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The Effect of Internalizing Symptoms on Affect Recognition and Theory of Mind Performance in a Community Sample of Adolescents

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Abstract

Difficulties with social interaction are a hallmark feature of many clinical disorders, and one factor that may contribute to these difficulties is a deficit in social perception skills, such as affect recognition and theory of mind (ToM). The present study examines the effect of depressive and anxiety symptoms on social perception in a community sample of adolescents. Based on past research, we hypothesized that greater levels of internalizing symptoms would predict poorer performance on an affect recognition and ToM task. Twenty-nine adolescent participants completed dimensional measures of depressive symptoms, worry, and anxiety sensitivity, as well as a standardized neuropsychological assessment of social perception. Regression analyses revealed that greater levels of internalizing symptoms did not significantly predict a global impairment of either affect recognition or ToM. However, greater levels of worry predicted an increased number of sad errors (b = 0.10, SE = 0.02, β = .70, p < .001), while greater levels of anxiety sensitivity predicted a decreased number of fear errors (b = -0.05, SE = 0.02, β = -.46, p < .05). Greater levels of worry also predicted deficits in affective, but not cognitive, ToM (b = -0.04, SE = 0.02, β = -.50, p < .05). These findings suggest that subclinical internalizing symptoms may have specific, but not global, effects on social perception in adolescents. Overall, this study highlights the importance of transdiagnostic research in adolescent populations to elucidating risk factors for clinical disorder and identifying appropriate targets for intervention.

The Effect of Internalizing Symptoms on Affect Recognition and Theory of Mind Performance in a Community Sample of Adolescents

Difficulties with social interaction are a hallmark feature of many mental health problems, such as depression, anxiety, autism, aggression, and schizophrenia (Armijo, 2017; Saris et al., 2017; Van Meter et al., 2016). Beyond their impact on risk for clinical disorder, poor social skills can contribute to wide-ranging distress and impairment in individuals' personal and professional lives, including higher levels of stress and loneliness (Segrin, 2017), a lack of close relationships (Davila & Beck, 2002; Oltmanns, Melley, & Turkheimer, 2002), and poorer performance at work (Müller, Schuler, Burton, & Yates, 2003; Sperry & Mesibov, 2005). Indeed, successful social interactions are critical in determining one's quality of life, and therefore much research has been devoted to examining the origins of social impairment across clinical disorders in an effort to identify targets for prevention and intervention.

Deficits in Social Perception

One important factor known to influence an individual's interpersonal success is social perception. Social perception is defined as the process of forming impressions of and making inferences about other people (Aronson, Wilson, & Akert, 2010). In order to successfully make these judgments, humans, like many other species, rely on a variety of cues in their environment to help them interpret and predict others' behaviors. These cues may be external, such as a person's facial expression, body posture, or tone of voice. On the other hand, they may also be internal, such as a person's mood, intentions, feelings, or desires. Accurate interpretation of both these external and internal cues allows humans to interact socially and respond appropriately in different situations. Thus, deficits in the ability to carry out social perception are likely to play a key role in clinical disorders where individuals demonstrate an impairment in social skills

(Morrison & Bellack, 1981). Difficulties with two specific components of social perception have been most well-studied with respect to risk for mental health problems: poor *affect recognition*, which corresponds to an individual's ability to interpret external cues, and deficits in *theory of mind (ToM)*, which corresponds to an individual's ability to interpret internal cues.

Affect recognition, or the ability to identify others' emotions from their facial expressions, is one of the most well-studied components of social perception. Ever since Darwin suggested that facial expressions of emotion are universal (Darwin, 1872), this topic has been given much attention. Researchers around the world have corroborated Darwin's proposal, demonstrating high cross-cultural agreement in the judgment of emotions based on facial expressions (Ekman, Sorenson, & Friesen, 1969; Ekman, 1971; Ekman & Friesen, 1971; Ekman, 1973; Izard, 1971). In fact, there are now seven emotions shown to be universally recognized by facial expression: anger, contempt, disgust, fear, joy, sadness, and surprise (Biehl et al., 1997), indicating that a consistent ability to recognize emotional facial expressions that has been conserved across cultures and generations. Furthermore, the development of affect recognition skills occurs early in childhood, with six-year-old children demonstrating near-adult levels of accuracy on the recognition of sad and angry faces (Lawrence, Campbell, & Skuse, 2015). These findings indicate that the ability to recognize others' emotions is critical to survival within a social species such as humans (Ekman, 1984). Affect recognition allows individuals to respond to others' emotions appropriately in different situations, and it also supports feelings of empathy, which are critical to building relationships (Davis, 1994). In sum, a deficit in affect recognition could have widespread impacts on one's social functioning.

Another component of social perception that is critical to interpersonal success is theory of mind (ToM), or the ability to attribute unobservable mental states, such as belief, desires, and

intention, to ourselves and others (Wellman, 1990). Recent models of ToM suggest that this complex ability is actually composed of two parts: cognitive ToM and affective ToM. Cognitive ToM refers to the ability to make inferences about others' beliefs and motivations, while affective ToM refers to the ability to infer what a person is feeling. According to the model developed by Shamay-Tsoory and colleagues (Shamay-Tsoory, Harari, Aharon-Peretz, & Levkovitz, 2010), cognitive ToM is a prerequisite for affective ToM, which also requires intact emotional empathy. This theory is supported by the fact that cognitive ToM is developed early in childhood, typically by age 5 (Astington & Dack, 2008; Astington, Hughes, & Zelazo, 2013), while affective ToM is thought to develop later in life, between adolescence and adulthood (Blakemore, 2008; Sebastian et al., 2011). The impact of ToM on social interaction can be seen across all age groups. Kids with good ToM abilities are better communicators (Slomkowski & Dunn, 1996), more effectively resolve conflicts with friends (Dunn, 1996), are happier in school and more confident with their peers (Astington, 2004), and have better academic competence (Astington & Pelletier, 2005). Likewise, in adults, this ability underlies human cooperation, deception, communication, and cultural learning (Liu, Sabbagh, Gehring, & Wellman, 2009).

