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Schizotypy involves social disinterest (anhedonia) and social anxiety. The first study examined the relationship of these constructs in 364 young adults. As hypothesized, there was a moderate association between them, which diminished after partialing out positive schizotypy. Confirmatory factor analyses found that a three-factor solution with positive schizotypy, negative schizotypy, and social anxiety factors provided the best fit, indicating that social anxiety is more associated with positive than negative schizotypy.

The second study employed experience sampling methodology to examine the expression of social anhedonia and anxiety in the daily lives of 245 participants. As hypothesized, social anxiety was associated with increased negative affect, whereas social anhedonia was associated with decreased positive affect. Social anhedonia, but not social anxiety, was associated with less social contact, engagement, and enjoyment. The findings suggest that social anxiety and anhedonia are expressed differently in terms of affective responding and their relationships to the schizotypy dimensions.

THE RELATIONSHIP OF SOCIAL ANHEDONIA AND SOCIAL ANXIETY WITH

SCHIZOTYPY AND THEIR EXPRESSION IN DAILY LIFE

by

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CHAPTER I

INTRODUCTION

Current models of the etiology of schizophrenia (e.g., Andreasen, 1999;
Gottesman, 1991; Meehl, 1990) posit that there are schizophrenia-prone, or
"schizotypic," people who are vulnerable to developing schizophrenia and related
disorders. While the exact mechanisms are not fully understood, this vulnerability is
presumed to result from an accumulation or interaction of multiple genetic,
neurodevelopmental, and psychosocial factors. These risk factors produce symptoms that
fall along a continuum of schizophrenic-like adjustment referred to as schizotypy,
ranging from relative health to subclinical deviance to schizophrenia-spectrum
personality disorders to full-blown clinical psychosis. It is hypothesized that the majority
of schizotypic people will not decompensate into psychosis, although they may
experience attenuated or transient symptoms of schizophrenia. Thus, schizotypy is
expressed across a dynamic continuum of adjustment with severity contingent on the
interaction of biopsychosocial factors (Gooding & Iacono, 1995).

Schizotypy—and, by extension, schizophrenia—has been described as a
multidimensional construct consisting of two or more factors. Positive and negative
schizotypy are the most consistently replicated factors, although other possible factors
include cognitive disorganization, paranoia, and nonconformity (e.g., Mason, Claridge &
Williams, 1997; Raine et al., 1994; Stefanis et al., 2002; Vollema & van den Bosch,

1995). The proposed factors appear consistent with the hypothesized dimensional structure of schizophrenia (e.g., Arndt, Alliger, & Andreasen, 1991; Bilder, Mukherjee, Rieder, & Pandurangi, 1985; Liddle, 1987; Peralta, Cuesta, & de Leon, 1992). This parallel structure adds empirical support to the hypothesis that the vulnerability to schizophrenia is expressed across the continuum of schizotypy.

Social impairment is widely described as a feature of the prodromal, active, and residual phases of schizophrenia, and it is a central feature of schizophrenia-spectrum conditions such as schizoid and schizotypal personality disorders (American Psychiatric Association, 2000). This social dysfunction includes isolation and disinterest in social contact (referred to as social anhedonia) and social anxiety. In their classic texts, Kraepelin (1913/1919) and Bleuler (1911/1950) described asociality as characteristic of the preschizophrenic condition as well as of non-psychotic relatives of patients. Social anhedonia played a central role in Rado's (1956) model of the development of schizophrenia, which greatly influenced Meehl's theory of schizotypy. Similarly, social anhedonia is a component of schizotaxia, a condition recently proposed by Tsuang, Stone, and Faraone (2000) to convey the liability for schizophrenia. Thus, social anhedonia is a prominent aspect of the negative symptom dimension of schizotypy and schizophrenia, and it provides a promising point-of-entry for identifying schizotypic people. Furthermore, social anhedonia appears to be a useful predictor of risk for developing schizophrenia and related conditions. Kwapil (1998) reported that 24% of nonpsychotic young adults identified by elevated scores on the Revised Social Anhedonia Scale (Eckblad, Chapman, Chapman, & Mishlove, 1982) developed schizophrenia-

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spectrum disorders at a ten-year follow-up assessment compared to only 1% of control participants.

While social anhedonia is a hallmark of negative symptom schizotypy, the relationship between social anxiety and schizotypy is less clear. Social anxiety is commonly reported among patients with schizophrenia and spectrum disorders. Pallanti, Quercioli, and Hollander (2004) reported a 36% comorbidity rate of social anxiety in a sample of outpatients with schizophrenia. Furthermore, social anxiety often occurs among nondisordered schizotypes, including nonpsychotic relatives of patients with schizophrenia and people with schizotypal personality disorder. Torgerson et al. (1993) reported that excessive social anxiety was more common in nonpsychotic dizygotic and monozygotic cotwins of patients with schizophrenia than among control participants. Social anxiety is also one of the diagnostic criteria for schizotypal personality disorder, although the nature of social anxiety in the disorder has evolved. The Diagnostic and Statistical Manual of Mental Disorders-3rd Edition (DSM-III; American Psychiatric Association, 1980) broadly described social anxiety as a diagnostic criterion of schizotypal personality disorder. However, the current edition (DSM-IV-TR; American Psychiatric Association, 2000) has limited this to social anxiety that is fueled by paranoid expectations of mistreatment. Although Raine et al. (1994) initially categorized social anxiety as part of negative schizotypy, inconsistent results led to the suggestion that social anxiety may constitute a third factor separate from positive and negative schizotypy known as "disorganization/social impairment" (Bentall, Claridge, & Slade, 1989; Raine, Lencz, & Mednick, 1995; Venables & Bailes, 1994).

CHAPTER II

REVIEW OF THE LITERATURE

One way to enhance our understanding of the relationship between social anxiety and social anhedonia is to examine their expression in daily life. Researchers have recently begun using experience sampling methodology (ESM) to explore the daily life experiences of patients with schizophrenia and the contexts in which these experiences occur (see Myin-Germeys, Delespaul, & van Os, 2003, for a review). ESM is a widely used, within-day self-assessment technique in which participants are prompted at random intervals to complete a brief questionnaire. ESM has been used in clinical and social psychology research, and offers several powerful advantages to traditional data collection procedures (e.g., Csikszentmihalyi & Larson, 1987; deVries, 1992; Reis & Gable, 2000). Specifically, ESM (1) repeatedly assesses participants in their normal daily environment, thereby enhancing ecological validity, (2) assesses the participants' experiences at the time of the signal (or in the moment), thereby minimizing retrospective bias, and (3) allows for an examination of the context of participants' experiences.

ESM studies of participants with schizophrenia indicate that patients are more emotionally active than behavioral observations suggest (Myin-Germeys, Delespaul, & deVries, 2000), that daily life context impacts the experience of delusions (Myin-Germeys, Nicolson, & Delespaul, 2001), and that different patterns of emotional reactivity occur for patients with schizophrenia and affective disorders (Myin-Germeys et

al., 2003). In addition, several recent studies have used ESM in a sample of putatively schizotypic college students. Verdoux, Husky, Tournier, Sorbara, and Swendson (2003) reported that change in social contact was associated with the experience of psychotic symptoms in high scorers on the positive symptom scale of the Community Assessment of Psychic Experiences (Stefanis et al., 2002). Husky, Grondin, and Swendsen (2004) reported that schizotypy was associated with increased negative affect when with social partners, but decreased negative affect in secure environments. They suggest that these associations may reinforce social withdrawal and anxiety in schizotypic people. Kwapil et al. (2006) recently examined the relationship of social contact, affect, and functioning across levels of social anhedonia. As hypothesized, elevated social anhedonia was associated with increased social isolation, diminished social interest, and decreased positive affect from social contact.

To date, no studies have been published that examine the expression of both social anhedonia and social anxiety in daily life using ESM. However, independent empirical examinations of social anxiety and social anhedonia suggest that they may be differentiated by their expressions of positive and negative affect in social situations. Human development and functioning occur within a social context and, in general, social interactions increase the experience of positive affect (e.g., Fleeson et al., 2002; Watson, 2000). However, Kwapil et al. (2006) found that high levels of self-reported social anhedonia were associated with lower levels of positive affect but not increased negative affect when compared to control participants. People high in social anxiety, on the other hand, experience increases in negative affect in social situations due to fears of

embarrassment and humiliation (Kashdan, 2004). Consistent with this finding, Vittengl and Holt (1998) found that undergraduates high in social anxiety reported higher levels of negative affect than control participants in diary records obtained after social encounters. These findings suggest that people who experience high levels of social anxiety may withdraw from social encounters and experience social impairment for different reasons than those high in social anhedonia. Socially anhedonic people may withdraw because social encounters are less rewarding, whereas socially anxious people may withdraw to avoid the negative emotions associated with fear of evaluation. Furthermore, socially anxious people may not experience as substantial increases in negative emotions when they are interacting with one or two people with whom they feel very close. Vittengl and colleagues found that the level of familiarity differentially affected socially anxious individuals' diary reports of negative affect, such that they reported less negative affect with familiar individuals.

