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Behavioral Signs of Schizoidia and Schizotypy in the Biological Parents of Social Anhedonics

Lindsay C. Emmerson,
University of California

Sarah L. Miller, and
University of Alabama

Jack J. Blanchard
University of Maryland

Abstract

A community sample of 88 putative schizotypes (48 social anhedonics, 40 controls), aged 18 to 19 years, and their biological parents (42 mothers of social anhedonics, 37 mothers of controls; 24 fathers of social anhedonics, 20 fathers of controls) receive videotaped diagnostic evaluations that serve as the basis for ratings of behavioral signs of schizoidia and schizotypy. Proband social anhedonics exhibit more atypical interpersonal behaviors characteristic of schizoid and schizotypal personality disorders than controls. Mothers of social anhedonics display more atypical interpersonal behaviors characteristic of schizotypal personality disorder than mothers of controls. In contrast, clinical symptom ratings of schizotypy do not differentiate mothers of social anhedonics from mothers of controls. Meaningful, though not statistically significant, effects are observed for behavioral sign ratings in the smaller sample of fathers of social anhedonics. Results provide preliminary support for the familiarity of atypical interpersonal behavior in social anhedonics.

Keywords

schizotypy; anhedonia; schizophrenia; behavior; interpersonal; family

Social anhedonia, the decreased capacity to experience pleasure through social interaction, is a promising indicator of Meehl's (1962,1989) construct of schizotypy, a personality organization comprised of cognitive slippage, anhedonia, ambivalence, and interpersonal aversiveness that is believed to reflect genetic liability for schizophrenia. Elevated levels of social anhedonia have been observed in patients with schizophrenia (Blanchard, Mueser, & Bellack, 1998;Cohen, Dinzeo et al., 2005;Katsanis, Iacono, & Beiser, 1990). In nonpsychotic individuals with elevated levels of social anhedonia, characteristics similar to those observed in schizophrenia, yet to a lesser degree, have been observed including psychotic-like experiences (Gooding, & Tallent, 2001;Mishlove & Chapman, 1985), minor physical anomalies (Chok & Kwapil, 2005;Chok, Kwapil, & Scheuermann, 2005), neurocognitive deficits (Cohen, Leung, Saperstein, & Blanchard, 2006;Gooding, Kwapil, & Tallent, 1999;Gooding & Tallent, 2003;Gooding, Tallent, & Hegyi, 2001;Tallent & Gooding, 1999),

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Please address all correspondence to Lindsay C. Emmerson, c/o Eric Granholm, VA San Diego Healthcare System (116B), 3350 La Jolla Village Drive, San Diego, CA, USA 92161; LCEmmerson@msn.com. .

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and eye tracking deficits (Gooding, 1999; Gooding, Miller, & Kwapil, 2000). When examined longitudinally, social anhedonic individuals demonstrate higher rates of schizophrenia spectrum disorders (Gooding, Tallent, & Matts, 2005; Kwapil, 1998).

Family studies represent another strategy for examining the validity of social anhedonia as a marker of genetic liability for schizotypy. First, higher levels of social anhedonia have been reported in first-degree relatives of schizophrenia patients compared to relatives of nonpatients (Katsanis et al., 1990; Kendler, Thacker, & Walsh, 1996; Vollema, Sitskoorn, Appels, & Kahn, 2002). Second, Lyons et al. (1995) found that in relatives of schizophrenia patients, social anhedonia severity correlates with schizophrenia spectrum characteristics, which supports Meehl's genetic theory of a spectrum of outcomes for schizotypes. Third, parent-offspring resemblance for social anhedonia has been observed in nonpatient probands (Berenbaum & McGrew, 1993; Meyer & Hautzinger, 2001). Finally, several twin studies have estimated the heritability of social anhedonia to be in the moderate range, on the order of .32 to .67 (Hay et al., 2001; Kendler & Hewitt, 1992; Linney et al., 2003; MacDonald, Pogue-Geile, Debski, & Manuck, 2001). More recently, an examination of the spectrum of outcomes within families has been conducted with social anhedonics. Cohen, Collins, Mann, Forbes, and Blanchard (2008) reported that individuals with social anhedonia were twice as likely to have a parent with a cluster A disorder compared to controls. Thus, social anhedonia appears to be heritable and is a promising indicator of Meehl's construct of schizotypy. Yet current knowledge of familial correlates of social anhedonia and clinical symptomatology exhibited by family members of social anhedonics is limited. This study examined familial aspects of psychosis proneness in social anhedonics and their biological parents.