The Impact of Mood on Social Perception Deficits

Theoretical models posit that an individual's mood and affect play a key role in influencing accurate social perception. The most widely-accepted theory to account for the various influences that affect may have on social judgments, called the Affect Infusion Model (AIM), was proposed by Forgas in 1995. According to the AIM, there are two information-processing strategies that are most likely to be influenced by one's mood or affect. First, in heuristic processing, individuals seek to construct a judgment using various shortcuts, and feelings are often used as one such shortcut to infer one's evaluative reactions to a target. For

instance, in one study researchers found that participants reported more happiness and satisfaction with their life as a whole when in a good mood than when in a bad mood (Schwarz & Clore, 1983). Thus, their feelings at the time of the call directly influenced their judgment of their overall happiness and life satisfaction via heuristic processing. Second, in substantive processing, individuals engage in the selective, constructive processing of available information that relies on a variety of learning, associative, and memory processes. Within this type of social judgment process, emotions influence judgment indirectly through their impact on processes like attention, encoding, and retrieval of specific pieces of information (Forgas, 1995). For instance, one study asked participants to watch a videotape of their own interactions the previous day and judge their own behaviors and those of their partner as either positive or negative. Happy subjects judged more behaviors as positive in both themselves and their partners, while sad subjects were more critical of their own behavior versus their partner's (Forgas, Bower, & Krantz, 1984). This reflects the selective priming of self-deprecatory but other-enhancing cognitions, which often occurs in depressed individuals (Blaney, 1986), and demonstrates how mood indirectly affects judgment via memory and attentional processes in substantive processing.

Several studies have provided empirical support for the AIM using mood induction experiments, where participants are manipulated to feel happy or sad for a brief period of time and then make social judgments. For example, a study done in 1984 by Clark and colleagues demonstrated that one's own arousal impacts the judgment of another's emotion, such that individuals with high arousal levels are more likely to judge another's positive emotions as joy, an emotion associated with high arousal, rather than serenity, an emotion associated with low arousal (Clark, Milberg, & Erber, 1984). This finding that one's own arousal and affect biases

their judgments of others has been corroborated by several other studies since then (Bower, 1991; Branscombe, 1988; Clore, Schwarz, & Conway, 1994; Clore & Huntsinger, 2007; Forgas, 1992; Forgas, 2001). Given this consistent evidence for the impact of induced emotion and arousal on social perception, individuals at-risk for, or currently suffering from, mood and anxiety disorders are also likely to struggle with accurate social perception.

Social Perception in Individuals with Emotional Disorders

While it is well-established that depressed individuals exhibit impaired social functioning (Hirschfeld et al., 2000; Kupferberg, Bicks, & Hasler, 2016; Saris et al., 2017), only recently have researchers begun to explore explanations for these interpersonal deficits by studying specific constructs of social perception, such as affect recognition and ToM. One of the earlier studies to look at the relationship between depression and affect recognition was done by Persad and Polivy in 1993. They recruited female participants with and without depression from both a college campus and psychiatric inpatient unit, and they compared their performances on a facial affect recognition task. Depressed individuals in the psychiatric unit as well as on a college campus made more errors on the affect recognition task than controls and were therefore more likely to respond inappropriately to others' emotions, contributing to interpersonal deficits (Persad & Polivy, 1993). This finding that patients with depression are less accurate than controls at identifying facial expressions has been replicated several times in adult patients with both unipolar and bipolar depression (Bourke, Douglas, & Porter, 2010; Dalili, Penton-Voak, Harmer, & Munafò, 2015; Demenescu, Kortekaas, den Boer, & Aleman, 2010; Derntl, Seidel, Kryspin-Exner, Hasmann, & Dobmeier, 2009; Leppänen, Milders, Bell, Terriere, & Hietanen, 2004; Yoon, Joormann, & Gotlib, 2009). Researchers have explained this finding as the result of a negative perception bias that exists in depression, where happy faces are perceived as neutral

and neutral faces are perceived as sad (Bourke et al., 2010; Gur et al., 1992; Joormann & Gotlib, 2006; Leppänen et al., 2004; Münkler, Rothkirch, Dalati, Schmack, & Sterzer, 2015; Punkanen, Eerola, & Erkkilä, 2011; Surguladze et al., 2004). This theory is further supported by the finding that patients with depression are also slower to detect positive facial expressions than healthy volunteers (Suslow et al., 2004). Researchers have also suggested that this deficit in affect recognition may be state-dependent, such that individuals in remission from depression demonstrate greater accuracy in recognizing facial emotional expressions than currently depressed individuals (Anderson et al., 2011; Münkler et al., 2015). In fact, a longitudinal study of major depressive disorder patients showed that individuals recover their ability to correctly identify facial emotional expressions during remission from depression (Mikhailova, Vladimirova, Iznak, Tsusulkovskaya, & Sushko, 1996). This finding is particularly of interest because it suggests that facial affect recognition abilities could be used as a tool to track clinical progress in depression patients.

In contrast, the relationship between depression and ToM in adults is less well-established. In recent years, this topic has attracted increased research interest, but studies have yielded conflicting findings, so no firm conclusions can be drawn about the relationship between ToM and depression. For instance, a study done by Wang and colleagues examined both cognitive and affective ToM in depressed adults with and without psychotic symptoms. They used the Reading the Mind in the Eyes task, which asks participants to judge what emotion a person is feeling based on photographs of their eyes alone, to test affective ToM. In addition, they used the Faux Pas task, which asks participants to read short stories about social encounters and determine if any character has done something socially awkward, to test cognitive ToM. The researchers found that depressed patients, with or without psychotic symptoms, performed worse

than controls on both components of ToM (Wang, Wang, Chen, Zhu, & Wang, 2008). Several studies support this finding, also reporting a deficit in ToM in depressed adult patients (Bora & Berk, 2016; Lee, Harkness, Sabbagh, & Jacobson, 2005; Nejati, Zabihzadeh, Maleki, & Tehranchi, 2012; Werden, Elikann, Linster, Dykierek, & Berger, 2008; Zobel et al., 2010). However, there are also a number of studies that have failed to find significant differences in ToM performance between depressed patients and controls groups (Bazin et al., 2009; Bertoux et al., 2012; Kettle, O'Brien-Simpson, & Allen, 2008; Wilbertz, Brakemeier, Zobel, Härter, & Schramm, 2010). In fact, one study found that adolescent boys with major depressive disorder were actually better at a ToM task than the control group (Mellick & Sharp, 2016). Thus, the relationship between ToM and depression is still unclear, particularly in adolescence, and warrants further investigation.

