kasen, 2005). The current findings do demonstrate the importance of assessing depression in studies of depression and emphasizes the need for longitudinal studies to examine the role of depression in the temporal unfolding of schizophrenia-spectrum characteristics.

Longitudinal studies may also benefit from assessing social anhedonia at different points throughout the study. Although the studies have found the stability of social anhedonia over a 90-day period (Blanchard et al., 1998) and a one year period (Blanchard et al., 2001) few studies using the extreme groups design have administered the RSAS at more than one point. The current standard is a single administration at the beginning of the study and it does not take into account that for some social anhedonia is more trait-like while for others it indicates a more stable trait measure.

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Although there were no group differences in psychopathology, social anhedonics were found to have lower functioning as compared to controls. Social anhedonics were rated lower on the GAF, a broad assessment of functioning, as well as the SOFA, a measure specific to social functioning. These findings replicate prior reports indicating that social anhedonics have fewer friends (Mishlove & Chapman, 1985) and fewer interpersonal relationships (Kwapil, 1998). The interpersonal relationships held by social anhedonics are also reported to be less satisfying than those of controls (Kwapil, 1998). Studies have also shown social anhedonics to have poorer overall social adjustment (Carreno, 2006; Mishlove & Chapman, 1985; Kwapil, 1998). Finally, marriage rates are statistically lower for social anhedonics than controls (Kwapil, 1998). The current study supports past findings that social anhedonics experience more functional difficulty than controls.

Turning to trait characteristics, as hypothesized, social anhedonia participants reported significantly elevated trait NA and significantly lower trait PA compared to controls. The finding of elevated NA is consistent with findings of increased trait NA/Neuroticism in schizophrenia (Blanchard et al., 2001; Blanchard et al., 1998), schizotypal personality disorder (Morey et al., 2002; Morey et al., 2003), and studies of social anhedonia within college students (Horan et al., 2007; Gooding et al., 2002; Gooding & Tallent, 2003). Similarly, diminished PA in social anhedonia participants fits with findings of low trait PA/Extraversion in schizophrenia (Blanchard et al., 2001; Blanchard et al., 1998), schizotypal personality disorder (Morey et al., 2002; Morey et al., 2003), and in college studies of social anhedonia (Gooding et al., 2002; Gooding & Tallent, 2003). Importantly, it should be noted that this pattern of trait affectivity is not

unique to schizophrenia, or related spectrum personality disorders, and has been identified in Axis I disorders such as depression (Clark, Watson, & Mineka, 1994; Morey et al., 2003; Watson, Gamez, & Simms, 2005) and social anxiety (Clark et al., 1994; Watson et al., 2005) as well as in other personality disorders (Morey et al., 2002). Exploratory analysis in the current study examined how traits may be contributing to general functioning. Correlational analysis indicated that trait positive and negative affect are both independently related to overall functioning. Other studies have supported the relationship between low positive affect and different areas of functioning such as increased social isolation (Brown, Silvia, Myin-Germeys & Kwapil, 2007) and the relationship between high negative functioning and greater interpersonal difficulty (Schaefer, 2007). These similar findings of functional difficulties with lower positive and higher negative trait affectivity should not be interpreted as findings resulting from a unitary system of “poor affectivity” but rather a pathological manifestation of two largely independent (Clark & Watson, 1991) affective systems.

In the current sample anhedonics have both higher negative affect and lower positive affect when compared to controls. Watson and Tellegen (1995) have characterized the specific combination of affects to be indicative of depression. Which again brings us to the fact that the anhedonics in the current sample did not meet diagnostic criteria for depression. However, differences in the BDI were found and therefore the relationship between depressive symptoms and trait affectivity were investigated further. Consistent with Watson and colleagues (1995) model of depression higher scores on the self-report measure of depression was related to lower trait positive affect and higher trait negative affect. For the purposes of further exploratory analysis

individuals BDI scores were next compared to the general functioning measures and correlations were also found indicating that participants that reported more depressive symptoms had poor overall functioning. These findings held true even after controlling for lifetime depression. The intercorrelations of these measures were important since they are all consistent with the conceptualization of the constructs. Given the lack of findings in other areas that have been consistently supported, it was an important step in the current study to be sure that the measures used in the current study hung together in a coherent manner.

There were no group differences in state positive or negative affect at baseline. This finding was unexpected given the differences in trait positive and trait negative affect. A likely explanation of the lack of differences may be the current experimental protocol. When subjects for the current study arrived at the laboratory they were asked to complete all self-report measures. They then participated in a diagnostic interview that consisted of a general overview, questions regarding mood disorder symptoms, psychotic disorder symptoms, schizoid characteristics, schizotypal characteristics, and paranoid characteristics. This battery generally took about an hour to complete before the participants were asked to enter a room free from distracters to watch the films. They were also given 5 minutes to settle in to the room prior to completing the questionnaire regarding state affect. It is likely that given the length of time being in an interview room and the lack of stimulation in the film room lead most participants to feel rather neutral at the start of the second half of the protocol.

Emotional experiences reported following the positive affect eliciting film specifically were also surprising. In order to support the notion that the comedy film clip

succeeded at eliciting positive emotion a statistically significant elevation in positive affect should have been reported when compared to the neutral clip. This was not found with the positive film clip. The other film clips however did elicit emotions consistent with the valence of the film. The negative clip was successful at elevating negative affect when compared to the neutral clip. The affiliative clip also elevated warmth and affection compared to the neutral clip. Therefore, faulty manipulations can only account for lack of group findings after the positive film clip. However, there was a lack of group differences in emotional experience regardless of film type.

Trait positive and trait negative affect were found to be unrelated to emotional experience following the affect eliciting film clips. These findings indicate that general predisposition to experience positive or negative emotion did not have an impact on emotional experience following the film clips. This is logical given the statistics that group differences were present in trait affectivity but not in emotional experience. These findings indicate that the sad and affiliative film were successful at eliciting emotions consistent with the valence they purported however, the lack of finding for the positive film clip may be due in part by the inability of the manipulation to elicit positive emotion. Self-reported emotional expressivity failed to differentiate social anhedonics and controls. This finding was consistent with a past study conducted on a college sample using the same recruitment technique and the same measure of emotional expressivity (Carreno, 2006). The finding was inconsistent however, with findings linking social anhedonia and blunted affect. These traits are part of the constellation of symptoms that comprise negative symptoms (Kirkpatrick, Buchanan, McKenny, Alphas, & Carpenter, 1989; Kirkpatrick et al., 2001). It is also inconsistent with Leung's (2006) finding the

anhedonic individuals reported less emotional expression. The BEQ (Gross & John 1995) has been validated by comparing the measure to other self-report measures of emotional expressivity (Emotional Expressivity Questionnaire, Emotional Expressivity Scale; Gross & John, 1998), and peer-reports of emotional expression (Gross & John, 1997). The relationship between behavioral ratings of emotional expression and self reports using the BEQ has also been reported (Gross & John, 1997) but the relationship is weak and correlation coefficients appear similar to those found in the current study.