Though the subtle neuropsychological deficits and clinical symptoms occurring in social anhedonics have been more extensively examined, few studies have examined the social behavioral characteristics of these putative schizotypes. Prior research has demonstrated less social accomplishment in social anhedonics, reflected by self-report or clinical interviews indicating poorer overall social adjustment (Kwapil, 1998; Mishlove & Chapman, 1985), less social support (Horan, Brown, & Blanchard, 2007), fewer friends and greater reticence with friends (Mishlove & Chapman, 1985), less frequent dating and marriage (Kwapil, 1998), and poorer quality of intimate relationships (Kwapil, 1998). Whereas these types of self-report ratings of social functioning assess experiences reported by an individual (i.e., asking an individual to describe his or her social relationships), behavioral sign ratings focus on an interviewer's observation of the respondent's behavior (i.e., observing the individual's social behavior during a social interaction); this is the fundamental distinction between behavioral signs and clinical symptoms. Closer examination of behavior may reveal information not obtained during a clinical interview and may yield insights as to why social anhedonics demonstrate difficulties in social relationships. For example, Collins, Blanchard, and Biondo (2005) speculated that deficits in interpersonal behavior exhibited by social anhedonics may reflect a risk for developing negative symptomatology (Andreasen, 1982).

As noted in Kendler, McGuire, Gruenberg, and Walsh (1995, p. 297), "If schizotypy is multidimensional, it is important to understand how different schizotypal dimensions relate to the familial liability to schizophrenia." Behavioral signs may be particularly sensitive indicators of genetic risk for schizophrenia, allowing for detection of subtle differences expected when behaviors among relatives are compared. Thus, assessment of behavioral signs in addition to clinical symptoms yields a more complete picture when assessing the relatives of schizotypes. Tyrka et al. (1995) studied the offspring of mothers with schizophrenia and observed that behavioral sign ratings of schizotypy based on psychiatric interviews and teacher reports were useful indicators of schizotypy. The behavioral sign of odd behavior was observed by Miller et al. (2002) to indicate heightened risk of decompensation in genetically high-risk individuals. Kendler et al. (1995) demonstrated that behavioral sign ratings of schizotypy are

not redundant with clinical symptoms assessed in diagnostic interviews and are in fact more powerful than symptom ratings at detecting schizophrenia spectrum characteristics in first-degree relatives of individuals with schizophrenia. For example, the observed sign of suspiciousness is more accurate than its corresponding self-reported symptom in the identification of relatives of schizophrenia patients (Kendler, Lieberman, & Walsh, 1989).

Based on the findings of Kendler et al. (1995), Miller et al. (2002), and Tyrka et al. (1995), as well as accumulating evidence supporting social anhedonia as an indicator of schizotypy, Collins et al. (2005) examined schizophrenia spectrum behavioral characteristics in a representative community sample of 18- to 19- year-old social anhedonics and controls. This is the only known study to have examined the utility of behavioral sign ratings compared to traditional clinical symptom ratings with social anhedonics serving as a putative schizotypic group. Behavioral raters in the Collins et al. study observed approximately 30 min of videotaped interaction between participants (social anhedonics or controls) and interviewers during semistructured clinical interviews. Compared to control participants, the social anhedonia group displayed significantly more behavioral signs characteristic of schizoid and schizotypal personality disorders. Within each group, men had higher levels of schizoidia than women. Behavioral signs of schizoidia accounted for a significant amount of group variance, even after controlling for clinical symptom ratings. These results indicate that social anhedonics display interpersonal behaviors consistent with risk for schizophrenia spectrum disorders and that these behavioral signs convey information about group status that is not accounted for by traditional clinical interview ratings of symptomatology (Collins et al., 2005).

Despite substantial support for Meehl's genetic theory for the etiology of schizophrenia and mounting support for social anhedonia as an indicator of schizotypy, research to date has yielded a limited understanding of the clinical and interpersonal characteristics of biological relatives of social anhedonics. There have been no published studies examining similarities between social anhedonics and their relatives in the behavioral domain. Given support for the genetic basis of schizophrenia and social anhedonia, first-degree relatives of social anhedonics would be expected to display the same pattern of atypical interpersonal behavior observed in proband social anhedonics. Such a finding would support Meehl's genetic theory for the etiology of schizophrenia, advance our understanding of the construct of schizotypy, and would have implications for improving the assessment of schizotypy.

The present study examined interpersonal behavior in a large community sample of 18- to 19-year-old social anhedonics and their biological mothers and fathers (Blanchard, Collins, Aghevli, Leung, & Cohen, 2009; Cohen et al., 2006; Collins et al., 2005) identified using a psychometric high-risk paradigm (Chapman, Chapman, Kwapil, Eckblad, & Zinser, 1994; Gooding et al., 2005; Kwapil, 1998). We sought to replicate and extend our prior behavioral findings (Collins et al., 2005) by refining our measure of behavioral signs and including ratings of biological parents. To our knowledge, this is the first study to examine the familiarity of schizoid and schizotypal behaviors in a psychometrically identified putative schizotypic group. We hypothesized that (a) the biological parents of social anhedonics would demonstrate atypical schizoid and schizotypal behaviors resembling those previously observed in social anhedonics, and (b) behavioral signs of schizoidia and schizotypy would differentiate the social anhedonia and control proband and parent groups at least as effectively as self-report symptom ratings.

