

## ABSTRACT

Title of Dissertation:       EXPERIENCE AND EXPRESSION OF EMOTION  
                                      IN SOCIAL ANHEDONIA: AN EXAMINATION OF  
                                      FILM-INDUCED SOCIAL AFFILIATIVE STATE IN  
                                      SCHIZOTYPY

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Social anhedonia is an important feature of schizophrenia and it is a promising indicator of schizotypy. Although social anhedonia is defined as an affective construct (less pleasure derived from social encounters), little is actually known about the affective correlates of social anhedonia. Prior laboratory research is limited in that no prior study has used affiliative social stimuli in examining affective reactions associated with anhedonia. This study sought to extend prior research through an examination of the expression and experience of emotion in social anhedonics by using a novel social affiliative film stimulus. After screening a large sample of female undergraduate students ( $N = 1,085$ ), a cohort of psychometrically identified social anhedonics ( $n = 34$ ) and normally hedonic controls ( $n = 45$ ) participated in laboratory assessments involving trait affectivity, self-reported dispositional emotional expressiveness, and the expression and

experience of emotion in response to neutral, non-affiliative (i.e., comedy) and affiliative film clips. Results showed that social anhedonics have lower trait positive affect compared to controls, but there were no group differences in trait negative affect. At baseline, social anhedonics reported lower state positive affect and less warmth and affection compared to controls, but there were no group differences in state negative affect. Social anhedonics also reported the disposition to be less expressive. Consistent with their reports of attenuated emotional experience and expression outside of the laboratory, social anhedonics reported less positive affect and displayed less facial expressions in response to affect eliciting films in the laboratory. Social anhedonics, however, did not report less warmth and affection across the films as compared to controls. Additionally, social anhedonics did not report less positive emotions or warmth and affection in response to the affiliative film, as compared to the non-affiliative (i.e., comedy) film. Implications and study limitations are discussed.

EXPERIENCE AND EXPRESSION OF EMOTION IN SOCIAL ANHEDONIA:  
AN EXAMINATION OF FILM-INDUCED SOCIAL  
AFFILIATIVE STATE IN SCHIZOTYPY

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Dissertation submitted to the Faculty of the Graduate School of the  
University of Maryland, College Park in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy  
2006

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## ACKNOWLEDGEMENTS

The author would like to thank Jack Blanchard for his continued support and guidance during the completion of this project. Many thanks are also extended to Jaclyn Leith and Jamie Carreno for their dedication and hard work in collecting these data. This research is supported by Grant MH-51240 from the National Institute of Mental Health.

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## CHAPTER 1: INTRODUCTION

### EMOTION AND SCHIZOPHRENIA

Disturbances of emotion have long been considered a prominent feature of schizophrenia. Early theorists wrote extensively about a range of emotional characteristics observed in schizophrenia, including a paucity of emotional expression, diminished emotional experience, and inappropriate affect (Bleuler, 1919, 1950; Kraepelin, 1919, 1971). In describing affective symptomatology, Bleuler (1911, 1950) noted a discrepancy between the outward display and self-reported emotional experiences of schizophrenia patients. That is, although individuals with schizophrenia showed no observable signs of emotion, they reported having strong internal emotions that were comparable to those of normal individuals. These early writings called for empirical investigations on emotion in schizophrenia, yet this area of research has been largely ignored until the last several decades (Kring, 1999).

With the adoption of methodological developments from basic emotion research in recent years, researchers have begun to experimentally examine the emotional deficits in schizophrenia. For example, in recent laboratory studies of emotion in schizophrenia, a variety of emotionally evocative stimuli, such as film clips, slides, cartoons, and flavored drinks, have been used to systematically examine the expressivity and experiential aspects of emotion (e.g., Berenbaum & Oltmanns, 1992; Blanchard, Bellack, & Mueser, 1994; Blanchard, Kring, & Neale, 1994; Dworkin, Oster, Clark, & White, 1998; Fitzgibbons & Simons, 1992; Kring & Neale, 1996; Kring, Kerr & Earnst, 1999; Kring, Kerr, Smith & Neal, 1993). One of the most robust findings to emerge from this literature is the disjunction between facial displays of emotion and subjective reports of



the emotional experience in schizophrenia. In a series of studies conducted with independent samples, Kring and colleagues presented film clips intended to elicit positive affect (e.g., comedy film) and negative affect such as sadness (e.g., children with a dying parent) and fear (e.g., man in danger) to participants while their facial expressions were videotaped for standardized behavioral rating. Facial expressivity of emotion was measured in terms of both the number and intensity of emotions displayed. Compared to controls, schizophrenics showed fewer positive expressions in response to a happy film and fewer negative expressions in response to sad and fear films (Kring et al., 1993). However, they reported experiencing similar levels of emotion as the control group (Kring et al., 1993) and individuals with depression (Berenbaum & Oltmanns, 1992). Subsequent studies have demonstrated that these findings are replicable (Berenbaum & Oltmanns, 1992; Dworkin, Clark, Amador, Gorman, 1996; Kring & Neale, 1996; Kring & Earnst, 1999; Kring et al., 1999), stable over time, and independent of medication side effects (Kring & Earnst, 1999). Additionally, psychophysiological data have shown that individuals with schizophrenia exhibit comparable or greater skin conductance reactivity to positive and negative film stimuli compared to controls (Kring & Neale, 1996). Taken together, these data indicate that despite a lack of emotional expressions, schizophrenics do not show a lack of emotional experience.

Such failure to discriminate the emotional responding (e.g., in self-report and physiological measures) of individuals with schizophrenia from controls and other patient groups in laboratory studies is surprising, particularly because individuals with schizophrenia have been documented to report an emotional deficit termed social anhedonia, the diminished capacity to experience pleasure from social relationships or

interactions (Berenbaum & Oltmanns, 1992; Blanchard, Mueser, & Bellack, 1998; Katsanis, Iacono, Beiser, 1990). Historical theorists of schizophrenia have long recognized the central role of social anhedonia (Meehl, 1962), yet this specific area of emotion has been largely unexplored. Although a substantial amount of empirical evidence suggests that social anhedonia is a replicable finding in schizophrenia (e.g., Berenbaum & Oltmanns, 1992; Blanchard et al., 1998; Chapman et al., 1982) and that it may be an indicator for individuals at risk for psychosis (Chapman, Chapman, Kwapil, Eckblad, & Zinser, 1994; Kwapil, 1998), there has been no systematic investigation of its affective nature. Instead, a general dampening of emotional experience in schizophrenia has been the focus of examination, though findings from that line of research have been difficult to interpret. It has been argued that close examination of this social pleasure deficit and its affective correlates will help advance the emotion literature in schizophrenia (Blanchard, 1998). Prior to a discussion of the emotional deficit associated with social anhedonia, the following sections will first review our current knowledge of social anhedonia in order to provide a basic understanding of the construct.

## SOCIAL ANHEDONIA

### Historical Background of Schizotaxia and Social Anhedonia

In his original proposal, Meehl (1962) introduced the concept of schizotaxia to describe a genetically based neural integrative defect that was the basic pathophysiology of schizophrenia. Schizotaxia is viewed by Meehl as an aberration in some parameter of a single cell function, which may be manifested in the functioning of central nervous systems. Essentially, what he described is a general neuronal and brain system deficit. Meehl further conjectured that through the process of social learning, all individuals with

schizotaxia would develop a personality structure referred to as schizotypy, which is the behavioral (phenotypic) manifestation of the latent vulnerability (schizotaxia) for developing schizophrenia. Although Meehl argued that all schizotaxic individuals become schizotypic in personality organization, regardless of their social learning history, not all schizotypic individuals will develop schizophrenia. Thus, schizotaxia is an etiologically specific and necessary condition, but it is not sufficient for the development of schizophrenia-spectrum disorders. The majority of schizotypes will remain compensated while a minority, disadvantaged by biological, personality, and other environmental weaknesses, will go on to develop schizophrenia.

Meehl's schizotype is characterized by four core features or behavioral traits, including anhedonia (pleasure deficit), cognitive slippage (mild thought disorder), ambivalence, and interpersonal aversiveness. The base rate of the schizotypy taxon (i.e., those having the schizogene) in the general population is postulated by Meehl to be approximately 10% (Meehl, 1962). Only a small percentage of schizotypes are predicted to decompensate into clinical schizophrenia (Meehl, 1989, 1990). Depending on the social environment and the presence of other genetic characteristics, the schizotype could manifest any degree of symptom outcome, from being well compensated, as expressed in "normal" functioning to schizophrenia-spectrum personality disorders to suffering from the deleterious impact of schizophrenic symptoms (Kwapil, 1998).

Recent literature drawing from several different lines of research suggest that, of the four core features of schizotypy, social anhedonia may be a promising indicator for the vulnerability towards developing psychosis and, specifically, schizophrenia (Chapman, Chapman, Kwapil, Eckblad, & Zinser, 1994; Kwapil, 1998; Blanchard,

Bellack, & Mueser, 1994). Initial conceptualization of anhedonia was described by Meehl as a “quasi-pathognomonic sign” that “is one of the most consistent and dramatic behavioral signs of the disease” (Meehl, 1962; p. 829). Since the original formulation of his theory of schizotypy, however, Meehl (1990) has modified his view on social anhedonia, indicating that “hypohedonia is one of a dozen normal-range individual differences factors that raise or lower the probability of decompensation” (p. 24). Thus, hypohedonia was not viewed as specific to schizotypy. It was proposed that anhedonia may arise either as a result of genetic causes (primary and genetic) or secondary to the environment (i.e., depression, poverty, etc.). Nevertheless, several lines of research have recently provided findings that are more compatible with Meehl’s original formulation, indicating that social anhedonia is taxonic (i.e., a common group of individuals who constitute the same latent class or taxon) (Blanchard, Gangestad, Brown & Horan, 2000). Despite the diminution of anhedonia as a causal agent in Meehl’s recent model, anhedonia continues to be considered prominent in contemporary investigations of schizophrenia as reflected in studies of its relation to schizophrenia-related characteristics and the liability for the development of schizophrenia (e.g., Chapman, Chapman, Kwapil, Eckblad, & Zinser, 1994; Erlemmeyer-Kimiling et al., 1993; Katsanis, Iacono, & Beiser, 1990).

#### Measurements of Social Anhedonia

Drawing from Meehl’s original proposal, Loren and Jean Chapman have developed the most widely used self-report instrument (Chapman, Chapman, and Raulin, 1976) employed in a psychometric high-risk paradigm to examine social anhedonia. The 40-true/false-item Revised Social Anhedonia Scale (RSAS; Eckblad, Chapman, Chapman,

Mishlove, 1982) samples interpersonal pleasures such as talking and being with people. The RSAS was designed to measure schizoid withdrawal rather than social anxiety and to tap a trait-like dimension of anhedonia rather than the transitory anhedonia associated with depression (Chapman et al., 1976). This measure includes items such as “Having close friends is not as important as many people say” (keyed true) and “If given the choice, I would much rather be with others than be alone (keyed false). The RSAS has been shown to have good internal consistency and test-retest reliability (Chapman, Chapman, & Miller, 1982). Further, it has been used extensively in studies examining various aspects of Meehl’s original theories, including the risk for the development of schizophrenia, other aspects of emotion, and social impairment.

#### Current Understanding of Social Anhedonia

A number of studies have now demonstrated that elevated social anhedonia is a replicable finding in schizophrenia (Berenbaum & Oltmanns, 1992; Blanchard, Mueser, & Bellack, 1998; Chapman et al., 1976; Katsanis, Iacono, Beiser, 1990). Within this disorder, social anhedonia is related to poor social functioning (Blanchard et al., 1998; Katsanis, Iacono, Beiser, & Lacey, 1992). Additionally, it appears that social anhedonia is an enduring individual difference in schizophrenia (Blanchard et al., 1998, Blanchard, Horan & Brown, 2001). Studies of social anhedonia have found that social anhedonia is independent of symptom status (Blanchard et al., 2001; Blanchard, Bellack, & Mueser, 1994; Katsanis, et al., 1992) and is related to premorbid functioning in schizophrenia but not in psychotic affective disorder (Katsanis et al., 1992). Although social anhedonia is also elevated in mood disorders (e.g., Berenbaum & Oltmanns, 1992; Katsanis et al., 1990; Blanchard et al., 1994), anhedonia appears to be associated with clinical symptoms

rather than a trait feature in these disorders. Specifically, it has been found that social anhedonia diminishes following the recovery of depression, but not schizophrenia (Blanchard et al., 2001). These findings suggest that anhedonia is a stable vulnerability indicator in schizophrenia while in depression it reflects an episode or symptom indicator (Nuechterlein et al., 1990; Nuechterlein & Dawson, 1984).

Consistent with Meehl's (1962) hypothesis that social anhedonia is an indicator of a genetically based liability to develop schizophrenia, social anhedonia has been found to be elevated in the family members of individuals with schizophrenia. Results from a study conducted by Katsanis et al. (1990) showed that social anhedonia was elevated in the first-degree relatives of individuals with schizophrenia compared to nonpsychiatric controls. In a study examining family vulnerability to schizophrenia, Kendler, Thacker, and Walsh (1996) found that social anhedonia, as measured by an abbreviated 5-item version of the Social Anhedonia Scale (Chapman et al., 1976), significantly predicted proband diagnosis in relatives of schizophrenia patients compared to relatives of controls. Interestingly, however, social anhedonia did not differentiate proband diagnoses in mood and other psychotic disorders compared to controls (Kendler et al., 1996). In support of the genetic theory, studies using other measures of social anhedonia have also yielded similar results. Characteristics such as social withdrawal and contentment with social isolation are found to be important indicators of schizophrenia proneness (Kendler, McGuire, Gruenderg, & Walsh, 1995; Tyrka et al., 1995) and may differentiate relatives of individuals with schizophrenia from relatives of individuals with affective disorders (Kendler et al., 1995). In summary, social anhedonia appears to be an emotional deficit that is unique to individuals with schizophrenia and the family members of these patients.

However, longitudinal research is necessary to address Meehl's (1962) conjectures that social anhedonia is an indicator of individuals at risk for schizophrenia.

#### Predictive Validity of Social Anhedonia

One of the most prominent studies demonstrating the ability of social anhedonia to predict schizophrenia was a 10-year longitudinal study with a nonclinical college population conducted by Chapman and colleagues (Chapman et al., 1994). Using a psychometric high-risk paradigm, social anhedonia was examined in association with other traits that were also thought to be indicators of risk for psychosis as measured by the Perceptual Aberration Scale (PerAb; Chapman, Chapman, & Raulin, 1978) and the Magical Ideation Scale (MagID; Eckblad & Chapman, 1983). The Perceptual Aberration Scale measures distortions in perceptions that individuals may have such as "At times, I have wondered if my body was really my own". The Magical Ideation Scale measures belief in forms of causation that are regarded invalid and magical such as "I have sometimes felt that strangers were reading my mind". Results indicated that social anhedonia was a significant predictor of schizotypal dimensional scores and psychotic-like experiences at follow-up among those who scored high on the Magical Ideation Scale (Chapman et al., 1994). Moreover, in comparison to the other groups, those high in magical ideation and also scoring above the mean on social anhedonia displayed the highest rates of psychosis at the follow-up (21%), had higher ratings of psychotic-like experiences and of schizotypal symptoms at the follow-up assessment.

Although these findings are informative, it remains difficult to conclude whether or not social anhedonia by itself is related to higher risks for schizophrenia and schizophrenia spectrum personality disorders. In an effort to elucidate the role of social

anhedonia, Kwapil (1998) extended the study conducted by Chapman et al. (1994) by reassessing individuals from their longitudinal sample to determine if social anhedonia independently predicts the development of schizophrenia-spectrum disorders. At the 10-year follow-up, after statistically controlling for the effects of other psychosis-proneness measures, 24% of individuals with extreme scores on the RSAS were diagnosed with a schizophrenia-spectrum personality disorder, exceeding the controls in which only 1% received such diagnoses (Kwapil, 1998). Additionally, it was found that those with extreme scores on social anhedonia exceeded controls on dimensional scores of schizotypal, schizoid, and paranoid personality disorders, as well as on the rating of highest psychotic-like experience (Kwapil, 1998). It is important to note that the prediction of schizophrenia-spectrum disorders by the RSAS was not improved by the use of other psychosis-proneness scales. Thus, these results appear to support the independent role social anhedonia plays in the eventual development of schizophrenia-spectrum personality disorders.