Differences in affective response to social experiences may provide a theoretical framework for understanding the relationship of social anxiety and social anhedonia to the dimensions of schizotypy. Social anhedonia is generally considered to be a component of negative symptom schizotypy—consistent with the flattened or blunted affect that characterizes this dimension (although, Lewandowski et al. [in press] also found a modest relationship between scores on the Revised Social Anhedonia Scale and positive schizotypy). Social anxiety, on the other hand, is reported to involve intense emotional reactivity (especially negative affect in social situations), consistent with the affective instability observed in positive symptom schizotypy. Lewandowski et al.

reported that anxiety was more strongly associated with positive than negative symptom

schizotypy. However, that study examined general anxiety and did not specifically

consider the relationship of social anxiety to the schizotypy dimensions.

CHAPTER III

STATEMENT OF PURPOSE

The goals of the present research were to examine the relationship of social

anxiety and social anhedonia, and to examine the relationship of social anhedonia and

anxiety with the positive and negative dimensions of schizotypy in an unselected sample

of college students (Study 1). Furthermore, it examined the expression of social anxiety

and social anhedonia in daily life using ESM (Study 2). College students provided an

appropriate sample for examining the relationship between schizotypy and social

functioning. Although college graduates have a slightly lower lifetime prevalence of

schizophrenia than the general population (Robins et al., 1984), longitudinal studies have

reported that psychometrically identified schizotypic college students are at heightened

risk for developing psychotic disorders and schizophrenia-spectrum illnesses (e.g.,

Chapman, Chapman, Kwapil, Eckblad, & Zinser, 1994; Kwapil, 1998).

For the first study, it was hypothesized that there would be a modest relationship

between social anxiety and social anhedonia, especially across lower and middle ranges

of the constructs. However, high levels of social anhedonia are presumed to be

characterized by negative symptoms of schizotypy, including diminution of affect. In

contrast, high levels of social anxiety are likely to be characterized by high affective

reactivity (especially in regards to negative affect). Therefore, there should be a

decoupling of this relationship at high levels of social anhedonia resulting in an overall

curvilinear relationship. Furthermore, it was predicted that the relationship between social anxiety and social anhedonia would diminish when variance associated with positive symptoms of schizotypy was partialed from the relationship. Consistent with these predictions and the findings of Lewandowski et al. (in press), it was expected that social anxiety would be more strongly associated with positive schizotypy than with negative schizotypy.

The second study examined the relationship of social contact, affect, and functioning across levels of social anhedonia and social anxiety in daily life using ESM. It was hypothesized that social anxiety and social anhedonia would be associated with decreased social contact. However, it was also expected that social anhedonia and anxiety would differ in terms of their impact on the relationship between social contact and affect. Specifically, social anxiety was hypothesized to be associated with increased negative affect related to social contact, but unrelated to the relationship of social contact and positive affect. Social anhedonia, on the other hand, was hypothesized to be associated with decreased pleasure from social contact, but unassociated with negative affect. Furthermore, it was proposed that the level of social anxiety, but not social anhedonia, will moderate the relationship between affective responding in social situations and the closeness of the interaction partner. It was hypothesized that, in social encounters with "close" interaction partners, socially anxious individuals will experience increased positive affect and decreased negative affect. Furthermore, it was predicted that social anxiety, but not social anhedonia, would be associated with increased reports of self-consciousness in social situations.

CHAPTER IV

METHOD

Participants: Study 1

      Usable data were collected for 272 female and 92 male college students enrolled in General Psychology courses at the University of North Carolina at Greensboro (UNCG). The sample was limited to Caucasian and African-American participants because reliable norms for the schizotypy scales have not been established for other ethnic groups. The sample was 75% Caucasian and 25% African American, consistent with the student demographics at UNCG. The mean age of the sample was 19.7 years ($SD = 2.9$). Males and females did not differ in age or ethnicity.

Participants: Study 2

      A subset of 245 participants from the initial study participated in Study 2. Recruitment of participants involved two different mechanisms. Unselected participants who completed the departmental mass screening assessment volunteered to take part in the study through a confidential web-based recruitment system. Participants were also recruited (oversampled) if they had elevated scores (standard scores of 1.96 or above) on the Revised Social Anhedonia and social anxiety scales in order to ensure that a sufficient number of people who experience elevated rates of these characteristics were included in the study. Participants received research credit for taking part in the study, and those who completed 70% of the ESM questionnaires were entered into a drawing for two

$100 gift cards awarded each semester. The sample included 184 females and 61 males. Similar to the larger sample reported in Study 1, this subset of participants was 73% Caucasian and 27% African-American. The mean age of the sample was 19.5 ($SD = 2.6$).

Materials and Procedures: Study 1

Participants completed a brief demographic questionnaire, the Social Interaction Anxiety Scale and the Social Phobia Scale (SIAS and SPS; Mattick & Clark, 1998), and four schizotypy questionnaires: the Revised Social Anhedonia, Physical Anhedonia (Chapman, Chapman, & Raulin, 1976), Perceptual Aberration (Chapman, Chapman, & Raulin, 1978), and Magical Ideation (Eckblad & Chapman, 1983) Scales. The items on the schizotypy scales were intermixed with a 13-item measure of infrequent responding (Chapman & Chapman, 1983). The infrequency scale was included to screen out participants who responded in a random or "fake-bad" manner. Consistent with the recommendations of Chapman and Chapman, participants who endorsed more than two infrequency items were dropped from further study.

The SIAS is a 20 item scale that assesses discomfort during social situations, and the 20-item SPS assesses socially phobic concerns of being scrutinized or judged during routine activities. Coeffcient alpha is reported to be .90 for the SIAS and .94 for the SPS (Mattick & Clarke, 1998). The Revised Social Anhedonia Scale consists of 40 items that tap asociality and indifference to others, while the Physical Anhedonia Scale includes 61 items that measure deficits in sensory and aesthetic pleasure. The anhedonia scales generally tap aspects of negative symptom schizotypy. However, Lewandowski et al. (in press) reported that the Revised Social Anhedonia Scale also is modestly associated with

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measures of positive schizotypy, consistent with findings from Diaz, Dickerson, and Kwapil (2003) that high scorers experience both positive and negative symptoms of schizophrenia. The Perceptual Aberration Scale consists of 35 items that tap schizotypal perceptual experiences and bodily distortions, while the Magical Ideation Scale is made up of 30 items that measure belief in implausible or invalid causality. The Perceptual Aberration and Magical Ideation Scales assess positive symptom schizotypy.

Participants completed the above measures, as well as other measures not included in the present study, as part of the Department of Psychology mass screening. The assessment lasted between 1.5 and 2 hours. Students received course credit for their participation.

Materials and Procedures: Study 2

ESM data was collected on PDAs (Personal Digital Assistants; Palm Pilot Zire model) using iESP software (Intel, 2004), a modification of the widely used ESP software (Feldman-Barrett & Barrett, 2004). The same ESM questionnaire and summary affect and stress indices used by Kwapil et al. (2006) were administered, except for changing the question, "I am feeling irritable" to "I am feeling self-conscious" during the course of data collection ($n = 76$ and $n = 169$, respectively). The questionnaire and indices were developed in consultation with Inez Myin-Germeys following from Myin-Germeys et al. (2000) and Myin-Germeys et al. (2003). The ESM questionnaire inquires about cognition, affect, activities, and social contact that the participant is experiencing at the time of the signal. Most of the items are rated on a 7-point scale from 1 (not at all) to 7 (very much). Following Myin-Germeys et al. (2001), summary indices were computed

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for positive affect (coefficient alpha = .76), negative affect (.74), activity disengagement (.64), social distance (.86), and thought impairment (.65).

Findings from Study 1 guided the selection of measures of social anxiety and social anhedonia in this study. First, the decision was made use the SPS alone instead of the SIAS or a combination of the two measures. Although the SIAS and SPS are highly correlated, the content of the SIAS appears to tap more general social discomfort, whereas the SPS appears to tap social anxiety more directly. Furthermore, the SIAS had a slightly stronger relationship with the Revised Social Anhedonia Scale than did the SPS.

A second change in the measures included in Study 2 was the decision to use a subset of items from the Revised Social Anhedonia Scale in the analyses. The findings of Study 1, consistent with the findings of Lewandowski et al. (in press), indicate that the Revised Social Anhedonia Scale loads on positive, as well as negative, schizotypy factors, which is conceptually inconsistent. Furthermore, the content of a number of the items did not appear to tap social disinterest or withdrawal. Therefore, a subset of 15 items was identified that specifically tapped social disinterest, based upon an analysis of item content. An examination of the psychometric properties of the items, conducted after the items were selected, appeared to validate the selection of these items. The abbreviated scale had a coefficient alpha of .79, contrasted with an expected alpha of .48 predicted by the Spearman-Brown Prophecy Formula as a result of shortening the measure to this degree. The abbreviated scale correlated .85 with the full anhedonia scale and .12 with the SPS. Thus, the SPS and abbreviated Social Anhedonia Scale were selected for Study 2 in order to provide more distinct measures of social impairment.