For behavioral ratings of emotional expression there was a main effect for film consistent with the valence of each film. With regards to emotional expression, the positive film clip and the affiliative film clip produced significant changes in expressions of positive emotion across all domains of positive expressive behavior. The sad film clip also produced the highest level of negative emotional expressions in terms of frequency and duration. It seems puzzling that intensity of negative emotion was highest in the comedy film clip however, a review of the content of the positive film clip may explain some of this finding. The clip is of a man and a woman working on a house that needs a lot of repair. During the clip several things happen that can elicit negative emotion, specifically disgust. Examples of these scenes include a faucet leaking brown muddy water and a raccoon attacking the woman. These scenes could elicit intense negative but brief and infrequent expressions. This is supported by the data indicating that only the intensity of negative emotion was greatest in the comedy clip. The frequency and duration of the negative expressions were greatest during the sad clip as expected.

In addition to examining differences in the experience and expression of emotion, this study investigated the relationship between self-reported emotional expression and

behavioral ratings of emotional expressiveness. It was expected that self-report measures of emotional expression and behavioral codings of emotional expressivity would be correlated with each other. Several studies have shown behavioral rating to be correlated with self-report measures of emotional expressivity (King et al., 1994). But this finding was not replicated by Leung (2006) and it was not replicated in the current study. It is possible that novel situation of being in a laboratory with an experimenter and watching a movie while being filmed is so divergent from everyday situations that a behavioral coding system is unable to capture natural responses. Specifically, having the experimenter in the room for both Leung's (2006) study and the current study may have influenced behavioral expressions of emotion. Also the laboratory paradigm is only able to capture a limited sample of the participants emotional responding and the sample may not be representative of the participant's normative response patterns. A final alternative may be that individuals may not be accurate reporters in their general tendency to express emotions.

Limitations

The largest limitation for this study is the sample size. Recruitment for the current study consisted of four semesters or two years of sampling from psychology 100 courses at the University of Maryland. Student's who choose to, voluntarily completed several questionnaires including the social anhedonia scale. In order to be classified as a socially anhedonic individual an individual needs to score greater than 1.96 standard deviations above the race x sex mean. This ensures that the measure is sensitive to racial and gender differences and allows only extreme scorers to be included in this group. One hurdle that

was encountered was the lack of racial diversity in the sample of completed surveys. It would have meant little to have an extreme score based on a very limited number of people who share your race and gender. Therefore, it was necessary to make an inclusion rule for which races would be included in the current study. Once it was decided that only 3 races would be included in the sample the number of social anhedonics decreased. The decisions that decreased the sample size further limited the power to detect group differences.

The self-report measures of mood used in this study could have been problematic. These measures were based on a circumplex model of emotion however; the individual subscales have not been previously validated. Additionally, the measure of warmth and affection includes adjectives that are not included in the circumplex model of emotion but rather were included in the subscale based on face validity. They are adjectives that encompassed the researchers' perspective of what warmth and affection consist of. Using a validated measure of affective responding could have provided a more complete and accurate assessment of state affect. Measuring warmth and affection in particular was a challenge in the current research. A measure that better captured the complexity of these emotions would have been useful and perhaps more informative than the measure used in this study by more accurately capturing levels of warmth and affection in the participants.

Another limitation of the study involves the clip used to elicit feelings of affiliation. First it has not been validated in its shortened version. Moreover, it has not been validated as an appropriate method to elicit feelings of affiliation in males. Therefore, the inclusion of males in the sample may have restricted our findings namely because we are not certain about the manner in which the affiliative clip was received by

the male participants. The content of the affiliative film clip is of a man and a woman having a child and becoming committed through marriage. It is possible that the age range of the sample and perhaps more so the young male participants did not elicit the level of affiliation needed to identify group differences. Future studies should take care to fully explore the issues of social norms related to age in their quest to manipulate internal affect and external expressions of emotion. The film used in the current study may have simply been a poor choice given the age of the sample and the context of a major state University.

The ability of the comedy film to engender feelings of positive affect may have also been affected by social and contextual issues. The film clip was from a movie filmed over twenty years ago. The clip included instances of mishaps intended to elicit positive emotions commonly known as “slap stick comedy.” The visual quality of the clip at some points is much less visibly believable than more modern films. For example, the clip depicted a raccoon attacking the female character in the clip and clearly used a stuffed raccoon for the scene. It is possible that the sample of young college students have developed a different threshold for changes in internal affective states. This was not seen in behavioral expressions of behavior. It is possible that this form of comedy or this clip in particular continues to elicit expressions of positive emotion does not change internal affective states.

The use of an all college sample also brought with it further limitations. College samples have been shown to be more homogenous than non-college samples (Peterson, 2001). Although this study specifically selected individuals on the extreme of one personality domain, they may not be too different in other areas. In the current sample it

was true of age, clinical characteristics, and attendance at their state's flagship college campus. However, a large number of studies have reported social anhedonia to be a high-risk longitudinal indicator for the later development of schizophrenia spectrum disorders and found positive findings using college students. It is possible that the current groups if followed over time would begin to appear more different from each other than seen here.

Another possible contribution to the lack of findings in the current study may be the presence of the researchers in the room at the time of the film presentation. Having another person in the room can have an effect on external expressions of emotions. This may be particularly true if the researcher is of the opposite sex of the participant. In the study all researchers were female. It may be possible that the inclusion of males in the sample with all female researchers may have had an effect on the results, yielding a lack of findings that were seen in an all female sample.

Finally, this study took great care to exclude individuals who currently met criteria for a major depressive episode, a psychotic disorder or any schizophrenia spectrum disorders. It is possible that by excluding so many disorders we have a sample that is not consistent with how social anhedonia manifests itself in reality. Future studies should consider the amount of external validity their study holds if they choose to exclude disorders that highly co-occur with psychosis proneness.