Method

Participants

To overcome a consistent limitation of prior research on schizotypy, the use of nonprobabilistic college samples, the Maryland Longitudinal Study of Schizotypy (MLSS; Blanchard et al., 2009, Cohen et al., 2006, 2008; Collins et al., 2005) recruited a community sample from the area surrounding the University of Maryland at College Park (UMCP). Using MLSS data in the present study afforded the unique opportunity to examine social behavior within a sample that may be more representative of the general population than would be found in a college student sample. The MLSS participants included a subset of 2,236 18- to 19-year-olds recruited by the UMCP Survey Research Center using random digit dial methods. Participants received US \$15 for completing a mailed consent form and screening questionnaire including the Revised Social Anhedonia Scale (SocAnh; Eckblad, Chapman, Chapman, & Mishlove, 1982), Perceptual Aberrations Scale (PerAb; Chapman, Chapman, & Raulin, 1978), Magical Ideation Scale (MagicID; Eckblad & Chapman, 1983), and Infrequency Scale (Chapman, Chapman, & Raulin, 1976). The MLSS recruited normal controls (scores less than 0.5 standard deviations above the SocAnh, PerAb, and MagicID scales of psychosis proneness and Bayesian probabilities below 0.5 on SocAnh) and individuals identified as socially anhedonic (scores 1.9 or more standard deviations above the SocAnh mean and/or Bayesian probabilities greater than or equal to 0.50 on SocAnh), as well as their biological parents. After offering informed consent, including videorecording consent, diagnostic interviews, symptom severity measures, and family inventories were administered; Axis I diagnoses were determined using the Structured Clinical Interview for *DSM-IV* Axis I Disorders, Patient Edition—Research Version (SCID-I; First, Gibbon, Spitzer, & Williams, 1996). Following completion of the study tasks, participants were paid US \$100 and were fully debriefed as to the nature of the study and provided with diagnostic feedback and clinical referrals if warranted. Further details on the MLSS are available in Blanchard et al. (2009) and Collins et al. (2005).

Two MLSS participants from the control group were excluded from the present study because the videotaped clinical interviews necessary for making behavioral sign ratings were not available due to recording errors. Although most of the proband group in this present study overlapped with the participant group in the Collins et al. (2005) study, the selection criteria and assessment procedure used in the present study differed. Due to the aims of the present study, only those probands for whom at least one parent also agreed to participate in an on-site interview as part of the MLSS were eligible for inclusion in the present study ($N = 48$ of 86 (55.8%) social anhedonic probands, with 40 meeting the standard deviation cutoff and 8 meeting the Bayesian probability cutoff; $N = 40$ of 87 (46.0%) control probands). Group status (social anhedonic vs. control) and demographic group differences between eligible probands (i.e., those having at least one parent who participated in the MLSS) and noneligible probands were examined. Although eligible and noneligible probands did not differ on group status, $\chi^2(1, N=173) = 1.67, p > .05$, level of education, $\chi^2(2, N = 173) = 0.01, p > .05$, or gender, $\chi^2(1, N = 173) = 0.17, p > .05$, a significant group difference was present for race, $\chi^2(3, N = 173) = 14.11, p < .01$, with more parents of White probands completing the study than those refusing to participate.¹ With regard to the subsample of 88 participants analyzed in the present study, no significant differences between the social anhedonia and control groups were found for level of education, $\chi^2(2, N = 88) = 5.14, p > .05$, gender, $\chi^2(1, N = 88) = 1.47, p > .05$, or race, $\chi^2(2, N = 88) = 3.75, p > .05$, and the sample was ethnically diverse (see Table 1).

¹Further detail with regard to examination of possible differences between eligible and noneligible probands as well as potential differences between their parents are available from the authors. Overall, the group of eligible participants appears to be representative of the total group of probands who participated in the MLSS; however, higher dimensional ratings of proband paranoid personality symptoms were associated with lack of parental participation.

Procedures for the present study principally consisted of rating schizophrenia spectrum behavioral signs for probands and their biological parents who agreed to participate in the MLSS and had ratable videotaped interactions. A total of 79 mothers of the proband group (42 mothers of social anhedonics, 37 mothers of controls) and 44 fathers of the proband group (24 fathers of social anhedonics, 20 fathers of controls) were rated on behavioral signs of schizoidia and schizotypy. In addition to having different selection criteria than Collins et al. (2005), the present study involved refining the interpersonal measure of schizoidia and schizotypy (IM-SS; Kosson, Byrnes, & Park, 1999) to increase the quantity and breadth of schizotypal signs. All of the behavioral sign ratings in the present study, including those for probands, mothers, and fathers, are novel data using the revised IM-SS-R (Kosson, Byrnes, Park, Collins, & Kwapil, 2004).