Participants attended a one-hour information session in which experimenters provided PDAs, obtained informed consent, and described study procedures. Additionally, participants who did not participate in mass screening or did not have usable data completed the paper-and-pencil questionnaires described above. After being assigned a PDA and provided verbal instructions on its use during the initial session, participants were asked to complete a practice questionnaire to ensure familiarity with study procedures. Before participants finished the session, they were provided a written summary of the study instructions and contact information in the event that they experienced problems with the procedures.

The PDAs signaled the participants, administered the questionnaires, and time-stamped and recorded the participants' responses. Participants were signaled to complete the ESM questionnaire eight times daily between noon and midnight for seven days. One signal occurred randomly during each of the eight 90-minute blocks that fell within the twelve-hour window. Participants responded by tapping the appropriate answer on the PDA screen with a stylus. Participants had up to five minutes to initiate their responses following the signal and up to three minutes to complete each subsequent question. After these time intervals (or the completion of a questionnaire), the PDA turned off and would not reactivate until the next signal. This procedure ensured that participants could not skip questionnaire administrations and complete them at a later time. The ESM questionnaires required about two minutes to complete. Participants were also asked to meet with experimenters on days two and four of the study to allow investigators to download their current data. These visits were scheduled in order to decrease the

likelihood of data loss resulting from lost or defective PDAs and increase the likelihood

of participants regularly completing the protocols. Participants completed an average of

41 usable ESM questionnaires ($SD = 11$).

CHAPTER V

RESULTS

Findings: Study 1

Table 1 presents the descriptive statistics for the schizotypy and social anxiety

scales. The coefficient alpha was good to excellent for all of the scales. The mean,

standard deviation, distribution, and reliability for each of the schizotypy scales were

consistent with data from a larger normative sample ($n = 6{,}137$) assessed at UNCG. The

alpha level was set at .001 for all of the analyses in order to minimize the risk of Type I

error and to reduce the likelihood of reporting statistically significant, but inconsequential

findings, due to the large sample size. Analyses are presented for the male and female

participants combined, because the results were substantively unchanged when computed

separately by sex.

Table 2 displays the bivariate correlations of scores on the schizotypy and social

anxiety scales. Consistent with earlier findings (Chapman, Chapman, & Miller, 1982), the

Revised Social Anhedonia and Physical Anhedonia Scales were significantly positively

correlated, as were the Perceptual Aberration and Magical Ideation Scales. The Physical

Anhedonia Scale was uncorrelated with either the Magical Ideation or Perceptual

Aberration Scales. The Social Anhedonia Scale was significantly, though modestly,

correlated with the Perceptual Aberration and Magical Ideation Scales—consistent with

the finding that the Social Anhedonia Scale taps aspects of both positive and negative

schizotypy. Scores on the SIAS and SPS correlated significantly with each other and all the other scales, except the Physical Anhedonia Scale.

Both a linear and curvilinear model were fit to describe the relationship between the social anxiety scales and social anhedonia. As indicated by the Pearson correlations above, a significant positive linear relationship between the SPS and social anhedonia was observed, $F(1, 362) = 27.97$, $p < .001$, as well as between the SIAS and social anhedonia, $F(1, 362) = 51.74$, $p < .001$. The curvilinear model was also significant for both the SPS, $F(2, 361) = 14.09$, $p < .001$, and the SIAS, $F(2, 361) = 26.12$, $p < .001$, suggesting that there is both a linear and curvilinear component to the relationship. As hypothesized, the analyses support a decoupling of the linear relationship between social anxiety and social anhedonia at high levels of anhedonia. Further evidence of this decoupling is seen by the fact that as scores on the Revised Social Anhedonia Scale increase, there is a decreasing percentage of participants with elevated scores on the social anxiety scales. For example, 60% of the participants who scored above the mean on the Revised Social Anhedonia Scale scored above the mean on the SPS. However, only 33% of the participants who received a score of at least 1 SD above the mean on the anhedonia scale scored as highly on the SPS. Likewise, only 10% of the participants with anhedonia scores at least 2 SD above the mean received SPS scores of 2 or more SD above the mean. Thus, extremely high scorers on the Revised Social Anhedonia Scale included a minimal number of those also scoring high on measures of social anxiety.

To examine the relationship of social anhedonia and social anxiety independent of the effects of positive schizotypy, scores from the Perceptual Aberration and Magical

Ideation Scales were partialed from the correlations between scores on the Revised Social Anhedonia Scale and the social anxiety measures. These partial correlations were significant for the SPS, $r_p = .19$, $p < .001$, and the SIAS, $r_p = .30$, $p < .001$. To evaluate whether these partial correlations were significantly less than the bivariate correlations, mediational analyses were conducted using the Aroian second-order exact solution formula (1944) as recommended by MacKinnon et al. (2002). The partial correlations were significantly lower than the bivariate correlations between scores on the Revised Social Anhedonia Scale and the SPS, $z = 3.8$, $p < .001$, but not the SIAS, $z = 2.4$, $p < .05$. This suggests that the relationship between measures of social anhedonia and socially phobic experiences, but not social discomfort, is mediated in part by positive symptom schizotypy.

To more fully examine the relationship of social anxiety with schizotypy, four confirmatory factor analyses based upon *a priori* hypotheses were conducted to compare the fit of several competing models of schizotypy and social anxiety. Both the sample size and number of participants per variable were adequate for conducting confirmatory factor analyses in accordance with the recommendations set out by Anderson and Gerbing (1984) and Bentler and Chou (1987). Following the recommendations of Little et al. (2002), the items for each of the schizotypy scales were divided into three parcels to produce more robust estimates. The residuals from each parcel within a schizotypy scale were allowed to correlate, given that they shared a common source. Model fit was assessed using the Goodness of Fit Index (GFI), Adjusted GFI, Normed Fit Index (NFI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and

the chi-square statistic. Table 3 reports these fit statistics. Model fit adequacy is typically indicated by fit indices greater than .95, RMSEA less than .05, and a nonsignificant chi-square statistic (Bentler & Bonett, 1980; Browne & Cudeck, 1993); however, with a sample size this large, a nonsignificant chi-square value is unlikely. The models were nested, so the change in chi-square was compared across successive models to assess improvement in fit.

The first model tested whether all the scales load primarily on a single factor, representing general psychopathology. As indicated in Table 3, this model provided a poor fit. The second model evaluated the fit of a two-factor model, one factor representing general schizotypy and one representing social anxiety. This model also provided poor fit. A third model evaluated a three-factor model containing positive schizotypy, negative schizotypy, and social anxiety factors. This model provided a marked improvement, but still failed to provide adequate fit. Lewandowski et al. (in press) found that an alternative three factor model in which the Revised Social Anhedonia Scale cross-loaded on positive and negative schizotypy factors provided the best fit for the data. A similar three-factor model, when applied to this data, provided excellent fit. Given that the models were nested, the change in chi-square and degrees of freedom were evaluated with each successive model. In every case the subsequent model provided significantly improved fit over the preceding model. As hypothesized, the final model indicated that the social anxiety factor was more strongly associated with positive, than negative, schizotypy. Figure 1 contains the standardized coefficients for the final three-factor model.

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Two additional models were tested to clarify the relationship of social anxiety and anhedonia with schizotypy. The first model tested whether social anhedonia and anxiety might be better understood as tapping a general social dysfunction factor. In this model, the Perceptual Aberration and Magical Ideation Scales loaded on a positive schizotypy factor, the Physical Anhedonia Scale loaded on a negative symptom/anhedonia factor, and the social anhedonia and anxiety scales loaded on a social dysfunction factor. The fit for this model was poor (all fit indices < .90 and RMSEA > .10).

The second model examined whether the social anxiety measures were part of positive schizotypy, rather than constituting a separate factor. In this model, the Perceptual Aberration, Magical Ideation, and social anxiety scales loaded on a positive schizotypy factor, while the Revised Social and Physical Anhedonia Scales loaded on a negative symptom/anhedonia factor. Note the model was also recomputed with social anhedonia cross-loading on positive schizotypy. Neither model produced adequate fit (all fit indices < .90 and RMSEA > .10).

As noted in Chapman et al. (1995), the distributions of scores for the schizotypy scales depart from normality. Following the recommendation of Wilcox and Muska (2001), the confirmatory factor analyses were computed using bootstrap procedures. The analyses were computed using 1000 bootstrap samples, and the difference (bias) between the original coefficients and the bootstrapped coefficients was determined. All of the bootstrap samples were usable and the bias was minimal for the standardized regression weights (bias range: -0.005 to 0.005) and the correlation coefficients (-0.013 to -0.008). The results of the bootstrap analyses support the findings of the original analyses.