Future Directions

The findings in this study suggest several areas for further research. The research in the area of emotional expression in socially anhedonic samples is limited. There have been several studies indicating a relationship between social anhedonia and decreased emotional expression. Other studies have examined the relationship between anhedonia

and other characteristics of negative symptom schizophrenia including blunted affect. It may be beneficial to look at the relationships between such variables in a more naturalistic fashion. Very little is known about how the social interactions of social anhedonics are outside of the laboratory or self-assessments. Moreover, being able to capture the ways in which social anhedonia tends to manifest itself in real world situations can provide the psychological community with some jumping off point for intervention and remediation. This information may have particular benefits for improving interpersonal relationship for at risk individuals. Social anhedonics have fewer relationships and are less satisfied with the relationships that they do have (Kwapil, 1998). It is possible that a better understanding of the interpersonal interactions and more specifically the role of emotional expression on their interpersonal interaction can provide the framework for an interpersonal intervention. It may be possible to see differences in emotional expression in this high-risk sample and treatments targeted at creating more appropriate socially appealing emotional reactions may be beneficial to a group of individuals that would benefit from a strong social support network.

Summary

The current study examined emotional experience and expression in social anhedonics and controls. No group differences were found in psychopathology. Notable group differences were seen in the number of depressive symptoms identified in a self-report measure. Group differences were also found in levels of overall functioning and social functioning. No group differences were found in self-report measures of emotional expression. No group differences were found in affective responding to any of the affect eliciting films. Exploratory analysis looked at the ability of the films to elicit emotions in

the total group. All of the films elicited emotions consistent with the emotion they intended to elicit with the exception of the comedy film clip and self reports of positive affect. Possible explanations for the lack of group differences include the exclusion criteria used in the current study, the choice of stimuli used and the homogeneity of the sample. Future studies should take into considerations the limits of the current study and address them accordingly.

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Table 1: Descriptive Statistics for Demographic Variables by Group

	Social Anhedonics N = 29	Controls N = 39
<u>Race</u>		
Caucasian	27	30
African-American	1	5
Asian	1	4
<u>Sex</u>		
Male	16	18
Female	13	21
<u>Education</u>		
Freshman	6	7
Sophomore	12	16
Junior	4	12
Senior	7	4

Table 2: Diagnostic Classifications by Group

	Social Anhedonics N = 29	Controls N = 39
	N (%)	N (%)
Lifetime Depression	8 (27.5%)	5 (12.8%)
	M (SD)	M (SD)
BDI	10.34 (10.98)	5.49 (6.33)
Schizotypal	.66 (1.08)	.69 (1.61)
Schizoid	1.17 (1.77)	.67 (1.31)
Paranoid	.62 (1.64)	.49 (1.02)
GAF	73.93 (14.81)	84.92 (9.81)
SOFA	74.21 (14.04)	84.90 (9.80)
<u>Psychological Interventions</u>		
	N (%)	N (%)
Outpatient Treatment	16 (55.1%)	13 (33.3%)
Psychopharmacological Intervention	5 (17.2%)	12 (30.8%)

Table 3: Descriptive Statistics for General Temperament Survey for Social Anhedonics (n = 23) and Controls (n = 33).

	Social anhedonics	Controls
	Mean (SD)	Mean (SD)
Trait positive affectivity	24.87 (8.99)	29.70 (7.28)
Trait negative affectivity	21.39 (6.58)	15.52 (7.28)
State positive affect	13.04 (4.98)	14.06 (5.23)
State negative affect	6.61 (2.92)	6.67 (2.61)
Warmth and affection	13.09 (5.88)	13.52 (5.75)

Table 4: Self Report Ratings of the General Disposition to Display Emotion in Social Anhedonics (n = 29) and Controls (n = 39).

	Social Anhedonics	Controls
	Mean (SD)	Mean (SD)
<u>Measures</u>		
BEQ Positive Expressivity	19.86 (5.48)	20.49 (6.12)
BEQ Negative Expressivity	22.59 (4.66)	23.72 (4.24)
BEQ Impulse Strength	23.86 (8.79)	24.44 (6.56)

Table 5: Berkeley Expressivity Questionnaire (BEQ) in Social Anhedonics (above diagonal) and Controls (below diagonal)

Measures	1	2	3
1. BEQ Positive Expressivity	($\alpha = .88$)	.34*	.58**
2. BEQ Negative Expressivity	.38*	($\alpha = .64$)	.44**
3. BEQ Impulse Strength	.70**	.58**	($\alpha = .83$)

* $p < .05$

** $p < .01$

Table 6: Self-Reports of Affectivity Across Films

	Positive	Negative	Warmth Affection
	M (SD)	M (SD)	M (SD)
Neutral	$\alpha = .95$	$\alpha = .82$	$\alpha = .97$
Social Anhedonics	13.61 (4.66)	7.22 (1.91)	12.70 (6.71)
Controls	12.03 (4.85)	6.91 (1.81)	11.00 (5.65)
Comedy	$\alpha = .93$	$\alpha = .72$	$\alpha = .95$
Social Anhedonics	14.78 (4.85)	5.91 (1.41)	13.22 (6.78)
Controls	13.42 (4.46)	5.84 (1.75)	11.82 (5.43)
Affiliative	$\alpha = .94$	$\alpha = .88$	$\alpha = .97$
Social Anhedonics	14.52 (5.65)	6.09 (1.93)	13.65 (7.20)
Controls	13.36 (5.09)	5.94 (2.21)	12.67 (5.96)
Sad	$\alpha = .93$	$\alpha = .82$	$\alpha = .94$
Social Anhedonics	11.65 (4.44)	8.26 (3.56)	12.74 (5.49)
Controls	10.79 (5.41)	9.36 (3.93)	11.15 (5.86)