In addition to diagnostic characteristics, individuals with markedly elevated social anhedonia scores on the RSAS have been reported to demonstrate neuropsychological impairments similar to those seen in schizophrenic patients. As with schizophrenia patients, individuals with elevated RSAS scores exhibit deficits in sustained attention (Kwapil & Diaz, 2000), working memory (Tallent & Gooding, 1999), executive functioning (Gooding, Kwapil, & Tallent, 1999; Tallent & Gooding, 1999), aberrant smooth pursuit tracking (Gooding, Miller, & Kwapil, 2000), and antisaccade performance (Gooding, 1999). The diagnostic characteristics and neuropsychological deficits shared by schizophrenia patients and psychometrically identified social anhedonics, coupled



with indications that social anhedonia can longitudinally predict schizophrenia spectrum pathology, provide compelling evidence to support the putative role of social anhedonia as an indicator of schizotypy.

## EMOTION IN SOCIAL ANHEDONIA

Although a number of investigations have examined social anhedonia in relation to the etiology of schizophrenia and reports have suggested social anhedonia as a potential indicator of schizotypy (Chapman et al., 1994; Kwapil, 1998), only limited attention has been paid to systematically characterizing the emotional nature of social anhedonia. By definition, social anhedonia involves a lack of interest and pleasure from social relationships. Despite the particular relevance of emotional responding in anhedonic individuals, however, the emotional and affective aspects of social anhedonia is presently not well understood. As will be demonstrated below, the literature discusses anhedonia in emotional terms, yet the exact nature of the relationship between anhedonia and emotion remains unclear.

### Trait Affectivity of Social Anhedonia

Examinations of trait affectivity in schizophrenia patients with social anhedonia can provide some insight to the emotional nature of this social pleasure deficit (Blanchard et al., 1998). Specifically, a pertinent empirical question is whether anhedonia is solely characterized by a diminished experience of positive affect or whether negative affect is involved as well. Trait positive affect (PA) refers to a dispositional tendency to experience positive or rewarding emotional states (e.g., enthusiasm, cheerfulness, joy), willingness to actively engage in the environment, and low reactivity to negative stimuli (Clark & Watson, 1999). In contrast, trait negative affect (NA) reflects the tendency to

experience aversive emotional states (e.g., tension, anxiety, hostility, distress), to perceive the world negatively and heightened reactivity to stress (Watson & Clark, 1984; Watson & Walker, 1996). Importantly, under the current models of personality and affectivity (Tellegen, 1985; Watson & Clark, 1992a, 1992b; Watson & Tellegen, 1985), PA and NA are two independent dimensions that have emerged in both short-term state and long-term trait ratings of affect and they are viewed as orthogonal dimensions that may have differential (i.e., not just opposite) correlations with other variables (e.g., Watson & Clark, 1992a, 1992b; Watson & Tellegen, 1985; Tellegen, 1985). It has been demonstrated that in individuals with schizophrenia, social anhedonia is significantly negatively correlated with trait PA and significantly positively correlated with trait NA (Blanchard et al., 1998). That is, a deficit in hedonic capacity within schizophrenia is characterized by both diminished positive affectivity and increased negative affectivity. Furthermore, the association between social anhedonia and this pattern of trait affectivity appears to be stable across different clinical states (Blanchard et al., 2001). To the extent that extroversion and neuroticism reflect dimensions of positive and negative affectivity respectively (Tellegen 1985; Tellegen & Waller, in press), these findings converge with other studies indicating decreased extraversion and increased neuroticism in schizophrenia (Berenbaum & Fujita, 1994).

Despite evidence that low trait PA and high trait NA are related to social anhedonia among schizophrenia patients (Blanchard et al., 1998; Blanchard et al., 2001), these results do not fully address the experiential and expressivity components of emotion as they relate to social anhedonia. Currently, examinations of the emotional deficit in social anhedonia come from two lines of research: studies of schizophrenia patients with

elevated social anhedonia and studies of nonpatients psychometrically identified as social anhedonics.

### Emotional Characteristics of Social Anhedonia in Patient Samples

Findings from the emotion research in the deficit syndrome of schizophrenia may provide an initial illustration of the emotional characteristics of social anhedonia. The deficit syndrome subtype is defined by the primary and enduring negative symptoms of the disorder, such as diminished facial affect, diminished emotional range, and diminished social drive (Carpenter, Heinrichs, & Wagman, 1988; Kirkpatrick, Buchanan, Breier, & Carpenter, 1993; Kirkpatrick, Buchanan, Ross, & Carpenter, 2001). In contrast to nondeficit schizophrenics, the enduring negative symptoms observed in deficit schizophrenics are not attributable to such influences as medication side effects, depression, anxiety, or paranoia. The validity of the deficit syndrome construct is supported by several lines of evidence indicating that schizophrenia patients with deficit syndrome differ from nondeficit syndrome schizophrenia patients in terms of clinical signs and symptoms, neurobiological correlates, social functioning (Horan & Blanchard, 2003a), course of illness, and treatment response (see Kirkpatrick et al., 2001 for a review).

Examination of emotion in the deficit syndrome is important to our understanding of social anhedonia for a variety of reasons. For example, compared to nondeficit syndrome patients, deficit syndrome patients consistently report elevations in social anhedonia (Horan & Blanchard 2003a; Kirkpatrick & Buchanan, 1990; Laos Boyer, & Legrand, 1999). Additionally, the pattern of emotional responding in deficit schizophrenics appears to be different from that of nondeficit schizophrenics (Bryson,

Bell, Kaplan, Greig, Lysaker, 1998; Earnst & Kring, 1999; Horan & Blanchard, 2003a). Earnst and Kring (1999) found that deficit syndrome patients demonstrate fewer objective ratings of observable facial expressions compared with nondeficit syndrome patients in response to emotionally valenced film clips. With regard to the experiential aspect of emotion, there are data pointing to a reduction of trait positive affectivity in deficit syndrome schizophrenics compared with nondeficit schizophrenics (Horan & Blanchard, 2003a), while there is no distinction in trait negative affectivity between the two groups. In line with those findings, more severely diminished emotional range (i.e., a negative symptom in the deficit syndrome) has also been associated with self reports of less positive emotion and less activated emotion in response to positive film clips (Earnst & Kring, 1999). Given the association between social anhedonia and the deficit syndrome, these studies have provided an indirect examination of the affective correlates in social anhedonia.

More direct examinations of emotion in social anhedonia have come from other researchers. Berenbaum and Oltmanns (1992) reported that although schizophrenia patients with or without blunted affect were more socially anhedonic than controls, the patient and control groups did not differ in self-reported emotional responses to pleasant and unpleasant film clips or flavored drinks. Similarly, Blanchard et al (1994) found that although schizophrenic patients scored higher on social anhedonia compared with other psychiatric patients, the self-reported affective response following pleasant and unpleasant film clips between the two patient groups was not significantly different. These results appear to mirror those from the earlier literature of emotion in

schizophrenia, such that the emotional experience of schizophrenics who are socially anhedonic is comparable to controls and other psychiatric patient groups.

Studies of emotion in schizophrenia patients should be interpreted with caution, as they are complicated with issues of medication side effects that are known to be common in this population, including blunted affect (Blanchard & Neale, 1992). Although researchers have employed sophisticated statistical methods, such as a within-subjects design, to partial out the effects of medication on emotional functioning (Kring & Earnst, 1999), other researchers argue that studies using unmedicated drug-naïve participants have the advantages of avoiding drug effects entirely (Blanchard & Neale, 1992). Consistent with that argument, investigators may find examinations of the emotional deficit in social anhedonia to be more informative when utilizing nonclinical populations psychometrically identified as social anhedonics.

#### Emotional Characteristics of Social Anhedonia in Nonpatient Samples

Among the limited number of emotion studies in nonpatient samples of anhedonics, two distinct types of anhedonia have been identified. These include social anhedonia and physical anhedonia, a deficit in the experience of pleasure from physical or sensory experiences, such as touch and taste. Like social anhedonia, physical anhedonia was initially proposed to be a vulnerability indicator of schizotypy (Chapman et al., 1976), though in contrast to social anhedonia, physical anhedonia was later found to have no predictive validity for psychosis (Chapman et al., 1994). However, despite Meehl's (1962; 1989; 1990) emphasis on a social pleasure deficit in schizophrenia and empirical support for social anhedonia as an indicator of schizotypy, the majority of emotion investigations have been conducted with physically anhedonic individuals.

Clearly, it is critical to include social anhedonics in future emotion studies. Nevertheless, given the paucity of research in social anhedonia, emotion studies of physically anhedonic individuals can be informative.

Reports comparing psychometrically identified anhedonic and normal control college students have yielded mixed results. First, only two studies have reported the relationship between trait affectivity and social anhedonia. Findings from the two groups of investigators are consistent with the schizophrenia literature, such that compared to controls, social anhedonics are characterized by higher trait NA (Brown, Blanchard, & Horan, 1998; Gooding, Davidson, Putman, Tallent, 2002) and lower trait PA (Gooding et al., 2002). Second, no studies to date have been conducted to examine the facial expressivity of social anhedonics in response to affect eliciting stimuli. However, in one relevant study carried out by Collins, Blanchard and Biondo (2004), social anhedonics displayed significantly more constricted facial affect compared to controls during an interaction with a clinician. Kring, Smith, and Neale (1994) also reported that social anhedonia was negatively correlated with a well validated self-report measure of emotional expressivity (Kring et al., 1994), such that greater social anhedonia was related to less self reported outward displays of emotion. These results suggest that like individuals with schizophrenia, socially anhedonic nonclinical individuals may demonstrate a deficit in emotional expressivity.

Third, while one study found that individuals with high physical anhedonia scores rated positive and neutral affective slides as less positive than controls (Fitzgibbons & Simons, 1992), most studies have typically demonstrated that physical anhedonics and controls do not differ in their self reports of emotional experience in response to

positively valenced stimuli (Allen, Trinder, Rae, & Brennan, 1995; Berenbaum, Snowwhite & Oltmanns, 1982; Germans & Kring, 2000). In the only study that examined the emotional experience of social anhedonics, Gooding, Davidson, Puttman, and Tallent (2002) measured participants' affective startle eyeblink modulation in response to positive affect eliciting pictures. Consistent with the general pattern of results emerging from these investigations, Gooding et al. (2002) found no group difference in affective eyeblink responses. As a whole, the lack of experiential differences in emotion (whether in self-report or psychophysiological measures) between anhedonics and controls appear at odds with reports of anhedonia.

A recent attempt to account for these observations has been made with a model of emotion, which proposes that different states of positive emotion differ not only in terms of the level of activation, but also by the type of pleasure relating to the appetitive and consummatory aspect of natural rewards (Germanns & Kring, 2000). According to researchers of basic emotion, there is an important distinction between positive emotion resulting from the expectation of a reward (i.e., appetitive pleasure) and positive emotion resulting from the engagement with a rewarding stimulus (i.e., consummatory pleasure) (Berridge, 1999; Depue & Collins, 1999; Klein, 1984). Germans and Kring (2000) proposed that anhedonia does not reflect a singular hedonic deficit (i.e., both appetitive and consummatory pleasure are impaired), but rather, anhedonia represents an appetitive hedonic deficit. To empirically evaluate this hypothesis, Germans and Kring (2000) presented cues (or written descriptions) of various positive, negative, and neutral physical stimuli to a college sample of physical anhedonics and controls to elicit anticipation of a sensory experience (e.g., "a golden-brown, freshly baked, chocolate chip cookie").

Subjects were later presented with visual slides of the actual stimuli. Inconsistent with their hypothesis, Germans and Kring (2000) found that compared to controls, physical anhedonic subjects did not differ in their reported experience of pleasure to either positive sensory cues or stimuli, indicating that no appetitive or consummatory hedonic deficit was evident in response to the laboratory task. These findings replicate other studies that have also failed to find group differences in self-reported experience of positive emotion in response to affect-eliciting stimuli (e.g, Allen et al., 1995; Berenbaum et al., 1987; Gooding et al., 2002). However, although researchers have not demonstrated group differences in the experience of emotion between social anhedonics and controls, major methodological limitations from prior studies may have contributed to these null findings.

#### Methodological Limitations

Across all studies of emotion in schizophrenia and social anhedonia, the most problematic methodological limitation lies with the stimuli used to elicit affective response (Blanchard, 1998). In Meehl's (1962) original conjectures, anhedonia was not constructed as a pan deficit in the capacity to experience pleasure. Rather, anhedonia is mainly interpersonal and "schizotypes seem to derive adequate pleasure from esthetic and cognitive rewards" (Meehl, 1982; p. 833), indicating that even social anhedonics can achieve pleasure from a few sources such as smoking or watching television. Yet, stimuli such as comedic film clips (e.g., Berenbaum & Oltmanns, 1992; Berenbaum, et al., 1982; Blanchard et al., 1994) and flavored drinks (Berenbaum & Oltmanns, 1992) that have no social or interpersonal context have been used to examine this social pleasure deficit. It may be that affect-eliciting stimuli that are nonsocial in nature cannot adequately tap the



social hedonic deficit presumed to underlie social anhedonia. Blanchard, et al., (1994) found that physical anhedonia, but not social anhedonia, was related to attenuated reports of positive affect following the viewing of non-social affect-eliciting films in schizophrenia and schizoaffective disorder patients. Based on these results, the authors suggested that the RSAS may only identify affective responding when an individual is confronted with socially relevant stimuli. In other words, the RSAS may only be related to affective experience within a social context. Thus, a social stimulus that can better elicit social affiliative experiences is much needed.

#### Summary of Current Knowledge

Social anhedonia has long been proposed as a core feature of the latent liability for schizophrenia (Meehl, 1962, 1989, 1990) and an accumulation of recent findings now lend promising support for this conjecture (e.g., Chapman et al., 1994; Kwapil, 1998). However, although a number of investigations have focused on the predictive validity of social anhedonia and its relation to the etiology of schizophrenia, less is known regarding the emotional and affective characteristics of social anhedonia. Preliminary negative findings of group differences in self-reported experience in response to positive affect-eliciting stimuli are at odds with self reports of anhedonia, trait-level response of decreased PA, and observations of blunted facial affect in social anhedonics. Methodological limitations from prior studies may account for the failure to find attenuated positive emotional experience in social anhedonics.

## CHAPTER 2: CURRENT STUDY

### RATIONALE

#### Methodological Refinement

To date, studies of the emotional experiences in anhedonia have only included evocative stimuli that are nonsocially oriented. Blanchard (1998) argued that the existing disjunction between self reports of social anhedonia and normative emotional experience (measured by self reports and physiological reactivity) in response to pleasant stimuli may be a consequence of the failure to use social stimuli in affect manipulation procedures. As noted above, examination of social-interpersonal factors is particularly important, as these factors are presumed to be central to the construct of social anhedonia.

Several different forms of social stimuli are available to investigators of emotion in social anhedonia, though they are not without potential limitations. One form of social stimuli may be found in an individual's naturalistic environment. For example, the experience sampling method (ESM) has been used in investigations of social behavior (Husky, Grondin, & Swendsen) quality of life (Delespaul and deVries, 1987), and stressful life events (Myin-Gremeys, Delespaul, deVries, 2000; Myin-Gremeys, Krabbendam, & Delespaul, 2003) in schizophrenia. ESM is a random time-sample self-assessment technique in which a subject is asked to document daily events and the mood states related to those events at various points throughout the day. In studies of positive affect relating to social experiences, ESM can provide data on the affective responses of anhedonic individuals that are elicited by ecologically valid social stimuli.

However, one major disadvantage of ESM is that social anhedonics will likely not participate in social activities given their social withdrawal. For example, Kwapił (1998)

found that compared to controls, social anhedonics are less likely to marry or date. Another concern of the ESM is that there may be significant differences between the quality of social interactions encountered by socially anhedonic and non-anhedonic individuals, which may result in misleading data. Individuals with social anhedonia have been found to have fewer friends (Blanchard, unpublished) and poorer quality of intimate relationships (Kwapil, 1998) compared to controls. Thus, any group differences found in affective experiences may possibly be a result of differences in the quality (e.g., interaction with a cashier versus a friend) or quantity of social interaction rather than the affective response to social interactions per se. These concerns highlight the importance of experimental control in examinations of affective experience.