Findings: Study 2

ESM data have a hierarchical structure in which repeated ESM ratings made in daily life (level 1 data) are nested within participants (level 2 data). Multilevel modeling provides a more appropriate method than conventional unilevel analyses for analyzing nested data (Affleck, Zautra, Tennen, & Armeli, 1999; Schwartz & Stone, 1998). Multilevel modeling techniques are a variant of the more commonly used unilevel regression analyses (Hox, 2002; Luke, 2004), and they are standard for the analysis of ESM data (see Nezlek, 2001; Reis & Gable, 2000). Cross-level interactions (or slopes-as-outcomes effects, as they are sometimes called; see Kreft & de Leeuw, 1998) test whether level 1 relationships vary as a function of the level 2 variables of social anxiety and anhedonia. The multilevel data were analyzed with HLM 6 (Raudenbush, Bryk, & Congdon, 2004).

The intercept, β_{01}, tested the relationship between level 1 dependent variables and level 2 variables using the formula, $\beta_0 = \gamma_{00} + \gamma_{01}$(Social Anhedonia) $+ \gamma_{02}$(Social Anxiety) $+ \mu_0$ (where γ_{00} is the mean value of the level 1 dependent measure, γ_{01} and γ_{02} are the effects of the level 2 predictors, and μ_0 is the error term). This offers an advantage over traditional correlational analyses in that it includes an error term for within-person variance, thereby increasing precision. The level 2 predictors of social anxiety and social anhedonia were entered simultaneously into the equations, so the effects of each were assessed with the other partialed out of the equation. The interaction of social anxiety and anhedonia were entered at a second step to examine its effect over and above the partialed main effects. Consistent with the recommendations of Cohen et al. (2003) and

Luke (2004), the level 2 predictors were grand mean centered. The data departed from normality, so parameter estimates were calculated using robust standard errors, following the recommendations of Hox (2002).

The first set of analyses examined the extent to which social anhedonia was associated with daily reports of diminished affect and social interactions after partialing out variance associated with social anxiety (see Table 4). As predicted, social anhedonia was found to be associated with decrements in overall positive affect but not increases in negative affect. Consistent with these findings, no association was found between social anhedonia and reports of feeling anxious, sad, or self-conscious. Furthermore, there was a negative relationship between social anhedonia and ratings of happiness and liking the current activity, and a marginally negative relationship with the ratings of the current event as pleasant. Note that social anhedonia was consistently associated with decrements in positive affect, but was unrelated to negative affect. The relationship between social anhedonia and three summary indices of functioning in daily life was examined. Social anhedonia was not associated with an index of thought impairment; however, it was positively related to activity disengagement and social distance, consistent with negative schizotypy.

The relationship of social anhedonia and the quality and amount of social contact was assessed in daily life. As predicted, social anhedonia was associated with being alone at the time of the beep. In addition, social anhedonia was associated with reports of social disinterest and distance. Social anhedonia was negatively associated with reports of liking the person the participant was with, feeling that the time with the person was important,

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and reporting that the most important activity since the last beep occurred with other people. Social anhedonia was also negatively associated with the degree to which the participant reported interacting with the other person and feeling close to that person. Social anhedonia was positively associated with reports of the preference to be alone when with others. Furthermore, social anhedonia was negatively associated with the preference to be with others when alone. It was not associated with reports of being alone because of not being wanted by others, or being alone by choice.

Identical analyses were conducted to examine the relationship between social anxiety and daily life experiences after partialing out the variance associated with social anhedonia. Consistent with the hypotheses, social anxiety was found to be positively associated with negative affect; specifically, it was positively associated with reports of anxiety and sadness. Note that social anxiety was also associated with increased reports of self-consciousness in daily life. Contrary to expectations, social anxiety—like social anhedonia—was negatively associated with positive affect; specifically, it was negatively associated with happiness. It was unrelated to reports of liking the current activity or of the activity as pleasant. In other words, social anxiety was associated with greater negative affect and less positive affect. There was no relationship between social anxiety and the three indices of functioning in daily life. Social anxiety was not associated with ratings of thought impairment. Furthermore, unlike social anhedonia, it was unrelated to reports of activity disengagement and social distance.

In contrast to the findings for social anhedonia, social anxiety was unrelated to reports of being alone at the time of the beep. During social encounters, social anxiety

was not associated with reports of liking the person the participant was with, feeling the time with the person was important, and reporting that the most important activity since the last beep occurred with other people. Social anxiety was also unassociated with the degree to which the participant was interacting with the other person and feeling close to that person. However, social anxiety was positively associated with reports of the preference to be alone when with others. In contrast, social anxiety was not associated with the preference to be with others when alone, or being alone by choice. There was a marginally significant positive relationship between social anxiety and reports of being alone because of not being wanted by others. A negative relationship was found between the social anxiety x social anhedonia interaction term and reports of feeling sad, suggesting the combination of high social anxiety and low social anhedonia was associated with reports of sadness over and above the effects of either variable alone. The interaction term was not significant in any other analyses.

In addition to these analyses, cross-level interaction analyses examined the extent to which social anhedonia, social anxiety, and their interaction moderated the relationships of level one variables. In other words, these analyses considered whether the relationships of level one variables would change depending on the level of social anhedonia or anxiety reported by participants. A cross-level interaction is evaluated by estimating the effect of a level 2 predictor on the level 1 slopes, using the equation, $\beta_1 = \gamma_{10} + \gamma_{11}$(social anhedonia) + γ_{12}(social anxiety) + γ_{13}(social anhedonia x social anxiety) + μ_1 (in which γ_{10} is the mean value of the level 1 slope, γ_{1j} is the effects of the level 2 predictors, and μ_1 is the error term). If a level 2 predictor is significant, then it explains

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variability in the within-person slopes. The γ_{10} coefficient evaluates the strength of the relationship of the level 1 predictor and criterion, independent of the level 2 variables. The level 2 predictors of social anxiety and social anhedonia were entered simultaneously into the equations, so the effects of each were assessed with the other partialed out of the equation. The interaction of social anxiety and anhedonia was entered at a second step to examine its effect over and above the partialed main effects. As in the initial multilevel analyses, the level 2 predictors were grand mean centered. In addition, the level 1 predictors were group mean centered.

The results of the cross-level interactions are presented in Table 5. The first set of cross-level interaction analyses examined the relationship between being alone or with others at the time of the signal with various measures of daily life experiences (level one dependent measures) and whether these relationships changed across levels of social anxiety and anhedonia. There was a relationship between positive affect and social contact, indicating that being with others was associated with increased ratings of positive affect. The cross-level interactions of this relationship were not significant, indicating that the level 1 relationship was not moderated by social anxiety or anhedonia. Conversely, negative affect was negatively associated with social contact, indicating that being with others is related to less negative affect. The cross level interactions again were not significant.

Social contact was negatively associated with the indices of thought impairment and activity disengagement, suggesting that people experience less impairment in daily functioning when with other people. Neither of these slopes had significant cross-level

interactions with social anhedonia and social anxiety. There was a significant positive association between daily ratings of liking one's current activity and social contact, consistent with this general pattern that people report greater enjoyment when with other people. The cross-level interactions were not significant. Self-consciousness was positively related to social contact, indicating that social contact was associated with increased self-consciousness. Consistent with the predictions, there was a cross-level interaction between social anxiety and ratings of self-consciousness in social situations (see Figure 2), but no significant cross-level interaction with social anhedonia. In other words, there was a stronger positive relationship between feeling self-conscious and being with others as one moved from low to high levels of social anxiety.

A second set of analyses examined the relationship between reports of anxiety in daily life and two level 1 predictors that occurred during social encounters: feeling close to the other person and reporting that they are interacting together. The cross-level interactions examined the extent to which social anhedonia and social anxiety would moderate these relationships. Participants reported a negative relationship between daily reports of anxiety and feelings of closeness to other people. In other words, reports of greater anxiety were associated with less feelings of closeness to other people. The cross-level interactions were not significant. Reports of anxiety and interacting together were also negatively associated, such that greater anxiety was related to less interaction with the other person. The cross-level interaction was not significant with social anhedonia. However, there was a marginally significant negative cross-level interaction with social anxiety, suggesting a stronger negative relationship between feeling anxious and

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interacting with others as one moved from low to high levels of social anxiety (see Figure 3). In other words, highly socially anxious participants were likely to report lower anxiety when interacting with others than when not interacting with others.

The relationship between whether or not the participant felt close to the other person and several predictor variables was examined across levels of social anxiety and anhedonia. There was a positive relationship between feeling close and positive affect, suggesting that the participants feel more positive emotions when with people with whom they feel close. The cross-level interactions were not significant. Negative affect and closeness were negatively related, suggesting that participants reported greater negative affect during social situations when they do not feel close to their social companions. Social anhedonia did not appear to moderate this relationship. Social anxiety, on the other hand, had a negative cross-level interaction (see Figure 4). This finding suggests that socially anxious participants felt much greater negative affect when they are not close to social companions than when they were with people to whom they feel close compared to their non-socially anxious peers.

There was also a negative relationship between closeness and self-consciousness, such that participants reported more self-consciousness when they did not feel close to social partners. The cross-level interaction with social anhedonia was not significant. As predicted, there was a negative cross-level interaction with social anxiety (see Figure 5). In other words, participants high in social anxiety reported more intense self-consciousness when with people to whom they were not close. The relationship of closeness to the preference to be alone suggested similar findings. There was a negative

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relationship between closeness and the preference to be alone. Social anhedonia did not appear to moderate this relationship. Social anxiety moderated the relationship in the negative direction, suggesting that those high in social anxiety experienced a much greater preference to be alone when with others they were not close to, and a less strong preference to be alone when with people to whom they felt close (see Figure 6).