Table 7: Behavioral Measures of Positive Emotional Expression

	Frequency M (SD)	Intensity M (SD)	Duration M (SD)
Neutral			
Social Anhedonics	.24 (1.12)	.10 (.38)	1.03 (5.20)
Controls	.24 (.85)	.15 (.39)	.95 (3.74)
Total	.24 (.97)	.13 (.39)	.99 (4.40)
Comedy			
Social Anhedonics	6.14 (4.59)	1.04 (.61)	35.41 (40.84)
Controls	6.66 (4.77)	1.47 (.63)	43.32 (48.11)
Total	6.43 (4.67)	1.29 (.65)	39.90 (44.95)
Affiliative			
Social Anhedonics	1.14 (1.51)	.62 (.66)	5.10 (9.28)
Controls	1.47 (2.42)	.59 (.68)	5.95 (12.32)
Total	1.33 (2.07)	.60 (.66)	5.58 (11.04)
Sad			
Social Anhedonics	1.10 (2.06)	.39 (.57)	4.93 (12.65)
Controls	.58 (1.18)	.33 (.51)	1.32 (3.91)
Total	.81 (1.63)	.40 (.53)	2.88 (8.93)

Table 8: Behavioral Measures of Negative Emotional Expression

	Frequency M (SD)	Intensity M (SD)	Duration M (SD)
Neutral			
Social Anhedonics	.28 (.84)	.14 (.35)	1.76 (5.83)
Controls	.11 (.31)	.16 (.49)	.26 (.92)
Total	.18 (.60)	.15 (.44)	.91 (3.93)
Comedy			
Social Anhedonics	1.10 (1.92)	.70 (.98)	7.10 (17.26)
Controls	1.16 (1.98)	.68 (.89)	14.16 (45.86)
Total	1.13 (1.94)	.69 (.92)	11.10 (36.30)
Affiliative			
Social Anhedonics	.86 (1.83)	.50 (.80)	8.72 (23.43)
Controls	.53 (.95)	.37 (.60)	6.16 (18.57)
Total	.67 (1.40)	.43 (.69)	7.27 (20.68)
Sad			
Social Anhedonics	1.00 (1.75)	.45 (.68)	20.07 (48.31)
Controls	1.32 (1.63)	.71 (.64)	31.47 (62.07)
Total	1.18 (1.68)	.60 (.66)	26.54 (56.42)

Table 9: Reliability of the Facial Expression Coding System (FACES)

	Positive Expressions	Negative Expressions
	ICC	ICC
<u>Neutral</u>		
Frequency	1.00	0.75
Duration	1.00	0.75
Mean intensity	1.00	0.75
<u>Positive</u>		
Frequency	0.98	1.00
Duration	0.99	0.68
Mean intensity	0.80	0.98
<u>Affiliative</u>		
Frequency	0.90	0.85
Duration	0.90	0.86
Mean intensity	0.87	0.71
<u>Negative</u>		
Frequency	0.83	0.98
Duration	0.80	0.99
Mean Intensity	0.70	0.64

Table 10: Intercorrelations of the Facial Expression Coding System (FACES) variables in Social Anhedonics (above each diagonal) and Controls (below each diagonal)

	Positive Expressions		
Rated dimension	1	2	3
Neutral film			
1. Frequency	--	.99**	.94**
2. Mean duration	.94**	--	.91**
3. Mean intensity	.86**	.79**	--
Comedy film			
1. Frequency	--	.71**	.72**
2. Mean duration	.78**	--	.56**
3. Mean intensity	.49**	.36*	--
Affiliative film			
1. Frequency	--	.84**	.63**
2. Mean duration	.61**	--	.45*
3. Mean intensity	.53**	.39*	--
Sad film			
1. Frequency	--	.80**	.75**
2. Mean duration	.94**	--	.62**
3. Mean intensity	.75**	.51**	--

* $p < .05$, ** $p < .01$

Table 11: Intercorrelations of the Facial Expression Coding System (FACES) variables in Social Anhedonics (above each diagonal) and Controls (below each diagonal)

Rated dimension	Negative Expressions		
	1	2	3
Neutral film			
1. Frequency	--	.95**	.84**
2. Mean duration	.84**	--	.77**
3. Mean intensity	.94**	.92**	--
Comedy film			
1. Frequency	--	.74**	.56**
2. Mean duration	.76**	--	.70**
3. Mean intensity	.53**	.18	--
Affiliative film			
1. Frequency	--	.77**	.67**
2. Mean duration	.32*	--	.62**
3. Mean intensity	.78**	.47**	--
Sad film			
1. Frequency	--	.84**	.78**
2. Mean duration	.49**	--	.57**
3. Mean intensity	.71**	.44**	--

* $p < .05$, ** $p < .01$

Table 12: Correlations of Self-reported Emotional Expressivity and Facial Expression Coding System (FACES)

	BEQ Positive Expressivity	BEQ Negative Expressivity
	<i>r</i>	<i>r</i>
<u>Social Anhedonics</u>		
FACES Congruent Expressions [†]		
Frequency	-.01	-.17
Mean Duration	-.02	-.01
Mean Intensity	-.06	-.02
<u>Controls</u>		
FACES Congruent Expressions [†]		
Frequency	.25	.11
Mean Duration	.07	.29
Mean Intensity	.10	-.02

[†]Following the method developed by Kring et al., 1994, FACES frequency, mean duration and mean intensity are each summed across all four film conditions to yield one composite score in order to reduce the number of variables.

Table 13: Correlations between Self-reported Emotional Expression and Facial Expression Coding System (FACES) across the Total Sample.

	BEQ Positive Expressivity	BEQ Negative Expressivity
	<i>r</i>	<i>r</i>
FACES Congruent Expressions [†]		
Frequency	.07	.04
Mean Duration	.04	.18
Mean Intensity	.06	-.03

* $p < .05$

[†]Following the method developed by Kring et al., 1994, FACES frequency, mean duration and mean intensity are each summed across all three film conditions to yield one composite score in order to reduce the number of variables.

