Associations between Fear of Negative Evaluation and Covert and Overt Attention Bias Through Eye-Tracking and Visual Dot Probe

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ABSTRACT

Social Anxiety Disorder is characterized by irrational and persistent fears of potential evaluation and scrutiny by others. For socially anxious youth, the core, maladaptive cognition is fear of negative evaluation (FNE). Whereas Cognitive Behavioral Therapy (CBT) targets remediation of intense and unfounded FNE, Attention Bias Modification Treatment (ABMT) targets attention bias. The degree to which FNE and biased attention are related processes is unknown. This study sought to assess the relationship between FNE and two indices of attention bias (dot probe and eye-tracking). In addition, this study examines differences in attention bias between a clinically confirmed group of youth SAD and healthy controls. A significant group difference in average latency to fixate on angry faces was found [$F(1,65) = 31.94, p < .001, \eta_p^2 = .33$]. However, the pattern was not consistent across the other attention bias metrics (i.e., dot probe bias scores and first fixation direction percentage towards angry faces). In addition, associations between FNE and the attention bias metrics were not statistically significant in either group. Future directions and implications of these findings within the context of refinements to existing interventions are discussed.

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ABSTRACT (GENERAL AUDIENCES)

Social Anxiety Disorder (SAD) is characterized by irrational and persistent fears of potential evaluation and scrutiny by others. For socially anxious youth, a main feature of the disorder is fear of negative evaluation (FNE). Whereas Cognitive Behavioral Therapy (CBT) targets FNE, Attention Bias Modification Treatment (ABMT) targets attention bias. However, the degree to which FNE and biased attention are related processes has not been studied. This study examined the relationship between FNE and two indices of attention bias (dot probe and eye-tracking). This study also examines differences in attention bias between a youth with SAD and healthy youth (no psychological diagnoses). Group differences were found for only one attention bias measure (i.e., youth with SAD were quicker to look at anger faces relative to non-anxious youth). In addition, associations between FNE and the attention bias metrics were not statistically significant in either group. Future directions of these findings are discussed.

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Introduction

SAD is characterized by irrational and persistent fears of potential evaluation and scrutiny by others. Individuals with SAD often report excessive fear of negative evaluation or embarrassment when engaging in social or performance situations (e.g., eating in front of others, giving oral reports, joining in on a conversation). This fear often results in significant impairment, which gives rise to behavioral avoidance of social situations (APA, 2013). Typically, SAD onsets during the teenage years (Rapee & Spence, 2004), likely due to the increase in social demands which gives rise to fears of social evaluation (Weems & Costa, 2005; Westenberg, Gullone, Bokhorst, Heyne, & King, 2007). SAD is one of the leading causes of school refusal in adolescents (Kearney & Albano, 2004) and can lead to negative psychological outcomes including substance abuse, depression, and conduct problems (Beidel & Turner, 1998). Moreover, it is often chronic in nature, persisting throughout adulthood if untreated (Alfano, Beidel, & Turner, 2006; Kessler et al., 2005).

SAD symptoms are classified along three dimensions (i.e., the tripartite model of SAD; Mesa, Nieves, & Beidel. 2011). The behavioral domain is primarily categorized by avoidance of social situations. Behaviorally, children and adolescents may overtly (e.g., refusing to attend social functions) or covertly (avoiding eye contact with others) avoid social interaction. Physical symptoms are characterized by physiological or somatic responses and may consist of increased heart rate, blushing, and perspiration. The cognitive component of the tripartite model of SAD is marked by fear of negative evaluation by others. FNE is associated with a perceived evaluative threat (Watson & Friend, 1969) and considered the cognitive determinant in the development and

maintenance of SAD (Clark & Watson, 1991; Clark & Wells, 1995). Relative to prior versions of the DSM, SAD diagnostic criteria per the current DSM-5 (APA, 2013), emphasize the focus on FNE (Heimberg et al., 2014). Given the heightened focus on FNE, a more careful examination of the cognitive component of SAD and its potential maintenance factors (e.g., attentional biases) is timely in terms of research refinement and clinical impact.

Attentional Biases and Anxiety

Anxiety disorders are marked by selective attention to perceived threat (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & Van Ijzendoorn, 2007; Barlow & Craske, 2000; Cisler & Koster, 2010; Puliafico & Kendall, 2006; Waters, Henry, Mogg, Bradley, & Pine, 2010), termed 'attention bias'. Cognitive models of anxiety posit that biased attention toward threat cues is central to the development and maintenance of anxiety disorders (Beck, Emery, & Greenberg, 1985; Mogg & Bradley, 1998; Waters, Mogg, Bradley, & Pine, 2008). Enhanced attentional vigilance can also give rise to hyperarousal and social withdrawal (Perez-Edgar et al., 2010; Shechner et al., 2013). Several experimental paradigms have proven beneficial to examine the role of attention biases in anxious populations. Within the anxiety literature, the dot probe was developed in light of evidence that anxious individuals demonstrate selective attention to threat-related information (MacLeod, Matthews, & Tata, 1986). The task yields an index of attentional bias through the use of reaction times (RTs). Behaviorally, the use of the dot probe serves as a means to assess covert attention biases (i.e., shifts in attention without accompanying eye movements; Bradley, Mogg, & Millar, 2000). For anxious individuals, attention bias is marked by quicker RTs to probes replacing pre-cued locations following the presentation of angry faces (i.e., congruent trials), compared to probes appearing in non-cued locations depicting neutral faces (i.e., incongruent trials; Lindstrom et al., 2009; Mogg, Millar, & Bradley, 2000). The dot

probe is used to assess biases in initial orientation and thus allows for a "snapshot" of attentional bias (Mogg et al., 2000, pg. 696). The use of gaze-tracking technology provides a direct means to study fixation patterns, or how an individual overtly orients their attention to visual stimuli. Avoidance of social threat cues (specifically faces that depict anger or disgust) is a behavioral marker of social anxiety (Horley, Williams, Gonsalvez, & Gordon, 2004; Moukheiber et al., 2010). By examining attention bias covertly and overtly, via dot-probe and eye-tracking respectively, we hope to be able to identify and target mechanisms which perpetuate social anxiety.