Another strategy that may better ensure experimental control and minimize stimulus variability is to simulate social interactions in the laboratory. Simulated social interactions can be conducted with a role play involving a live confederate (role play test RPT; Sayers, Bellack, Wade, Bennett, & Fong, 1995) or an interactive videotaped confederate (Gangestad, Simpson, Cousins, Gurver-Apgar, & Christensen, 2004; Simpson, Gangestad, Christensen, & Leck, 1999). However, this type of social interaction is artificial and contrived, and may not necessarily be perceived by participants as pleasant. Indeed, simulated social interactions have actually been shown to be stress inducing in some cases (Horan & Blanchard 2003b). Recent work in basic personality and emotion research within the normal population suggests that there may also be other issues associated with simulated social interactions that could make data interpretation more challenging. Specifically, positive emotion from social interactions may be a result of multiple reasons, including enjoyment of leadership role and social

dominance (Depue & Collins, 1999), which may not necessarily be related to the social warmth and affection central to social anhedonia. Thus, differences in positive emotion states induced by social dominance and positive emotion states induced by social warmth have significant implication for emotion studies in social anhedonia.

#### Distinction between Affiliation and Agency

Based on the emotion and personality literature in the normal population, there are two independent and distinct components involved in positive emotional states during social interactions (Depue & Collins, 1999; Morrone-Strupinsky & Depue, 2004; Morrone, Depue, Scherer, & White, 2000). Namely, these two systems are agency and affiliation. Agency represents a general disposition encompassing social dominance, enjoyment of leadership roles, assertiveness and a sense of accomplishment that is manifested in a range of achievement-related, as well as interpersonal, contexts. In contrast, affiliation is strictly interpersonal in nature, and appears to reflect enjoying and valuing close interpersonal bonds and being warm and affectionate (Carter, Lederhendler, & Kirkpatrick, 1997). A relevant distinction that should be noted is between affiliation and sociability. Sociability is a broader construct that is quantitative in nature (i.e., frequency of social engagement), while affiliation refers to the quality of interactions, based particularly on social reward derived from close interpersonal bonds with specific individuals (Depue & Morrone-Strupinsky, in press; Lucas, Diener, Grob, Suh, & Shao, 2000). Indeed, it has been demonstrated that when these two different aspects of social interaction (i.e., sociability and affiliation) are psychometrically separated, their correlation is near zero (Lucas et al., 2000).

Support for the distinct subtypes of positive emotional states involved in social

situations (i.e., affiliation and agency) comes from studies indicating that the strongest adjectival markers of trait affiliation are warm, affectionate, kind, compassionate, and sympathetic (Goldberg & Rosolack, 1994). In contrast, agency is characterized by adjectival markers of enthusiasm, joy, energy, and confidence (Watson & Clark, 1997; Watson & Tellegen, 1985). Of importance, affiliative adjectives correlate near zero with agentic adjectives (Goldberg & Rosolack, 1994; Tellegen & Waller, in press), indicating their independence. Additional support comes from psychometric studies. Both affiliation and agency have been shown to be about equally associated (0.42 and 0.21, respectively) with positive emotions (Helgeson, 1994; Watson & Clark, 1997), though affiliation and agency do not correlated strongly (0.14) with each other (Watson & Clark, 1997). However, partial correlations have demonstrated that when positive emotion is statistically removed, the association between scales of affiliation and agency is nonsignificant (Watson & Clark, 1997). A significant implication from these findings suggest that although affiliation and agency both generate a general, nonspecific state of pleasant emotional feelings, they are in fact distinct subsystems (Depue & Collins, 1999). The distinction between these subtypes of positive emotional states is important to research in social anhedonia, as it has implication for the way in which the affective deficit in social anhedonics is measured.

In studies of social anhedonia, the affective deficit is more closely associated with what has been described as affiliation (e.g., social warmth and affection), rather than the agentic component (e.g., social dominance) of positive emotional states. What has been lacking in the literature is a social stimulus designed to elicit social affiliation that can enhance our assessment of the pleasure deficit underlying social anhedonia. The use of

dynamic film material has become a standard means of studying emotion in normal controls (Gross & Levenson, 1995), schizophrenia and social anhedonia (e.g., Berenbaum & Oltmanns, 1992; Germans & Kring, 2000; Gooding et al., 2002; Kring et al., 1993; Kring & Neale, 1996) among ethnically diverse populations (Gross & Levenson, 1995). Continuation with this type of approach will allow researchers to compare findings across studies.

### Film Induction of Affiliation

One group of investigators has successfully developed film material (i.e., close mate relationship encountering struggles and joys), that is shown to specifically induce affiliation in females (Morrone-Strupinsky & Depue, 2004). From a sample of female participants, Morrone-Strupinsky & Depue (2004) reported that scores on a Warm-Affectionate scale significantly increased following viewing of the affiliative film. Further, affiliative film-induced increases in warmth-affection ratings were significantly related to trait measures of social closeness (a component of affiliation), but not social potency or achievement (components of agency) (Morrone-Strupinsky & Depue, 2004). Conversely, agentic film material was associated with increases in motivation-positive activation ratings, and these changes in activation significantly correlated with social potency, but not social closeness (Morrone-Strupinsky & Depue, 2004). Although initial validity for the affiliation film clip has been demonstrated in females, the emotional experience in response to this social stimulus has not been examined in males. Nevertheless, these findings appear to support the efficacy of the film-induced affiliation paradigm, at least in the female population.

### Conclusions

In summary, an accumulation of research points to the role of social anhedonia in schizophrenia, though there is a void in the literature that has yet to explain the emotional characteristics of this social pleasure deficit. The most promising method to examine emotion in social anhedonia is to utilize a social stimulus that can adequately target affiliative states. The most appropriate social stimulus currently available is the affiliation film material developed by Morrone-Strupinsky & Depue (2004). Using the film-induced affiliation paradigm, this proposed study will examine both the expressivity and experiential domains of emotion in social anhedonics and normal controls.

#### OVERVIEW OF THE CURRENT STUDY

In this study, social anhedonics were identified through screening in a large sample of freshman undergraduate students. Two groups, social anhedonics and controls, were identified based on extreme scores on a self-report measure of social anhedonia. Both groups of subjects were recruited to participate in laboratory assessments that involved trait affectivity, general disposition of emotional expressiveness, and the expression and experience of emotion in response to affiliative, non-affiliative (i.e., comedy), and neutral film clips. Facial expressions and self-reported experience in response to the film chips were examined to determine if social anhedonics would demonstrate attenuated expressivity and diminished positive emotion compared to controls.

This study examined the following hypotheses:

1. Replicating previous studies of schizophrenia and social anhedonia, social anhedonics would report lower trait positive affectivity and greater trait negative affectivity compared to controls.

2. Extending prior findings, anhedonics would report having a general dispositional tendency to be less emotionally expressive compared to controls. Self-reported levels of positive expressivity, negative expressivity, and impulse strength to express emotion would also be lower in social anhedonics as compared to controls.
3. Compared to controls, social anhedonics would report attenuated state positive affect following the affiliation film clip. Additionally, social anhedonics would report lower ratings of warmth and affection following the affiliation film clip compared to controls. There would be no group differences in reports of positive affect or warmth and affection following the comedy or neutral film clip.
4. Compared to controls, social anhedonics would be characterized by less facial expressions (in frequency, duration and intensity) in response to both the affiliative and comedy stimuli.
5. Additionally, self reports on a general index of emotional expressiveness would be positively correlated with observed ratings of facial expressions in response to film stimuli for controls and social anhedonics.



## CHAPTER 3: METHODS

### PARTICIPANTS

Female undergraduate students at the University of Maryland were recruited to participate in this study. The current study focused exclusively on female subjects for the following reasons. First, although epidemiological data suggest that schizophrenia is equally prevalent in both sexes (Dohrenwend & Dohrenwend, 1974; Lewine, Burbach & Meltzer, 1984), most emotion studies have only included male schizophrenics (e.g., Aghevli et al., 2003; Earnst & Kring, 1999; Kring & Earnst, 1999; Kring et al., 1993; Kring & Neale, 1996) and emotion in female schizophrenics and anhedonics is virtually unknown. Second, validity for the film-induced affiliation paradigm has only been documented in women thus far (Morrone-Strupinsky & Depue, 2004). Third, Kring and Gordon (1998) found that, although healthy females are more facially expressive than healthy males, they do not differ in self-reported experienced emotion in response to happy, sad, and film-inducing films. However, while similar magnitude of emotion is experienced by both genders in response to positive and negative affect eliciting films, pilot work conducted by the developers of the film material (Morone-Strupinsky & Depue, 2004) suggested that different stimuli may be needed to induce warmth-affection states in males and females. To date, there is no affiliative inducing stimulus available for men. Given the failure to include females in prior emotion studies coupled with the lack of gender differences in emotional experience and the lack of social affiliative stimuli for men, data collection for this study was limited to female participants to increase internal validity. As such, the current study presented a unique opportunity to extend the existing literature on the emotional responding in female social anhedonics.

## Recruitment

Female freshman students living on campus ( $N = 3,850$ ) were identified by the Department of Residential Life. Using preprinted mailing labels purchased through the Department of Residential Life, students were mailed a recruitment letter, inviting them to participate in an online survey, which consisted of a series of anhedonia screening questionnaires and emotional expressivity measures. Reminder letters were used as a strategy to increase recruitment success. The screening questionnaires, which participants completed from a secured University maintained website, consisted of the Revised Social Anhedonia Scale (RSAS; Eckblad et al., 1982), an Infrequency Scale (IS; Chapman & Chapman 1976) designed to exclude invalid responses, the Emotional Expressivity Scale (EES; Kring, Smith, & Neale, 1994), and the Berkeley Expressivity Questionnaire (BEQ; Gross & John, 1995). All subjects were entered into a lottery prize drawing for \$50 per 100 participants upon completion of the questionnaires. A total of 1,082 participants completed the screening questionnaires from the available sample.

Subsequent group selection was based on individual responses to the RSAS. Because of concerns that there might be a bias in RSAS scores due to race, the RSAS scores were z-scored separately by race. Subjects with extreme scores on the RSAS that was at least 1.96 standard deviations above the mean were assigned to the social anhedonia group, while subjects with RSAS scores of no more than .5 standard deviation above the mean were assigned to the control group. These cut-off scores have been widely used throughout the literature and seem to effectively identify a deviant, anhedonic group and an appropriate control group (Chapman et al, 1994; Kawpil et al., 1998). Subjects were excluded if they endorsed 3 or more items in the unexpected

direction on the Infrequency Scale (Jackson, 1974). The Infrequency Scale is designed to identify those individuals who may be responding randomly in order to allow these invalid responses to be eliminated. This exclusionary methodology has been used consistently in psychometric research and in conjunction with the RSAS (e.g., Chapman et al., 1994; Kawpil et al., 1998). Nineteen of the 1,082 participants (1.75%) who completed the screening questionnaire were excluded from the current study due to high infrequency scores. This percentage of subjects classified as invalid responders is consistent with the available data indicated in a previous study (Chapman et al., 1976). Control participants were selected to match social anhedonia participants on race. All subjects provided informed consent.

Of the 1,082 participants who completed the screening questionnaire, 51 social anhedonics and 702 controls were identified using the selection procedure noted above. The percentage of social anhedonics identified in the current study (4.7%) is consistent with the low base rate reported in the taxometric literature (Blanchard et al. 2000; Horan, Blanchard, Gangestad, & Kawpil, 2004). Potential subjects identified by this selection procedure were contacted by telephone or E-mail and invited to participate in the laboratory assessment phase of the current study. During the recruitment, each subject was informed details of the laboratory task and that they would be compensated with \$20 for their participation. Upon arrival to the study site, each participant reviewed and signed a consent form which specified the study tasks, risk involved, and participation rights. The final sample included 34 social anhedonics and 45 controls. During the recruitment process, every effort was made to ensure that the groups did not differ by ethnicity. Chi-squared analyses of the recruited participants showed that there were no

significant differences between social anhedonics and controls on ethnicity,  $\chi^2$  (4, N = 79) = 4.00,  $p > .05$ . The two groups also did not differ in age,  $t$  (77) = 1.12,  $p > .05$  (see Table 1 for Demographics).

## MEASURES

### Assessment of Social Anhedonia

The Revised Social Anhedonia Scale (RSAS; Eckblad et al., 1982 see Appendix C) was administered as part of the initial screening questionnaire to assess for social anhedonia. The RSAS is a 40 true/false item inventory to assess social anhedonia and include questions such as “Having close friends is not as important as many people say” (keyed true) and “Just being with friends can make me feel really good” (keyed false). Validation of the RSAS as a measure of social anhedonia comes from findings that high scores on the RSAS is related to interview-based reports of current social withdrawal and isolation (but not loneliness), and reports of less enjoyment from and need for social contact (Mishlove & Chapman, 1985). Additionally, the RSAS has been shown to be internally consistent with coefficient alphas between 0.79 and 0.84 (Blanchard, Mueser, & Bellack, 1998; Mishlove & Chapman, 1985), and it has demonstrated high test-retest reliability over a 90-day period with a stability coefficient of 0.79 (Blanchard et al., 1998) and over a 1-year period with a stability coefficient of 0.72 (Blanchard et al., 2001). The current study has also found the RSAS to be internally consistent with Cronbach’s Alpha of .82. Taxometric procedures have been used to show that a low base rate taxon of extreme high scorers approximately .10 exists for the RSAS (Blanchard et al., 2000; Horan et al., 2004). These findings are consistent with Meehl’s (1962, 1989) conjecture of a latent class of individuals predisposed to developing schizophrenia. Additional data

supporting the validity of the RSAS as a measure of schizotypy comes from studies showing elevated social anhedonia in schizophrenia (Blanchard, et al., 1998; Chapman et al., 1976) and their family members (Katsanis et al., 1990; Kendler et al., 1996), cross-sectional studies showing elevated schizophrenia-spectrum disorder dimensional scores in social anhedonic individuals (Brown, Blanchard, & Horan, 1998), and longitudinal studies of the development of schizophrenia-spectrum disorders in social anhedonics (Kwapil, 1998).

The Infrequency Scale (Chapman & Chapman, 1976 see Appendix D) has been designed as an invalidity index for the RSAS and was used to in the current study to identify invalid responses. This 17-item scale is composed of items that are almost universally answered in one direction. An example item is “I visited Eastern Island last year” (keyed true). Following procedures from prior studies (e.g., Chapman et al., 1994; Kwapil, 1998) scores with a criterion of three or greater responses in the unexpected direction on the infrequency scale suggest invalid responding. Individuals with such invalid responding were excluded from the study.

#### Assessment of Trait Affectivity

Trait positive affect (PA) and trait negative affect (NA) were measured with the General Temperament Survey (GTS; Clark & Watson, 1990 see Appendix E). The present study focused on the two factor analytically derived affect scales from the GTS: Negative Temperament and Positive Temperament. Individuals scoring high on the 27-item trait PA scale describe themselves as happy, enthusiastic, and acting in ways conducive to experiencing positive emotional experiences. Individuals scoring high on the 28-item trait NA scale describe themselves as anxious, worrying, irritable, and

generally tend to appraise the environment in a manner that fosters negative emotional experiences. These 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, 2003a). The internal consistency (Cronbach's alpha) for trait PA in this study was found to be high for social anhedonics ( $\alpha = .91$ ) and controls ( $\alpha = .89$ ). Alphas for trait NA was also found to be high for social anhedonics ( $\alpha = .94$ ) and controls ( $\alpha = .89$ ).