Two other cross-level interaction analyses examined the relationship between self-consciousness and the preference to be alone when with others, and whether social anhedonia and anxiety moderated this relationship. There was a significant positive relationship among the level 1 measures. In other words, greater reports of self-consciousness were associated with a greater preference to be alone. Neither social anxiety nor social anhedonia moderated this relationship. The second analysis examined whether the reported pleasantness of the activity and whether the most important thing since the last beep was with other people. There was a negative relationship between these two variables, suggesting that activities are more pleasant when the most important thing since the last beep occurred with others. The cross-level interactions were not significant.

In addition to these cross-level interaction effects for social anxiety and anhedonia, these relationships were also examined by adding in the social anxiety x social anhedonia interaction term as an additional level 2 variable at a second step. None of these interactions was significant, suggesting that the combination of social anxiety and social anhedonia did not moderate the level 1 relationships over and above the effects of the individual level 2 predictors.

CHAPTER VI

DISCUSSION

The present studies examined the relationship of self reported social anxiety and

social anhedonia, their associations with positive and negative symptom dimensions of

schizotypy, and their expression in daily life. Researchers examining social dysfunction

in schizotypy and schizophrenia have often failed to distinguish between social

anhedonia and social anxiety. However, social anxiety and anhedonia appear to represent

different patterns of dysfunction that have different implications regarding the etiology,

course, nature, and treatment of impairment across the continuum of schizotypy and

schizophrenia-spectrum disorders (e.g., Kashdan, 2004; Kwapil et al., 2006; Vittengl &

Holt, 1998).

The present findings indicate that social anhedonia and social anxiety are

separate, albeit related, constructs and that these aspects of social impairment are

differentially associated with underlying dimensions of schizotypy. Social anhedonia is

associated with emotional deficits (especially in positive affect), whereas social anxiety is

associated with an excess of negative affect in social contexts. These findings are

consistent with reports that positive affect and negative affect are independent factors

with specific characteristics and patterns in daily life (e.g., Goldstein & Strube, 1994;

Watson, 2000). The modest relationship between social anxiety and social anhedonia was

not surprising given that low scores on both scales represent relatively healthy social

functioning. Furthermore, participants' willingness to acknowledge social problems likely contributed in part to this association, given that the measures of social anxiety and social anhedonia were completed at the same time. The findings also suggest that the relationship between social anxiety and anhedonia is mediated in part by self-reported symptoms of positive schizotypy, given that the Revised Social Anhedonia Scale is modestly associated with positive, as well as negative schizotypy. Removal of variance associated with positive schizotypy significantly diminished, but did not eliminate, the relationship between social anxiety and anhedonia. It was also predicted that socially anhedonic people would be less likely to experience marked social anxiety, resulting in a curvilinear relationship between the constructs. Consistent with this hypothesis, this relationship was characterized by both curvilinear and linear components.

The confirmatory factor analyses supported a two factor solution for schizotypy, with social anxiety represented as a separate dimension. Furthermore, the confirmatory factor analyses did not support the idea that social anxiety and anhedonia form a general social impairment factor. These findings are consistent with the fact that social anxiety is central to or comorbid with a number of disorders, and is not a unique feature of schizotypy. In contrast, trait-like social anhedonia appears to be more central to schizotypy, as evidenced by the confirmatory factor analyses. Social anhedonia as measured by the Revised Social Anhedonia Scale appears to represent dysfunction distinct from that seen in mood disorders. Clearly, depression can involve disinterest in social contact and withdrawal. However, anhedonic symptoms in depression tend to be limited to the depressive episodes. Participants identified by high scores on the Revised

Social Anhedonia Scale do not report elevated rates of depressive disorders in either cross-sectional or longitudinal assessments, although they are at marked risk for developing schizophrenia-spectrum disorders (e.g., Kwapil, 1998). Furthermore, Study 2 findings confirm that social anhedonia was unrelated to reports of negative affect in daily life, including reports of sadness and anxiety.

Study 1 suggests that both types of social dysfunction share some variance with positive schizotypy, and results from the confirmatory factor analyses indicate that social anxiety is more strongly associated with positive symptom schizotypy, consistent with findings by Lewandowski et al. (in press) that self-reported symptoms of anxiety and depression are more strongly associated with positive schizotypy than with negative schizotypy. This supports the notion that positive schizotypy and social anxiety are characterized by affective dysregulation and elevated levels of negative affect, while social anhedonia is characterized by a diminution of affect.

The Study 2 findings further confirm that social anxiety and anhedonia are distinguished by differential expression of affect in daily life, as suggested by the Study 1 findings. As hypothesized, increased levels of social anhedonia were associated with decreased positive, but not increased negative, affect in daily life. Social anhedonia was associated with less happiness, but not increased levels of anxiety, sadness, or self-consciousness. Furthermore, results support the understanding of social anhedonia as characterized by social disinterest and disengagement. First of all, participants high in social anhedonia were interacting with others less frequently, but did not endorse doing so because they were unwanted by others. They endorsed the preference to be alone when

with others, and when alone reported decreased desire for social interactions. Social anhedonia was associated with less engagement in activities, more social distance, and less likelihood to view social interactions as either valuable or enjoyable. Overall, it seems clear that people high in social anhedonia are experiencing substantially decreased quality and amount of social interactions, but seem to prefer solitude.

The social dysfunction associated with social anhedonia in daily life did not appear to be influenced by situational context, as evidenced by the fact that none of the cross-level interactions with social anhedonia was significant. Kwapil et al. (2006) examined many of the variables included in the present research, and found a number of cross-level interactions with social anhedonia. For example, they found that social anhedonia was associated with decrements in positive affect most strongly in social contacts, but not markedly so in non-social contexts. However, those were preliminary findings from a much smaller study. Furthermore, Kwapil et al. included only relatively few individuals with extreme scores on the Revised Social Anhedonia Scale, and also used the full version of the scale. Thus, the current research can be viewed as a more definitive examination of these daily life experiences. Furthermore, the present findings suggest that people high in social anhedonia are experiencing decrements in positive affect across situations, which suggests that their deficits in emotional responding that are not limited to social situations. The findings are consistent with the notion that the emotional deficits and disengagement occur across situations in the daily life of people high in social anhedonia.

The Study 2 findings suggest that social anxiety is associated with daily life experiences that differ from those of people high in social anhedonia. As hypothesized, people high in social anxiety experienced more negative affect across situations, including reporting greater feelings of sadness, anxiety, and self-consciousness. They also may experience greater feelings of being unwanted by others, although this finding was only marginally significant. However, findings deviated from the predictions in that social anxiety was associated decreased positive affect. Furthermore, it did not moderate the relationship between social contact or closeness and positive affect. It had been expected that social interactions with close individuals would result in enough positive affect to compensate for decrements in positive affect experienced in novel situations; however, this did not seem to be the case. Indeed, recent diary studies by Kashdan (2006) suggest that overall decrements of positive affect in daily life are characteristic of people high in social anxiety. Furthermore, it is known that social anxiety is highly comorbid with depression, which could also account for deficits in the experience of positive emotions.

Consistent with previous studies, participants in general reported that social interactions were associated with more positive emotions, and being alone was associated with less pleasant and enjoyable experiences. The closeness felt with social interaction partners seemed to increase these effects, with "close" interactions rated as even more positive and enjoyable. Findings for people high in social anxiety seemed to show some similarities to this broader pattern. Although negative affect was positively associated with social anxiety, it was not the case that negative affect was differentially increased

for highly socially anxious people when they were with others compared to when they were not. However, findings suggest that *who a socially anxious person is with* may play an important role in how distressed they become during social interactions. For example, negative affect was substantially increased when they were with others whom they did not report feeling close, and substantially less so in interactions in which they felt close to others. Furthermore, social anxiety was associated with markedly increased self-consciousness in social situations compared both to being alone and with people to whom they feel close. Previous empirical studies suggest that socially anxious individuals may have small networks of close friends with whom they have relatively normal social interactions (e.g. Davila & Beck, 2002) and thus the context of the social interactions may determine the person's subjective reports of affect. Future work examining social anxiety in daily life must attempt to more carefully parse these situational differences by examining the exact nature of participants' relationship with their interaction partners and the specific types of social situations they are in.