Assessment of Social Anhedonia

SocAnh (Eckblad et al., 1982) was administered as part of the initial screening questionnaire, with high scorers serving as the putative schizotypic group for comparison against normal controls. SocAnh is a 40-item true-false self-report questionnaire assessing decreased pleasure from interpersonal sources. Items include, "If given the choice, I would much rather be with others than be alone" (keyed *false*). High scores on SocAnh are 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; these findings support the construct validity of SocAnh (Mishlove & Chapman, 1985). SocAnh has demonstrated good internal consistency reliability (Blanchard et al., 1998; Mishlove & Chapman, 1985) as well as high test-retest reliability over 90-day (Blanchard et al., 1998) and 1-year periods (Blanchard, Horan, & Brown, 2001). Schizophrenia spectrum dimensional scores have been shown to be elevated in social anhedonic individuals in both cross-sectional studies (Blanchard et al., 2009; Brown, Blanchard, & Horan, 1998) and longitudinal studies (Gooding et al., 2005; Kwapil, 1998).

Schizophrenia Spectrum Symptom Ratings

The International Personality Disorder Examination (IPDE; Loranger et al., 1995) is a semistructured interview that yields both categorical and dimensional ratings of Axis II disorders. Advanced doctoral students blind to group status administered the schizophrenia spectrum modules of the IPDE to probands and their parents. Videotapes of these interviews were reviewed by a pair of doctoral students then discussed in a monthly case conference until consensus diagnoses had been reached. Consensus IPDE diagnoses were obtained following evaluation of videotaped interviews by an independent rater and a team discussion of all available diagnostic information (see Blanchard et al., 2009; Cohen et al., 2006, 2008). A number of studies have used the IPDE for the assessment of schizophrenia spectrum disorders in putatively psychosis-prone individuals (e.g., Blanchard & Brown, 1999; Brown et al., 1998; Chapman et al., 1994). Findings from the full MLSS sample have demonstrated that compared to controls, social anhedonics evidence significant elevations in schizotypal, schizoid, and paranoid personality disorder symptom ratings (Blanchard et al., 2009) and parents of social anhedonics are twice as likely to have a diagnosable schizophrenia spectrum disorder compared to parents of controls (Cohen et al., 2008). The schizophrenia spectrum modules of the IPDE incorporate behavioral observation through 5 items involved in the assessment of schizoid and schizotypal personality disorders. These items consist of ratings of "odd thinking and speech," "odd behavior and appearance," "emotional coldness, detachment, or flattened affectivity," "inappropriate or constricted affect," and "suspiciousness or paranoid ideation." These behavioral items were removed from all analyses in the present study such that the IPDE served strictly as a schizophrenia spectrum symptom measure for comparison against IM-SS-R behavioral ratings; the schizoid, schizotypal, and paranoid scales each consisted of six symptoms.

Behavioral Sign Ratings

The IM-SS (Kosson et al., 1999) is a coding system for behavioral signs characteristic of schizoid and schizotypal personality disorders. No direct questions are included in the IM-SS; ratings are based almost entirely on observation of atypical interpersonal behavior following either a semistructured interview or unstructured professional interaction of sufficient duration. Recently the test developers consulted with other researchers using the IM-SS and revised the measure (IM-SS-R; Kosson et al., 2004), primarily focusing on increasing the quantity and breadth of schizotypal signs assessed by the measure. No published data currently exist that examine the reliability and validity of the revised version; using both the schizoidia and schizotypy scales from the original IM-SS in a social anhedonic sample, Collins et al. (2005) found satisfactory internal consistency (with coefficient alphas of .82 for the IM-SS schizoidia scale and .59 for the IM-SS schizotypy scale) and interrater reliability (with ICCs of .91 for the IM-SS Schizoidia Scale and .44 for the IM-SS Schizotypy Scale) for the measure. Social anhedonics were found to display atypical behaviors characteristic of schizoid and schizotypal personality disorders. In addition, schizoid behavioral characteristics were found to contribute to the identification of putative schizotypes beyond traditional clinical symptom ratings. These findings support the validity of the IM-SS and the utility of the measure in the identification of schizotypes.

The revised measure includes two subscales with dimensional scores of schizophrenia spectrum behaviors and was used in the present study for proband and parent behavioral sign ratings. For the purpose of this study, 7 IM-SS-R items were not relevant and were thus excluded from the ratings (see Table 2). Six items from the IM-SS-R schizotypy scale are redundant with IPDE symptom ratings and thus conceptually inconsistent with use of the IM-SS-R in this study; 1 item was excluded from the IM-SS-R schizoidia scale because the selected portions of the videotapes on which IM-SS-R ratings were based did not include necessary information. Thus, the version of the IM-SS-R used in the present study consisted of 11 IM-SS-R schizoidia scale items and 12 IM-SS-R schizotypy scale items. Although a subscale specific to paranoid personality disorder is not incorporated in the IM-SS-R, characteristics of this disorder are included in the schizoidia and schizotypy scales (e.g., “guardedness” from the IM-SS-R schizoidia scale and “suspiciousness/paranoid behavior” from the IM-SS-R schizotypy scale). IM-SS-R ratings are based on the frequency and severity of specific kinds of interactions and nonverbal behaviors observed over the course of a single session. The IM-SS-R is scored based on a 4-point ordinal scale (0, 1, 2, 3) rating how well each item characterizes an individual (i.e., *not at all*, *somewhat*, *very well*, or *perfectly/highly*).