#### Self-reported Emotional Expressivity

The general disposition to outwardly express emotion was assessed with the Emotional Expressivity Scale (EES; Kring, Smith, & Neale, 1994 see Appendix F), which allowed for a broader assessment of emotional expression. The EES is a 17-item self-report questionnaire that is a general index for outward expressivity, regardless of emotional valence (e.g., positive or negative) or channel (facial, vocal, or gestural) of expression. The response format for the EES is a 6-point Likert scale (1 = never true and 6 = always true), allowing ratings of the extent to which each item applies to each participant. This scale contains items such as "I think of myself as emotionally expressive", "I display my emotions to other people" and "Other people aren't easily able to observe what I'm feeling." From a large validity study using six different samples of college students and adults from the community, the EES has shown to be highly reliable, with an average alpha of .91 and a 4-week test-retest correlation of .90 (Kring et al., 1994). In the current study, the EES demonstrated to have high internal consistency

(Cronbach's alpha) for social anhedonics ( $\alpha = .93$ ) and controls ( $\alpha = .90$ ).

The EES has demonstrated good convergent and discriminant validity, such that the EES is significantly related to other self-report measures of emotional expressiveness, but examination of the measures' unshared variance suggest that they are not redundant with one another (Kring et al., 1994). Further, EES has been shown to be positively related to ratings of facial expressions made by trained coders, providing evidence that participants are able to report on their own levels of expressiveness (Kring et al., 1994). Finally, EES does not appear to be just a measure of "emotionality" and not expressivity. Partial correlation analyses show that the magnitude of the relationship between EES and facial expressions remains the same even after controlling for emotional experience (self-report mood) in response to affective stimuli (Kring et al., 1994). However, although the EES provides a broad assessment self-reported general expression of emotion, it does not allow investigators to exam emotion in a multidimensional fashion.

The Berkeley Expressivity Questionnaire (BEQ; Gross & John, 1995) is a 16-item self-report questionnaire that takes a multifaceted approach in measuring expressions of emotion (see Appendix G). It is designed to assess both a) the general strength of emotion-response tendencies and b) the degree to which such tendencies are typically expressed as manifest behavior. Thus, while the EES measures general emotional expressivity, the BEQ provides additional information in various dimensions of emotion. Three facets representing typical levels of behavioral modulation have been found in this scale: Positive Expressivity, which represents the degree to which positive emotional response tendencies are expressed behaviorally, Negative Expressivity, which represents the degree to which negative emotional response tendencies are expressed behaviorally,

and Impulse Strength, which is conceptualized as the general strength of the emotional-response tendencies (Gross & John, 1997; Gross & John, 1995). Thus, the BEQ is composed of three subscales, including the Positive Expressivity Subscale, Negative Expressivity Subscale, and Impulse Strength Subscale, and one Total Score, which is computed by averaging across the three subscales. Internal consistency has been demonstrated for the total BEQ and the three subscales, with alphas ranging from .70 to .86 (Gross & John, 1997). In the current study, high internal consistency (Cronbach's alpha) was found for the total BEQ in social anhedonics ( $\alpha = .84$ ) and controls ( $\alpha = .80$ ), the BEQ Negative Expressivity Subscale in social anhedonics ( $\alpha = .80$ ) and controls ( $\alpha = .71$ ), and the BEQ Impulse Strength Subscale in social anhedonics ( $\alpha = .77$ ) and controls ( $\alpha = .71$ ). Although high internal consistency was found for the BEQ Positive Expressivity Subscale in social anhedonics ( $\alpha = .70$ ), a lower alpha was found for controls ( $\alpha = .43$ ) in the current sample. All three facets of emotional expressivity have been shown to correlate with one another, ranging from .52 to .56 (Gross & John 1997), and the BEQ has shown convergent and discriminant validity with peer ratings (Gross & John, 1997).

#### Self-reported Experience of Emotion

A scale based on the circumplex model of emotion explicated by Larsen and Diener (1992 see Appendix H) was administered to assess emotional experience (i.e., mood) at baseline and in response to the film stimuli. This scale is a 36-item self-report questionnaire designed to provide a quick, reliable, and valid measurement of pleasantness or state positive affect (PA) and unpleasantness or state negative affect (NA). The 18-item PA scale consists of items taping pleasant affect such as elated and happy



and the 18-item NA scale consists of items reflecting unpleasant affect, such as distress and unhappy. In completing these scales, subjects were instructed to rate on a 5-point Likert scale (1 = very slightly or not at all, 5 = extremely) the extent to which they were experiencing each of the 36 affective terms “right now, that is, at the present moment.” These scales have been shown to have good internal consistency reliabilities for both schizophrenic patients and non-patient samples (e.g., Horan & Blanchard, 2003b; Kring & Earnst, 1999), with alphas ranging from 0.93-0.97 and 0.76-0.90, respectively. In the current study, alphas for PA ranged from 0.88-0.95 and 0.93-0.96 for social anhedonics and controls, respectively. Alphas for NA in the current study ranged from 0.92-0.94 and 0.76-0.90 for social anhedonics and controls, respectively. These alphas indicate that both the PA and NA scales have good internal consistency reliabilities for both social anhedonics and controls across the different film conditions.

The Warm and Affectionate scale (WA; Morrone-Strupinsky & Depue, 2004 see Appendix I) was constructed to measure the emotional state accompanying trait affiliation. The emotional nature of this dimensional scale is characterized by the two strongest adjectival markers defining an affiliation factor, warm and affectionate. The WA requires a single rating for feelings of warmth and affection, on a 7-point Likert scale with increasing magnitude (0 = not at all, 3 = moderately, 6 = completely). Ratings of the WA scale are current state ratings introduced by “Rate how you currently feel in comparison to the highest level indicated on the rating scale.” It has been previously found that ratings having a comparison point (i.e., highest level on the scale) are less variable within a subject across time and more orderly in their relation to other indices of mood (Krauss, Depue, Arbisi, & Spont, 1992). Published data on the reliability of IM-

SS ratings do not yet exist, as this is a new instrument, though preliminary validity for the WA scale has been reported by Morrone-Strupinsky & Depue (2004). Affiliative film-induced increases in warmth-affection ratings have been found to be positive related to social closeness, as measured by the Multidimensional Personality Questionnaire (MPQ; Tellegen, 1982), but not social potency, well being, or achievement (Morrone-Strupinsky & Depue, 2004).

#### Assessment of Expression of Emotion

Facial expressions in response to the film stimuli were rated by using the Facial Expression Coding System (FACES; Kring & Sloan, 1991 see Appendix J), a behavioral coding system that was developed based on a two dimensional model of emotion, where each emotion varies on both valence (positive or negative) and intensity (weak or high intensity). Researchers have argued that the variance of emotional experience is best captured by these two dimensions (Watson, Clark, & Tellegen, 1988). Additionally, research supports the two dimensional model of affect as being present in patients with schizophrenia and schizoaffective disorder, as well as for nonpatient samples. Therefore, this model appears to be valid and applicable to populations not typically included in the studies of the structure of affective experience (Kring, et al., 2003). FACES was designed to be used reliability and more time-efficiently than many other measure of facial expression, and to provide richer information about the frequency, intensity, valence, and duration of facial expressions.

When used with trained undergraduate and graduate students as coders on a variety of subject populations, interrater agreement has been very high ( $r = 0.70-0.99$ ) (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). Thus, FACES has been the standard measurement of facial expressions in numerous studies (e.g., Aghevli, Blanchard, & Horan, 2003; Earnst & Kring, 1999; Kring & Earnst, 1999; Kring et al., 1993; Kring & Neale, 1996).

*Variable Composition:* The FACES coding system involves making separate frequency counts for positively and negatively valenced facial expressions. According to FACES, an emotional expression is defined 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 valance, the second display is counted as a separate discrete expression. In addition, each individual facial expression is rated on duration (in seconds) and intensity (from 1 = low to 4 = high). Should an expression vary in intensity over time, the highest intensity rating during that expression is counted. Mean scores for duration and intensity were computed to capture the duration and intensity per expression. Non-emotional facial movements such as yawning, sneezing, or facial tics are not coded as facial expressions. Further, facial expressions are intended to be identified independent of speech. For the purposes of this study, FACES ratings were made without the audio component of the videotapes in order to prevent contamination of ratings.

Historically, emotion studies using FACES to measure facial expressions have examined congruent expressions to the emotional eliciting stimuli (e.g., Aghevli et al., 2003; Earnst & Kring, 1999; Kring & Neale, 1996; Kring et al, 1993). That is, positive facial expressions are examined during a happy film and negative expressions are examined during sad/scary films. Following that approach, analyses in this study focused

only on positive expressions on all films (neutral, comedy, affiliative). This approach has been widely used and supported in other similar studies of expression and experience of emotion (e.g., Earnst & Kring, 1999; Kring & Neale, 1996; Kring et al, 1993). Thus, group comparisons were made with three measures of facial expressivity (frequency, mean duration, mean intensity) across three different film stimuli for positive expressions.

*Coder Training:* A graduate student and an advanced undergraduate student, trained by Ms. Winnie Leung, performed the FACES ratings. Given that the a priori hypothesis of facial expressivity in the current study concerns group differences (i.e., social anhedonics would display less facial expressions overall compared to controls) rather than a function of film differences, raters were blind to group status, but not to the films being watched by the participants. Agreement between the two coders was established during a training period, using pilot videotaped expressed facial emotions of subjects not included in the study. During this training period, coders began by discussing how to make ratings and discussing their individual ratings until disparities are minimized. The criterion for agreement during training was an  $r$  of 0.8, a criterion that was met. Once all coders have an understanding of how to accurately rate these dimensions, they began to independently rate tapes for all subjects from the present study and agreement was calculated statistically across the entire set of FACES ratings. Periodic random checks of their agreement were conducted to prevent coder drift. Previous studies have found intra-class correlations (ICCs; Shrout & Fleiss, 1979) for both normal and schizophrenics to be high, typically averaging 0.9 and above (Kring et al., 1993; Kring & Earnst, 1999). In order to minimize the effect of individual coder error, the FACES ratings for each subject consisted of an average rating between the two

coders.

## MATERIALS

### Film Stimuli

Three different film clips were used in the current study to induce emotional states. These film stimuli included an affiliative, comedy and neutral film clip, with each lasting 9 minute 35 seconds, 5 minutes 33 seconds, and 2 minutes 58 seconds in duration, respectively. The affiliative film clip used in this study was a novel stimulus developed by Morrone-Strupinsky & Depue (2004). Selection of affiliative film material was based on a number of strict criteria guided by theories of emotion. First, film content should be relatively independent of scenes or organismic states that can induce incentive motivation. Film contents that can elicit incentive states, such as hunger or sexual motivation, can influence reactivity to affiliative stimuli and, thereby, increase individual variation in warmth and affection that derives from other sources (Depue & Collins, 1999). Second, in addition to pro-affiliative effects, film stimuli that also have an inhibitory influence on emotional reactivity may increase error variance in induced affiliative state. For instance, sexual stimuli may have differential inhibitory effects as a function of shyness, religion, or gender (Morrone-Strupinsky, 2004). Third, it has been documented that stories portrayed in film material increase vicarious identification with a character's positive emotional state when the number of main characters is one (or one of each gender) rather than when there are multiple characters, none of whom represents a primary character, as in a team story (Morrone et al., 2000). Fourth, the film story should be immediately understood by most members of a specific society as representing an affiliative context. Morrone-Strupinsky and Depue (2004) propose that nonsexual interaction between

romantic partners or between parents and children is an immediately understood context that induces strong feelings of warmth and affection.

After an initial film selection by Morrone-Strupinsky and Depue (2004), scenes from one film were extracted and put together as a coherent story. This final affiliative film clip portrays the development of a close mate relationship (without sex scenes) as the couple encounters struggles and joys while they are expecting their first child and after the birth of their child (Morrone-Strupinsky & Depue, 2004). This film clip has been found to be the most effective in inducing an emotional state of warmth and affection as indexed by the Warm and Affectionate scale (Morrone-Strupinsky & Depue, 2004).

In addition to the affiliative film clip, a comedy non-social film clip that has been widely used in similar studies (e.g., Earnst & Kring, 1999; Kring & Neale, 1996; Kring et al, 1993) was included in the present study to compare affiliative and affective differences between social and non-social film clips. This comedy film clip was developed and provided by Dr. Ann Kring, and consisted of excerpts taken from a slapstick comedy movie depicting a man and a woman encountering a number of things go wrong with their new house (e.g., doorbell shorts out, door falls over, raccoon jumps out, bed mattress collapse, stairs fall down). However, this clip portrayed very minimal interaction between the man and the woman. Previous studies have demonstrated that this film clip is effective in inducing state positive affect in controls and individuals with schizophrenia, as compared to both negative (sad, fear) and neutral films (e.g., Kring & Neale, 1996). A neutral film clip consisting of a narrated segment of tropical rain forest scenes served as a control to examine whether the affiliative and comedy film clips could

produce affective reaction.

## PROCEDURES

Following group assignment, social anhedonic and control subjects completed measures of trait affectivity (NA and PA) and self-report measures of emotional expressiveness prior to arriving for their appointments for the laboratory task. Self-report measures of baseline affective states, including state PA, state NA, and warmth-affection, were administered approximately five minutes after each subject arrived to the laboratory. Three film clips (affiliative, comedy, neutral) were presented to each subject. In order to minimize order effects, each subject was randomly assigned to view one of six tapes, with each tape consisted of the three film clips presented in different orders. Additionally, each of the six tapes was randomly viewed once by every six subjects in order to ensure equal distribution of the tapes across the sample. Film clips were presented on a 27" color television monitor, with a 5-minute resting interval between each film clip to complete questionnaires and to dissipate emotion induced by the prior film. Self-report measures of affective states were completed immediately after the presentation of each film clip. During each viewing, participants' facial responses were videotaped by a concealed digital camera for later coding. All subjects were compensated with \$20 for their participation.

## CHAPTER 4: RESULTS

### OVERVIEW

Statistical analyses were conducted in six stages. First, group differences in trait affectivity were examined. Second, group differences in self-reported emotional expressivity were assessed. Third, repeated measures analyses were performed to examine whether there is an emotional experiential deficit in social anhedonics across the film stimuli, as compared to controls. Fourth, repeated measures analyses were performed to examine whether there are any group difference in laboratory ratings of facial expressions across the different film stimuli. Fifth, correlational analyses between laboratory ratings of facial expressions and self-reported emotional expressivity were examined among social anhedonics and controls. Sixth, post hoc exploratory analyses were conducted to examine whether social anhedonics demonstrated greater discrepancies between the experience and expression of emotion.

### TRAIT AND STATE AFFECTIVITY

#### Trait Affect

Descriptive statistics for trait PA and trait NA are presented in Table 2. Social anhedonics reported lower trait PA, as compared to controls ( $t [77] = -4.66, p < .05$ ), but there were no group differences in levels of trait NA ( $t [77] = 1.45, p > .05$ ). 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 and controls are comparable in the general dispositional tendency to experience negative emotions.

#### State Affect



Baseline positive affect, negative state affect, and warm and affectionate mood were measured to assess mood states upon arrival to the laboratory. Descriptive statistics for these mood states are presented in Table 3. T-tests were conducted to examine group differences in self-reported state affect at baseline. Compared to controls, social anhedonics reported significantly lower state PA ( $t [77] = -2.33, p < .05$ ) and lower levels of warmth and affection ( $t [77] = -2.36, p < .05$ ) at baseline. However, there were no significant group differences in the state NA between social anhedonics and controls ( $t [77] = .91, p > .05$ ). These results mirror the trait affect findings, such that social anhedonics demonstrated a pattern of low state PA and low levels of warmth and affection upon arrival to the laboratory, as compared to controls, but the two groups demonstrated comparable baseline state NA.

## SELF-REPORT INDICES OF EMOTIONAL EXPRESSIVITY

### Group Comparison of Expressivity

Group comparisons in the general disposition to express emotions were examined using the EES while the BEQ was utilized to assess multifaceted emotional expressivity. The BEQ yields three subscales that capture three different dimensions of emotional expressivity: the BEQ Positive Expressivity, BEQ Negative Expressivity, BEQ Impulse Strength. A MANOVA was conducted to compare the self-reported emotional expressivity of social anhedonics to that of the control subjects. One social anhedonic and two control subjects had incomplete data on the EES and were excluded from the EES analysis. Descriptive statistics are presented in Table 4. The MANOVA showed significant differences between the two groups, ( $F [4, 71] = 17.77, p < .01$ ). Posthoc one-way ANOVAs showed that, compared to controls, social anhedonics reported lower EES

scores ( $F [1, 74] = 53.89, p < .01$ ), lower BEQ Positive Expressivity ( $F [1, 74] = 55.37, p < .01$ ), lower BEQ Negative Expressivity ( $F [1, 74] = 20.73, p < .01$ ), and lower BEQ Impulse Strength ( $F [1, 74] = 4.49, p < .05$ ). Thus, results showed that, in comparison to controls, social anhedonics reported a disposition to display less positive and negative emotions as well as a general tendency to be less emotionally expressive, regardless of valence or channel of emotion. Further, social anhedonics also reported lower impulse intensity to display outward emotions, as compared to controls.