Table 14: Correlations of Trait Positive and Trait Negative and Consistent Emotional Experience

	Positive Trait Affect	Negative Trait Affect
Neutral Film	-.07	.31*
Sad Film	-.12	-.07
Positive Film	-.09	.17
Affiliative Film	.07	.32*

* $p < .05$

Table 15: Sex and Emotional Expression

	Males M (SD) N = 33	Females M (SD) N = 34
FACES		
Frequency of Positive	7.24 (6.23)	10.32 (6.61)
Duration of Positive	44.15 (50.44)	54.38 (51.77)
Intensity of Positive	2.20 (1.58)	2.54 (1.30)
Frequency of Negative	2.82 (3.88)	3.50 (3.96)
Duration of Negative	25.45 (46.58)	65.59 (117.73)
Duration of Negative	1.75 (2.01)	1.99 (1.77)
BEQ		
BEQ Positive	20.53 (5.51)	19.91 (6.19)
BEQ Negative	22.97 (4.76)	23.50 (4.13)
BEQ Impulse	25.12 (7.71)	23.26 (7.35)

Table 16: Dimensional clinical characteristics and trait affectivity

	Trait Negative Affect	Trait Positive Affect
Schizotypal		
Social Anhedonic	.23	-.10
Control	-.15	.30
Total	-.05	.15
Schizoid		
Social Anhedonic	.19	.01
Control	-.23	.05
Total	.01	.19
Paranoid		
Social Anhedonic	.10	-.31
Control	-.13	-.02
Total	.05	-.02
BDI		
Social Anhedonic	.76**	-.24
Control	.64**	-.35*
Total	.72**	-.40**

* p < .05

**p < .01

Figure 1: Self-Reports of Positive Affectivity Across Films

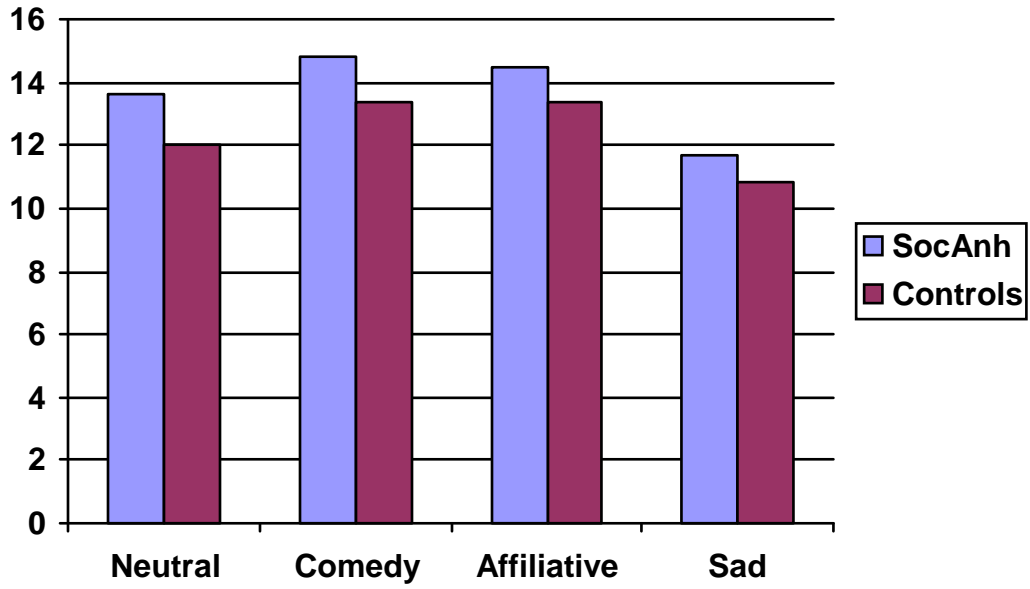


Figure 2: Self-Reports of Negative Affectivity Across Films

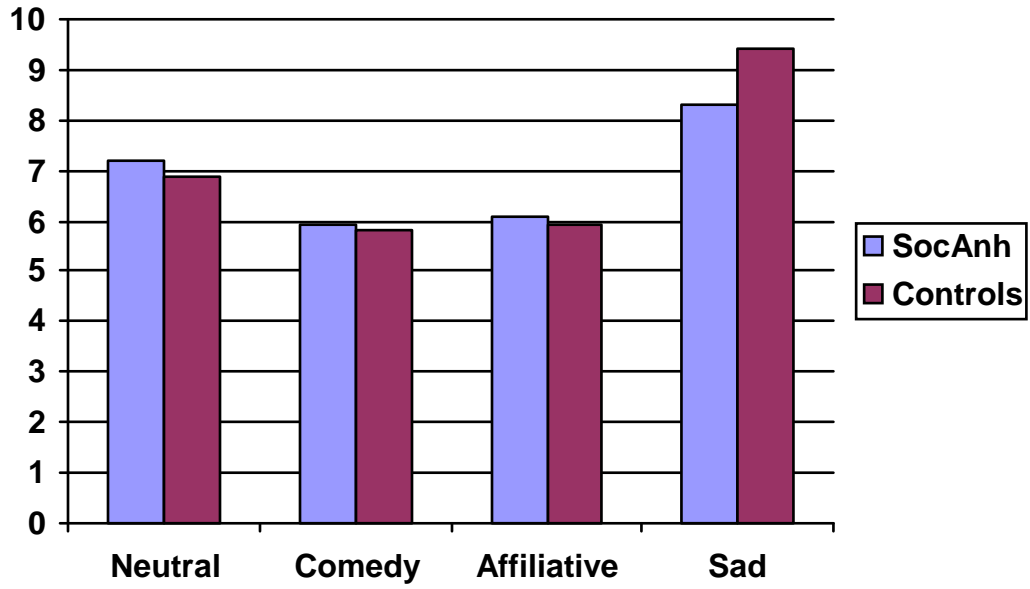
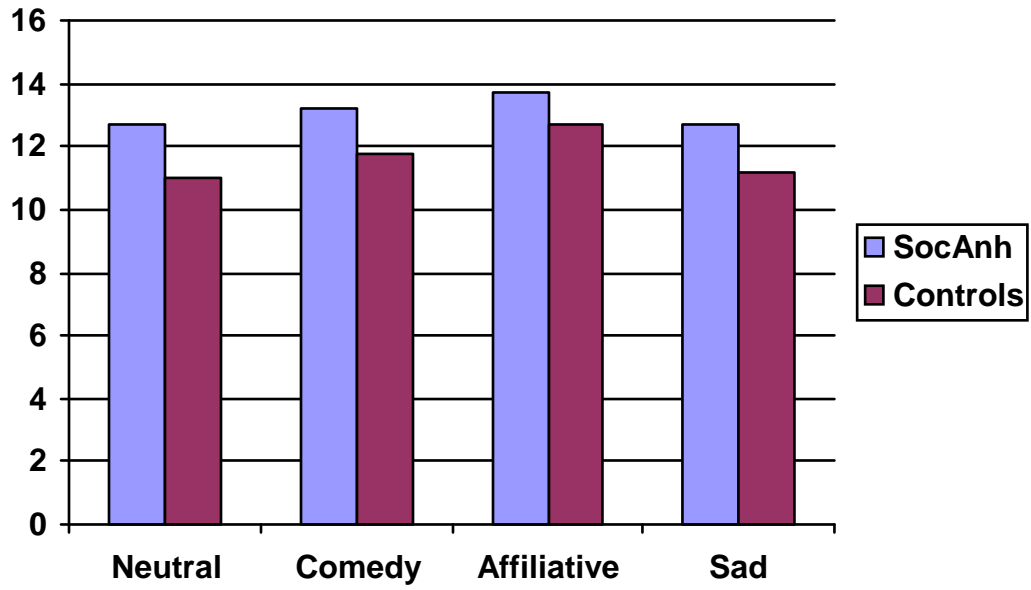


Figure 3: Self-Reports of Warmth and Affection Across Films



Appendices

Appendix A.