The three-factor model in which the Revised Social Anhedonia Scale loaded exclusively on the negative schizotypy factor along with the Physical Anhedonia Scale provided poorer fit than the final model in which the Revised Social Anhedonia Scale loaded on both the positive and negative schizotypy factors. These findings are consistent with the modest positive correlation of the Revised Social Anhedonia Scale with measures of positive schizotypy reported in the literature (e.g., Lewandowski et al., in press), and with interview assessments of participants identified by deviantly high scores on the scale. Kwapil (1998) reported that socially anhedonic college students exhibited

elevated rates of psychotic symptoms and schizophrenia-spectrum disorders at a ten-year

follow-up assessment. Similarly, Diaz et al. (2003) reported that social anhedonia

participants exceeded control participants on interview ratings of both negative and

psychotic-like (positive) symptoms. Nevertheless, these counterintuitive, but replicated,

findings leave the question of whether this can best be understood conceptually (i.e., the

nature of the construct of social anhedonia and its relationship to dimensions of

schizotypy) or methodologically (i.e., the extent to which the scale actually assesses the

construct). From a conceptual standpoint, social anhedonia is characteristic of negative

schizotypy, which is believed to exclusively tap diminished affect and avolition and none

of the behavioral and affective excesses associated with positive schizotypy. Thus, it

seems clear that these conceptually inconsistent findings necessitate further examination

of the Social Anhedonia Scale in order to permit a more precise measurement of social

disinterest and disengagement. The abbreviated version of the scale used in Study 2

seemed to better assess this construct, and may suggest that future studies using this scale

could benefit by conducting analyses with the shortened version as well. Note that the

present findings that the confirmatory factor analyses only identified positive and

negative dimensions of schizotypy should not imply that there are only two factors

underlying the construct. Positive and negative symptom dimensions are the most widely

reported factors of schizotypy and schizophrenia; however, our focus on these factors

admittedly reflects the nature of the measures administered.

The present study indicates that schizotypic traits are associated with social

dysfunction, consistent with the impairment seen in schizophrenia. This raises clinical

concerns because social impairment in nonpsychotic people with schizotypy may serve both as a marker of premorbid impairment and as a stressor that contributes to the transition into schizophrenia-spectrum disorders. Poor premorbid functioning is often characterized by social withdrawal and disinterest. While the expressed emotion literature suggests that not all social contact is beneficial, social contact generally provides a number of protective features, which socially anhedonic people may lack. This is especially problematic for schizotypic people who are beginning to experience prodromal symptoms, such as unusual beliefs and perceptual experiences, because they may fail to seek social support and clinical intervention. Kwapil (1998) found that social anhedonia predicted the development of schizophrenic-spectrum disorders in an undergraduate sample at a 10-year follow-up assessment, despite levels of baseline dysfunction similar to controls. The deterioration of the socially anhedonic group may reflect, in part, the participants moving from structured social environments (parents' home and college) to environments lacking inherent social support.

It remains unclear the extent to which symptoms of social anxiety serve as an early indicator of schizotypy and predictive of the development of spectrum disorders, given that social anxiety likely develops and worsens as a consequence of paranoid ideation and social rejection. The expression of negative affect tends to be associated with a more favorable prognosis in patients with schizophrenia, as is primarily positive-symptom schizophrenia. However, the presence of depression and anxiety in premorbid or prodromal schizotypy appears to increase the risk of transition into psychosis (e.g. Yung et al., 2003). This suggests that, while positive symptoms and their correlates may

be indicative of a better prognosis for patients with schizophrenia, the distress associated with social anxiety may contribute to the development of clinical psychosis. The present findings suggest that the assessment of social impairment should aid in the early identification of individuals at risk for schizophrenia and spectrum disorders. Furthermore, early intervention strategies should address specific patterns of social dysfunction.

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APPENDIX A

TABLES

Table 1: Descriptive Statistics for Schizotypy and Social Anxiety Scales (n = 364)

Schizotypy Scales	Mean	SD	Range	α
Revised Social Anhedonia	8.70	6.25	0 – 36	.83
Physical Anhedonia	13.51	6.93	0 – 37	.83
Perceptual Aberration	5.48	5.40	0 – 33	.83
Magical Ideation	8.65	5.34	0 – 24	.88
Social Anxiety Scales				
Social Phobia	61.58	21.40	20 – 136	.92
Social Interaction Anxiety	64.96	20.82	22 – 123	.95

Table 2: Correlations between Schizotypy and Social Anxiety Scales (n = 364)

	Perceptual Aberration	Magical Ideation	Physical Anhedonia	Social Anhedonia	Social Interaction Anxiety	Social Phobia
Perceptual Aberration						
Magical Ideation	.65*					
Physical Anhedonia	-.07	-.11		.		
Social Anhedonia	.29*	.28*	.41*			
Social Interaction Anxiety	.22*	.20*	.11	.35*		
Social Phobia	.27*	.29*	.06	.27*	.71*	

Table 3: Confirmatory Factor Analyses of Schizotypy and Social Anxiety

Model	GFI	AGFI	NFI	CFI	RMSEA	RMSEA CI	χ^2 (df)	p-value	$\Delta\chi^2(\Delta df)$	p-value
1-Factor	.84	.75	.82	.84	.13	.12-.14	478.3(66)	< .001		
2-Factor[a]	.90	.83	.90	.92	.10	.08-.11	278.7(65)	< .001	199.6 (1)	< .001
3-Factor[b]	.96	.73	.96	.98	.05	.04-.06	119.8(63)	< .01	158.9 (2)	< .001
3-Factor[c]	.97	.95	.97	.99	.03	.01-.05	83.0(60)	< .05	36.8 (3)	< .001

_____

[a]General schizotypy factor (with loadings from the Perceptual Aberration, Magical Ideation, Physical Anhedonia, and Revised Social Anhedonia Scales); Social Anxiety factor (with loadings from the SIAS and SPS).

[b]Positive schizotypy factor (with loadings from the Perceptual Aberration and Magical Ideation Scales); Negative schizotypy factor (with loadings from the Revised Social Anhedonia and Physical Anhedonia Scales); Social Anxiety factor (with loadings from the SIAS and SPS).

[c]Positive schizotypy factor (with loadings from the Perceptual Aberration, Magical Ideation and Revised Social Anhedonia Scales); Negative schizotypy factor (with loadings from the Revised Social Anhedonia and Physical Anhedonia Scales); Social Anxiety factor (with loadings from the SIAS and SPS).

GFI = Goodness of Fit Index, AGFI = Adjusted Goodness of Fit Index, NFI = Normed Fit Index, CFI = Comparative Fit Index, RMSEA = Root Mean Square Error of Approximation, RMSEA CI = 90% confidence interval for RMSEA

Table 4: Relationship of Social Anxiety and Social Anhedonia with Daily Life Experiences (n = 245)

Level 1: Independent Variable	Level 2: Independent Variables	Level 2: Independent Variables	Level 2: Independent Variables
	Step 1: Social Anhedonia γ_{01} ($df = 240$)	Step 1: Social Anxiety γ_{02} ($df = 240$)	Step 2: SocAnh x SocAnx γ_{03} ($df = 239$)
Alone[a]	-0.030 (*SE*=0.009)***	-0.017 (*SE*=0.011)	0.001 (*SE*=0.007)
Negative Affect	0.049 (*SE*=0.042)	0.142 (*SE*=0.053)**	-0.033 (*SE*=0.031)
Positive Affect	-0.102 (*SE*=0.042)*	-0.103 (*SE*=0.053)*	0.045 (*SE*=0.044)
Thought Impairment	0.037 (*SE*=0.055)	0.103 (*SE*=0.066)	-0.004 (*SE*=0.048)
Event Pleasantness	-0.109 (*SE*=0.057)[@]	-0.032 (*SE*=0.059)	0.030 (*SE*=0.049)
Activity Disengagement	0.071 (*SE*=0.027)**	0.006 (*SE*=0.039)	0.009 (*SE*=0.018)
Social Distance	0.211 (*SE*=0.039)***	0.005 (*SE*=0.043)	-0.009 (*SE*=0.028)
Happy	-0.103 (*SE*=0.047)*	-0.141 (*SE*=0.059)*	0.048 (*SE*=0.045)
Anxious	-0.062 (*SE*=0.057)	0.168 (*SE*=0.071)*	-0.018 (*SE*=0.044)
Sad	0.089 (*SE*=0.054)	0.137 (*SE*=0.064)*	-0.072 (*SE*=0.036)*
Self-Conscious[b]	-0.037 (*SE*=0.079)	0.280 (*SE*=0.082)***	-0.054 (*SE*=0.061)

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Like Activity	-0.140	0.003	-0.009
	(*SE*=0.036)***	(*SE*=0.051)	(*SE*=0.027)
Like Person	-0.184	0.036	-0.005
	(*SE*=0.042)***	(*SE*=0.043)	(*SE*=0.035)
Important with Person	-0.230	0.033	0.002
	(*SE*=0.049)***	(*SE*=0.056)	(*SE*=0.035)
Interacting	-0.152	-0.004	0.033
	(*SE*=0.044)***	(*SE*=0.053)	(*SE*=0.035)
Close to Person	-0.238	0.030	0.009
	(*SE*=0.050)***	(*SE*=0.055)	(*SE*=0.035)
Prefer Alone	0.255	0.117	-0.004
	(*SE*=0.050)***	(*SE*=0.052)*	(*SE*=0.036)
Alone by Choice	-0.011	-0.102	0.067
	(*SE*=0.075)	(*SE*=0.079)	(*SE*=0.066)
Alone Not Wanted	0.071	0.085	-0.009
	(*SE*=0.050)	(*SE*=0.046) [@]	(*SE*=0.034)
Alone Prefer Others	-0.155	0.121	0.095
	(*SE*=0.059)**	(*SE*=0.080)	(*SE*=0.056)
Important with Others	0.035	-0.003	0.002
	(*SE*=0.012)**	(*SE*=0.014)	(*SE*=0.010)