IM-SS-R ratings were based on videotaped diagnostic interviews (the overview section of the SCID-I and the schizophrenia spectrum disorders section of the IPDE) and were made by two doctoral students and two advanced undergraduate students, none of whom had access to information regarding group status (social anhedonic vs. control) or diagnostic ratings (e.g., SCID-I and IPDE ratings). A 30-min cutoff was imposed to ensure that participant ratings were based on equivalent amounts of observed behavior (length of interview observed by raters, in minutes: $M = 27.23$, $SD = 4.17$ for probands; $M = 26.42$, $SD = 4.40$ for mothers; $M = 26.98$, $SD = 4.00$ for fathers). In an effort to minimize the effect of individual rater error, IM-SS-R ratings for each participant consist of an average rating between two raters. Intraclass correlations (ICC) type (3, 2) were used to evaluate the reliability of generalization from a single rating to a mean rating (Shrout & Fleiss, 1979); three raters rated the majority of interactions and were thus included in the ICC analyses. For the IM-SS-R schizoidia scale, ICCs indicated good interrater reliability for probands (ICC = .86), mothers (ICC = .73), and fathers (ICC = .93), with an average IM-SS-R schizoidia scale ICC across all participants of .84. For the IM-SS-R schizotypy scale, ICCs indicated moderate interrater reliability for probands (ICC = .71), mothers (ICC = .52), and fathers (ICC = .74), with an average IM-SS-

R schizotypy scale ICC across all participants of .65. Thus, though interrater reliability was acceptable across both IM-SS-R scales, ICCs were higher for the IM-SS-R schizoidia scale than the IM-SS-R schizotypy scale and for probands and fathers compared to mothers.

Median internal consistencies for the IM-SS-R schizoidia scale indicated satisfactory reliability for proband ($\alpha = .86$), mother ($\alpha = .74$), and father ($\alpha = .83$) ratings. For the IM-SS-R schizotypy scale, alpha coefficients for proband ($\alpha = .66$), mother ($\alpha = .40$), and father ($\alpha = .35$) ratings were in the moderate range. This finding could be due to low endorsement of scale items resulting in a truncated range of the IM-SS-R schizotypy scale. As evidence of this possible explanation, dimensional ratings using the IM-SS-R schizoidia scale resulted in a greater range (0-16) than dimensional ratings using the IM-SS-R schizotypy scale (0-7). In addition, the lower alpha for mothers and fathers may reflect that the parent groups had an even narrower range (0-3.5) of IM-SS-R schizotypy scale scores than the proband group (0-7). In the alternative, the relatively small number of items on the IM-SS-R schizotypy scale may underlie the moderate alpha coefficients observed, or the scale may not assess a unitary concept, but rather different dimensions of behaviors characteristic of schizotypal personality disorder.

Results

Hypotheses for elevated schizoid and schizotypal behaviors in social anhedonics and their biological parents were evaluated in a series of univariate analyses of variance (ANOVAs) on the IM-SS-R schizoidia and schizotypy Scales. Within these analyses, we also examined the effects of gender on both the proband and parent findings in response to previously observed gender discrepancies in schizophrenia spectrum behaviors (Collins et al., 2005). To adjust for positive skewness, a square-root transformation was applied to proband and parent IM-SS-R scores. Next, effect sizes representing the ability of behavioral signs and clinical symptoms (measured using the IDPE) to differentiate between the social anhedonia and control groups were compared.

Behavioral Signs of Probands

The ANOVA on the IM-SS-R schizoidia scale for probands resulted in a significant main effect for group, $F(1, 84) = 8.03, p < .01$, with social anhedonics rated higher than controls, but there was no main effect for gender nor a group by gender interaction ($p > .05$). This group difference on IM-SS-R schizoidia scale ratings represents a medium effect ($d = .64$; Cohen, 1988). The effect for gender on IM-SS-R schizoidia scale ratings was nonsignificant ($d = .08$).

The ANOVA on the IM-SS-R schizotypy scale for probands resulted in a significant main effect for group, $F(1, 84) = 7.02, p = .01$, with social anhedonics rated higher than controls, but there was no main effect for gender nor a group by gender interaction ($p > .05$). This group difference on IM-SS-R schizotypy scale ratings represents a medium effect ($d = .53$). The effect for gender on IM-SS-R schizotypy scale ratings was small ($d = .18$) (see Table 3).²

Behavioral Signs of Biological Parents

The ANOVA on the IM-SS-R schizoidia scale found no significant difference between mothers of social anhedonics and mothers of controls ($p > .05$). Accordingly, an effect size below the “small effect” cutoff of .20 was observed for group differences on mothers’ IM-SS-R schizoidia scale ratings ($d = .13$; Cohen, 1988). The ANOVA on the IM-SS-R schizotypy scale for mothers