Through the use of eye-tracking, Shechner and colleagues (2013) found that anxious youth made faster visual fixations during early stimulus exposure to angry, relative to neutral, faces when compared to non-anxious youth. These findings suggest attentional bias toward threat is present during the earliest temporal stages of stimulus exposure (i.e., biases in initial orientation). Although anxious youth exhibit selective attention to threatening social stimuli, the direction of attention allocation is inconsistent across studies (Shechner et al., 2012). This may be a result of the experimental paradigms which often use adult facial stimuli to examine attention bias to threat in child and adolescent samples. Research suggests that children and adolescents demonstrate differential brain activation (Hoehl, Brauer, Brasse, Striano & Friederici, 2010; Marusak, Carré & Thomason, 2013) to adult versus adolescent affective stimuli. In fact, research by Scherf and Scott (2012) demonstrated that youth exhibit an overall processing bias toward same-age faces compared to adult faces. Further, youth are slower to respond to adult faces, compared to child faces (Benoit, McNally, Rapee, Gamble, & Wiseman, 2007; Gamble & Rapee, 2009). Therefore, it is important that experimental stimuli are

developmentally sensitive and socially salient given that anxious youth are more likely to be rejected or evaluated negatively by their peers rather than adults.

Contrary to results by Shechner and colleagues (2013), several studies posit that anxious youth demonstrate an attentional bias away from threatening, or emotionally intense stimuli (Gamble & Rapee, 2009; Stirling, Eley, & Clark, 2006). For example, Gamble and Rapee (2009) found that anxious teenagers directed their first visual fixation away from negative and positive faces. However, this effect was only found when stimuli were presented briefly (i.e., 500 milliseconds). For anxious youth, initial eye movements away from emotional faces might serve as a means to alleviate their anxious thoughts and feelings. As such, avoidance of emotional stimuli maintains anxiety and limits emotional processing (Hudson & Rapee, 2004; Rapee, 2001). Through the use of the dot probe, children with elevated social anxiety symptoms avoided fearful and angry faces when they were paired with neutral faces (Stirling et al., 2006). Expressions depicting fear and anger often signal social threat and, as such, may trigger avoidance responses which are responsible for fear conditioning and negatively reinforcing subsequent avoidance.

While the use of eye-tracking and the dot probe as modalities to detect attention bias is well documented in the adult literature, the use of eye-tracking within the child and adolescent literature is less developed. Eye-tracking offers an objective way to quantify visual fixation patterns and is therefore a useful tool to measure attentional biases to socially threatening stimuli, specifically faces. Additionally, the use of non-clinical samples with high levels of anxiety as well as the use of multiply-diagnosed clinical samples limit our understanding of diagnosis-specific manifestations of attention allocation to threat. Specifically, FNE is the cardinal cognitive feature of SAD and unique to the disorder (i.e., not characteristic of anxiety

disorders broadly). However, the relationship between FNE and attention bias within a group of socially anxious adolescents has not yet been explored. Further, there is no research which has examined these processes in tandem to determine whether they are separable or are conceptually and experimentally related. As such, a more thorough examination of how FNE is associated with attention to threat and how this biased attention allocation might differ in healthy youth is important to consider. Lastly, eye-tracking can serve as a complement to the dot probe as a measure of bias, thus prompting the examination of both indices in the present study.

Attentional Bias and FNE

For adults with SAD, selective attention and attention bias to threat-related information is present and impairing most often in socially evaluative situations (Armstrong & Olatunji, 2012; Clark & Wells, 1995; Harvey, Watkins, Mansell, & Shafran, 2004; Rapee & Heimberg, 1997; Spector, Pecknold, & Libman, 2003). Specifically, individuals who fear socially evaluative situations often describe perception of negative evaluation by others in terms of the facial expressions and comments indicating dislike (anger) or disgust (i.e., socially threatening; Amir, Najmi, Bomyea, & Burns, 2010). This perceptual distortion might be a result of the potential or imagined social rejection that often characterizes individuals with SAD. These specific perceptual distortions have been documented in clinical SAD samples as well as non-clinical samples with heightened social anxiety (Van der Molen, Poppelaars, Van Hartingsveldt, Harrewijn, Gunther-Moor, & Westenberg, 2014; White, Maddox, & Panneton, 2015; Wieser, Pauli, Weyers, Alpers, & Mühlberger, 2009). Despite the consensus within the SAD literature, which suggests that attention biases are present and impairing within adults with SAD, the directionality of these biases is not entirely clear, and likely differs by cognition and behavior. Clark and Wells (1995) posit that threat cues are largely avoided by socially anxious individuals

(e.g., behavioral avoidance). In contrast, Rapee and Heimberg (1997) theorize that individuals with social anxiety demonstrate hypervigilance toward threat cues (e.g., cognitive vigilance) and difficulty disengaging attention from them (e.g., behavioral vigilance). Moreover, extant research has supported the understanding of specific attention biases for individuals who report high FNE through the use of eye-tracking and eye gaze analyses (Garner, Mogg, & Bradley, 2006; White et al., 2015; Wieser et al., 2009) and performance based tasks (e.g., visual dot probe; Mansell, Ehlers, Clark, & Chen, 2002; Rossignol, Campanella, Bissot, & Philippot, 2013).

Several studies have used eye-tracking to examine attentional bias to emotional facial stimuli within the context of FNE. Work by Garner and colleagues (2006) found that during evaluative stress (i.e., participants told they would need to give a videotaped speech after task) non-clinical college students with elevated social anxiety (as measured by the BFNE) tended to initially orient their attention towards emotional faces and subsequently quickly disengaged their attention, relative to students who reported low levels of social anxiety. These findings offer support for the vigilance-avoidance model which suggests that individuals with SAD initially attend to threatening social stimuli because socially threatening cues are salient but subsequently disengage attention perhaps as a means to regulate their fears of negative social evaluation (Schulze, Renneberg, & Lobmaier, 2013). Similar to work by Garner and colleagues (2006), Wieser and colleagues (2009) used eye-tracking to examine attention bias in relation to FNE. Their findings suggested that during the first second of a three-second-stimulus presentation, non-clinical college students who reported elevated FNE (as measured by the BFNE) initially attended to emotional faces moreso than to neutral faces (i.e., vigilance for emotional faces), relative to individuals who reported low levels of FNE.