In addition to depression, anxiety disorders also involve impairments in interpersonal functioning, but little research has been done to examine the impact of anxiety symptoms on specific social perception domains, such as affect recognition and ToM. One of the few studies done on this topic examined the relationship between social phobia and affect recognition in late childhood and early adolescence (Simonian, Beidel, Turner, Berkes, & Long, 2001). The participants were split into an experimental group and control group based on their score on the Social Phobia and Anxiety Inventory for Children (SPAI-C) and then shown pictures of facial expressions displaying six basic emotions: happiness, anger, sadness, fear, surprise, and disgust. The researchers found that children with social phobia were significantly less accurate in identifying the emotional expressions than the control children. This finding was corroborated by a broader study done by Easter and colleagues in 2005, which included 11 children with general anxiety disorder, 8 with social phobia, and 3 with social anxiety disorder. In this study, the

children with anxiety disorders exhibited a significantly poorer performance on a face-emotion recognition task than healthy controls (Easter et al., 2005). Thus, both these studies suggest that anxiety may impair facial emotion recognition, yet very few studies have replicated these findings and even fewer in adolescents. Furthermore, the study done by Easter and colleagues suggests that an impairment may be present across anxiety disorders, yet little research has been done to study this relationship in disorders other than social phobia. Similarly, the relationship between anxiety and ToM is nearly unstudied in the literature. One meta analysis attempted to determine effect size of anxiety on ToM, but few conclusions could be drawn due to the lack of published studies on this topic (Lavoie, Battaglia, & Achim, 2014). They did find that the effect size of the deficit in ToM in individuals with PTSD was large, suggesting that anxiety symptoms may influence ToM abilities. However, this area certainly requires greater study in order to determine if a ToM deficit may be a risk factor or correlate of other anxiety disorders.

Current Study

Overall, the literature suggests that depression is associated with worse performance on social perception tasks in adult clinical populations and that these deficits may contribute to impaired social functioning. In addition, there is some evidence suggesting that social perception deficits also are seen in adults with anxiety disorders. However, relatively few studies have examined the relationship between social perception and internalizing symptoms in an adolescent population. Given that many difficulties with social functioning have their origins early in life, it is important to explore the emergence of social perception deficits as a risk factor for the development of clinical disorders. In particular, mood and anxiety disorders show sharp increases in prevalence during adolescence, making this developmental stage an important time

to identify and target mechanisms of risk (Beesdo, Knappe, & Pine, 2009; Thapar, Collishaw, Pine, & Thapar, 2012).

Furthermore, the majority of studies examining deficits in social perception compare clinical populations with diagnosed mood or anxiety disorders to healthy control groups (Jarros et al., 2012; Langenecker et al., 2005; McClure, Pope, Hoberman, Pine, & Leibenluft, 2003; Mikhailova et al., 1996; Zobel et al., 2010). However, internalizing symptoms are dimensional, and often many people without diagnoses experience some level of symptomatology. Therefore, it is important to consider the broad risk for psychopathology rather than discrete diagnoses, especially considering the high comorbidity rates between mood and anxiety disorders (Hirschfeld, 2001). Many studies have begun to focus more on dimensional measures of internalizing symptoms, as research has shown that dimensional measures of internalizing symptoms are more sensitive to variation than categorical constructs and may have more predictive value (Esposito & Clum, 2002).

Our study addresses these gaps in the literature by using a community sample of adolescents, rather than a clinical sample of adults, and by measuring internalizing symptoms using dimensional scales rather than discrete diagnoses. We assessed dimensional levels of internalizing symptoms by using scales of symptom severity derived from traditional diagnostic categories for depression and anxiety, namely the Center for Epidemiologic Studies Depression Scale (CESD; Radloff, 1977), the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990), and the Anxiety Sensitivity Index (ASI; Reiss, Peterson, Gursky, & McNally, 1986). In addition, we use a well-validated and standardized neuropsychological assessment, the NEPSY-II (Korkman, Kirk, & Kemp, 2007), to test affect recognition and ToM in adolescents.

Based on the existing literature, we hypothesized that greater levels of internalizing symptoms would negatively impact adolescents' overall performance on social perception tasks. In particular, we hypothesized that a score on the CESD indicating greater levels of depressive symptoms would predict decreased accuracy on the affect recognition and ToM task. Similarly, we also hypothesized that a score on the PSWQ or ASI indicating greater levels of anxiety symptoms would predict decreased accuracy on the affect recognition and ToM task. In addition to assessing global performance on the affect recognition task, we also examined the relationship between internalizing symptoms and the frequency of each type of emotion-specific error. Furthermore, we also examined the impact of internalizing symptoms on cognitive versus affective ToM to see if these two components may be affected differently.

Method

Participants and Procedure

35 participants ranging from 14 to 16 years old (M = 15.54, SD = .72; 65.5% male) and one parent/guardian for each participant (86% mothers) were recruited from the community. Upon arrival to the lab, participants and their parents were given verbal information about the study, and they signed an informed assent and consent form, respectively. Then, participants and their parents were seated in front of separate computers to complete online surveys. The adolescents completed questionnaires regarding demographics, depressive symptoms, worry, and anxiety sensitivity. The parents completed questionnaires regarding demographics, parenting style, child behavior. Parents were then told that they could sit in the waiting room until their child had completed the remaining activities in the study.

The adolescents went in a separate room to complete the NEPSY-II social perception assessment with the experimenter, which took approximately 15 minutes. Then, participants

were returned to the room with their parent and both parties were debriefed and compensated for their participation. Participants were given $20 and their parent was given $5. All procedures were approved by the university's Protection of Human Subjects Committee.

Measures

Demographic information. Adolescents self-reported demographic information, such as their date of birth, gender, and grade. They also reported their ethnicity by indicating whether or not they are Hispanic or Latino. In addition, they indicated their race by selecting one of the options (American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, or White) or by selecting "other" and writing in their self-identified race. Parents also self-reported demographic information, such as their family's total yearly income, which was used to measure socioeconomic status.

Internalizing symptoms. Participants completed the Center for Epidemiologic Studies Depression Scale (CESD; Radloff, 1977), a 20-item measure that asks individuals to indicate how often over the past week they have experienced symptoms associated with depression, such as restless sleep, poor appetite, and feeling lonely. Responses are recorded on a 4-point scale, from 0 (rarely or none of the time) to 3 (most or almost all the time). Scores range from 0 to 60, with higher scores indicating greater depressive symptoms. (Appendix A). For the current sample, Cronbach's alpha for the CESD was .87.