#### Intercorrelations of Indices

Correlations between the EES and the BEQ subscales were computed separately for social anhedonics and controls in order to examine the intercorrelations between these variables (see Table 5). Pearson's  $r$  showed that the EES total score is in general highly correlated with the BEQ subscales for both groups (.50 to .78), but it was not significantly correlated with BEQ Impulse Strength within the social anhedonia group. While the BEQ Positive Expressivity, BEQ Negative Expressivity, and BEQ Impulse Strength are in general moderately intercorrelated, each of these subscales is highly correlated with the BEQ Total Score for both groups, as expected.

#### SELF-REPORTED EMOTIONAL EXPERIENCE

In order to assess the ability of the film stimuli to elicit affect, it was necessary to both examine the effects of the manipulation on experienced emotion across film stimuli and the differences on experienced emotion across the two groups. A two (group: social anhedonics vs. controls) x three (film condition: neutral-comedy-affiliative) repeated measures ANOVA was conducted separately for positive emotion, negative emotion, and warmth and affection. In this experimental design, analysis of covariance (ANCOVA)

will not be used to control for baseline positive affect, negative affect, and warmth and affection for a number of reasons. First, ANCOVA was developed as a statistical noise reduction technique to adjust the observed differences in the group means, prior to experimental treatments, that are due to chance (i.e., statistically independent of group membership) rather than being meaningfully related to the group variable. However, Miller and Chapman (2001) explained that when group membership is predetermined nonrandomly, “controlling for” a given pretreatment difference would be inappropriate as the observed pretreatment differences (i.e., the covariate) may reflect some meaningful, substantive differences that are attributable to group membership rather than random error. Second, when pretreatment differences are analyzed as covariates in an experimental design with predetermined and nonrandom group memberships, the grouping variables would be in essence substantially altered in a way that is not conceptually meaningful (Elashoff, 1969; Evans & Anastasio, 1968). As such, a covariance adjustment with nonrandom and predetermined groups may thus remove part of the treatment effect or produce a spurious treatment effect (Cochran, 1957; Elashoff, 1968).

In the current study, group status is assigned by scores on the RSAS (i.e., having a personality trait of social anhedonia or not). Group differences in baseline mood found in the current study may reflect meaningful differences that are attributable to group membership and to partial out this factor as a covariate would essentially alter inherent group characteristics that are important and violate the underlying assumptions of an ANCOVA. Based on the current experimental design (i.e., predetermined membership), baseline mood measures will not be used as covariates in the subsequent analyses.

Manipulation check on mood changes produced by the comedy and affiliative film stimuli will be compared against the neutral film clip.

Self-reported positive emotions experienced in response to the film clips are presented in Figure 1. For state PA, the repeated measures ANOVA showed a significant main effect for group ( $F [1, 77] = 6.01, p < .05$ ) and a significant main effect for film condition ( $F [2, 76] = 16.68, p < .01$ ), but no significant group by film condition interaction ( $F [2, 76] = 1.83, p > .05$ ). Posthoc pairwise comparisons showed that, compared to controls, social anhedonics reported significantly lower levels of positive affect across the three films ( $p$ 's  $< .05$ ). In addition, pairwise comparisons showed that, as compared to the neutral film, subjects reported significantly higher levels of state PA during both the comedy ( $p < .01$ ) and the affiliative ( $p < .01$ ) films. Subjects also reported significantly higher levels of state PA during the affiliative film as compared to the comedy film ( $p < .05$ ). These results indicate that, as a group, social anhedonics reported experiencing lower levels of positive emotions as compared to controls, regardless of the film condition. Further, results suggest that the comedy and affiliative films produced significant changes in mood for both groups, as compared to the neutral film, with the affiliative film eliciting the highest level of PA followed by the comedy film and then the neutral film.

Group reports of negative affect in response to the films are presented in Figure 2. For NA, there was a significant main effect for film condition ( $F [2, 76] = 10.96, p < .01$ ), but the main effect for group was non-significant ( $F [1, 77] = .29, p > .05$ ), as was the group by film condition interaction ( $F [2, 76] = 3.66, p > .05$ ). 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. However, pairwise comparisons showed that there were no significant differences in the level of state NA experienced by subjects between the comedy and affiliative films ( $p > .05$ ). Thus, although there were no differences in the level of negative affect experienced across the two groups, the comedy and affiliative films both elicited significant declines in the participants' level of state NA as compared to the neutral film.

The levels of warmth and affection reported by social anhedonics and controls are presented in Figure 3. For warm and affectionate ratings in response to the films, there was a significant main effect for film condition ( $F [2, 76] = 40.59, p < .01$ ), but no significant main effect for group ( $F [1, 77] = 2.50, p > .05$ ) or the group by film condition interaction ( $F [2, 76] = 2.17, p > .05$ ). Posthoc pairwise comparisons showed that, as compared to the neutral film, subjects reported higher warmth and affection during both the comedy ( $p < .01$ ) and affiliative ( $p < .01$ ) films. Subjects reported higher warmth and affection during the affiliative film as compared to the comedy film ( $p < .01$ ). 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 comedy film, while the comedy film produced a higher level of affective state in comparison to the neutral film.

## EMOTIONAL EXPRESSIVENESS

### Missing Data

Equipment errors with the digital recording resulted in unrecorded digital video discs (DVDs) for one social anhedonic subject and three control subjects. In addition,

equipment errors also led to missing data in two of the three film conditions for one social anhedonic subject and one of the three film conditions for two other social anhedonic subjects. Thus, subsequent facial expressions analyses included 30 social anhedonics and 42 controls.

### Interrater Agreement

Interrater agreement for FACES ratings was calculated using an intra-class correlation following the recommendations of Shrout and Fleiss (ICC; 1979). Specifically a Formula 3 mixed design was used, with a fixed number of raters whereby each rater rated each target. The agreement between the two raters was calculated across subjects for each of the three separate components (frequency, duration and intensity) for each of the congruent emotions (see Table 6). Because the variance due to raters is not ignored, the correlations can be interpreted as an index of agreement rather than consistency (Shrout & Fleiss, 1979). ICCs for rater agreement ranged from .96 to 1.00, indicating excellent agreement between raters (see Table 6).

### 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 (see Table 7). Correlations for the individual variables in the neutral and affiliative films all achieved significant levels, ranging from .46 to .82 for the social anhedonics and .32 to .82 for the controls. Variables in the comedy film were moderately intercorrelated for controls, but they were overall lower for social anhedonics. The moderately to highly intercorrelated FACES variables for the neutral and affiliative films demonstrated in this study are consistent with previous findings (e.g.,

Kring et al., 1993). However, the low correlations found in the comedy film are unexpected given the high correlations reported in other studies which used the same film stimulus in a patient population (e.g., Kring et al., 1993). It is unclear why such low intercorrelations were found in the present study for the individual FACES variables. To date, one other study using a role play task to elicit emotions has also demonstrated low intercorrelations among the FACES variables within the control group, but not within the schizophrenia group (Aghevli et al., 2003). Due to the lower levels of intercorrelations, subsequent FACES analyses will be conducted with the individual FACES variables to depict a fuller representation of emotional expression.

#### Expressions of Emotion in Response to Film Conditions

Descriptive statistics for the frequency, mean duration and mean intensity of positive expressions are presented in Table 8 for each film condition. A two (group: social anhedonics vs. controls) x three (film condition: neutral-comedy-affiliative) repeated measures ANOVA was conducted separately for frequency, mean duration and mean 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 group ( $F [1, 70] = 4.56, p < .05$ ) and a significant main effect for film condition ( $F [2, 69] = 78.42, p < .01$ ), but no group by film condition interaction ( $F [2, 69] = 2.75, p > .05$ ). Posthoc pairwise comparisons indicate that social anhedonics expressed fewer numbers of positive facial expressions as compared to the control group ( $p < .05$ ). Posthoc analyses also showed that, as compared to both the neutral ( $p < .01$ ) and affiliative ( $p < .01$ ) films, subjects displayed the greatest number of positive facial expressions during

the comedy film. The number of positive facial expressions displayed during the affiliative film, however, was greater than the neutral film ( $p < .01$ ).

One potential difficulty in interpreting these findings relates to the differences in the length of the films. Given that the affiliative film is the longest of the three films in duration, followed by the comedy and neutral films respectively, it can be argued that the number of facial expressions is a function of the length of the film. That is, subjects simply may have more opportunities to display facial emotions as the length of the film increase. However, results demonstrate that subjects expressed more facial emotions during the comedy film, as compared to the affiliative film, despite the shorter film duration. In order to rule out variation of film duration as a potential confounding variable, an additional analysis was conducting by examining the average number of positive expressions expressed per minute (see Table 9 for descriptive statistics). Again, the main effect for group ( $F [1, 70] = 4.90, p < .05$ ) and the main effect for film condition ( $F [2, 69] = 73.93, p < .01$ ) were significant, but there was no significant group by film condition interaction ( $F [2, 69] = 2.58, p > .05$ ). Posthoc pairwise comparisons indicated that social anhedonics expressed fewer positive facial expressions as compared to the control group ( $p < .05$ ). Posthoc analyses also showed that, as compared to both the neutral ( $p < .01$ ) and affiliative ( $p < .01$ ) films, subjects displayed the greatest average number of positive facial expressions during the comedy film. The average number of positive facial expressions displayed during the affiliative film, however, was greater than the neutral film ( $p < .01$ ). These findings suggest that the differences in film duration did not impact the opportunity for facial expressivity and that facial expressions are likely a function of the emotions elicited by the film itself.



For the mean duration of positive expressions displayed (i.e., average duration per expression), there was a significant main effect for film condition ( $F [2, 69] = 37.95, p < .01$ ), but the main effect for group ( $F [1, 70] = .36, p > .05$ ) and the group by film condition interaction ( $F [2, 69] = 1.94, p > .05$ ) were not significant. Posthoc analyses showed that subjects displayed the longest duration of positive facial expressions during the comedy film, as compared to both the neutral ( $p < .01$ ) and affiliative ( $p < .01$ ) films. Compared to the neutral film, subjects displayed longer duration of positive facial expressions during the affiliative film ( $p < .01$ ). These results suggest that, of all three films, subjects tended to display positive facial expressions that were longer in duration during the comedy film followed by the affiliative and then the neutral film, though there were no group differences between social anhedonics and controls in the duration of positive expressions across the film conditions.

With regard to the mean intensity of positive expressions displayed (i.e., average intensity per expression), there was a significant main effect for the film condition ( $F [2, 69] = 85.22, p < .01$ ), but the main effect for group ( $F [1, 70] = 1.72, p > .05$ ) and group by film condition interaction ( $F [2, 69] = 1.68, p > .05$ ) were not significant. Posthoc analyses showed that, compared to both the neutral ( $p < .05$ ) and affiliative ( $p < .05$ ) films, subjects displayed positive facial expressions that are higher in intensity during the comedy film. The positive facial expressions displayed during the affiliative film were also higher in intensity as compared to the neutral film ( $p < .05$ ). These results indicate that, of the three films, the comedy film elicited the most intense facial expressions followed by the affiliative film and then the neutral film, though the level of intensity was not significantly different between the two groups across all film conditions.

In summary, findings from the present study indicate that social anhedonics expressed positive facial emotions less frequently as compared to the control group regardless of the film condition, but the emotions expressed by these subjects, albeit lower in frequency, are not different in duration or intensity compared to the facial expressions of controls. Results also demonstrate that, compared to both the neutral and affiliative films, subjects tended to express more positive facial expressions (in frequency, duration and intensity) during the comedy film. In comparison to the neutral film, the affiliative film elicited more positive facial expressions across all three measures of expressivity. The two groups did not differ in facial expressions as a function of the film conditions.

#### OBSERVED AND SELF-REPORTED EXPRESSION OF EMOTION

The relationship between laboratory observed expressions of emotion 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 10). In order to reduce the number of variables entered into the analysis, frequency, duration, and intensity were each summed across the three film conditions to yield one total composite score for each domain of expression. Given that positive facial expressions were examined in response to the film stimuli, the following correlation analysis included the EES and BEQ Positive Expressivity Subscale to be consistent with the valence of interest.

Within the social anhedonic group, the BEQ Positive Expressivity score was negatively correlated with mean duration ( $r = -.36, p < .05$ ), such that increased self-reported positive expressivity was related to decreased observed duration of positive

expressions. EES was not significantly correlated with mean duration within the social anhedonic group. Neither the EES nor BEQ Positive Expressivity scores were significantly correlated with the frequency, mean intensity or overall level of expressiveness for the social anhedonics. Within the control group, the BEQ Positive Expressivity and EES scores were not significantly correlated with any of the FACES expressivity measures. These findings suggest that although social anhedonics rated themselves to be generally expressive with positive emotions, they tended to display expressions that are shorter in duration in response to a laboratory task. However, this pattern was not observed in control subjects.

One concern regarding the within group analyses is that restricted range within each extreme group may mask any correlation findings. As such, a subsequent correlational analysis was conducted to include the entire sample (see Table 11). Again, EES and BEQ Positive Expressivity scores were not significantly correlated with the frequency, mean intensity or overall level of expressiveness for the entire sample. Mean duration ( $r = -.24, p < .05$ ) was found to be negative correlated with BEQ Positive Expressivity, though not with EES, suggesting that increased self-reported positive expressivity was related to decreased observed duration of positive expressions.

## POST HOC EXPLORATORY ANALYSES

### Experience and Expression of Emotion

Previous investigators have examined the discrepancy between the expression and experience of emotion across groups (Kring et al, 1993). Thus, the current study adopted this strategy to examine whether the social anhedonics would demonstrate a greater discrepancy in the expression and experience of emotion (i.e., less synchrony) in

comparison to the controls. In examining the discrepancy between the expression and experience of emotion, the following analyses will specifically focus on one domain of facial expression, namely the frequency of expressions, for two reasons. First, studies that have not utilized composite FACES scores have specifically focused on frequency scores (Kring & Gordon, 1998; Kring & Neale, 1996). Second, the current study found that social anhedonics displayed fewer facial expressions compared to controls while there were no significant group differences in either duration or intensity of expressions. Discrepancy scores were computed by standardizing (i.e., computing Z scores) the state PA and warmth and affection scores and then subtracting the standardized FACES frequency score from each variable for each film. That is, the two discrepancy scores for the affiliative film was computed by 1) subtracting the positive expression frequency score from the state PA and 2) subtracting the positive expression frequency score from the warmth and affectionate score. To avoid confusing the magnitude of the discrepancy scores with their signs, the Z score discrepancy values were converted to *T* scores ( $M = 50$ ,  $SD = 10$ ). Thus, scores higher than 50 reflect more emotions experienced relative to expression. Means and standard deviations for these discrepancy scores are presented in Table 12.

These discrepancy scores were entered as dependent variables in a repeated measures ANOVAs, conducted separately for state PA and warmth and affection discrepancies. Analyses for the discrepancies in the frequency of positive facial expressions and state PA showed that there was no significant main effect for group ( $F [1, 70] = 1.73, p > .05$ ), film condition ( $F [2, 69] = .14, p > .05$ ), or group by film condition interaction ( $F [2, 69] = .91, p > .05$ ). Analyses for the discrepancies in the frequency of

positive facial expressions and ratings of warmth and affection showed that there was no significant main effect for group ( $F [1, 70] = .01, p > .05$ ), film condition ( $F [2, 69] = .13, p > .05$ ), or group by film condition interaction ( $F [2, 69] = 2.36, p > .05$ ). These results indicate that social anhedonics and controls did not demonstrate any differences in the synchrony between facially expressed emotions and self-reported mood regardless of the film condition. Further, there were no differences in the discrepancy between expressed and experience emotions across the film conditions.