Only one study has examined how FNE may influence gaze patterns within an adolescent sample. White and colleagues (2015) found that for adolescents on the autism spectrum, self-reported FNE (as measured by the BFNE) predicted greater gaze duration to social threat cues (i.e., faces depicting disgust and anger). In sum, these studies all support the notion that an attention bias marked by preferential initial orientation to emotional faces, in comparison to neutral faces, exists for samples characterized by elevated FNE. However, these studies have yet to examine FNE in relation to initial gaze orientation within a clinically referred group of adolescents with SAD. To our knowledge, no published study compares attention allocation to social threat in both socially anxious and healthy teenagers.

To date, only two studies have examined potential associations between FNE and covert indices of attention bias, specifically the visual dot probe. Using the visual dot probe with socio-evaluative words rather than facial stimuli, Mansell and colleagues (2002) found that social anxiety (as measured by the FNE scale) was associated with avoidance of threat cues (i.e., words such as pathetic and stupid) and increased self-focused attention.

Within a sample of non-clinical college students, Rossignol and colleagues (2013) found evidence for hypervigilance to emotional faces as demonstrated by faster response latencies to congruent cues replacing emotional faces (i.e., probe appears in same location as emotional face). In sum, these findings present equivocal support for the directionality of the association between FNE and covert attention biases in response to social threat cues. As such, a more systematic examination is needed to ascertain if FNE is associated with bias and to determine the directionality of this association. Furthermore, data acquisition across modalities will allow for a more in-depth analysis of how threat bias might be related to differences in how individuals with high FNE view or respond to socially threatening stimuli.

Current Study and Hypotheses

The goal of this study was to determine the role of FNE in relation to attention bias among socially anxious teens, relative to non-anxious controls. In order to examine potential bias in initial orientation to social stimuli, we used multiple indices of attentional bias derived from gaze and dot probe RT data. For the purposes of the present study, bias was defined as preferential social attention toward angry faces during initial stimulus presentation (Garner et al., 2006). To examine FNE in relation to attention bias, this study had two primary aims and one exploratory aim. We first determined FNE's relationship to attention bias, as measured by the dot probe RT and eye-gaze data (i.e., latency and first fixation direction). It was hypothesized that a positive correlation between FNE and measures of vigilance, as calculated by the three proposed attention bias metrics, would be observed for both groups, and that the magnitude of this correlation would be stronger for the socially anxious teens. The second aim was to determine if there is group effect (SAD vs. control) on attention bias, as measured by the dot probe RT and eye-gaze data (i.e., latency and first fixation direction). We hypothesized that adolescents with SAD would demonstrate quicker and more frequent first fixations toward socially threatening faces (e.g., angry) relative to non-anxious controls during initial stimulus presentation. We also hypothesized that adolescents with SAD would demonstrate faster RTs to probes replacing angry faces relative to probes replacing neutral faces relative to non-anxious controls during initial stimulus presentation. As an exploratory aim, we sought to determine the inter-relationship among the three bias metrics in order to establish convergent validity across the bias metrics as measures of attention to threat.

Method

Power

No previous studies have examined the role of FNE in predicting both covert and overt indices of attention bias. Given the lack of research in this area, the expected effect size is unknown. For Aim 1, in order to detect a moderate effect size (*r*=.30*)*, with a power of 0.80 and $\alpha = 0.10$ (because directional hypotheses are proposed, and $\alpha = 0.10$ results in $\alpha = 0.05$ for a one-tailed test) a sample of $n = 47$ was determined necessary. For Aim 2, in order to detect a moderate effect ($Cohens\ f^2 = 0.15$) with a power of 0.80 and $\alpha = 0.10$ yielded a target sample size of $n = 62$. MANOVA requires sample sizes with a recommended minimum number of 20 observations per cell (Hair, Anderson, Tatham, & Black, 1995). At the minimum, however, the sample in each cell must be greater than the number of dependent variables included (Hair, Anderson, Tatham, & Black, 1995). As such, it was determined *n*=60 was both feasible to collect and sufficient in size to provide at least .79 power, assuming at least a moderate effect.

Participants

The sample was comprised of two groups: treatment-seeking adolescents (*n* = 58; *M* age =14.29 years) with a diagnosis of SAD participating in a larger treatment outcome study and non-anxious controls (*n* = 30; *M* age =13.52 years). All participants were between the ages of 12-16 and free of a co-occurring intellectual disability. This age range was selected based on evidence that SAD typically onsets during adolescence (Rapee & Spence, 2004). Of the initial sample of 88 participants, 16 participants with SAD and 0 control participants were excluded due to difficulty in obtaining stable eye-tracking (e.g., poor calibration, apparatus malfunction), and 5 control participants were excluded due to scores above the pre-determined threshold for SAD (see below). No participants were excluded due to missing data or system malfunctions from the

dot probe task. Thus, the final sample consisted of 67 participants (42 SAD and 25 control participants). Demographic information is presented in Table 1.

For the SAD group, inclusion criteria for the present study were: diagnosis of SAD (Clinical Severity Rating of 4 or higher) as determined by the Anxiety Disorders Interview Schedule for DSM-IV-Child and Parent Versions (ADIS-IV-C/P; Silverman & Albano, 1996); average or greater cognitive functioning as determined by the Wechsler Abbreviated Scale of Intelligence ([WASI; Wechsler, 2011] FSIQ≥85); if prescribed psychiatric medication, a stable dosage of a least four weeks was required; and not currently receiving psychological treatment for anxiety concerns. Participants who met criteria for an autism spectrum disorder, childhood schizophrenia, and/or psychopathology that warranted more immediate clinical care were excluded from the current study. Inclusion criteria for the control group was consistent with the SAD group criteria, with the exception that the control group could not have a current diagnosis of SAD and cognitive ability was not formally assessed. Although cognitive ability was not formally assessed, all controls were free from a school classification or clinical diagnosis of intellectual disability or mental retardation. All participants completed data collection at the Virginia Tech Child Study Center.