²During the MLSS diagnostic assessment, one female proband was diagnosed with current major depressive disorder and one male proband was diagnosed with schizophrenia, both from the social anhedonia group. To examine the potential impact of these diagnoses on group comparison analyses, ANOVAs for both the IM-SS-R schizoidia scale and IM-SS-R schizotypy scale were recomputed twice, each time excluding one of these participants. Group comparison results remained unchanged. Thus, analyses throughout were conducted including all 88 probands.

found a significant difference, with mothers of social anhedonics rated higher than mothers of controls, $F(1, 77) = 8.08, p < .01$. This group difference on mothers' IM-SS-R schizotypy scale ratings represents a medium effect ($d = .64$).³

The ANOVA on the IM-SS-R schizoidia scale and schizotypy scale for fathers found no significant difference between fathers of social anhedonics and fathers of controls ($p > .05$). However, a small effect ($d = .39$) was observed for group differences on fathers' IM-SS-R schizoidia scale ratings, and an effect approaching medium range was observed for group differences on fathers' IM-SS-R schizotypy scale ratings ($d = .48$; see Table 4).

Group Differentiation Using Signs Versus Symptoms

Consistent with Kwapil (1998) and as reported in the full MLSS sample (see Blanchard et al., 2009), the present study found that IPDE clinical symptom ratings (all behavioral sign items were removed from the scales) of schizoid, $F(1, 85) = 11.26, p < .01$, and schizotypal, $F(1, 85) = 9.10, p < .01$, personality disorders accounted for a significant amount of variance in group status, with social anhedonics reporting significantly higher dimensional scores compared to controls. One social anhedonic participant was not included in the above analyses due to a current Axis I psychotic disorder diagnosis. In contrast, for mothers' schizoid and schizotypal personality disorder ratings as well as fathers' schizoid and schizotypal personality disorder ratings, traditional clinical symptom ratings failed to account for a significant amount of variance in parent group status ($p > .05$). To examine the utility of behavioral sign ratings compared to traditional clinical symptom ratings, a comparison of effect sizes for group differentiation across the IM-SS-R and IPDE scales was performed (see Figure 1). Effect sizes for the different measures of schizoidia and schizotypy (IM-SS-R for signs, IPDE for symptoms) were comparable for probands and fathers; however, behavioral sign ratings were superior at differentiating mothers of social anhedonics from mothers of controls, especially for schizotypal signs ($d = .64$ for IM-SS-R vs. $d = .00$ for IPDE).

Discussion

The present study examined schizophrenia spectrum behavioral characteristics in social anhedonics and controls as well as their biological parents as an initial investigation to the familiarity of these behaviors in a psychometrically identified putative schizotypic group. Consistent with the Collins et al. (2005) study using the original IM-SS, proband social anhedonics were found to exhibit atypical interpersonal behaviors characteristic of schizoid and schizotypal personality disorders. These results support previous work (Kendler et al., 1995; Miller et al., 2002; Tyrka et al., 1995) showing that the assessment of behavioral signs is an important component of the measurement of schizotypy. Using the original IM-SS in the Collins et al. study, in addition to finding that social anhedonics exhibited more schizoid behaviors than controls, men in both the social anhedonia and control groups were found to have higher IM-SS schizoidia scale ratings than women. Using the IM-SS-R in the present study, no effect for proband gender was observed on schizoid behavioral ratings. The IM-SS-R schizoidia scale may include items that are more representative of atypical interpersonal behaviors exhibited by both men and women. In the alternative, statistical power limitations in the present study ($N = 88$ compared to $N = 170$ in Collins et al.) may have influenced the examination of gender differences in proband behavioral ratings. Future research with a larger sample should examine possible gender differences in IM-SS-R schizophrenia spectrum behavioral ratings. Reliability analyses of the revised version of the IM-SS (IM-SS-R; Kosson

³During the MLSS diagnostic assessment, three mothers (two mothers of control probands and one mother of a social anhedonic proband) were diagnosed with current major depressive disorder. To examine the potential impact of these diagnoses on group comparison analyses, ANOVAs for both the mother IM-SS-R schizoidia scale and mother IM-SS-R schizotypy scale were recomputed excluding these three participants. Group comparison results remained unchanged.

et al., 2004) add to the growing literature showing the IM-SS to be a reliable assessment measure (e.g., Collins et al., 2005; Kosson et al., 2008). Further research is needed to examine whether the IM-SS-R schizotypy scale measures a single unidimensional latent construct or multiple dimensions of behavior characteristic of schizotypal personality disorder.