Demographic Questions

Self-report

1. Gender:

- a. Male
- b. Female

2. Age: _____

3. Ethnicity:

- a. European Origin / White
- b. African American / Black / African Origin
- c. Hispanic / Latino(a)
- d. Asian American / Asian Origin / Pacific Islander
- e. American Indian / Alaska Native / Aboriginal Canadian
- f. Bi-racial / Multi-racial
- g. Other

4. Current Education Status:

- a. Freshman
- b. Sophomore
- c. Junior
- d. Senior

6. Dorm Address:

7. Permanent Address:

8. E-mail Address 1: _____

9. E-mail Address 2: _____

10. Phone Number: _____

11. Cell Phone Number: _____

Appendix B.

The Revised Social Anhedonia Scale

Self-report

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

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

Appendix C.

Infrequency Scale

Self-rated

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

Appendix D.

Consent Form-Lab Based Assessment

INFORMED CONSENT FORM

STAGE 2

Project Title: PERSONALITY TRAITS AND SOCIAL RESPONDING

I certify that I am 18 years of age or older, in good health, and wish to participate in a program of research being conducted by Jack Blanchard, Ph.D. in the Department of Psychology at the University of Maryland, College Park, MD 20742.

Purpose:

The purpose of this project is to examine the relationship between mood, social behavior, and personality traits in individuals.

Procedure:

The procedures I voluntarily agree to take part in are:

- I will complete a questionnaire that focuses on social behavior and personality traits.
- I will receive a clinical interview and were asked about my feelings, mood, thoughts, beliefs, and relationships with others. Should the interview identify any clinical diagnosis, this information were provided to me. A trained member of the research team will provide me with treatment referrals in the community. I understand that neither Dr. Jack Blanchard nor members of his research team were able to provide any treatment. If I provide a written request, Dr. Blanchard will provide any diagnostic information to my treatment provider. I understand that such information will only be released with my permission, otherwise all diagnostic information is strictly confidential and will not be released except as required by law.
- I were asked to watch four different short film clips.
- I were asked to view pictures of people. Sometimes while watching these pictures I will hear a brief noise.
- While watching the videos and the pictures, some of my body's reactions were recorded through electrodes.
- I were video taped by a concealed camera throughout the duration of the study.
- The study should take about 2-3 hours to complete.

Page 1 of 3 Initials: _____

- I will receive \$40 for my participation after the completion of study tasks. If I withdraw from the study, I were given *partial* payment based on the amount of the tasks completed. For example, if I complete a ¼ of the tasks, I were paid \$10.
- I may or may not be called to participate in an additional study.

Confidentiality:

All information collected during this project were kept confidential. All records and tapes were stored in a locked file cabinet in a locked room. Only members of the research team will have access to these records. My name were kept confidential and I will only be identified by a subject number. Presentations or publications of the study were based on grouped data and will not reveal my identity. At the conclusion of this study, copies of written material from participation were shredded and discarded; videotapes were magnetically erased and destroyed.

Risks:

There is a small chance that you may have an adverse skin reaction to the conductive gel placed below the electrodes being used in this study. The unlikely skin irritation is usually mild, and usually consists of itching, which tends to clear rapidly with the removal of the electrode. You may also become bored while completing the project. You may also experience mild discomfort due to the sensitive nature of some of the questions. Below is a listing of several available community resources if any psychological discomfort should occur:

UMD College Park Resources:

The Counseling Center:
(301) 314-7651
The Health Center:
(301) 314-8184
The Psychology Clinic:
(301) 405-4808

Local County Resources:

Crisis Response Service, PG County:
(301) 927-4500
Montgomery County Crisis Center:
(301) 315-4000
Emergency Psychiatric Risk Dept.:
(202) 675-7888

Whenever confidential information is collected there is some risk that this information may somehow be inappropriately disclosed. However, I understand that the researchers are taking clear and specific steps to guard the confidentiality of the information I provide (as outlined in the section on *Confidentiality*).

Benefits:

Although this project is not designed to help me personally, the researchers hope to gain valuable information about the relationship between personality traits and social behavior.

Page 2 of 3 Initials: _____

Participant Rights:

By signing this form, I agree that:

- I have freely volunteered to complete several questionnaires, and complete a laboratory based assessment.
- I may ask questions before, during, and after the laboratory assessment.
- I may contact the researchers by phone at any time to obtain verbal or written information about the project.
- I may withdraw from the project at any time without penalty.

Contact Information:

If I have further questions or concerns about this study, I may contact the primary investigator:

Dr. Jack Blanchard, 301-405-8438

University of Maryland College Park

Biology/Psychology Building

College Park, MD 20742

If you have any questions about your rights as a research subject or wish to report a research-related injury, please contact:

Institutional Review Board Office

University of Maryland College Park

College Park, MD 20742

301-405-0678

Participant's Name (Please Print)

Signature

Date

Appendix E.

Social and Occupational Functioning Assessment Scale

Consider social and occupational functioning on a continuum from excellent functioning to grossly impaired functioning. Include impairments in functioning due to physical limitations, as well as those due to mental impairments. To be counted, impairment must be direct consequence of mental and physical health problems; the effects of lack of opportunity and other environmental limitations are not to be considered.

100

Superior functioning in a wide range of activities

90

Good functioning in all areas, occupationally, and socially affective.

80

No more than a slight impairment in social, occupational, or school functioning. (e. g., infrequent interpersonal conflict, temporarily falling behind in schoolwork)

70

Some difficulty in social, occupational, or school functioning, but generally functioning well, has meaningful interpersonal relationships.