Participants reported on symptoms of worry using the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990), a 16-item scale that assesses worry by asking individuals to rate how well certain statements about worry describe them. The items on the scale assess the occurrence ("I do not tend to worry about things"), intrusiveness ("I find it easy to dismiss worrisome thoughts"), pervasiveness ("Many situations make me worry"), and

other characterizing features of an individual's experience with worry. These worry symptoms are thought to be characteristic of anxiety disorders, such as Generalized Anxiety Disorder (Hirsch, Mathews, Lequertier, Perman, & Hayes, 2013), although this scale has also been shown to identify struggles with worry, even outside of diagnosable conditions of anxiety and depression (Meyer, Miller, Metzger, & Borkovec, 1990). Responses are recorded on a 5-point scale, ranging from 1 (not at all typical of me) to 5 (very typical of me). Scores range from 16-80, with higher scores indicating greater worry. (Appendix B). For the current study, Cronbach's alpha for the PSWQ was .70.

Finally, participants also completed the Anxiety Sensitivity Index (ASI; Reiss et al., 1986), a 16-item scale measuring anxiety sensitivity, which is defined as the fear of arousal-related sensations (e.g., fear of heart palpitations), which arise from beliefs that these anxiety-related sensations have harmful consequences (Reiss & McNally, 1985). This measure asks individuals to indicate how well a statement about anxiety sensitivity applies to them. Anxiety sensitivity is a key component of many anxiety disorders, including Panic Disorder and Social Phobia (Scott, Heimberg, & Jack, 2000), and has been correlated with clinical outcomes in these populations (Hazen, Walker, & Eldridge, 1996; Pérez Benítez et al., 2009). Responses are recorded on a 5-point scale from 0 (very little) to 4 (very much). Scores range from 0-64, with higher scores indicating greater anxiety sensitivity (Appendix C). For the current sample, Cronbach's alpha for the ASI was .83.

Social perception. The adolescents' social perception abilities were assessed using subtests of the Social Perception domain of the NEPSY-II, a standardized neuropsychological assessment developed for use with children through age 16 (Korkman et al., 2007). The Social

Perception domain includes two subtests: Affect Recognition and Theory of Mind (ToM), which is divided into verbal and contextual tasks.

The Affect Recognition subtest examines adolescents' ability to match expressions of basic emotions (happy, sad, angry, afraid, disgusted, and neutral) in pictures of children's faces. In the first few items, the adolescent is asked to select which picture from four options on the bottom of a page depicts the same emotion as in the picture at the top of the page. In the following items, the adolescent is asked to identify from four pictures which two faces are expressing the same emotion. Finally, they are shown a picture of a face for 5 seconds, after which they are immediately asked to identify two pictures out of the six options that depict the same emotion as the face in the picture previously shown to them. The total score range is between 1 and 36, with higher scores reflecting a greater ability to recognize and match facial expressions of emotion. Raw scores can be converted into standard scores between 1 and 16, which indicate the adolescent's affect recognition ability in relation to others of the same age. In addition, experimenters can count the number of each type of emotion-specific error that the participant made and convert it to a percentile rank to compare the participant's accuracy in recognizing each emotion to others of the same age.

The ToM subtest measures an adolescent's understanding of mental functions and other people's perspectives. In the verbal tasks, the questions are based on verbal scenarios with (six items) or without (11 items) pictorial support. In all of the items, the adolescent gives a brief verbal answer, which is recorded and scored by the experimenter. The items measure understanding of beliefs, intentions, others' thoughts, ideas, and comprehension of figurative language. Therefore, this task overall measures cognitive ToM. On the other hand, the contextual ToM tasks measure affective ToM by testing an adolescent's ability to infer emotion from a

social context. In these items, the adolescent is shown drawings with children in different social situations. In each drawing, there is a target girl whose face is not shown. The child is asked to select one picture showing how the target girl is feeling from four options depicting different emotions. Thus, the adolescent must infer the girl's emotion on the basis of the social context, rather than her facial expression. The total score is a sum score of the 17 verbal tasks and eight contextual tasks, and it can range from 1-25, with a higher score indicating better ToM abilities. As in the Affect Recognition subtest, raw scores can be converted into standard scores to compare an adolescent's performance against others of his or her age.

Analytic Procedures

To examine the global effect of internalizing symptoms on affect recognition, a simultaneous linear regression model was run using scores on the CESD, PSWQ, and ASI as predictors, age, gender, minority status, and family income as covariates, and the scaled affect recognition score as the outcome variable. Due to the high correlation between depressive and anxiety symptoms, individual regression models were also run using scores on the CESD, PSWQ, and ASI separately as predictors for affect recognition to control for multicollinearity. Then, to explore emotion-specific effects of internalizing symptoms on affect recognition, simultaneous and individual regression models were run using scores on the CESD, PSWQ, and ASI as predictors, age, gender, minority status, and family income as covariates, and the number of emotion-specific errors that the participant made during the affect recognition task as the outcome variable. These analyses were repeated for each type of emotion-specific error (happy, sad, neutral, angry, fear, and disgust). Next, to examine the global effect of internalizing symptoms on ToM, simultaneous and independent linear regression models were run using scores on the CESD, PSWQ, and ASI as predictors, age, gender, minority status, and family

income as covariates, and the total ToM score as the outcome variable. These simultaneous and individual regression models were also run using the cognitive and affective ToM scores separately as outcome variables to explore the effect of internalizing symptoms on specific components of ToM.

Results

Descriptive Statistics

Of the 35 participants recruited for the study, five were excluded because they were over the age of 16, and one was excluded for having a neurodevelopmental disorder that prevented completion of the social perception tasks. The remaining 29 participants ranged in age from 14 to 16 years old (M = 15.54, SD = 0.72), and ten participants (34.5%) were female. Twenty-one (72.4%) were Caucasian, five (17.2%) were Black or African American, three (10.3%) were Hispanic or Latino, one (3.4%) was biracial, and one (3.4%) was American Indian. In total, nine participants (31%) were members of an ethnic or racial minority. As indicated by parent self-report, five participants (17.2%) had a family income of $35,000-$49,999, two (6.9%) had an income of $50,000-$74,999, six (20.7%) had an income of $75,000-$99,999, and 15 (51.7%) had an income of $100,000 or more. Table 1 summarizes these demographic characteristics of the sample.

Participants' mean scores on the CESD, PSWQ, and ASI indicated subclinical levels of internalizing symptoms, similar to those found in other community samples of adolescents (Meyer, Miller, Metzger, & Borkovec, 1990; Radloff, 1991; Wilson & Hayward, 2006). On the affect recognition task, participants' mean scores were approximately equal to the standardized mean, indicating that their scores were similar to others their age. They scored in the 51-75th percentile on average for the number of happy and sad errors. However, for the number of

neutral, angry, fear, and disgust errors, they scored within the 26-50th percentile, falling slightly below average for their age range. Their mean scores on the ToM task were also within the 26-50th percentile range, suggesting that this sample demonstrated slightly poorer ToM performance than other adolescent populations. These descriptive statistics are shown in Table 2.