This was the first study to examine interpersonal behavior in the biological parents of social anhedonics. Mothers of social anhedonics displayed higher rates of atypical interpersonal behaviors characteristic of schizotypal personality disorder than mothers of controls. This finding is particularly noteworthy given that none of the clinical symptom ratings (i.e., IPDE ratings of schizoid, schizotypal, or paranoid personality disorder) contributed to group differentiation among mothers either in this subsample of the MLSS using only IPDE symptom items (5 behavioral sign items were omitted) or in the full MLSS sample using the full IPDE schizophrenia spectrum scales (Cohen et al., 2008). Thus, behavioral signs of schizotypy were the only outcome measure to successfully identify mothers of social anhedonics in the present study. These findings support those of Kendler et al. (1995), showing that clinical symptoms and behavioral signs of schizotypy represent fundamentally distinct domains of psychopathology and extend Kendler et al.'s finding that behavioral signs are more powerful than symptom ratings for detecting schizophrenia spectrum characteristics in first-degree relatives of individuals with schizophrenia to the biological mothers of social anhedonics. Results from the present study and Kendler et al. suggest that measures focusing on the assessment of schizotypal symptoms alone may fail to detect familial characteristics of schizotypes.

Although no significant differences in displays of schizophrenia spectrum behavior were observed between fathers of social anhedonics and fathers of controls, a small effect for group differentiation was observed for the IM-SS-R schizoidia scale and a medium effect was observed for the IM-SS-R schizotypy scale, with fathers of social anhedonics rated higher than fathers of controls. Low statistical power may have affected these analyses, such that the father group had only 44 participants (20 fathers of controls and 24 fathers of social anhedonics), whereas the mother group had 79 participants (37 mothers of controls and 42 mothers of social anhedonics). The effect of fathers' schizoid signs on group differentiation was comparable to that observed for clinical symptom ratings of schizoid and schizotypal personality disorders. Findings by Cohen et al. (2008) supported the hypothesis that low statistical power in the present study may have limited the ability to detect behavioral sign differences between fathers of probands and fathers of controls such that the elevated rates of schizophrenia spectrum disorders observed in parents of social anhedonic probands compared to parents of control parents (24% vs. 12%) in Cohen et al. were the result of elevated rates of diagnoses in the fathers of social anhedonic probands. In the alternative, because an abbreviated version of the IPDE with 5 behavioral sign items omitted was used in the present study to provide a direct comparison between schizophrenia spectrum clinical symptoms and behavioral signs, differences in IPDE item content may account for the difference in group differentiation between fathers of social anhedonics and fathers of controls observed in the present study, compared to Cohen et al.'s findings, further highlighting the value of behavioral sign ratings.

The present study design allowed for an examination of the familiarity of atypical interpersonal behavior but did not allow for analysis of the relative contribution of genetics and environment on familial transmission of interpersonal behavior. Therefore, results must be interpreted cautiously with an understanding that findings may represent genetic influences, modeling, reciprocal parent-child influences, or shared environment influences. Despite this limitation, the present study provides an initial examination of the familiarity of schizophrenia spectrum behavioral signs in social anhedonics and serves as a basis for further exploration of this construct. Other study limitations should be considered when interpreting findings from the present study. The IM-SS-R schizotypy scale was observed to have low internal consistency

reliability, possibly related to low endorsement of scale items that was particularly evident for the parent groups; further revisions to the scale may be necessary and findings related to parental schizotypy behaviors should be interpreted cautiously. Related to low endorsement of scale items, proband participants in the present study were recruited from the community in an effort to increase the generalizability of the findings. However, it is possible that parent participants were higher functioning than community members in general (i.e., they had found romantic partners and raised at least one child to the age of 18). Further assessment of schizophrenia spectrum behaviors in a more natural environment will build on these findings based on a limited sample of interview-based behavior. Several separate analyses were conducted in this study, and the sample overlapped with the original Collins et al. (2005) study; continuing to develop focused hypotheses and corresponding analyses will reduce potential sources of error in the data, and replication of the study using a novel sample will add to the generalizability of the results.

The proband group examined in the present study was a relatively young, nonclinical group of putative schizotypes; schizophrenia spectrum characteristics may change over time, especially during the transition from adolescent to adult roles (e.g., Cohen, Chen et al., 2005). Thus, the stability of behavioral findings in probands will be important to assess, and such longitudinal measurement will help address whether persistent behavioral indicators are more robustly related to parental characteristics than are cross-sectional assessments. Findings from the present study have implications for the development of assessment measures of schizotypy such that both proband and family member assessments should include behavioral ratings of schizophrenia spectrum characteristics; behavioral sign ratings appear to add limited assessment time but significant incremental validity to clinical interviews assessing symptoms of schizotypy. Furthermore, within the realm of family systems therapeutic interventions, clinicians may find behavioral sign ratings useful in understanding family dynamics or in identifying goals for parents, focusing less on clinical symptoms and diagnoses. Finally, the identification of premorbid behaviors, in addition to psychophysiological abnormalities and personality traits, in individuals at risk for developing schizophrenia may promote the identification of etiological factors in the disorder (Holzman, 1992).

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Biography

Lindsay C. Emmerson, PhD, is a postdoctoral fellow at the VA San Diego Healthcare System research service and the University of California, San Diego, psychiatry department. Her current work focuses on clinical trials of cognitive-behavioral therapy for psychosis.

Sarah L. Miller, MA, is a senior doctoral student at the University of Alabama psychology department's subspecialty area of psychology and the law.