Note: values are multilevel modeling coefficients (and standard error)

[a]These items are reversed scored (1 = yes, 2 = no)

[b]Degrees of freedom for self consciousness (γ_{01}/ γ_{02} *df* = 164, γ_{03} *df* = 163)

[@]$p \leq .07$ *$p \leq .05$ **$p \leq .01$ ***$p \leq .001$

Table 5: Cross Level Interactions of Social Anxiety and Social Anhedonia with Daily Life Experiences

Level 1: DV	Level 1: IV	Relationship of Level 1 Predictor & Criterion γ_{10} (df = 240)	Level 2: IV Step 1: Social Anhedonia γ_{11} (df = 240)	Level 2: IV Step 1: Social Anxiety γ_{12} (df = 240)	Level 2: IV Step 2: SocAnh x SocAnx γ_{13} (df = 239)
Positive Affect	Alone	0.267 (SE=0.031)***	-0.011 (SE=0.034)	-0.049 (SE=0.033)	0.043 (SE=0.025)
Negative Affect	Alone	-0.239 (SE=0.030)***	0.005 (SE=0.028)	-0.033 (SE=0.029)	0.026 (SE=0.018)
Thought Impairment	Alone	-0.109 (SE=0.036)**	-0.029 (SE=0.034)	-0.071 (SE=0.038)	0.023 (SE=0.026)
Activity Disengagement	Alone	-0.101 (SE=0.033)**	0.015 (SE=0.031)	0.016 (SE=0.037)	0.020 (SE=0.022)
Self-Conscious[a]	Alone	0.189 (SE=0.048)***	-0.020 (SE=0.046)	0.206 (SE=0.059)***	0.032 (SE=0.043)
Like Activity	Alone	0.233 (SE=0.047)***	-0.047 (SE=0.040)	0.006 (SE=0.046)	0.010 (SE=0.027)
Event Pleasantness	Important with Others	-0.862 (SE=0.060)***	0.069 (SE=0.054)	-0.063 (SE=0.065)	-0.011 (SE=0.043)
Anxious	Interacting	-0.035 (SE=0.012)**	-0.006 (SE=0.010)	-0.024 (SE=0.013)[@]	-0.002 (SE=0.009)
Anxious	Close to Person	-0.067 (SE=0.013)***	0.014 (SE=0.012)	-0.021 (SE=0.013)	-0.003 (SE=0.012)
Positive Affect	Close to Person	0.139 (SE=0.009)***	0.015 (SE=0.009)	0.015 (SE=0.009)	0.009 (SE=0.006)
Negative Affect	Close to Person	-0.048 (SE=0.008)***	0.001 (SE=0.008)	-0.022 (SE=0.009)*	-0.002 (SE=0.008)
Self-Conscious[a]	Close to Person	-0.058 (SE=0.016)***	-0.001 (SE=0.012)	-0.034 (SE=0.017)*	0.005 (SE=0.011)
Prefer Alone	Close to Person	-0.344 (SE=0.018)***	-0.031 (SE=0.021)	-0.062 (SE=0.019)**	-0.004 (SE=0.018)
Prefer Alone[a]	Self-Conscious	0.151 (SE=0.027)***	-0.010 (SE=0.032)	-0.023 (SE=0.027)	-0.004 (SE=0.029)

Note: values are multilevel modeling coefficients (and standard error)
[a]These items are reversed scored (1 = yes, 2 = no)
[b]Degrees of freedom for self consciousness ($\gamma_{01/}$ γ_{02} df = 164, γ_{03} df = 163)

[@]$p \leq .07$ *$p \leq .05$ **$p \leq .01$ ***$p \leq .001$

APPENDIX B

FIGURES

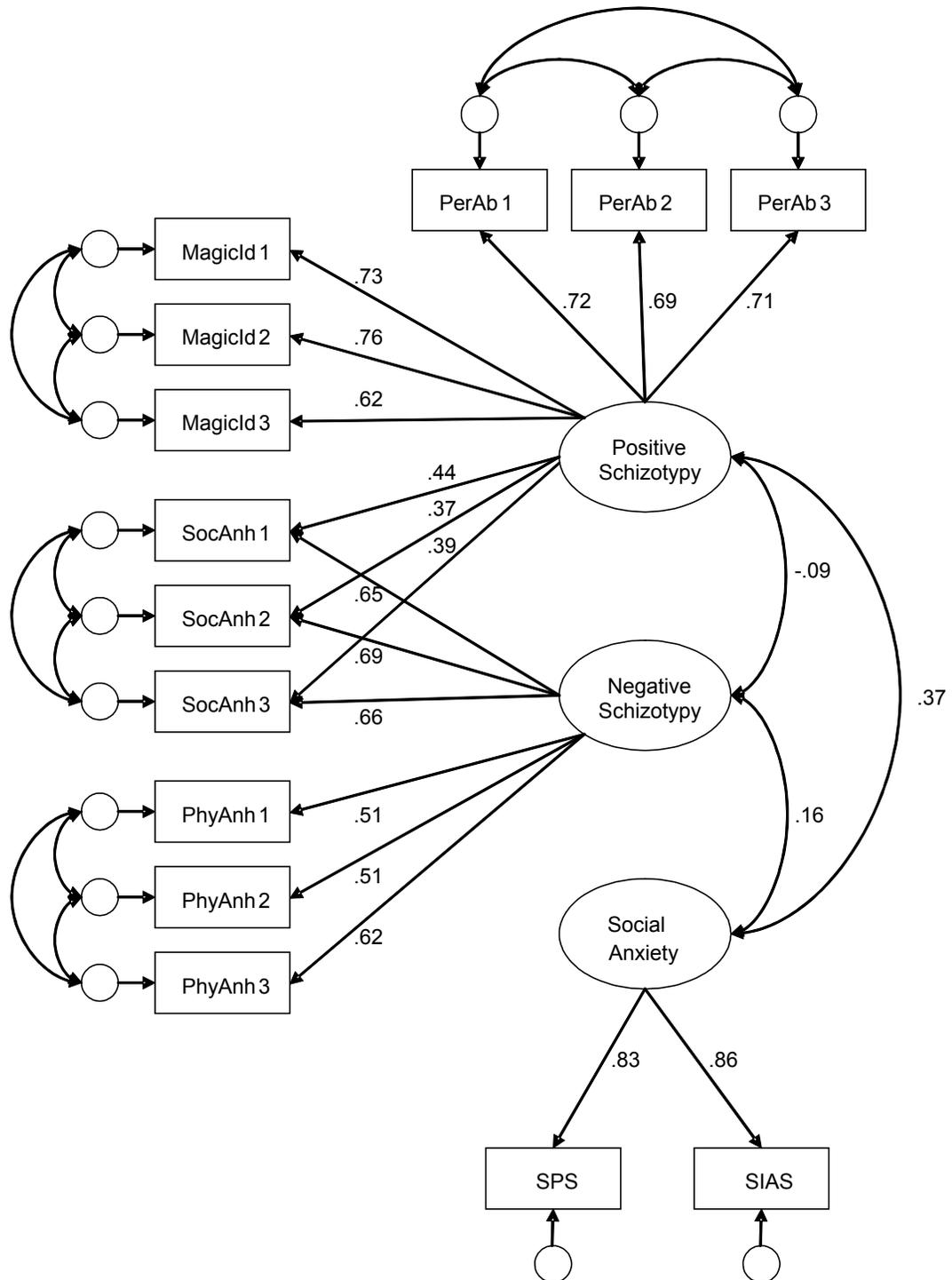Figure 1: Three-factor model with standardized coefficients