Correlations were computed between demographic (gender, ethnicity, race, minority status, income, and age), predictor (CESD, PSWQ, and ASI scores), and outcome (affect recognition and ToM scores) variables. Table 3 shows the results of these correlational analyses. Notably, none of the measures of internalizing symptoms were significantly correlated with affect recognition or ToM performance (all r's < .21, all p's > .05). However, family income was negatively correlated with affect recognition ($r(27) = -.55$, $p < .01$). In addition, gender was correlated with scores on the PSWQ ($r(27) = -.24$, $p < .05$) and ASI ($r(27) = -.45$, $p < .05$), with females showing higher scores on each. The measures of internalizing symptoms were also all positively correlated (all r's > .38, all p's < .05).

Internalizing Symptoms and Affect Recognition

Linear regression analyses examined the relationship between internalizing symptoms and performance on the affect recognition task. When the level of depressive symptoms, worry, and anxiety sensitivity were included simultaneously as predictors with gender, minority status, age, and family income as covariates, none of the measures of internalizing symptoms significantly predicted performance on the affect recognition task (all p's > .05; see Table 4). Similarly, when individual regression models were run using depressive symptoms, worry, and anxiety sensitivity separately as predictors, none of the measures of internalizing symptoms predicted affect recognition performance (all p's > .05). The results of these analyses are shown in Tables 5-7.

Additional regression analyses were performed to examine the relationship between internalizing symptoms and emotion-specific errors on the affect recognition task. First, simultaneous regression models were run for each type of emotion-specific error using the level of depressive symptoms, worry, and anxiety sensitivity as predictors and gender, minority status, age, and family income as covariates. Depressive symptoms did not significantly predict any type of emotion-specific error (all *p*'s > .05). Greater levels of worry predicted an increased number of sad errors (b = 0.01, SE = 0.02, β = .75, $p < .001$) and fear errors (b = 0.06, SE = 0.02, β = .49, $p < .05$). In contrast, higher levels of anxiety sensitivity predicted a decreased number of fear errors (b = -0.05, SE = 0.02, β = -.45, $p < .05$). These results are shown in Table 8. Individual regression models were also run for each type of emotion-specific error using the level of depressive symptoms, worry, and anxiety sensitivity separately as predictors and gender, minority status, age, and income as covariates. Similar to the simultaneous model, depressive symptoms did not significantly predict any type of emotion-specific error (all *p*'s > .05). Greater levels of worry predicted an increased number of sad errors (b = 0.10, SE = 0.02, β = .70, $p <$ .001; see Table 9), and greater anxiety sensitivity predicted a decreased number of fear errors (b = -0.05, SE = 0.02, β = -.46, $p < .05$; see Table 10).

Although not one of our a priori hypotheses, it is interesting to note that higher income predicted poorer performance on the affect recognition task in both the simultaneous (b = -0.94, SE = 0.29, β = -.58, $p < .01$) and individual (all *p's* < .01) regression models. In addition, in the model examining worry as a predictor of affect recognition, minority status predicted poorer performance on the affect recognition task (b = -1.56, SE = .75, β = -.38, $p < .05$). For emotion-specific errors, a greater family income predicted an increased number of sad errors in both simultaneous (b = 0.42, SE = 0.16, β = .40, $p < .05$) and individual (all *p's* < .05) regression

models. Additionally, being a member of a racial or ethnic minority group predicted an increased number of sad errors in both simultaneous (b = 1.16, SE = 0.47, β = .44, p < .05) and individual (b = 1.34, SE = 0.41, β = .51, p < .01) regression analyses.

Internalizing Symptoms and Theory of Mind

To examine the relationship between internalizing symptoms and performance on the ToM tasks, similar linear regression analyses were performed. When the level of depressive symptoms, worry, and anxiety sensitivity were included simultaneously as predictors with gender, minority status, age, and family income as covariates, none of the internalizing measures or covariates predicted ToM performance (all *p's* > .05; see Table 4). Depressive symptoms, worry, and anxiety sensitivity also did not predict ToM, over and above income, age, race/ethnicity, and gender, when examined separately as predictors (all *p's* > .05; see Tables 5-7).

Additional linear regression analyses were run to examine the relationship between internalizing symptoms and specific components of ToM. When the level of depressive symptoms, worry, and anxiety sensitivity were included simultaneously as predictors with gender, minority status, age, and family income as covariates, the level of worry significantly predicted poorer performance on the affective (b = -0.04, SE = 0.02, β = -.50, p < .05) but not cognitive (b = -0.08, SE = 0.06, β = -.42, p > .05) ToM task (See Table 11). In addition, in an individual regression model, greater levels of worry significantly predicted poorer performance on the affective ToM task (b = -0.04, SE = 0.02, β = -.43, p < .05). Gender was also a significant predictor in both the simultaneous (b = -1.06, SE = .49, β = -.67, p < .05) and individual (b = -1.08, SE = .40, β = -.68, p < .05) regression models, with females demonstrating greater accuracy on the affective ToM task. These results are shown in Tables 12.

Discussion

The present study examined the effects of subclinical internalizing symptoms on social perception in a community sample of adolescents. When co-varying for demographic variables, we found that depressive symptoms, worry, and anxiety sensitivity did not predict global affect recognition or ToM abilities. However, greater levels of worry predicted an increased number of sad errors, while greater levels of anxiety sensitivity predicted a decreased number of fear errors. Furthermore, worry also predicted affective, but not cognitive, ToM performance. Although not one of our a priori hypotheses, we also found that socioeconomic status predicted overall affect recognition performance, such that those with lower family incomes demonstrated greater accuracy on the affect recognition task.

The finding that adolescents with greater levels of depressive symptoms did not demonstrate impaired performance on the affect recognition task contradicts our original hypothesis. Multiple researchers have shown depressive symptoms to impair affect recognition accuracy (Bourke et al., 2010; Dalili et al., 2015; Leppänen et al., 2004). However, nearly all of those studies were run with adult participants that had been diagnosed with a depressive disorder. Therefore, our study suggests that these findings may not generalize to an adolescent population with subclinical levels of depressive symptoms. The contrast in affect recognition performance between these two groups could suggest that adolescents with depressive symptoms do not experience the same impairment in facial affect recognition as adults. Alternatively, these results could suggest that deficits in affect recognition do not emerge until the onset of an acute depressive episode, thereby explaining why adolescents with subclinical levels of depressive symptoms do not show impairment. This idea has been explored in adults, with several studies showing that patients in remission from depression demonstrate greater accuracy on a facial

affect recognition task than acutely depressed individuals (Anderson et al., 2011; Münkler et al., 2015), and that individuals may even recover affect recognition accuracy upon entering remission (Mikhailova et al., 1996). Our findings support this notion that affect recognition deficits may be state-dependent. As a result, affect recognition tests may not be useful in identifying individuals at risk for depression, but rather for tracking the clinical progress of depressed patients. Further research comparing clinical and subclinical adolescent populations is needed in order to explore this relationship further.