60

Moderate difficulty in social, occupational, or school functioning (e. g., few friends, conflicts with peers or co-workers)

50

Serious impairment in social, occupational, or school functioning (e. g. no friends, unable to keep a job)

40

Major impairment in several areas, such as work or school, family relations (e. g., depressed man avoids friends, neglects family, and is unable to work; child frequently beats up younger children, is defiant at home, and is failing at school)

30

Inability to function in almost all areas (e. g. stays in bed all day; no job, home or friends)

20

Occasionally fails to maintain minimal personal hygiene; unable to function independently

10

Persistent inability to maintain minimal personal hygiene; unable to function without harming self or others or with out considerable external support (e. g., nursing care and supervision)

0

Inadequate information

Appendix F.

Beck Depression Inventory – Second Edition

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

1. Sadness

- 0 I do not feel sad.
- 1 I feel sad much of the time
- 2 I am sad all of the time.
- 3 I am so sad or unhappy that I can't stand it.

2. Pessimism

- 0 I am not discouraged about my future.
- 1 I feel more discouraged about my future than I used to be.
- 2 I do not expect things to work out for me.
- 3 I feel my future is hopeless and will only get worse.

3. Past Failure

- 0 I do not feel like a failure.
- 1 I have failed more than I should have.
- 2 As I look back, I see a lot of failures.
- 3 I feel I am a total failure as a person.

4. Loss of Pleasure

- 0 I get as much pleasure as I ever did from the things I enjoy.
- 1 I don't enjoy things as much as I used to.
- 2 I get very little pleasure from the things I used to enjoy.
- 3 I can't get any pleasure from the things I used to enjoy.

5. Guilty Feelings

- 0 I don't feel particularly guilty.
- 1 I feel guilty over many things I have done or should have done.
- 2 I feel quite guilty most of the time.
- 3 I feel guilty all of the time.

6. Punishment Feelings

- 0 I don't feel like I am being punished.
- 1 I feel I may be punished.
- 2 I expect to be punished.
- 3 I feel I am being punished.

7. Self-Dislike
 - 0 I feel the same about myself as ever.
 - 1 I have lost confidence in myself.
 - 2 I am disappointed in myself.
 - 3 I dislike myself.

8. Self-Criticalness
 - 0 I don't criticize or blame myself more than usual.
 - 1 I am more critical of myself than I used to be.
 - 2 I criticize myself for all of my faults.
 - 3 I blame myself for everything bad that happens.

9. Suicidal Thoughts or Wishes
 - 0 I don't have any thoughts of killing myself.
 - 1 I have thoughts of killing myself, but I would not carry them out.
 - 2 I would like to kill myself.
 - 3 I would kill myself if I had the chance.

10. Crying
 - 0 I don't cry any more than I used to.
 - 1 I cry more than I used to.
 - 2 I cry over every little thing.
 - 3 I feel like crying, but I can't.

11. Agitation
 - 0 I am no more restless or wound up than usual.
 - 1 I feel more restless or wound up than usual.
 - 2 I am so restless or agitated that it's hard to stay still.
 - 3 I am so restless or agitated that I have to keep moving or doing something.

12. Loss of Interest
 - 0 I have not lost interest in other people or activities.
 - 1 I am less interested in other people or things than before.
 - 2 I have lost most of my interest in other people or things than before.
 - 3 It's hard to get interested in anything.

13. Indecisiveness
 - 0 I make decisions about as well as ever.
 - 1 I find it more difficult to make decisions than usual.
 - 2 I have much greater difficulty in making decisions than I used to.
 - 3 I have trouble making any decisions.

14. Worthlessness

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

15. Loss of Energy

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

16. Changes in Sleeping Pattern

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

1a I sleep somewhat more than usual.

1b I sleep somewhat less than usual.

2a I sleep a lot more than usual.

2b I sleep a lot less than usual.

3a I sleep most of the day.

3b I wake up 1-2 hours early and can't get back to sleep.

17. Irritability

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

18. Changes in Appetite

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

1a My appetite is somewhat less than usual.

1b My appetite is somewhat greater than usual.

2a My appetite is much less than before.

2b My appetite is much greater than usual.

3a I have no appetite at all.

3b I crave food all the time.

19. Concentration Difficulty

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

20. Tiredness or fatigue

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

21. Loss of Interest in Sex

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

Appendix G.

Berkeley Expressivity Questionnaire

Self-rated

For each statement below, please indicate your agreement or disagreement. Do so by filling in the blank in front of each item with the appropriate number from the following rating scale

1	2	3	4	5	6	7
Strongly			Neutral			Strongly Disagree

1. Whenever I feel positive emotions, people can easily see exactly what I am feeling.

1	2	3	4	5	6	7
Strongly			Neutral			Strongly Disagree

2. I sometimes cry during sad movies.

1	2	3	4	5	6	7
Strongly			Neutral			Strongly Disagree

3. People often do not know what I am feeling

1	2	3	4	5	6	7
Strongly			Neutral			Strongly Disagree

4. I laugh out loud when someone tells me a joke that I think is funny.

1	2	3	4	5	6	7
Strongly			Neutral			Strongly Disagree

5. It is difficult for me to hide my fear.

1	2	3	4	5	6	7
Strongly			Neutral			Strongly Disagree

6. When I'm happy, my feelings show.

1	2	3	4	5	6	7
Strongly			Neutral			Strongly Disagree

7. My body reacts very strongly to emotional situations.

1	2	3	4	5	6	7
Strongly			Neutral			Strongly Disagree

8. I've learned it is better to suppress my anger than to show it.

1	2	3	4	5	6	7
Strongly			Neutral			Strongly Disagree

9. No matter how nervous or upset I am, I tend to keep a calm exterior.

1	2	3	4	5	6	7
Strongly			Neutral			Strongly Disagree

10. I am an emotionally expressive person.

1	2	3	4	5	6	7
Strongly			Neutral			Strongly Disagree

11. I have strong emotions.

1	2	3	4	5	6	7
Strongly			Neutral			Strongly Disagree

12. I am sometimes unable to hide my feelings, even though I would like to.

1	2	3	4	5	6	7
Strongly			Neutral			Strongly Disagree

13. Whenever I feel negative emotions, people can easily see exactly what I am feeling.

1	2	3	4	5	6	7
Strongly			Neutral			Strongly Disagree

14. There have been times when I have not been able to stop crying even when I tried to stop.

1	2	3	4	5	6	7
Strongly			Neutral			Strongly Disagree

15. I experience my emotions very strongly.

1	2	3	4	5	6	7
Strongly			Neutral			Strongly Disagree

16. What I'm feeling is written all over my face.

1	2	3	4	5	6	7
Strongly			Neutral			Strongly Disagree

Appendix H.