Jack J. Blanchard, PhD, is a professor in the psychology department at the University of Maryland, College Park, and director of the clinical psychology doctoral program. He conducts research examining the psychopathology of schizophrenia including the emotional, social, and neurocognitive changes associated with this disorder.

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Figure 1. Proband and Parent Group Differences on the Interpersonal Measure of Schizoidia and Schizotypy, Revised (IM-SS-R) and the International Personality Disorders Examination (IPDE)
 Note: Five behavioral sign items were omitted from the IPDE to create a measure of only schizophrenia spectrum clinical symptoms; one social anhedonic proband was not included in the IPDE analyses because he was missing IPDE ratings due to a current Axis I psychotic disorder diagnosis. * $p < .05$ (two-tailed). ** $p < .01$ (two-tailed for ANOVAs).

Table 1

Demographic Characteristics of Social Anhedonics and Controls

	Social Anhedonics (<i>N</i> = 48) <i>N</i> (%)	Controls (<i>N</i> = 40) <i>N</i> (%)
Gender		
Female	29 (60.4)	19 (39.6)
Male	19 (47.5)	21 (52.5)
Ethnicity		
White	24 (50.0)	24 (60.0)
Black	20 (41.7)	16 (40.0)
Hispanic	4 (8.3)	0 (0.0)
Other	0 (0.0)	0 (0.0)
Level of education		
Grade 7-12 but not graduating	1 (2.1)	0 (0.0)
Graduated High School or GED	13 (27.1)	4 (10.0)
Part College	34 (70.8)	36 (90.0)

Table 2**Interpersonal Measure of Schizoidia and Schizotypy, Revised (IM-SS-R) Item Content**

Schizoidia scale

- 1** Constricted facial affect
- 2** Lack of nonverbal expression
- 3** Detachment (lack of engagement)
- 4** Lack of verbal expression
- 5** Indifference (lack of interest)
- 6** Guardedness
- 7** Lack of variability in affect/expression over time
- 8** Poor rapport
- 9** Absence of spontaneity in speech
- 10** Lack of verbal responsiveness to interviewer's remarks
- 11** Lack of interpersonal synchrony
- 12** Physical anergia

Schizotypy scale

- 1** Inappropriate affect
 - 2** Suspicious/paranoid behavior
 - 3** Guarded posture
 - 4** Speech disorganized or difficult to understand
 - 5** Tangential speech
 - 6** Unusual or odd speech (other than disorganized or repetitive speech)
 - 7** Odd speech volume or rate or tone
 - 8** Excessive use of gestures to accentuate or qualify speech
 - 9** Repetitive behavior
 - 10** Odd behavior (other than repetitive behavior)
 - 11** Odd or disorganized appearance
 - 12** Negative reaction of interviewer to individual
 - 13** Displays signs of experiencing auditory hallucinations or illusions
 - 14** Displays signs of experiencing visual hallucinations or illusions
 - 15** Spontaneously expresses referential ideation
 - 16** Spontaneously expresses ideation about thought transmission
 - 17** Spontaneously expresses ideation about being controlled or controlling others
 - 18** Spontaneously expresses paranoid/persecutory ideation
-

Note: Item 11 from the Schizoidia Scale and Items 13 through 18 from the schizotypy scale were omitted from the IM-SS-R for use in the present study.

Table 3

Group Differences Between Social Anhedonics and Controls on the IM-SS-R by Gender

	Social Anhedonics (<i>N</i> = 48) <i>M</i> (<i>SD</i>)	Controls (<i>N</i> = 40) <i>M</i> (<i>SD</i>)
Schizoidia scale		
Females	3.22 (3.18)	1.11 (1.58)
Males	2.95 (3.95)	1.36 (1.85)
Total	3.12 (3.47)	1.24 (1.71)*
Schizotypy scale		
Females	0.45 (0.60)	0.32 (0.82)
Males	1.26 (2.21)	0.24 (0.44)
Total	0.77 (1.50)	0.28 (0.64)*

Note: IM-SS-R = Interpersonal Measure of Schizoidia and Schizotypy, Revised; raw data means and standard deviations are presented.

* $p < .05$ (two-tailed).

Table 4

Group Differences Between Parents of Social Anhedonics and Parents of Controls on the IM-SS-R

	Social Anhedonic Proband <i>M(SD)</i>	Control Proband <i>M(SD)</i>
Mothers (<i>N</i> = 79)		
IM-SS-R Schizoidia scale	1.50 (1.77)	1.30 (1.91)
IM-SS-R Schizotypy scale	0.61 (0.78)	0.27 (0.67)*
Fathers (<i>N</i> = 44)		
IM-SS-R Schizoidia scale	2.13 (3.04)	0.88 (1.44)
IM-SS-R Schizotypy scale	0.65 (0.87)	0.38 (0.79)

Note: IM-SS-R = Interpersonal Measure of Schizoidia and Schizotypy, Revised; raw data means and standard deviations are presented.

*
 $p < .05$ (two-tailed).