Similarly, our finding that greater levels of depressive symptoms did not predict impaired performance on ToM tasks also contradicts our original hypothesis. However, this result is not uncommon; several researchers have shown in adults that depressive symptoms do not predict ToM performance (Bertoux et al., 2012; Kettle et al., 2008; Wilbertz et al., 2010). In fact, there are many conflicting findings in the published literature on this topic, making it difficult to conclude whether depressive symptoms impact ToM or not, even in adults diagnosed with a depressive disorder. A recent meta-analysis suggests that these conflicting findings may be due to differing methods of assessing ToM and small sample sizes (Bora & Berk, 2016). One strength of the present study is the use of a well-validated, standardized neuropsychological assessment to measure both cognitive and affective ToM. However, we also had a relatively small sample size, so it is possible that subclinical depressive symptoms do have a moderate effect on ToM and that our study was simply underpowered to detect it. Further research with larger sample sizes is needed to clarify the relationship between depression and ToM in both adults and adolescents.

The present study also found that anxiety symptoms did not predict overall accuracy on the affect recognition task. This result does not support our hypothesis, and it runs counter to the

few studies published on this topic (Easter et al., 2005; Simonian et al., 2001). However, those studies were done in younger children and included many participants with social phobia. For our study, we measured anxiety by assessing levels of worry and anxiety sensitivity. It is possible that these measures captured a broader spectrum of anxiety-related symptoms that go beyond the specific clinical experience of social phobia, which could explain the discrepancy in our findings. This explanation would suggest that symptoms of social phobia, as opposed to other types of anxiety, are the best predictors of affect recognition abilities. Logically, the idea that individuals who fear social situations may have an impaired ability to read others' facial expressions seems valid, and future research should be done to investigate this hypothesis by comparing individuals with social phobia to those with other types of anxiety disorders on affect recognition tasks. One other explanation for the discrepancy between our findings and the published literature could be that children in general show greater deficits in affect recognition than adolescents, due to their young age and relative lack of interpersonal experience.

Although there was no global effect of anxiety symptoms on affect recognition, we did find emotion-specific effects. For instance, adolescents with greater levels of worry made more sad errors, meaning that they more frequently mistakenly identified a facial expression of sadness as matching a different type of emotional expression. Therefore, adolescents with greater levels of worry may be more likely to misinterpret other emotional expressions as sadness, demonstrating a negative bias. This finding is supported by past research showing that adults with anxiety disorders are highly sensitive to recognizing negative facial expressions (Joormann & Gotlib, 2006) and that they might misinterpret neutral expressions as displaying a negative emotion (Bradley, Mogg, White, Groom, & De Bono, 1999; Gilboa-Schechtman, Foa, & Amir, 1999; Winton, Clark, & Edelmann, 1995). In addition, we found that individuals with higher

levels of anxiety sensitivity made less fear errors. This suggests that anxiety sensitivity may lead to a heightened detection of fear, making individuals less likely to mistakenly match it with a different emotion. While this specific relationship has not been studied in the literature before, anxiety sensitivity is a hallmark feature of Panic Disorder, which involves increased sensitivity to interoceptive cues of arousal. Therefore, it makes sense that individuals with greater levels of anxiety sensitivity would more accurately recognize facial expressions of fear, given that they display heightened vigilance in detecting arousal and fear overall.

As for ToM, our results showed that adolescents with greater levels of anxiety symptoms did not demonstrate a global impairment on the ToM task. However, individuals with greater levels of worry did demonstrate poorer performance on the affective ToM task specifically. This result suggests that adolescents who worry more may not be as accurate at inferring what others are thinking. One explanation for this finding could be that not being able to infer others' emotions contributes to the increased amount of worry in these individuals. Future research should explore the directional relationship between worry and affective ToM in order to investigate this hypothesis.

Finally, although levels of internalizing symptoms did not predict performance on either measure of social perception, parent-reported family income did significantly predict affect recognition accuracy across regression models, with adolescents from lower-income families demonstrating greater accuracy on the affect recognition task than individuals from higher-income families. While this relationship was not one of our original hypotheses, it is consistent with past research. One group of researchers has shown in a series of three studies that individuals of a lower social class score higher on measures of empathy and emotion recognition (Kraus, Côté, & Keltner, 2010). In the first study, they found that high-school-educated adults

scored higher on an emotion recognition task than their college-educated counterparts. Then, they showed that following a job interview simulation, lower-class college students more accurately rated their interviewer's emotions. Finally, in the third study, participants who were temporarily induced to experience lower social class were better at recognizing emotions from the eye region of the face than those who were induced to experience higher social class. These findings, as well as the ones from the present study, could be due to the greater interdependence that is characteristic of lower-class communities, which gives these individuals more experience with and knowledge of facial expressions of emotion (Manstead, 2018).

Several limitations of the present study must be acknowledged. Our sample size was relatively small, meaning that this study may have been underpowered to detect moderate effects of internalizing symptoms on social perception. We plan to collect data from additional participants in order to have a greater sensitivity to detect potential effects. In addition, this study was conducted in a predominantly white and middle- to upper-class community, limiting its generalizability. Given our finding that income impacts affect recognition performance, future studies should be conducted in more diverse communities with a greater number of individuals from a lower socioeconomic background to explore the full range of performance on the affect recognition task. In addition, one main assumption of this study is that deficits in affect recognition and theory of mind may explain the social impairment seen in individuals with high levels of depression or anxiety. While social perception in general is known to influence interpersonal functioning (Morrison & Bellack, 1981), the present study did not directly assess the link between affect recognition and ToM and actual social skills or interpersonal functioning within our sample. Future research should explore the relationship between these domains of social perception and naturalistic social interactions in adolescent populations. Lastly, in order to

better explore social perception deficits as a risk factor for internalizing disorders, future research should use a longitudinal approach to track the clinical outcomes of individuals with social perception deficits over time.