Procedure

Data for the SAD group were drawn from the pre-treatment data from a randomized clinical control trial (RCT) which examined the effectiveness of ABM for teenagers with SAD (Ollendick et al., 2018). The present study was approved by the university's institutional review board for human subject research. Control adolescents were recruited through the psychology department's child participant database, university-affiliated clinics, and advertisements in the community and on campus. Upon initial contact, potential participants' parents completed a brief

phone screener in order to determine initial eligibility. Although cognitive ability was not formally assessed for the control group, parents of participants were asked during the telephone screener if their child has ever received a school classification or clinical diagnosis of intellectual disability or mental retardation. None of the parents endorsed their child as having a school diagnosis or clinical diagnosis of intellectual disability or mental retardation. Following the phone screen, eligible families within the SAD group were invited to participate in a two-part pre-treatment assessment session. The control participants participated in a single assessment session. All parents provided informed written consent and all teens provided assent before the start of the assessment.

Over the course of both assessment sessions, parents and children within the SAD group completed a clinical intake which consisted of a semi-structured clinical interview, a test of cognitive ability (WASI-II; Wechsler, 2011), experimental tasks, and a battery of questionnaires. Examiners trained to reliability and supervised by a licensed clinical psychologist administered the ADIS-IV-C/P separately for parent and child. Within the control group, participants completed experimental tasks and a battery of questionnaires. All participating adolescents, including the control group, completed experimental paradigms which consisted of three eye-tracking tasks and one dot probe task. For the purposes of the present study, we only focused on the NIMH Child Emotional Faces Picture Set (NIMH-ChEFS; Egger et al., 2011) stimuli for the eye-tracking task which consisted of only teen faces. For this reason, we wanted to address a gap in the current body of literature which has predominantly used adult facial stimuli to examine attention bias in anxious youth. The NIMH-ChEFS eye-tracking session lasted approximately 2.5 minutes. The dot probe task lasted approximately nine minutes. In total, the two assessment

sessions lasted about five hours for the SAD teens. For the control group, the assessment session lasted 45 minutes on average.

Measures

Screen for Child Anxiety Related Disorders, Child Version (SCARED; Birmaher et al., 1997). The SCARED self-report and examines a broad range of anxiety symptoms, and is comprised of 41 items rated on a 3-point likert scale. The SCARED total score was used to confirm eligibility of control group participants; participants had to have a total score less than 25 and a score of < 8 on the social anxiety subscale to be included. Five control participants were excluded from the present analyses due to meeting the predetermined cutoff. Internal consistency on the SCARED for the control group demonstrated good internal consistency (alpha = .863).

Brief Fear of Negative Evaluation Questionnaire (BFNE; Leary, 1983). The BFNE serves as an abridged version of the full FNE (Watson & Friend, 1969), consisitng of twelve items that assess worry or fear about negative evaluation from others. BFNE items are coded on a likert scale ranging from 1 (not at all characteristic of me) to 5 (extremely characteristic of me). The BFNE correlates highly (.96) with the original FNE and has excellent internal consistency (alpha = .90; Leary, 1983). Carleton and colleagues (2011) found that using only the eight items that have straightforward wording (i.e., not the four reverse-scored items) results in the best diagnostic sensitivity and reliability. Past studies have supported the use of the BFNE in examining FNE within adolescent samples (Capriola, Maddox, & White, 2016; de Hullu et al., 2011; Fitzgerald et al., 2016). Therefore, only the eight straightforward worded items were summed for the total BFNE score in the present study. Both the teens with SAD and the control group completed the BFNE. For both groups, the BFNE demonstrated excellent internal consistency (alpha = .954 and .920 for SAD and control, respectively).

Apparatus and Stimuli

Eye-Tracking

Eye-tracking was completed using a Tobii T60 XL eye-tracker. Participants were seated about 66 cm from the 18" monitor. In order to ensure gaze is detected, the eye-tracking system was calibrated to each of the participant's eyes. The eye-tracker's calibration system was set to 0.5 degrees of accuracy with less than 0.3 degrees of visual drift. The five-point calibration procedure involved tracking a moving red circle located at five predefined locations across the screen (i.e., the four corners and the center of the screen). The examiner visually inspected the calibration display before advancing the participant to the eye-tracking task. Following the calibration, participants began the eye-tracking task with the only explicit directions being to look at the screen in any way they pleased.

For the eye-tracking tasks, face stimuli were color photographs taken from the NIMH ChEFS (Egger et al., 2011), with adjustments made by members of our research team (i.e., standardized luminance, size, and smoothness) and all faces have at least 70% rater agreement of presented emotions, based on ratings by 41 adolescents, 54 parents, and 34 mental health professionals (Coffman et al., 2015). For the purposes of the present study, only the neutral and angry facial expressions were analyzed to ensure consistency across modalities, since the dot probe only relied on angry-neutral face pairs. All non-facial features (e.g., clothing, background, etc.) were removed for the purposes of the task. Faces were presented in an equally sized oval shape (each face 19.05 cm long X 16.51 cm wide, with 11.43 cm of gray space between the two faces, all subtending 37° visual angle) against a gray background. Faces were presented in pairs across each trial. Specifically, each trial contained a pair of photographs of the same actor or actress, with one photo depicting an angry face and the other depicting a neutral facial

expression. This methodology is consistent with previous social anxiety eye-tracking research (e.g., Garner et al., 2006; Mogg, Philippot, & Bradley, 2004; Wieser et al., 2009) which posits that attentional biases are more likely to occur when more than one stimulus is competing for attention (In-Albon, Kossowsky, & Schneider, 2010). Face pairs used in the eye-tracking task were presented horizontally, centered on the screen in a counter balanced fashion. Three presentations counterbalancing the stimuli were created and participants were randomly assigned to one of the three tasks. All tasks were similar and differed only in order of the presented stimuli. A centered X (36 cm inch long by 36 cm inch wide) is presented for 1 second, immediately followed by a face-pair. The face-pair is shown for 3 seconds. After the face-pair, a gray screen is presented for half a second.

Dot Probe

Similar to the eye-tracking task, the face stimuli used in the dot probe task were color photographs taken from the NIMH-ChEFS (Egger et al., 2011). The current dot probe paradigm also included adult facial stimuli, which was a part of the NIMSTIM battery (Tottenham et al., 2009). Despite the inclusion of both the adult and child faces, only RT data in response to the NIMH-ChEFS battery (child faces) were included in order to ensure consistency across the tasks. The current paradigm only used angry and neutral stimuli and as such, only the angry and neutral face pairs were analyzed. All non-facial features (e.g., clothing, background, etc.) were removed for the purposes of the task. Faces were presented in an equally sized oval shape against a black background. In contrast to the eye-tracking task, faces were displayed in a vertical fashion which was counterbalanced between the angry and neutral emotions. Faces were presented in a random order across all participants. Before the start of the task, participants were oriented to a welcome screen which outlined the task. The experimenter read the instructions aloud to participants.