General Temperament Survey

This scale is made up of a list of statements, each of which may or may not be true about you. For each statement, we would like you to fill in the “True” space if it is *True or Mostly True* about you. If the statement is *False or Mostly False* about you, fill in the “False” space.

You may find that many of the statements are neither clearly true nor clearly false. In these cases, try to decide *quickly* whether Probably True (“True”) or Probably False (“False”) is most descriptive of you. Although some questions were difficult to answer, it is important that you pick one alternative or the other. Remember to choose *only one* of the alternatives for each statement.

Please read each item quickly but carefully before responding. Remember that this is not a test and there are no right or wrong answers

1. I have the ability to approach tasks in such a way that they become interesting or fun.
2. I sometimes rush from one activity to another without pausing for a rest.
3. I don't keep particularly close track of where my money goes.
4. I often experience strong emotion such as anxiety or anger without really knowing why.
5. I lead an active life.
6. I'll take almost any excuse to goof off instead of work.
7. I sometimes get too upset by minor setbacks.
8. My mood sometimes changes (for example, from happy to sad, or vice versa) without

good reason.

9. I often stop in the middle of one activity to start another one.

10. Sometimes I feel “on edge” all day.

11. I lead a very interesting life.

12. I frequently find myself worrying about things.

13. If I had to choose, I would prefer having to sit through a long concert of bad music to being in a bank during an armed robbery.

14. My anger frequently gets the best of me.

15. I get excited when I think about the future.

16. Before I make a decision I usually try to consider all sides of the issue.

17. People would describe me as a pretty enthusiastic person.

18. I can easily find ways to liven up a dull day.

19. I believe in playing strictly by the rules.

20. Small annoyances often irritate me.

21. Sometimes I will suddenly feel scared for no good reason.

22. I work just hard enough to get by.

23. In my life, interesting and exciting things happen everyday.

24. I sometimes get all worked up as I think of the day’s events.

25. I rarely, if ever, do anything reckless.

26. Other people sometimes have trouble keeping up with the pace I set.

27. The way I behave often gets me into trouble on the job, at home, or at school.

28. I get a kick out of really scaring people.

29. I can get very upset when little things don’t go my way.

30. I live a very full life.
31. If I had to choose, I would prefer being in a flood to unloading a ton of newspapers from a truck.
32. I am often nervous for no reason.
33. I often take my anger out on those around me.
34. I greatly dislike it when someone breaks accepted rules of good behavior.
35. I am usually alert and attentive.
36. I would describe myself as a tense person.
37. I rely on careful reasoning when making up my mind.
38. I put a lot of energy into everything I do.
39. I often worry about things I have done or said.
40. I would much rather party than work.
41. I can make a game out of some things that others consider work.
42. It takes a lot to get me excited.
43. I like to take chances on something that isn't sure, such as gambling.
44. Sometimes life seems pretty confusing to me.
45. I can work hard, and for a long time, without feeling tired.
46. When I resent doing something, I sometimes deliberately make mistakes.
47. I am sometimes troubled by thoughts or ideas that I can't get out of my mind.
48. My pace is usually quick and lively.
49. I always try to be fully prepared before I begin working on anything.
50. I would not use others' weaknesses to my own advantage.
51. I often have difficulty sleeping because of my worries.

52. I really enjoy beating the system.
53. Most days I have a lot of “pep” or vigor.
54. I don’t get very upset when things go wrong.
55. I’ve been told that I work too hard.
56. People would describe me as a pretty energetic person.
57. I often feel nervous and “stressed”.
58. I am not an “impulse buyer”.
59. I have days that I’m very irritable.
60. In my life, I would rather try to do too much than too little.
61. I am a serious-minded person.
62. I get pretty excited when I’m starting a new project.
63. Little things upset me too much.
64. I like to show-off.
65. I am often troubled by guilt feelings.
66. I seem to be able to remain calm in almost any situation.
67. Lying comes easily to me.
68. I worry about terrible things that might happen.
69. I like to stir up some excitement when things are getting dull.
70. When I’m having a good time. I don’t’ worry about the consequences.
71. I am often playful around other people.
72. I worry too much about things that don’t really matter.
73. I am a caution person.
74. I am sometimes “on the go” so much that I wear myself out.

75. I've done a lot of things for which I wear myself out.
76. Often life feels like a big struggle.
77. I spend a good deal of my time just having fun.
78. When I decide things, I always refer to the basic rules of right and wrong.
79. I have more energy than most of the people I know.
80. Taking care of details is not my strong point.
81. Things seem to bother me less than most other people.
82. I often get out of things by making a believable excuse.
83. I sometimes feel angry for no good reason.
84. I get the most fun out of things that others consider either immoral or illegal.
85. I would never hurt other people just to get what I want.
86. I often feel lively and cheerful for no particular reason.
87. I don't ever like to stay in one place for long.
88. People sometimes tell me to slow down and "take it easy".
89. At times I've done some petty thievery.
90. I am usually enthusiastic about the things that I do.

Appendix I.

Facial Expression Coding System (FACES)

Coding Sheet

Subject ID: _____ Rater: _____ Film Type: _____

Time start: _____ Time end: _____ Duration: _____

Valence: Positive: _____ Negative: _____

Intensity: low medium high very high
1 2 3 4

Time start: _____ Time end: _____ Duration: _____

Valence: Positive: _____ Negative: _____

Intensity: low medium high very high
1 2 3 4

Time start: _____ Time end: _____ Duration: _____

Valence: Positive: _____ Negative: _____

Intensity: low medium high very high
1 2 3 4

Time start: _____ Time end: _____ Duration: _____

Valence: Positive: _____ Negative: _____

Intensity: low medium high very high
1 2 3 4

Facial Expression Coding System (FACES) (continued)

FACES Summary Sheet

What is the overall level of expressiveness for this person for this film clip?

Low	fairly low	medium	fairly high	high
1	2	3	4	5

Number of positive expressions: _____

Number of negative expressions: _____

Mean intensity-positive: _____

Mean intensity-negative: _____

Duration of positive expressions: _____ (in seconds)

Duration of negative expressions: _____ (in seconds)

If needed.

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