Despite these limitations, this study is one of the first to examine the relationship between subclinical symptoms of anxiety and depression and social perception in a community sample of adolescents. While past research has mainly been conducted in adult populations with clinical disorders, the use of a community sample of adolescents allowed us to evaluate social perception deficits as a possible risk factor for subclinical (but still distressing) internalizing symptoms, as well as for developing more serious clinical conditions later in life. Furthermore, our dimensional assessment of internalizing symptoms conforms with the movement towards transdiagnostic research, exemplified by the National Institute of Health's Research Domain Criteria (Insel et al., 2010). Our findings suggest that a greater level of internalizing symptoms does not predict a global deficit in social perception in adolescents. However, certain anxiety symptoms may have emotion-specific effects on affect recognition and may selectively impair affective ToM performance. In addition,we found that lower socioeconomic status consistently predicted better affect recognition, which is a trend that is emerging in recent literature (Manstead, 2018). Overall, this study highlights the importance of transdiagnostic research in diverse populations of adolescents to elucidating risk factors for the development of clinical disorders and to identifying appropriate targets for intervention.

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Tables

Table 1

Frequencies of Demographic Variables

		Frequency	Percent
Gender	Female	10	34.50
	Male	19	65.50
Ethnicity	Hispanic/Latino	3	10.30
	Not Hispanic/Latino	25	86.20
Race	American Indian or Alaska Native	1	3.40
	Black or African American	5	17.20
	White	21	72.40
	Other	2	6.90
Minority	Minority	9	31.00
	Not a minority	19	69.00
Family Income	$35,000-$49,999	5	17.20
	$50,000-$74,999	2	6.90
	$75,000-$99,999	6	20.70
	$100,000 or more	15	51.70

Table 2

Descriptive Characteristics

	Mean	SD	Range
Age	15.54	0.72	14-16
Affect Recognition	9.69	1.93	7-13
Happy Errors	.03	0.19	0-1
Sad Error	2.28	1.25	0-5
Neutral Errors	1.10	0.86	0-3
Fear Errors	.90	1.05	0-3
Angry Errors	1.93	1.16	0-4
Disgust Errors	1.93	0.96	0-4
ToM Verbal	20.54	1.58	16-22
ToM Contextual	5.34	0.77	4-6
ToM total	25.89	1.99	21-28
CESD	14.38	9.48	2-38
PSWQ	40.00	9.10	27-61
ASI	16.76	9.77	3-40

Table 3

Correlations Between Demographic Variables, Internalizing Symptoms, and Social Perception

	1	2	3	4	5	6	7	8	9
1. Gender									
2. Minority	-.45*								
3. Income	.05	-.16							
4. Age	.57**	-.28	.29						
5. CESD	-.24	-.12	-.25	-.15					
6. PSWQ	-.45*	.03	-.13	-.30	.43*				
7. ASI	-.37*	-.19	.03	.07	.45*	.38*			
8. AR	.07	-.21	-.55**	-.16	.20	-.10	.09		
9. ToM	-.16	-.00	-.15	-.07	-.04	-.21	-.02	.14	

Note: $N = 29$, * $p < .05$, ** $p < .01$

Table 4

Simultaneous Regression Analyses Predicting Social Perception from Internalizing Symptoms

	Affect Recognition			Theory of Mind		
	b	*SE*	β	*b*	*SE*	β
CESD	0.01	0.04	.05	-0.00	0.05	-.02
PSWQ	-0.06	0.04	-.30	-0.09	0.06	-.40
ASI	0.03	0.05	.14	-0.02	0.06	-.11
Gender	-0.09	1.13	-.02	-2.31	1.42	-.57
Minority	-1.27	0.86	-.31	-1.18	1.09	-.28
Age	-0.42	0.61	-.16	0.40	0.77	.15
Income	-0.94**	0.29	-.58	-0.43	0.37	-.27

Note: $N = 29$, ** $p < .01$

Table 5

Individual Regression Analyses Predicting Social Perception from Depressive Symptoms

	Affect Recognition			Theory of Mind		
	b	*SE*	β	*b*	*SE*	β
CESD	0.00	0.04	.01	-0.04	0.05	-.18
Gender	0.01	0.91	.00	-1.31	1.16	-.32
Minority	-1.31	0.80	-.32	-0.74	1.02	-.18
Age	-0.22	0.56	-.08	0.28	0.71	.10
Income	-0.93**	0.29	-.57	-0.38	0.38	-.23

Note: $N = 29$, ** $p < .01$

Table 6

Individual Regression Analyses Predicting Social Perception from Worry

	Affect Recognition			Theory of Mind		
	b	*SE*	β	*b*	*SE*	β
PSWQ	-0.05	0.04	-.25	-0.10	0.05	-.43
Gender	-0.54	0.91	-.14	-1.97	1.14	-.48
Minority	-1.56*	0.75	-.38	-0.97	0.94	-.23
Age	-0.23	0.53	-.09	0.26	0.67	.10
Income	-0.98**	0.27	-.61	-0.41	0.34	-.25

Note: $N = 29$, * $p < .05$, ** $p < .01$

Table 7

Individual Regression Analyses Predicting Social Perception from Anxiety Sensitivity

	Affect Recognition			Theory of Mind		
	b	*SE*	β	*b*	*SE*	β
ASI	0.02	0.04	.09	-0.05	0.05	-.23
Gender	0.28	1.11	.07	-1.76	1.41	-.43
Minority	-1.15	0.85	-.28	-0.93	1.09	-.22
Age	-0.32	0.61	-.12	0.51	0.78	.19
Income	-0.91**	0.28	-.57	-0.34	0.36	-.21

Note: $N = 29$, ** $p < .01$

Table 8

Simultaneous Regression Analyses Predicting Emotion-Specific Errors from Internalizing Symptoms

	Sad Errors			Fear Errors		
	b	*SE*	β	*b*	*SE*	β
CESD	-0.01	0.02	-.09	-0.04	0.02	-.34
PSWQ	0.10**	0.02	.75	0.06*	0.02	.49
ASI	-0.01	0.03	-.11	-0.05*	0.02	-.45
Gender	0.46	0.62	.18	-0.29	0.56	-.14
Minority	1.16*	0.47	.44	0.12	0.43	.05
Age	0.07	0.33	.04	0.30	0.30	.21
Income	0.42*	0.16	.40	0.32*	0.15	.36