Participants were instructed that if they saw an "E" after the facial stimulus they were to press the left button on the mouse provided. If the letter "F" was presented after the facial stimulus, they were to press the right button on the mouse. Moreover, all participants were instructed to respond quickly and accurately. After an initial fixation cross was presented in the middle of the screen for 1 second, an angry and neutral face pair was presented simultaneously at the top and bottom of the screen for 300 milliseconds. Following the presentation of the faces, a probe (depicted by the letter "E" or "F") replaced one of the two faces for 250 milliseconds. Following the presentation of the probe, the fixation cross reappeared to orient the participants' attention. The teens were allotted 2 seconds to make a response before the next face pair was presented.

Data Analyses

Data analyses were conducted in IBM SPSS Statistics Version 24.0. Descriptive statistics were computed for demographic variables (i.e., sex, age, race) in order to characterize the sample. All variables were assessed for normality and influential outliers. Values greater than three standard deviations from the mean were Winsorized (Kuckertz & Amir, 2015; Price et al., 2015). Preliminary analyses determined whether RT data and fixation patterns were associated with age, race, and sex. Any significant predictors were included as covariates in the analyses.

With respect to the eye-tracking data, the following gaze behaviors were calculated: latency (i.e., time to first fixation on a socially threatening face region; see Appendix G) and probabilities of first fixation direction (i.e., number of trials gaze was first directed to angry face *divided* by total number of trials with eye movements to angry-neutral face pairs; see Appendix G). Both these metrics have been well supported within the eye-tracking literature as means to assess for vigilance biases in initial gaze orientation to socially threatening faces (Gamble & Rapee, 2009; Garner et al., 2006; Shechner et al., 2013). In regards to the dot probe analyses,

there are various approaches to calculate attention bias. The approach selected follows the standards outlined by Price and colleagues (2015) which carefully considered how to best calculate RT data in order to assess for attention bias and to improve the overall stability of the dot probe (discussed in further detail below).

Eye-Tracking Data

Using Tobii Studio, fixation metrics were calculated from the available raw eye movement data. The data were processed and quantified using a MATLAB code. Fixation data was excluded for off-task trials, meaning that the participant was not gazing at the screen and/or the eye-tracker was not able to capture their gaze patterns. At the trial level, fixation data were excluded if less than the pre-determined 50% validity threshold for tracking across stimuli. Consistent with the approach by Garner and colleagues (2006), trials were excluded if the participant did not center their visual attention on the centered "X" presented before the presentation of the paired stimuli, as determined by inspection of the raw data.

Latency. Latency refers to the time from the initial presentation of facial stimuli to the first fixation on either the angry or neutral face. For the purposes of the present study, latency was calculated separately for angry and neutral face trials. The latency metric, expressed in milliseconds, was averaged separately across the neutral trials and angry trials. However, the present study only examined the angry face trials in order to analyze overt attention in response to social threat.

First fixation direction. First fixation direction scores were used to determine whether an initial bias toward angry faces exists for the samples. First fixation direction was calculated as a percentage with number of trials in which the first eye movement was directed to an angry face *divided* by the total number of trials of angry-neutral face pairs.

Dot Probe Analyses

All RT data were gathered using PsychoPy (Peirce et al., 2011), and processed and quantified using Python syntax. For Hypotheses 1 and 3, analyses focused on RTs to probes in milliseconds. RTs yielded from incorrect responses (i.e., participant pressed "E" button instead of "F" button or vice versa) were excluded. RTs to probes were averaged separately for congruent trials (i.e., the probe replaced the angry face) and for incongruent trials (i.e., the probe replaced the neutral face). Bias scores were calculated as the mean RT to incongruent trials (i.e., probe replaced neutral face) *minus* mean RT to congruent trials (i.e., probe replaced angry face; Price et al., 2015). Negative values of the bias score indicated attention away from angry faces (i.e., faster RTs on incongruent than congruent trials). Positive values of the bias score indicated biased attention toward angry faces (i.e., faster RTs on congruent than incongruent trials). Bias scores were calculated as follows, per Price and colleagues (2015) and Abend and colleagues (2017):

Bias score = (mean RT to incongruent trials – mean RT to congruent trials)

Data Cleaning

All SAD and control participants were successfully calibrated for the eye-tracking task, meaning that the tracker detected gaze within all five predefined areas. 10 participants with SAD and 0 control showed on-task percentage scores below 50%, which is a common benchmark within eye-tracking studies for including participants in analyses (e.g., Fischer et al., 2014; Swanson, Serlin, & Siller, 2013). As originally proposed, however, fixation data were excluded only if less than the pre-determined 50% validity threshold for tracking across stimuli was not met. No participants were excluded for demonstrating less than the pre-determined 50% validity threshold for tracking across stimuli. There was no significant differences in amount of data used

for analyses between groups, $t(65) = -.82$, $p = .42$, suggesting data loss was not systematic based on group. Further, there was not a significant group difference in number of trials during which participants did not fixate on the centered "X" before stimulus onset, $t(65) = 1.38$, $p = .17$. To investigate whether the percentage of on-task time and centering to the "X" before the stimuli appeared was related to other participant characteristics, we computed Pearson product-moment correlations. None of these results were statistically significant.

Statistical-Hypotheses Testing

For Aim 1, correlations were examined within group (i.e., separately for the SAD group and control group) and then *r* to *z* transformations were computed in order to compare the strength of the correlation coefficients between FNE and attention bias across the two groups. When conducting correlation analyses by two independent groups of different sample sizes, a comparison of the correlations is needed. As such, the correlation coefficients were transformed into z scores. This transformation, also known as Fisher's *r* to *z* transformation, was done in order to evaluate whether the *z* scores can be compared and analyzed for statistical significance by determining the observed *z* statistic (Cohen & Cohen, 1983; Preacher, 2002). This calculation was computed using Preacher's (2002) macro. By convention, values greater than |1.28| are considered significant if a 1-tailed test is performed (please see power section). It was hypothesized that a positive correlation between FNE and bias metrics would be observed for both groups, however this correlation would be stronger for the SAD teens (Hypothesis 1).