## CHAPTER 5: 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. It was hypothesized that social anhedonics would report diminished trait positive affect, greater trait negative affect, and less emotional expressivity 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, though the two groups were not expected to differ in mood in response to a non-affiliative (i.e., comedy) film. With regard to facial expression, it was hypothesized that social anhedonics would display fewer positive facial expressions across the film stimuli, as compared to controls.

Significant group differences in trait affectivity were observed. Compared to controls, social anhedonics reported a general disposition to experience lower levels of positive trait affect. This finding is similar to previous reports that psychometrical identified social anhedonics (Gooding et al., 2002) and individuals with schizophrenia (Blanchard et al., 2001; Blanchard et al., 1998; Horan & Blanchard, 2003a) are characterized by low positive trait affectivity. Inconsistent with previous studies of clinical samples (Horan & Blanchard, 2003a), however, social anhedonics from the current study did not report higher trait negative affect as compared to controls. One explanation that may account for this unexpected finding is low power due to the small

sample size in the current study. However, a post hoc analysis using Cohen's  $d$  showed that differences in the group means and standard deviations yielded a small effect size of 0.32. An alternative explanation for the lack of group differences in trait negative affect relates to sampling differences across studies. The present sample consisted of female participants ranging in various ethnic backgrounds, while schizophrenia studies examining emotion have historically included only male patients (e.g., Horan & Blanchard, 2003a; Horan & Blanchard, 2003b) and two published high-risk social anhedonia studies included both genders who are largely (95%) Caucasians (Gooding & Tallent, 2003; Gooding et al, 2002).

Similar to the trait affect findings, social anhedonics from the current study also reported significantly lower state positive affect and warmth-affection at baseline compared to controls, though their reports of state negative affect were comparable to the control group. Thus, although social anhedonics are not characterized as having a general disposition to experience greater negative affect, they do, however, demonstrate an affective deficit in positive emotions at the trait and baseline state levels. Overall, the results of trait and state self-reported affect are consistent with the conjecture that social anhedonia reflects a diminished hedonic capacity in that social anhedonics have lower positive affectivity than controls.

In line with previous findings of high social anhedonia being related to diminished emotional expressivity (Kring et al, 1994), social anhedonics reported a general tendency to express less positive emotions, less negative emotions, and lower impulse to express emotions compared to controls. These findings suggest that individuals who are putatively at risk for schizophrenia and are characterized by a social

pleasure deficit tend also to report that they are less emotionally expressive in the positive and negative domains. Further, self reported low emotional expressivity in social anhedonics is in line with the constellation of negative symptoms observed in schizophrenia, which includes blunted affect, anhedonia, alogia (i.e., poverty of speech) and avolition (i.e., lack of initiative/goals) (Kirkpatrick, Buchanan, McKenny, Alphas, & Carpenter, 1989; Kirkpatrick et al., 2001). The linkage between social anhedonia and blunted affect in the current study may reflect social anhedonia as a promising indicator of schizotypy (Meehl, 1969) and that elevated social anhedonia is related to increased risks for developing schizophrenia spectrum characteristics (Chapman et al. 1994; Gooding, Kwapil, & Tallent, 1999; Kwapil, 1998).

This is the first study to investigate the experience and expression of emotion within social anhedonics using a social affiliative film stimulus. With regard to the manipulation of emotion, the affiliative and comedy films both produced significant changes in the participants' mood, with higher PA, lower NA, and higher warmth-affection, as compared to the neutral film. Compared to the comedy film, the affiliative film produced higher PA and higher warmth-affection, suggesting that it induced an affiliative state as intended. Social anhedonics reported significantly lower state positive affect as compared to controls, regardless of the film condition. In contrast to previous studies of emotion in schizophrenia, which found comparable levels of emotional experiences between the schizophrenia and control groups (Aghevli et al., 2003; Berenbaum Otmanns, 1992; Earnst & Kring, 1999; Kring & Keale, 1993) or in some cases higher PA in the schizophrenia group (Kring et al., 1996), these results indicate that social anhedonics experienced significantly less positive emotions across all films, as



compared to controls. Although most emotion research have primarily included schizophrenia patients, one recent study conducted by Gooding et al. (2002) specifically examined affective response in social anhedonics. Similar to schizophrenia studies, Gooding et al. (2002) reported that social anhedonics and controls did not differ in their affective modulation of startle response to neutral, positively, or negatively valence slides. Despite previous reports that schizophrenia patients and healthy controls experience similar levels of emotions, and that social anhedonics and controls display similar physiological reactivity to emotional stimuli, findings from a recent investigation suggest that it may be premature to conclude that schizophrenia patients do not report diminished emotional response compared to other groups (Quirk, Strauss, & Sloan, 1998). The authors found that, relative to substance abuse patients without a history of psychosis, schizophrenia patients rated pleasant and neutral slides as less positive and unpleasant slides as more negative (Quirk et al., 1998). While state affect was not specifically examined, lower ratings of pleasantness in response to the positively valenced slides indicate that schizophrenia patients may experience diminished emotions, and converges with current findings of lower PA reported by social anhedonics. The two groups did not differ in negative affect across all film conditions. This result is inconsistent with reports that schizophrenia participations experience more NA during a positive film as compared to controls (Kring & Neale, 1993; Kring et al., 1996).

A diminution of positive emotion in response to positive affect eliciting stimuli found among social anhedonics is consistent with Meehl's (1969) conceptualization of social anhedonia as an affective deficit, and provides some support that individuals identified as anhedonics using the RSAS have a diminished capacity to experience

pleasure or positive affect. Further, the finding that social anhedonics reported lower levels of warmth and affiliation upon arrival to the laboratory provides support that social anhedonia is a construct that is characterized by low levels of social affiliation generally. Although unexpected, the lack of group differences in state NA in response to the film conditions is consistent with the findings of comparable trait NA and baseline state NA reported by controls and social anhedonics in the present study. These results suggest that social anhedonics from the current sample do not demonstrate heightened negative affect at the trait or state levels, though they are characterized by an affective deficit in the positive emotional domain.

The hypothesis that social anhedonics would demonstrate a greater emotional deficit specifically in response to the affiliative film was not supported and there were no group differences in warmth-affection across the film conditions. Thus, although social anhedonics reported lower levels of warmth-affection at baseline compared to controls, contrary to the hypothesis, these individuals with a social pleasure deficit did not differ from controls in warmth-affection in response to any of the film conditions, including the affiliative film stimulus. This is an unexpected finding and is difficult to interpret. Due to a lack of validated instruments available, this study utilized a one-item rating scale from the preliminary work conducted by Morrone-Strupinsky and Depue (2004) to assess for the level of warmth-affection experienced by participants. It may be argued that a one-item scale, which may lack reliability and sensitivity, is not ideal in measuring a spectrum of warmth and affectionate states. Alternatively, it may be the case that significant group and interaction effects were not detected as a result of low power and sample size. Post hoc analyses for group differences in reported warmth and affection

showed a moderate effect size of .58 (Cohen's *d*) for the affiliative film condition and -.26 for the comedy film condition. The moderate effect size for the affiliative film provides some, but not robust, support that group and interaction effects may be found with an increase in power and sample size.

Another explanation for this lack of interaction effect may be found in the basic emotion literature, which suggests that individual differences in emotional responding would be accentuated under situations that are less extreme in emotional context. Investigators of fear-related behavior among primates and young children have reported a stronger association between heightened physiological responses and fear-related behavior (i.e., freezing) during a less threatening situation, as compared to other situations with a high threatening context (Buss, Davidson, Kalin & Goldsmith, 2004; Kalin, Shelton, Rickman, & Davidson, 1998). Based on these findings, Buss et al. (2004) argue that individual differences in emotional response are accentuated under less threatening circumstances, and those reacting with more intense fear response during these situations reflect dysregulation of fear response. In other words, emotionally evocative stimuli that are expected to elicit strong emotions may lead to a ceiling effect whereby almost everyone would inevitably respond with emotions and little individual differences are found. Emotionally evocative stimuli with a less intense context that are design to elicit subtle emotional arousal, however, may allow for the detection of individual differences. As such, it may be that the affiliation film used in the current study consists of a strong emotional context, making it difficult to tap subtle group differences in emotional responding.

In addition to examining emotional experience, the current study also aimed to

understand the expression of emotion in social anhedonics. A lack of facial expressivity in individuals with schizophrenia has been consistently noted since early clinical observations by Bleuler (1950) and in recent investigations (Berenbaum & Oltmanns, 1992; Kring, et al., 1993; Kring & Neale, 1996). Affective flattening, which refers to an immobile and unresponsive face, poor eye contact, and reduced body language, is one of the negative symptoms that are diagnostic characteristics of schizophrenia (DSM-IV; American Psychiatric Association, 1994). These reports in the literature led to the current hypothesis that if social anhedonia is a true trait marker for the development of schizophrenia or related psychotic illnesses, then it would be expected that some flattened facial expressivity, as compared with non-social anhedonics, would be observed. Consistent with prior reports that individuals with schizophrenia are less facially expressive than controls (e.g., Aghevli et al., 2003; Earnst & Kring, 1999; Kring et al., 1996; Kring & Neale, 1993), the current findings demonstrate that social anhedonics displayed fewer positive facial expressions across all films, as compared to controls. The observation that social anhedonics displayed fewer facial expressions in the laboratory is in line with the negative relationship between RSAS scores and EES scores ( $r = -.42$ ) reported by Kring et al., (1994), such that elevated social anhedonia is correlated with the disposition to be less expressive. Similarly, in a study that examined behavior during a diagnostic interview, social anhedonics were rated by coders as having constricted facial affect, lack of non-verbal expression, and detachment/lack of engagement (Collins, Blanchard, & Biondo, 2005). Therefore, social anhedonics appear to be less facially expressive in response to emotionally arousing stimuli as well as during a semi-structured social interaction (Collins et al., 2005).

Although social anhedonics displayed fewer positive facial expressions in comparison to the controls, the mean duration and mean intensity of these expressions were not different between the two groups. Given that previous investigations of facial expressions in schizophrenia have primarily focused either on the frequency of expression alone or a composite score of the three dimensions of facial expressions (i.e., frequency, duration, intensity) (e.g., Aghevli et al., 2003; Kring et al., 1996; Kring & Neale, 1993), interpretation of the current findings is unclear. It may be that social anhedonics can facially express emotions that are equally as long or intense as the healthy controls when intense emotions are elicited by the occasional scenes of the film clip that may be more emotionally arousing. This explanation would be in line with the basic emotion literature, which suggests that emotion eliciting stimuli with a low arousal can better detect individual differences (Buss et al, 2004; Kalin et al., 1998).

Whereas a disjunction of experience and expression of emotion has been reported for individuals with schizophrenia (Aghevli et al., 2003; Earnst & Kring 1999; Kring et al., 1996; Kring & Neale, 1993), this study found synchronicity in the experience and expression of emotion among non-clinical participants with elevated social anhedonia. That is, while individuals with schizophrenia have been documented to display less facial expressions and describe greater or similar levels of PA and NA as compared to controls, anhedonic individuals who have not yet decompensate with clinical symptoms demonstrate a deficit in warmth/affection and positive affect as well as a deficit in positive facial expression. Using an approach created by previous investigators (Kring et al., 1993), discrepancy scores were calculated for each subject to examine whether social anhedonics would demonstrate a larger difference between the expression and experience

of emotion as compared to controls. Results indicated no group differences in discrepancy scores and provide further support there is no disjunction in two domains of emotional responding in the current anhedonic sample. Despite the synchrony in the two domains of emotional responding (i.e., self-report and behavioral responding) in the social anhedonics, the addition of physiological measures may provide additional non-redundant sources of information as proposed by Lang (Lang, 1984; Lang et al., 1998).

In addition to examining group differences in the experience and expression of emotion, the current study also sought to investigate the relationship between laboratory observations of facial expressions in response a mood-induction paradigm and participants' self-reported general disposition of emotional expressivity outside the laboratory. Interestingly, self-reported general disposition to express emotion was not significantly correlated to the facial expressivity ratings in response to the films for social anhedonics or controls. Theoretically, participants (both social anhedonics and controls) should be able to accurately report on their level of general expressiveness, and that self-reported responses should correspond to laboratory observations (Kring et al., 1994). In a validity study of the EES, Kring et al (1994) reported that the EES was positively related ( $r = .38$ ) to the FACES global rating of facial expressiveness when this score was summed across positive and negative films among a sample of college students. Further, the authors found that EES was positively related ( $r = .40$ ) to ratings of positive expressions during a happy film (Kring et al., 1994). Correspondence between self-reported expressiveness using the EES and ratings of expressiveness made by mothers of the proband has also been documented (Kring et al., 1994). In a second sample of adult community participants, however, Kring et al (1994) reported that although the EES was

positively correlated ( $r = .43$ ) with the FACES overall expressiveness when summed across positive and negative films, self-reported dispositional expressiveness was not associated with FACES positive or negative expressiveness. Thus, it seems that while the EES is a valid measure of dispositional expressiveness, results are mixed in terms of whether self-reported general expressiveness is correlated with laboratory-measured expressiveness. Given that the EES is a measure of general expressiveness regardless of valence (positive or negative) or channel (facial, vocal, or gestural), the lack of relationship between self-reported and observed expressivity could be accounted for by the current specific focus of positive facial expressions in the FACES ratings. However, this argument does not fully explain the current findings, as the correlation between the BEQ positive expressivity subscale and FACES positive expression ratings was not significant. It should be noted that because a laboratory assessment only provides a small sample of expressive behavior, which in this study is solely facial expression, and such behavior is observed under a novel and somewhat artificial environment, these results are not entirely surprising.

#### Limitations:

There are several methodological limitations that should be considered. First, this study only utilized female participants because validity for the film-induced affiliation paradigm has only been documented in women thus far (Morrone-Strupinsky & Depue, 2004). As a result, this study was not specifically designed to examine gender differences in emotional responding, but rather an initial investigation on the expression and experience in a subgroup of social anhedonics. Previous studies of emotional responding have found that women are more expressive of most emotions compared with

men across a variety of measures, including EMG (e.g., Greenwalk, Cook, & Lang, 1989; Lang, Greenwald, Bradley, & Hamn, 1993; Schwartz, Brown, & Ahern, 1980), ratings of communication accuracy (e.g., Buck, Baron, Goodman, & Shapiro, 1980; Rotter & Rotter, 1988; Wagner, Buck, & Winterbotham, 1993), self-reported expressiveness (e.g., Gross & John, 1995; Kring et al., 1994), and ratings of facial expressions (Kring & Gordon 1998). The gender differences in the expression of emotion has been shown to be moderated by gender role characteristics (i.e., socially desirable characteristics or traits that reflect stereotypical feminine or masculine behavior) and family expressiveness (Kring & Gordon, 1998). Men and women have also been found to show different patterns of skin conductance reactivity in response to emotionally arousing films, such that men have higher skin conductance reactivity than women to fear films, though both genders do not differ in reactivity to happy or sad films (Kring & Gordon, 1998). Further, sex differences are found in the ability to accurately recognize emotions from faces, with women outperforming men in identifying negative facial expressions but no gender differences were observed in the recognition of positive facial expression (Scholten, Aleman, Montagne, & Kaln, 2005).

While healthy women may be more emotionally expressive and accurate at identifying facial expressions than healthy men, it has been documented that they do not differ in self-reported experienced emotion in response to happy, sad, and fear-inducing films (Kring & Gordon, 1998). More relevant to the current study are positive emotional experiences, and physiological measures also provide support that women do not differ from men in their physiological response to happy films (Kring & Gordon, 1998). Currently, much of our understanding of gender differences in emotional responding



comes from the normal population, as most investigations of emotion in schizophrenia utilizes male samples for logistical reasons (e.g., Aghevli et al., 2003; Earnst & Kring, 1999; Kring & Earnst, 1999; Kring & Neale, 1996; Kring et al., 1993). Although both males and females have been included in some studies of schizophrenia (e.g., Berenbaum & Ottmanns, 1992) and anhedonics (Germans & Kring, 2000; Gooding et al., 2002), none have reported or examined gender differences.