Note: $N = 29$, * $p < .05$, ** $p < .01$

Table 9

Individual Regression Analyses Predicting Emotion-Specific Errors from Worry

	Sad Errors			Fear Errors			Disgust Errors		
	b	*SE*	β	*b*	*SE*	β	*b*	*SE*	β
PSWQ	0.10**	0.02	.70	0.03	0.02	.30	0.00	0.02	.02
Gender	0.73	0.50	.28	0.59	0.56	.27	0.00	0.55	.00
Minority	1.34**	0.41	.51	0.73	0.46	.33	-0.30	0.45	-.15
Age	-0.03	0.29	-.02	-0.04	0.33	-.03	-0.13	0.32	-.10
Income	0.46**	0.15	.44	0.44*	0.17	.50	0.34*	0.16	.42

Note: N = 29, * $p < .05$, ** $p < .01$

Table 10

Linear Regression between Anxiety Sensitivity and the Number of Fear Errors

	b	*SE*	β
ASI	-0.05*	0.02	-.46
Gender	-0.58	0.63	-.27
Minority	0.09	0.48	.04
Age	0.25	0.34	.17
Income	0.35*	0.16	.40

Note: N = 29, * $p < .05$

Table 11

Simultaneous Regression Analyses Predicting Theory of Mind from Internalizing Symptoms

	Cognitive ToM			Affective ToM		
	b	*SE*	β	*b*	*SE*	β
CESD	-0.02	0.05	-.14	0.02	0.02	.24
PSWQ	-0.08	0.06	-.42	-0.04*	0.02	-.50
ASI	-0.01	0.05	-.05	-0.01	0.02	-.06
Gender	-2.07	1.50	-.64	-1.06*	0.49	-.67
Minority	-0.72	1.05	-.22	-0.49	0.38	-.30
Age	-1.01	0.81	.46	0.02	0.27	.02
Income	-0.40	0.34	-.29	-0.11	0.13	-.17

Note: $N = 29$, * $p < .05$

Table 12

Individual Regression Analyses Predicting Theory of Mind from Worry

	Cognitive ToM			Affective ToM		
	b	*SE*	β	*b*	*SE*	β
PSWQ	-0.06	0.04	-.31	-0.04*	0.02	-.43
Gender	-0.84	0.96	-.26	-1.08*	0.40	-.68
Minority	-0.37	0.79	-.11	-0.55	0.33	-.34
Age	0.22	0.56	.10	0.02	0.24	.01
Income	-0.24	0.29	-.19	-0.15	0.12	-.23

Note: $N = 29$, * $p < .05$

Appendix A

Center for Epidemiologic Studies Depression Scale (CES-D)

Instructions: Below is a list of the ways you might have felt or behaved. Please select the option that indicates how often you have felt this way during the **past week.**

	During the Past Week			
	Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
1. I was bothered by things that usually don't bother me.				
2. I did not feel like eating; my appetite was poor.				
3. I felt that I could not shake off the blues even with help from my family or friends.				
4. I felt I was just as good as other people.				
5. I had trouble keeping my mind on what I was doing.				
6. I felt depressed.				
7. I felt that everything I did was an effort.				
8. I felt hopeful about the future.				
9. I thought my life had been a failure.				
10. I felt fearful.				
11. My sleep was restless.				

12. I was happy.				
13. I talked less than usual.				
14. I felt lonely.				
15. People were unfriendly.				
16. I enjoyed life.				
17. I had crying spells.				
18. I felt sad.				
19. I felt that people dislike me.				
20. I could not get "going."				

SCORING: Zero for answers in the first column, 1 for answers in the second column, 2 for answers in the third column, 3 for answers in the fourth column. The scoring of positive items is reversed. Possible range of scores is zero to 60, with the higher scores indicating the presence of more symptomatology.

Appendix B

The Penn State Worry Questionnaire (PSWQ)

Instructions: Rate each of the following statements on a scale of 1 ("not at all typical of me") to 5 ("very typical of me"). Please do not leave any items blank.					
	Not at all typical of me				Very typical of me
1. If I do not have enough time to do everything, I do not worry about it	1	2	3	4	5
2. My worries overwhelm me.	1	2	3	4	5
3. I do not tend to worry about things.	1	2	3	4	5
4. Many situations make me worry.	1	2	3	4	5
5. I know I should not worry about things, but I just cannot help it.	1	2	3	4	5
6. When I am under pressure I worry a lot.	1	2	3	4	5
7. I am always worrying about something.	1	2	3	4	5
8. I find it easy to dismiss worrisome thoughts.	1	2	3	4	5
9. As soon as I finish one task, I start to worry about everything else I have to do.	1	2	3	4	5
10. I never worry about anything.	1	2	3	4	5
11. When there is nothing more I can do	1	2	3	4	5

about a concern, I do not worry about it any more.					
12. I have been a worrier all my life.	1	2	3	4	5
13. I notice that I have been worrying about things.	1	2	3	4	5
14. Once I start worrying, I cannot stop.	1	2	3	4	5
15. I worry all the time.	1	2	3	4	5
16. I worry about projects until they are all done.	1	2	3	4	5

SCORING: Items 1, 3, 8, 10, and 11 are reversed scored. All 16 items are summed and the total score ranges from 16-80, with the higher scores indicating the presence of more symptomatology.

Appendix C

Anxiety Sensitivity Index (ASI)

Instructions: Please rate each item by selecting one of the five answers for each question. Please answer each statement by circling the number that best applies to you.

	Very Little	a little	some	much	Very much
1. It is important not to appear nervous.	0	1	2	3	4
2. When I cannot keep my mind on a task, I worry that I might be going crazy.	0	1	2	3	4
3. It scares me when I feel shaky.	0	1	2	3	4
4. It scares me when I feel faint.	0	1	2	3	4
5. It is important to me to stay in control of my emotions.	0	1	2	3	4
6. It scares me when my heart beats rapidly.	0	1	2	3	4
7. It embarrasses me when my stomach growls.	0	1	2	3	4
8. It scares me when I am nauseous (sick stomach).	0	1	2	3	4
9. When I notice my heart beating rapidly, I worry that I might be having a heart attack.	0	1	2	3	4
10. It scares me when I become short of breath.	0	1	2	3	4

11. When my stomach is upset, I worry that I might be seriously ill.	0	1	2	3	4
12. It scares me when I am unable to keep my mind on a task.	0	1	2	3	4
13. Other people notice when I feel shaky.	0	1	2	3	4
14. Unusual body sensations scare me.	0	1	2	3	4
15. When I am nervous, I worry that I might be mentally ill.	0	1	2	3	4
16. It scares me when I am nervous.	0	1	2	3	4

SCORING: All responses are summed (no reverse scoring). Scores range from 0-64, with higher scores indicating greater anxiety sensitivity.