For Aim 2, a one-way multivariate analysis of variance (MANOVA) was used to examine differences in attention bias metrics between adolescents with SAD and the control group (Hypotheses 2 and 3). Primary assumption testing was conducted to check for normality, linearity, univariate and multivariate outliers, homogeneity of variance, and multicollinearity.

The MANOVA examined group status (i.e., SAD and control) as the independent variable and the three indices of attention bias (i.e., probe RT, first fixation direction proportions towards angry faces, and latency to angry faces) as the dependent variables.

Results

Descriptive Statistics and Preliminary Results

Data were first assessed for normality and possible outliers. Following winsorizing of one data value (one control participant only for the latency to fixate on anger faces variable), skewness and kurtosis for all primary variables were within acceptable ranges, and visual inspection of the distribution of all variables indicated no concerns with non-normality or problematic outliers. Descriptive statistics were computed in order to characterize the participants across the two groups (Table 1). The groups did significantly differ in age $t(65) = 2.95$, $p = .00$. Specifically, the mean age for the SAD group was 14.50 and the mean age for the control group was 13.56 years. Given that age was not significantly correlated with any of the dependent variables of interest, it was not included as a covariate in further analyses. The groups did not differ in terms of participant sex, $\chi^2(1) = 1.96$, $p = .13$. Group descriptive statistics were computed for the completed questionnaires (SCARED, BFNE; see Table 1). Descriptive statistics for the three bias metrics are available in Table 2. Correlations between independent variables, dependent variables, and participant characteristics by participant group are available in Tables 3 and 4. Additional preliminary analyses were conducted to examine if eye gaze patterns differed as a function of participant sex and/or age. No significant differences were found, so the subsequent analyses were conducted without covariates.

All youth with valid eye-tracking data also had valid data for the dot probe task. There were no statistically significant differences between the groups in accuracy percentages for valid,

$t(65) = -1.25$, $p = .22$, or invalid trials, $t(65) = -1.22$, $p = .23$. To investigate whether the accuracy percentages for valid and invalid trails were related to other participant characteristics, we computed Pearson product-moment correlations. There were no statistically significant correlations. Additional preliminary analyses were conducted to examine if bias scores varied by participant sex and/or age. No associations were found. As such, the subsequent analyses were conducted without covariates. However, the mean bias score for the teenagers with SAD was negative, suggesting attention away from angry faces (i.e., faster RTs on incongruent than congruent trials). Control participants demonstrated positive bias scores, marked by attention toward angry faces (i.e., faster RTs on congruent than incongruent trials). For means and standard deviations of the calculated bias metrics, please refer to Table 2.

Preliminary assumption testing for the MANOVA was conducted to check for normality, linearity, univariate and multivariate outliers, homogeneity of variance and covariances, and multicollinearity. For the multivariate analyses, the Box's M test of equality of covariance matrices was significant, demonstrating that the model assumption of homogeneity of covariances was indeed violated. Given the violation, Pillai's trace was used to evaluate whether there were statistically significant differences among the groups on the linear combination of the dependent variables given that it is more robust and not linked to assumptions about the normality or distribution of the data (Tabachnick & Fidell, 2007).

Comparisons of Relationship between FNE and Attention Bias to Angry Faces (Hypothesis 1).

Latency. Within the SAD group, the association between FNE and latency to angry faces was not statistically significant $r(42) = .08$, $p = .32$. Within the control group, the association between FNE and latency to angry faces was also investigated following the same procedures

noted above. The observed correlation coefficient between FNE and latency was not statistically significant $r(25) = .04$, $p = .43$. The observed z statistic was not statistically significant $z = .15$, $p = .44$, indicating no group difference in strength of association.

First Fixation Direction. Within the SAD group, the observed correlation coefficient between FNE and first fixation direction was not statistically significant $r(42) = -.08$, $p = .31$. Within the control group, the association between FNE and first fixation direction to angry faces was also not statistically significant $r(25) = .13$, $p = .26$. The observed z statistic was not statistically significant $z = .79$, $p = .21$.

Dot Probe. The observed correlation coefficient between FNE and bias scores was not statistically significant $r(42) = -.06$, $p = .35$ within the SAD group. Within the control group, the association between FNE and bias scores was also investigated following the same procedures noted above. The observed correlation coefficient between FNE and bias scores was not statistically significant $r(25) = -.03$, $p = .45$. The observed z statistic was not statistically significant $z = .16$, $p = .44$.

Group Comparisons of Attention Bias to Angry Faces (Hypotheses 2 and 3).

There was a statistically significant group difference between the SAD and control adolescents on the combined dependent variables, Pillai's Trace = .37, $F(3,63) = 12.23$, $p < .001$, $\eta_p^2 = .37$. When the dependent variables were considered separately, the univariate F-tests showed there was only a significant difference between the groups for latency to first fixate on the angry face, $F(1,65) = 31.94$, $p < .001$, $\eta_p^2 = .33$. An inspection of the mean scores indicated that youth with SAD were quicker to fixate (i.e., shorter latency) on angry faces ($M = 445.66$ ms, $SD = 114.74$ ms) relative to control youth ($M = 654.80$ ms, $SD = 188.78$ ms).

Exploratory Analyses

Approximately one-third (39%) of the control group demonstrated "bias" as determined by the first fixation direction percentages above 50%. Over one-half (64%) of the SAD group demonstrated "bias" as determined by the first fixation direction percentages above 50%. This cutoff was established in prior research by Garner and colleagues (2006), because this percentage demarcates greater visual attention towards threat. Participants from both groups demonstrated "bias." As such, we conducted exploratory analyses to determine the inter-relationships among the three bias metrics in order to establish the convergent validity of the dot probe. Across the entire sample (SAD + control), there was a significant negative association between average latency to fixate on an anger face and first fixation direction percentages for anger faces, $r(67)= -.25$, $p = .02$ which suggests that the quicker fixations towards anger faces was associated with an number of first fixations towards anger faces. There was no relationship between threat bias scores calculated from the dot probe and average latency to fixate on an anger face, $r(67)= -.03$, $p = .41$. There was a non-significant negative relationship between threat bias scores calculated from the dot probe and first fixation direction percentages for anger faces, $r(67)= -.10$, $p = .20$.