In addition to examining positive emotions, this study also specifically aimed to understand affiliation in social anhedonics. Although findings of gender differences in general positive emotional responding have been mixed in the general population, with women being more behaviorally expressive compared to men while the two genders do not differ in emotional experience in response to happy and sad films (Kring & Gordon, 1998), the literature clearly indicates sex differences in affiliative behavior (Cyranowski, Frank, Young, & Shear, 2000). Females tend to display a strong affiliative style in their social relationships, such that they have a preference for close emotional communication, intimacy, and responsiveness within interpersonal relationships, which is in contrast to males' preference for independent activity, mastery, or agency (Cyranowski et al, 2000). Indeed, the dichotomy between the two genders in affiliation has long been viewed as "communion vs. agency." (Bakan, 1966). Females are more affiliative on average than males (Taylor, Klein, Lewis, Gruenewald, Gurung, & Updegraff, 2000), display greater warmth, gregariousness, and positive emotions (Campbell, 1999), and report stronger interpersonal bonds (Tellegen & Walker, in press). A recent meta-analysis showed that these gender differences in socialization and affiliation have been observed across the life span and different cultures (Feingold, 1994). Relevant to the gender differences in

affiliative style observed in the healthy population is that men with schizophrenia have poorer premorbid social adjustment compared with women, such that they are more socially isolated and withdrawn (Salem & Kring, 1998), are less able to maintain friendships and sexual relationships (Salem & Kring, 1998), and less likely to get married (Klorman, Strauss, & Kokes, 1977; Reich & Thompson, 1985; Walker, Bettes, Kain, & Harvey, 1985). Given the gender differences in affiliation among healthy men and women, coupled with the gender differences in premorbid social functioning observed in the schizophrenia population, an inclusion of male samples in the future studies may reveal interesting differences in the experience and expression of emotion between male and female anhedonics during viewing of the affiliative film.

Another limitation of the current study that should be noted is the use of a one-item measure to assess for warmth and affiliation. As mentioned earlier, utilization of a measure that contains only one-item presents several difficulties. First, internal consistency reliability can be difficult to established with a one-item measure. Second, the two adjectives presented with this scale, namely “warmth and affectionate,” may not adequately capture all emotions associated with affiliation. Development of a measure that includes additional adjectives such as “loving” and “close” may better tap into a complex construct such as affiliation.

A further limitation relates to the lack of clinical information in the current sample. The current sample reported on their hedonic capacity, but other clinical information such as depressive, schizophrenia, or schizophrenia spectrum symptoms, were not assessed. Such clinical information may be imperative in understanding emotional responding in social anhedonics for two reasons. First, assessment of

schizophrenia or schizophrenia spectrum personality disorder symptoms would provide a stronger link between the social anhedonia and schizophrenia research. The available data in the current study does not provide a clear linkage between emotional responding deficits and the liability for developing schizophrenia. Second, although elevated social anhedonia is an enduring trait in schizophrenia (Blanchard et al., 1998, Blanchard, Horan & Brown, 2001) and has been found to predict psychotic-like experiences (Chapman et al., 1994) and schizophrenia-spectrum personality disorders (Kwapil, 1998), social anhedonia is nevertheless a fallible indicator of schizotypy, as social anhedonia is also elevated in mood disorders (e.g., Berenbaum & Oltmanns, 1992; Katsanis et al., 1990; Blanchard et al., 1994). Given that the current study did not assess for depression, this current sample may consist of both “true” schizotypes who are characterized with enduring social anhedonia as well as “false-positive” schizotypes who report elevated social anhedonia that may be related to the presence of a mood disorder, rather than the trait-like social pleasure deficit described by Meehl (1969) that is presumed to underlie the schizophrenia disorder. Thus, without the assessment of depressive symptoms, implications of the current findings are unclear. This concern is somewhat mitigated by the finding that social anhedonics in the current study did not differ from controls in trait NA, state NA, or NA responses to the films. Thus, it appears unlikely that social anhedonics in the current sample were depressed, relative to controls.

In light of the limitations noted above, it is important to understand the emotional responding of depressed individuals as well as the way in which this group of individuals may differ from schizophrenia patients in their experience and expression of emotion. In several mood disorder studies, depression was found to be associated with reports of

diminished positive emotional response to affectively positive slides compared to controls, but no differences in emotional response to negative slides were reported (Dunn, Dalgleish, Lawrence, Cusack, & Ogilvie, 2004; Sloan, Strauss, Quirk, & Sajatovic, 1997; Sloan, Strauss, & Wisner, 2001). Aside from reports of diminished positive emotions, there have been replicable findings that depressed patients report increased ratings of sadness in response to positive slides (Dunn et al., 2004) and films (Rottenberg, Kasch, Gross, & Gotlib, 2002). Findings regarding the expression of experience in depressed patients are mixed, with one study documenting that depressed patients exhibited more negative expressions than controls in response to the negative slides, but there were no group differences in positive facial expressions to positive stimuli (Sloan et al., 1997) while another study reported that depression was associated with reduced frequency and intensity of facial expressions only to pleasant stimuli (Sloan et al., 2001). Thus far, there has only been one investigation that compared the emotional responding across individuals with schizophrenia and depression (Berenbaum & Oltmanns, 1992). Schizophrenia patients with blunted affect were found to be the least facially expressive to positive stimuli compared to depressed and schizophrenia subjects without blunted affect, and depressed subjects were less facially expressive to positive stimuli compared to schizophrenia subjects without blunted affect (Berenbaum & Oltmanns, 1992). The authors noted no group differences in self-reported emotional experience (Berenbaum & Oltmanns, 1992). To date, differences in emotional responding between schizophrenia, depressed individuals, and schizotypic individuals with elevated social anhedonia remain unclear due to the lack of cross-sectional studies that include a range of comparison groups and additional studies that can fully examine emotion across these groups would

help elucidate this issue.

#### Direction for Future Research

The findings in this study suggest interesting directions for further study. The current study provided a preliminary examination for a research area that is still in its infancy, namely the experience and expression of emotion in social anhedonics, a group of individuals thought to be at risk to develop psychosis. Although this study demonstrated that social anhedonics are characterized with lower PA and warmth and affection upon arrival to the laboratory, and are less facially expressive and experience lower PA across all films, social anhedonics do not experience lower levels of warmth and affection across any of the film conditions compared to controls. Thus, this study failed to provide support that individuals with a social pleasure deficit would demonstrate less positive emotional responding to an affiliative stimulus, as compared to a non-social stimuli. However, additional studies are needed to extend the present findings.

First, future studies would benefit from the inclusion of a male sample, which would allow for the examination of gender differences in emotion among social anhedonics. However, investigators would need to first develop and validate an affiliative film stimulus that could effectively emotionally arouse men. The way in which one could tap social affiliation in males is unclear at this point, though it has been argued that men and women establish and maintain social bonds differently (Hess, Adams, & Eleck, 2004) with females having more interpersonal focused conversations than males (Raffaelli & Duckett, 1989). Pilot work on the development of gender specific affiliative film stimuli is much needed and would allow for a better understanding of gender differences in affiliation as well as emotional responding.

An additional future research area may be to conduct longitudinal studies that assess clinical characteristics as well as emotion in social anhedonia. As noted above, self-report measures such as the RSAS may be a fallible indicator of schizotypy, as social anhedonia is also elevated in mood disorders (Berenbaum & Oltmanns, 1992; Katsanis et al., 1990; Blanchard et al., 1994). One argument may be to exclude individuals who either report elevated depressive symptoms or are clinically diagnosed with a mood disorder. However, due to the high rates of depressive symptoms in both schizophrenia patients (Martin, Cloninger, Guze, Clayton, 1985) and psychometrically identified social anhedonics (Blanchard et al, in preparation for publication), it would be inappropriate to exclude depressed participations in future cross-sectional studies of social anhedonia.

Longitudinal studies, however, would allow investigators to follow the clinical trajectory of social anhedonics and to identify individuals who exhibit an enduring rather than transitory trait of social anhedonia (i.e., true schizotypes). Inclusion of self-report questionnaires, such as the Schizotypy Traits Questionnaire (Claridge & Broks, 1984), or semi-structured interviews, such as the International Personality Disorder Examination (IPDE; Loranger et al., 1995) may allow investigators to more accurately identify true schizotypes (i.e., those with elevated RSAS scores and elevated scores on the schizotypy measures). These instruments would also yield valuable clinical information and the way in which schizophrenia spectrum characteristics may be correlated with the experience and expression of emotion among social anhedonics.

### Conclusions

This study has demonstrated that social anhedonics have lower trait PA compared to controls, but the two groups did not differ in trait NA. At baseline, social anhedonics

reported lower state PA and less warmth and affection compared to controls, but again, the two groups did not differ in state NA. In addition to the general dispositional tendency to experience less positive emotions, social anhedonics also reported a disposition to be less expressive generally as well as with positive and negative emotions. Consistent with their reports of an attenuated emotional experience and expression outside of the laboratory, social anhedonics reported less PA and displayed less facial expressions in response to affect eliciting films in the laboratory. Social anhedonics, however, did not report less warmth and affection across the films as compared to controls. Additionally, social anhedonics did not report less PA or warmth and affection in response to the affiliative film, as compared to the non-affiliative (i.e., comedy) film. These findings have provide a greater understanding of the affective reactions associated with anhedonia, and have important implication for the way in which the expression and experience of emotion in individuals at risk for developing schizophrenia may be different from those who have already fully developed the illness. As previously discussed, findings at this point are unclear, but additional studies that include both genders and schizotypy symptom measures may be informative. While there are clear limitations to the current results, this study provides the basis for promising future research.

Table 1: Demographic Characteristics of Social Anhedonics (n = 34) and Controls (n = 45)

	Social anhedonics	Controls
	n (%)	n (%)
<u>Ethnicity</u>		
Caucasian	23 (67.6%)	34 (75.6%)
African American	2 (5.9%)	4 (8.9%)
Hispanic	0 (0.0%)	1 (2.2%)
Asian American	8 (23.5%)	4 (8.9%)
Other	1 (2.9%)	2 (4.4%)

There were no significant differences between groups in ethnicity.



Table 2: Descriptive Statistics for General Temperament Survey for Social Anhedonics  
(n = 34) and Controls (n = 45)

	Social anhedonics	Controls	<i>t</i>
	Mean (SD)	Mean (SD)	
Trait positive affectivity	13.47 (7.17)	20.22 (5.70)	-4.66*
Trait negative affectivity	15.21 (8.29)	12.78 (6.62)	1.45

\* $p < .05$

Table 3: Self-reported Mood at Baseline among Social Anhedonics (n = 34) and Controls (n = 45)

	Social anhedonics	Controls	<i>t</i>
	Mean (SD)	Mean (SD)	
<u>Measures</u>			
State positive affect	42.06 (11.69)	48.20 (11.58)	-2.33*
State negative affect	28.91 (10.39)	27.27 (5.53)	0.91
Warmth and affection	1.97 (1.07)	2.60 (1.23)	-2.36*

\* $p < .05$

Table 4: Self Report Ratings of the General Disposition to Display Emotion in Social Anhedonics (n = 33) and Controls (n = 43)

	Social anhedonics	Controls	<i>F</i>
	Mean (SD)	Mean (SD)	
<u>Measures</u>			
EES	48.85 (14.39)	69.91 (10.63)	53.89**
BEQ Positive Expressivity	4.61 (1.03)	5.98 (0.54)	55.37**
BEQ Negative Expressivity	3.17 (1.17)	4.30 (0.99)	20.73**
BEQ Impulse Strength	4.62 (1.24)	5.16 (0.95)	4.49*

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

Table 5: Intercorrelations of the Emotional Expressivity Scale (EES) and the Berkeley Expressivity Questionnaire (BEQ) in Social Anhedonics (below diagonal) and Controls (above diagonal)

Measures	1	2	3	4	5
1. EES	--	<b>.59**</b>	<b>.73**</b>	<b>.37*</b>	<b>.71**</b>
2. BEQ Positive Expressivity	.60**	--	<b>.50**</b>	<b>.24</b>	<b>.65**</b>
3. BEQ Negative Expressivity	.78**	.49**	--	<b>.45**</b>	<b>.87**</b>
4. BEQ Impulse Strength	.33	.52**	.27	--	<b>.78**</b>
5. BEQ Total	.70**	.83**	.75**	.78**	--

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

Figure 1: Self-reported Positive Affect across Film Stimuli in Social Anhedonics (n = 34) and Controls (n = 45)

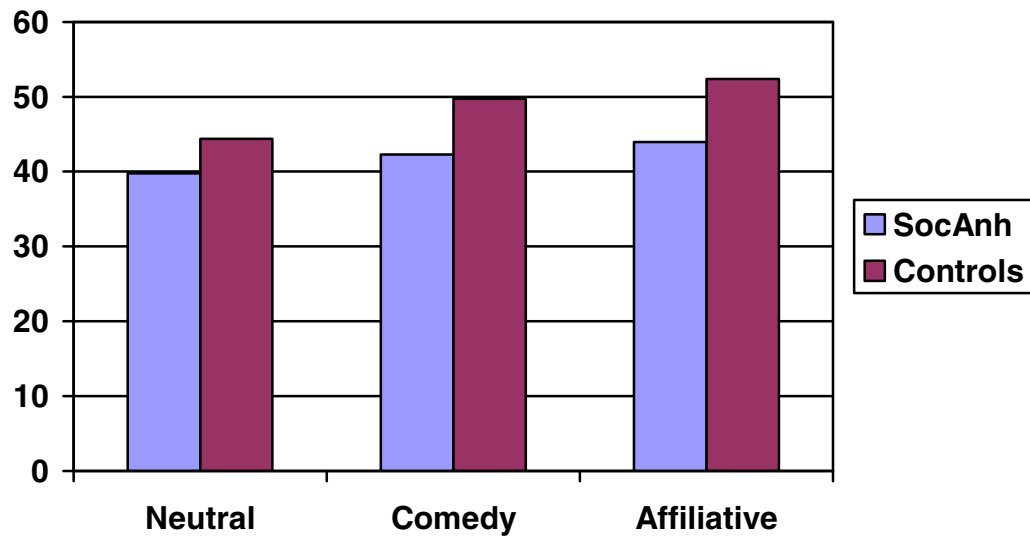


Figure 2: Self-reported Negative Affect Across Film Stimuli in Social Anhedonics (n = 34) and Controls (n = 45)

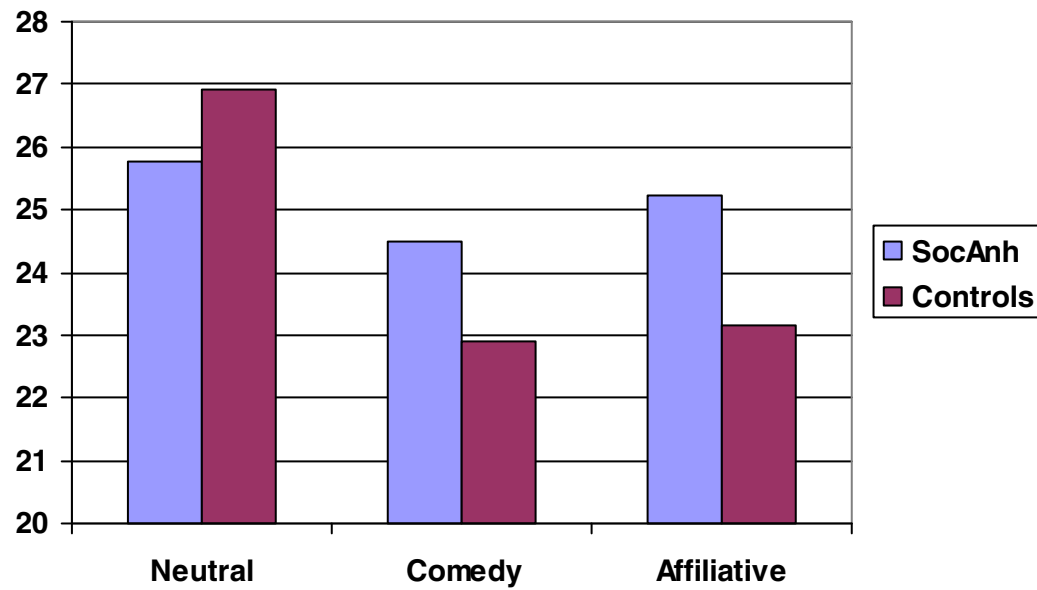


Figure 3: Self-reported Levels of Warmth and Affection Across Film Stimuli in Social Anhedonics (n = 34) and Controls (n = 45)