Figure 2: The cross level interaction of social anxiety with self-consciousness and being alone
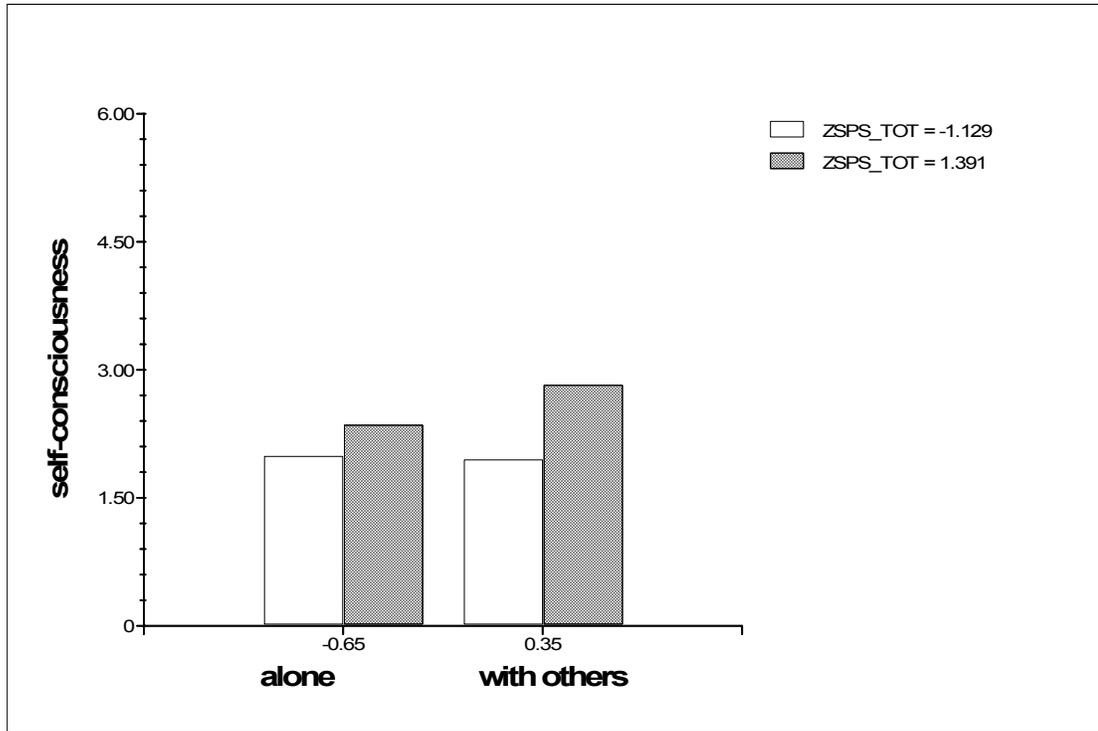
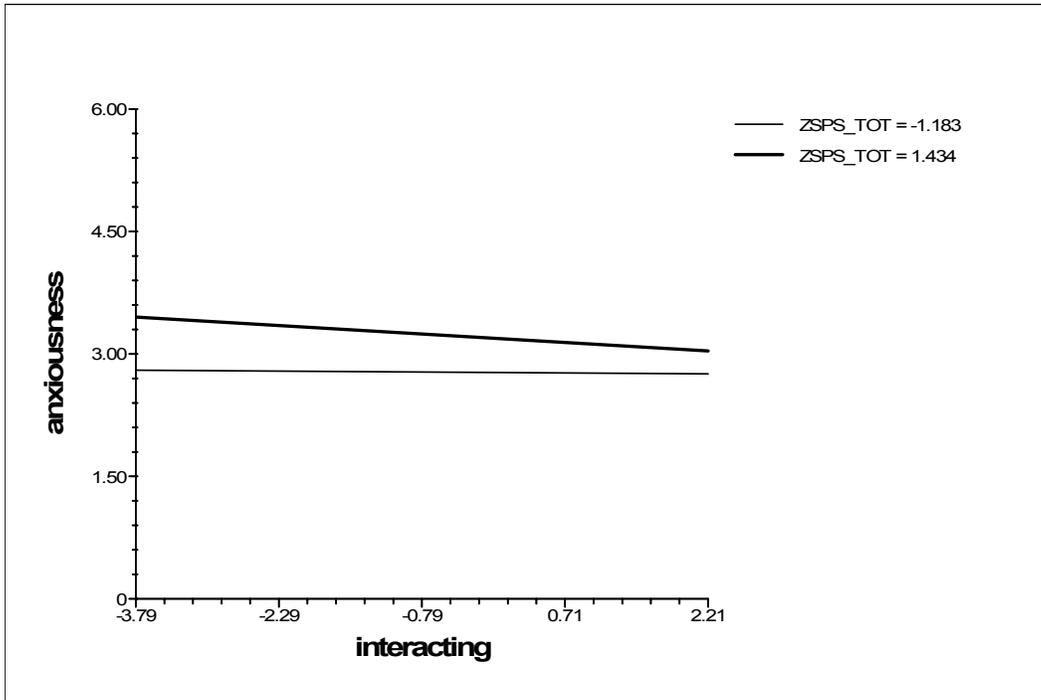Figure 3: The cross level interaction of social anxiety with anxiousness and interacting with others

Figure 4: The cross level interaction of social anxiety with negative affect and closeness
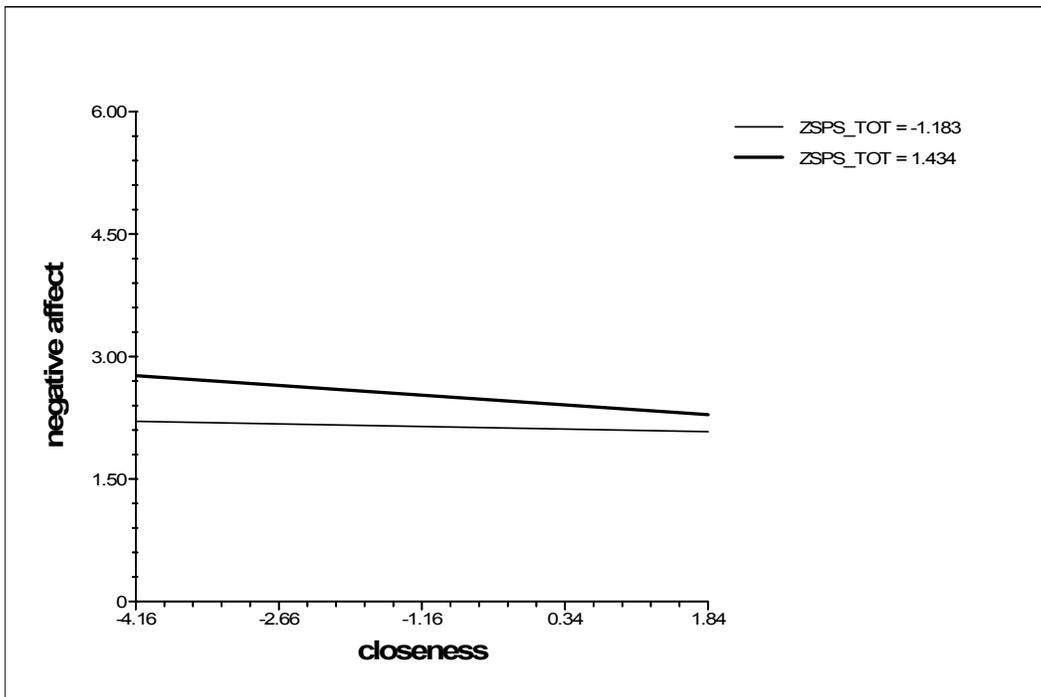
Figure 5: The cross level interaction of social anxiety with self-consciousness and closeness
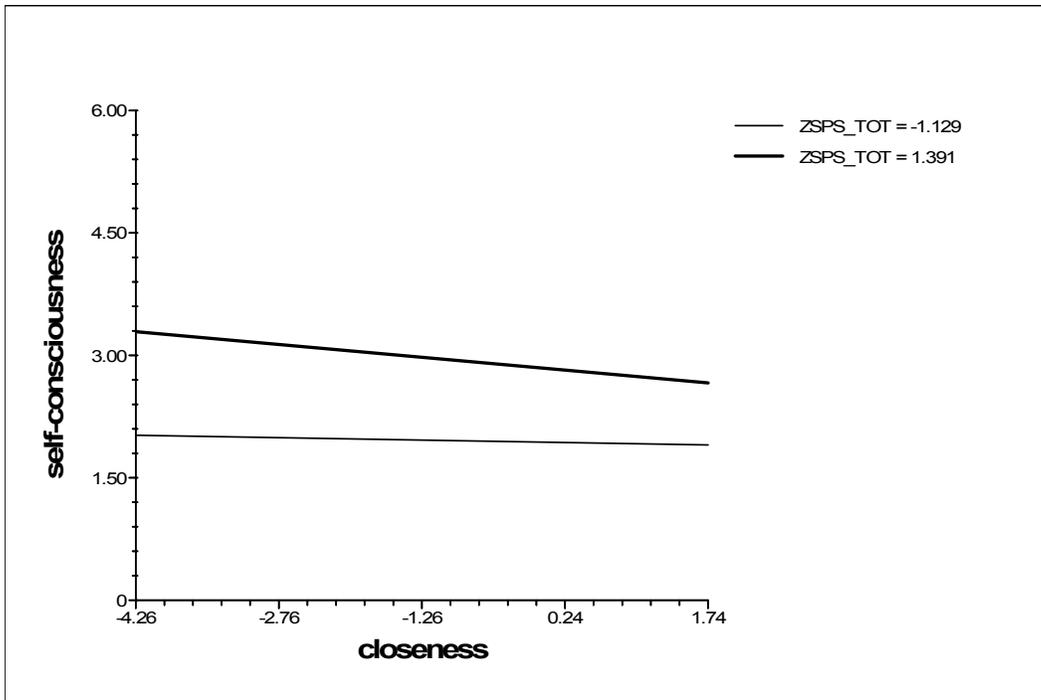

Figure 6: The cross level interaction of social anxiety with preference to be alone and closeness