Within the SAD group, convergence was observed between the eye-tracking metrics, but not between the dot probe bias scores and the eye-tracking measures. Specifically, there was a significant negative association between average latency to fixate on an anger face and first fixation direction percentages for anger faces, $r(42)= -.43$, $p = .01$. There was a non-significant, negative relationship between threat bias scores calculated from the dot probe and average latency to fixate on an anger face, $r(42)= -.12$, $p = .44$. There was a non-significant, positive relationship between threat bias scores calculated from the dot probe and first fixation direction percentages for anger faces, $r(42) = .25$, $p = .11$.

Within the control group, convergence was variable across the observed bias metrics. Unlike the SAD group, there was no relationship between average latency to fixate on an anger face and first fixation direction percentages for anger faces, $r(25) = -.18$, $p = .40$. There was also no relationship between threat bias scores calculated from the dot probe and average latency to fixate on an anger face, $r(25) = -.10$, $p = .64$. There was a non-significant, negative relationship between threat bias scores calculated from the dot probe and first fixation direction percentages for anger faces, $r(25) = -.32$, $p = .12$.

Given the unequal sample sizes, the *r* to *z* transformation was calculated. For the association between latency and first fixation direction towards anger faces, the observed *z* statistic was not statistically significant $z = 1.04$, $p = .15$, indicating no group difference in strength of association. For the association between latency and the dot probe threat bias scores, the observed *z* statistic was not statistically significant $z = 0.08$, $p = .47$, indicating no group difference in strength of association. For the association between first fixation direction towards anger faces and the dot probe threat bias scores, the observed *z* statistic was indeed statistically significant $z = 2.20$, $p = .03$. Specifically, there was a statistically significant group difference in the strength of the association between first fixation direction percentages towards anger faces and dot probe threat bias score.

Discussion

This study sought to assess the influence of FNE on attention bias metrics in both adolescents with SAD and controls, using same-age face stimuli. In addition, this study marks one of the first studies to examine group differences in attention bias metrics between a clinically confirmed group of youth with SAD relative to controls via multiple methods (i.e., dot probe and eye-tracking). We found a significant between group difference in average latency to fixate on

angry faces. However, these findings were not consistent with the other calculated attention bias metrics (i.e., dot probe bias scores and first fixation direction percentage towards angry faces). In addition, the associations between FNE and the attention bias metrics were not statistically significant in either group.

Contrary to our prediction, self-reported FNE was not positively associated with any of the calculated attention bias metrics for teens with or without SAD. These findings are inconsistent with work by Garner and colleagues (2006), who found that during evaluative stress non-clinical college students with elevated FNE scores tended to initially orient their attention towards emotional faces, relative to students who reported low levels of social anxiety. Despite the empirical rationale for the directionality of our hypothesis, the inconsistency may reflect our use of a clinical, adolescent sample. Although adolescence is a critical period for the development of SAD, perhaps the core cognitive process (i.e., FNE) is not associated with attention bias toward threat. As currently measured, attention bias research has yielded inconsistent patterns of attention allocation towards threat stimuli (Cristea et al., 2015; Dudeney et al., 2015). Consequently, our findings might partially explain the lack of effect seen in studies of ABM in teens – because even though SAD (and FNE) are present, perhaps the attentional biases have not yet become fully operational or accessible.

Similar to research by Shechner and colleagues (2013), there was a significant group difference in attention bias towards threat (Hypothesis 2). Specifically, youth with SAD were quicker to fixate to angry faces, relative to neutral faces, compared to non-anxious controls. These findings suggest that attentional bias toward threat is present during the earliest temporal stages of stimulus exposure (Gamble & Rapee, 2009; Shechner et al., 2013). To the authors' knowledge, this is the first to observe these biases in initial orientation among a clinically

confirmed sample of adolescents diagnosed with SAD, suggesting that teens with SAD are faster, though not more likely, to fixate on faces showing anger. These findings support a pattern of attention allocation marked by vigilance in initial orientation. As such, within interactions with socially threatening stimuli, the SAD group demonstrated atypical social attention. Mean latency scores indicated that youth with SAD were quicker to fixate on angry faces relative to peers without social anxiety. However, this association was not similar within the context of the dot probe (i.e., mean dot probe score for the SAD group suggested avoidance of threat stimuli). These results confirm preferential visual attention to threat stimuli through the use of adolescent facial stimuli. Despite this finding, there was no significant group difference in visual attention as marked by the dot probe bias scores, nor the first fixation direction percentages to anger faces. Perhaps this was not observed due to the restricted range of variability in these metrics (i.e., reduced number of trials in the dot probe task and eye-tracking tasks).

Notably, the pattern of attention to threat stimuli was variable across paradigms for the SAD group. Specifically, the overall mean for the SAD group indicated no apparent vigilance, as assessed by the dot probe. However, the SAD group demonstrated vigilance as assessed by the eye-tracking measurements. This pattern differed from the control group, who demonstrated a pattern of vigilance as assessed by the mean percentage of first fixation direction towards anger faces and faster mean RT to anger relative to neutral faces for the dot probe. For the latency to fixate on anger faces, the control group demonstrated slower latency to fixate on anger faces relative to the SAD group.

In regards to the exploratory analyses, the SAD group demonstrated a moderately sized and statistically significant negative association between the first fixation direction percentages to anger faces and latency to anger faces. This finding was not surprising given that Shechner

and colleagues (2013) indicated that these vigilance measures were not completely independent because the first fixation will always be quicker latency in comparison to the subsequent fixations. Within the SAD group, the relationship between threat bias scores calculated from the dot probe and first fixation direction percentages for anger faces was statistically non-significant. These findings suggest that heightened visual attention to anger faces was reflected across these two bias metrics within the SAD group. Results, however, indicated that there was no statistically significant convergence between dot probe bias scores and first fixation direction percentages towards anger faces, suggesting that separate attention processes are being measured.