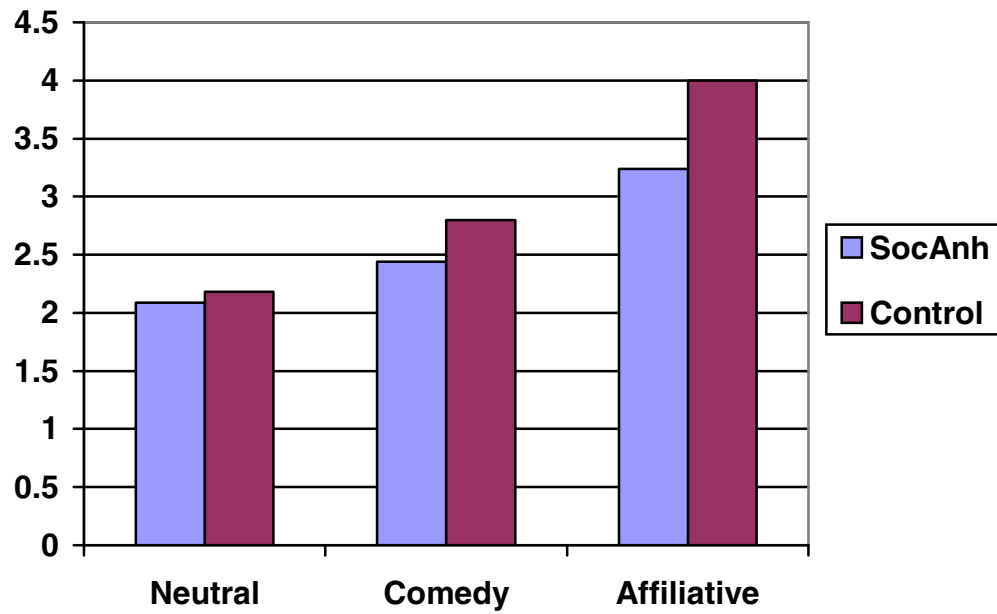


Table 6: Inter-Rater Reliability of the Facial Expression Coding System (FACES)

	ICC
<u>Neutral</u>	
Frequency of positive expressions	1.00
Mean duration of positive expressions	1.00
Mean intensity of positive expressions	1.00
<u>Comedy</u>	
Frequency of positive expressions	1.00
Mean duration of positive expressions	0.96
Mean intensity of positive expressions	0.99
<u>Affiliative</u>	
Frequency of positive expressions	0.99
Mean duration of positive expressions	0.99
Mean intensity of positive expressions	1.00



Table 7: Intercorrelations of the Facial Expression Coding System (FACES) variables in Social Anhedonics (below each diagonal) and Controls (above each diagonal)

Positive Expressions			
Rated dimension	1	2	3
Neutral film			
1. Frequency	--	<b>.82**</b>	<b>.74**</b>
2. Mean duration	.46**	--	<b>.82**</b>
3. Mean intensity	.82**	.50**	--
Comedy film			
1. Frequency	--	<b>-.04</b>	<b>.63**</b>
2. Mean duration	-.04	--	<b>.31**</b>
3. Mean intensity	.26	.38*	--
Affiliative film			
1. Frequency	--	<b>.32*</b>	<b>.67**</b>
2. Mean duration	.47**	--	<b>.55**</b>
3. Mean intensity	.75**	.73**	--

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

Table 8: Descriptive Statistics for the Facial Expression Coding System (FACES)

Variables among Social Anhedonics (n = 30) and Controls (n = 42)

	Social anhedonics	Controls
	Mean (SD)	Mean (SD)
Neutral		
Frequency	0.13 (0.43)	0.19 (0.80)
Mean duration <sup>†</sup>	1.54 (7.23)	0.54 (2.05)
Mean Intensity	0.13 (0.43)	0.10 (0.30)
Comedy		
Frequency	6.00 (4.61)	8.69 (4.94)
Mean duration <sup>†</sup>	12.77 (18.10)	8.48 (8.66)
Mean intensity	1.13 (0.67)	1.26 (0.58)
Affiliative		
Frequency	2.80 (4.41)	4.55 (5.80)
Mean duration <sup>†</sup>	4.17 (5.90)	6.49 (9.61)
Mean intensity	0.49 (0.54)	0.73 (0.55)

<sup>†</sup>The unit measured for duration is in seconds.

Table 9: Descriptive Statistics for the Average Number of Positive Facial Expressions among Social Anhedonics (n = 30) and Controls (n = 42)

	Social anhedonics	Controls
	Mean (SD)	Mean (SD)
Average Number of Expressions per Minute		
Neutral	0.04 (0.15)	0.06 (0.27)
Comedy	1.08 (0.83)	1.57 (0.89)
Affiliative	0.29 (0.46)	0.47 (0.61)

Table 10: Within Group Correlations between Observed and Self-reported Expressivity as Measured by the Emotional Expressivity Scale (EES), Berkeley Expressivity Questionnaire (BEQ), and Facial Expression Coding System (FACES)

	EES	BEQ Positive Expressivity
	<i>r</i>	<i>r</i>
<u>Social anhedonics</u>		
FACES Positive Expressions <sup>†</sup>		
Frequency	.09	.07
Mean Duration	-.05	-.36*
Mean Intensity	.01	-.05
<u>Controls</u>		
FACES Positive Expressions <sup>†</sup>		
Frequency	-.04	.01
Mean Duration	-.20	-.09
Mean Intensity	-.01	.06

\* $p < .05$

<sup>†</sup>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 11: Correlations between Observed and Self-reported Expressivity as Measured by the Emotional Expressivity Scale (EES), Berkeley Expressivity Questionnaire (BEQ), and Facial Expression Coding System (FACES) across the Entire Sample

	EES	BEQ Positive Expressivity
	<i>r</i>	<i>r</i>
FACES Positive Expressions <sup>†</sup>		
Frequency	.21	.20
Mean Duration	-.13	-.24*
Mean Intensity	.13	.12

\* $p < .05$

<sup>†</sup>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 12: Descriptive Statistics for Discrepancy Scores between Mood and Facial Expressions

	Social anhedonics	Controls
	Mean (SD)	Mean (SD)
<u>PA</u>		
Discrepancy score - Neutral film	48.08 (8.71)	51.46 (13.35)
Discrepancy score - Comedy film	49.79 (10.24)	50.74 (11.62)
Discrepancy score - Affiliative film	47.57 (9.39)	51.71 (11.68)
<u>Warmth and Affection</u>		
Discrepancy score - Neutral film	50.36 (7.99)	49.92 (14.31)
Discrepancy score - Comedy film	51.88 (12.61)	49.07 (12.89)
Discrepancy score - Affiliative film	47.84 (11.00)	51.54 (11.66)

Note: Discrepancy scores are presented as T-scores. Higher scores reflect greater discrepancy between the expression and experience of emotion.

## APPENDIX A

### University of Maryland IRB Approval



UNIVERSITY OF  
MARYLAND

INSTITUTIONAL REVIEW BOARD

2100 Lee Building  
College Park, Maryland 20742-5121  
301.405.4212 TEL 301.314.1475 FAX

December 3, 2004

### **INSTITUTIONAL REVIEW BOARD APPROVAL NOTIFICATION**

**TO:** Dr. Jack Blanchard  
Mr. Winnie Leung  
Department of Psychology

**PROJECT TITLE:**  
"Social Experiences and Personality Traits"

**IRB/HSR PROTOCOL IDENTIFICATION NUMBER: 04-0538**

**EXEMPTION STATUS AND APPROVAL EXPIRATION DATE:**  
**Non-Exempt: December 31, 2005**

The Institutional Review Board (IRB) Co-Chairpersons concur with the departmental Human Subjects Review (HSR) Committee's recommendation to approve the application to conduct the above referenced project. The IRB has approved the application and the research involving human subjects described therein, subject to any requests which may have been made by the IRB to revise the application. We ask that any future communications with our office regarding this research reference the protocol identification number indicated above.

We also ask that you not make any changes to the approved protocol without first notifying and obtaining the approval of the IRB. Also, please report any deviations from the approved protocol to the Chairperson of your departmental HSRC. If you have any questions or concerns, please do not hesitate to contact either of us at [irb@deans.umd.edu](mailto:irb@deans.umd.edu). Thank you.

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#### **ADDITIONAL INFORMATION REGARDING IRB/HSRC APPROVALS**

**EXPIRATION OF IRB APPROVAL**—Approval of non-exempt projects expires one year after the official date of IRB approval; approval of exempt projects expires three years after that date. If you expect to be collecting or analyzing data after the expiration of IRB approval, please contact the HSRC Chairperson in your department about submitting a renewal application. **(PLEASE NOTE: If you are not collecting data from human subjects and any on-going data analysis does not increase the risk to subjects, a renewal application would not be necessary.)**

**STUDENT RESEARCHERS**—Unless otherwise requested, the IRB will send copies of approval paperwork to the supervising faculty researcher (or advisor) of a project. We ask that such persons pass on that paperwork or a copy to any student researchers working on that project. That paperwork may be needed by students in order to apply for graduation. **PLEASE BE ADVISED THAT THE IRB MAY NOT BE ABLE TO PROVIDE COPIES OF THAT PAPERWORK, particularly if several years have passed since the date of the original approval.**

Enclosures (where appropriate), will include stamped copy of informed consent forms included in application and any copies of the application not needed by the IRB; copies of this memorandum and any consent forms to be sent to the Chairperson of the Human Subjects Review Committee

## APPENDIX B

### University of Maryland IRB Approval Renewal



UNIVERSITY OF  
MARYLAND

INSTITUTIONAL REVIEW BOARD

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To: Jack J. Blanchard, Ph.D.  
Winnie W Leung, M.A.  
Department of Psychology

From: Roslyn Edson, M.S., CIP *Roslyn Edson*  
IRB Manager  
University of Maryland, College Park

Re: IRB Application # 04-0538  
Title: Social Experiences and Personality Traits

Approval Date: November 15, 2005

Expiration Date: November 15, 2006

Type of Application: Renewal

Type of Research: Nonexempt

Type of Review: Expedited

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The University of Maryland, College Park Institutional Review Board (IRB) approved your IRB application. The research was approved in accordance with the University's IRB policies and procedures and 45 CFR 46, the Federal Policy for the Protection of Human Subjects. Please reference the above-cited IRB application number in any future communications with our office regarding this research.

**Recruitment/Consent:** For research requiring written informed consent, the IRB-approved and stamped informed consent document is enclosed. The IRB approval expiration date has been stamped on the informed consent document. Please keep copies of the consent forms used for this research for three years after the completion of the research.

**Continuing Review:** If you want to continue to collect data from human subjects or analyze data from human subjects after the expiration date for this approval, you must submit a renewal application to the IRB Office at least 30 days before the approval expiration date.



## APPENDIX C

### Revised Social Anhedonia Scale

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

most others.

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

## APPENDIX D

### Infrequency Scale

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

## APPENDIX E

### General Temperament Survey

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 reasons.
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 reasons.
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 meant doing something, I sometimes deliberately make mistakes.
47. I am sometimes troubled by thought 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' weakness 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 F

### Emotional Expressivity Scale

Rated on a 6-point Likert scale (1 = never true and 6 = always true)

1. I think of myself as emotionally expressive
2. People think of me as an unemotional person. (-)
3. I keep my feelings to myself. (-)
15. I am often considered indifferent by others. (-)
16. People can read my emotions.
17. I display my emotions to other people.
18. I don't like to let other people see how I'm feeling. (-)
8. I am able to cry in front of other people.
9. Even if I am feeling very emotional, I don't let others see my feelings. (-)
10. Other people aren't easily able to observe what I'm feeling. (-)
11. I am not very emotionally expressive. (-)
12. Even when I'm experiencing strong feelings, I don't express them outwardly.
13. I can't hide the way I'm feeling.
14. Other people believe me to be very emotional.
15. I don't express my emotions to other people. (-)
16. The way I feel is different from how others think I feel. (-)
19. I hold my feelings in. (-)

Note: (-) indicates negatively keyed items.

## APPENDIX G

### Berkeley Expressivity Questionnaire

Rated on a 7-point Likert scale (1 = strongly disagree and 7 = strongly agree)

1. Whenever I feel positive emotions, people can easily see exactly what I am feeling.
2. I sometimes cry during sad movies.
3. People often do not know what I am feeling. (-)
4. I laugh out loud when someone tells me a joke that I think is funny.
5. It is difficult for me to hide my fear.
6. When I'm happy, my feelings show.
7. My body reacts very strongly to emotional situations.
8. I've learned it is better to suppress my anger than to show it. (-)
9. No matter how nervous or upset I am, I tend to keep a calm exterior. (-)
10. I am an emotionally expressive person.
11. I have strong emotions.
12. I am sometimes unable to hide my feelings, even though I would like to.
13. Whenever I feel negative emotions, people can easily see exactly what I am feeling.
14. There have been times when I have not been able to stop crying even though I tried to stop.
15. I experience my emotions very strongly.
16. What I'm feeling is written all over my face.

Note: (-) indicates negatively keyed items.

## APPENDIX H

### Circumplex Model of Emotion: Measurement of State PA and NA

Rated on a 5-point Likert scale (1 = very slightly or not at all and 5 = extremely)

#### Positive Affect

At ease  
Glad  
Enthusiastic  
Serene  
Calm  
Peppy  
Cheerful  
Lively  
Pleased  
Warmhearted  
Content  
At rest  
Euphoric  
Elated  
Relaxed  
Happy  
Excited  
Delighted

#### Negative Affect

Anxious  
Gloomy  
Grouchy  
Tired  
Sad  
Miserable  
Distressed  
Fearful  
Droopy  
Unhappy  
Bored  
Annoyed  
Sluggish  
Jittery  
Drowsy  
Dull  
Blue  
Nervous

## APPENDIX I

### Warm and Affectionate Scale

#### Warm and Affectionate

not at all	a little	somewhat	moderately	strongly	very strongly	completely
0	1	2	3	4	5	6

## APPENDIX J

### Facial Expression Coding System (FACES)

#### **Valence:**

Positive\_\_\_\_\_

(e.g., happy, delighted, glad, amused, pleased, content, satisfied, clam, serene, excited, astonished, cheerful, surprised, active, content)

Negative\_\_\_\_\_

(e.g., miserable, distressed, annoyed, jittery, nervous, angry, gloomy, anxious, afraid, tense, alarmed, frustrated, disgusted, depressed, hostile)

Neutral\_\_\_\_\_

(e.g., engaged, interested, contemplative, a facial expression that is decidedly intense, but does not show either positive or negative valence)

**Intensity:**      low                      medium                      high                      very high  
                         1                              2                              3                              4

Low: a mild expression, such as a smile where the corners of the mouth are slightly raised but no teeth are shown and very little eye movement.

Medium: a moderate expression, a smile bordering on a laugh, with the eyebrows slightly raised and the lips apart, exposing teeth.

High: an expression that involves most, if not all, of the face, such as laughing with an open mouth and raising the eyebrows and cheeks.

Very High: reserved for very intense expressions, such as laughing with the mouth completely open with the eyebrows and cheeks substantially raised.

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*Subject*\_\_\_\_\_ *Interviewer:* \_\_\_\_\_ *Rater:* \_\_\_\_\_

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Time start: \_\_\_\_\_ Time end: \_\_\_\_\_ Duration: \_\_\_\_\_ Item # \_\_\_\_\_

**Valence:**      Positive\_\_\_\_\_      Negative\_\_\_\_\_      Neutral\_\_\_\_\_

**Intensity:**      low                      medium                      high                      very high  
                         1                              2                              3                              4

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Time start: \_\_\_\_\_ Time end: \_\_\_\_\_ Duration: \_\_\_\_\_ Item # \_\_\_\_\_

**Valence:**      Positive\_\_\_\_\_      Negative\_\_\_\_\_      Neutral\_\_\_\_\_

**Intensity:**      low                      medium                      high                      very high  
                         1                              2                              3                              4

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## 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)

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