Within the control group, a similar pattern between threat bias scores and first fixation direction percentages for anger faces, of a similar magnitude, however in the opposite direction, was observed. Perhaps vigilance is a more cohesive construct in teens with SAD, relative to unaffected teens. Given the moderately sized correlation coefficients, a larger sample might produce a statistically significant relationship. Our findings offer support for a statistically significant group difference (i.e., SAD vs. Control) in the strength of the association between first fixation direction percentages towards anger faces and dot probe threat bias score which might suggest that vigilance is a more cohesive construct in teens with SAD relative to non-anxious controls.

Limitations, Implications, and Future Directions

In terms of participant characteristics, the majority of participants were Caucasian. These results might not readily generalize to other races and ethnicities. Further, biased attention has been reported for individuals with other internalizing disorders (outside of SAD), and therefore, the co-morbid psychiatric disorders in our sample (i.e., other anxiety disorders) may have

influenced findings. It is possible that the co-morbid diagnoses could have potentially increased or attenuated the results observed. While the majority of the SAD adolescents presented with at least one comorbid diagnosis, the primary presenting concern was social anxiety. Accordingly, our results could only be applied to those individuals with a primary diagnosis of SAD. Within the initial sample of 88 participants, 16 participants with SAD and 0 control participants were excluded due to technical problems associated with the eye-tracking task which is a limitation in the current study. Although loss of eye-tracking data is often observed within clinical samples (Staugaard & Rosenberg, 2011; Wieckowski & White, 2017), this will be important to address in future research. Another potential limitation could be the use of the BFNE which might have served as more of an index of severity of SAD symptoms rather than the best measure to assess fears of social evaluation. It is also possible that the stimuli used in the study lacked potency and did not evoke fears of social evaluation. For example, Garner and colleagues (2006) included a social stress induction, telling participants that they would be videotaped while giving a speech after the eye-tracking task. The current study did not include a manipulation of social-evaluative stress. Future research should evaluate the associations between attention bias and FNE through the use of dynamic stimuli and or social stress induction tasks which are often more ecologically valid and representative of real word social interactions (Garner, Clarke, Graystone, & Baldwin, 2011; Weeks, Howell, & Goldin, 2013). Lastly, youth in the control group endorsed heightened FNE per the BFNE (i.e., overlapping range with clinical group), however were not excluded from the present analyses due to their SCARED scores being below threshold. As such, future research should examine the sensitivity and specificity of the BFNE in order to determine if there is a sensitive cutoff by which these non-anxious youth should be removed due to clinically significant fears of negative evaluation.

Despite these noteworthy limitations, this is a preliminary study with a well-characterized clinical group as well as a non-anxious control group. Extant research has suggested that, among socially anxious youth, attention bias is most pronounced during initial orienting to threatening, emotional stimuli. Recent studies which have examined attentional biases within anxious youth are characterized by a focus on mixed samples, with a range of anxiety diagnoses. Given that FNE is a core feature of SAD and is regarded as unique to the disorder, results from clinically heterogeneous samples cannot be readily generalized to socially anxious populations. Finally, the use of adult facial stimuli may result in processing differences for youth given that the disorder often involves fear of peer evaluation, specifically. The use of adolescent facial stimuli addresses a limitation in the prior research on threat biases which has primarily focused on the use of adult stimuli despite the likely possibility that adolescents with SAD may be more likely to receive negative peer evaluation from peers rather than adults. Research on the cognitive roots of SAD during adolescence is important given it is a critical period for the development of SAD. Consequently, it is possible to inform our existing interventions which attempt to target these processes while they are still developing.

Although both Cognitive Behavioral Therapy (CBT) and Attention Bias Modification (ABM) target underlying cognitive processes involved in social anxiety, they differ in their precise target, or mechanism of action. Whereas CBT targets remediation of intense and unfounded FNE, ABM targets attention bias. Attention bias is a more experimental construct, relative to FNE, which is fairly well-validated in both clinical and research settings. Our findings suggest that FNE and attention bias are distinct processes, and we propose that FNE might precede the development of biased attention towards threat. Biases are not present in all youth with an anxiety disorder, and it is estimated that 50% of anxious children and adolescents do not

show attention bias toward threat (Bar-Haim et al., 2007). These findings suggest the need for the development of individualized treatments for SAD according on the nature of the cognitive process(es) (e.g., heightened bias but not FNE, FNE but not heightened bias, both FNE and heightened bias). The present study also addresses the gap in the present body of literature which has predominantly focused on eclectic samples rather than SAD youth specifically. By focusing on SAD relative to non-socially anxious youth, we were able to examine and determine whether more nuanced patterns of attention to threat were specific to the SAD group. Furthermore, the use of similar age faces allowed for a more accurate and thorough assessment of the directionality of attention bias and how said directionality informs research and treatment. The lack of group differences seen uniformly across the bias metrics suggests that traditional ABM protocols might not be effective for reducing preferential attention for anger faces. Our results suggest that targeting biased attention to threat (anger faces) might be more effective if targeting slower orientation toward threat through the use of eye-tracking, thus allowing for the ability to examine biases in initial orientation versus delayed disengagement from threat. The majority of past research has focused on veering attention toward neutral or positive stimuli (Bar-Haim, 2010). However, these ABM protocols have been largely unsuccessful in modifying biased attention or reducing social anxiety symptoms (Bar-Haim, 2010). As such, results from our study suggest that perhaps instead of retraining attention towards neutral stimuli, bias could be reduced by reinforcing greater latency to fixate on threat cues (e.g., angry faces). Finally, future studies should examine the relative effectiveness of interventions targeting cognitive or attentional processes, as our results suggest these two mechanisms may be differentially engaged across adolescents over the course of development.

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Table 1

Participant Characteristics (n = 67)

	SAD (n = 42) *Mean (SD)*	SAD Range	Control (n = 25) *Mean (SD)*	Control Range
Age (in years)*	14.50 (1.29)	12-16	13.56 (1.45)	12-16
BFNE*	27.83 (9.20)	9-40	14.40 (6.03)	8-36
WASI-2	109.83 (14.01)	85-139	NA	
SCARED (child)				
Total score*	36.49 (15.01)	0-57	10.00 (6.83)	0-32
Panic Disorder*	8.67 (5.50)	0-19	1.40 (1.47)	0-5
GAD*	11.08 (5.13)	0-18	3.48 (3.06)	0-14
Separation* Anxiety	3.67 (2.67)	0-8	1.68 (2.08)	0-8
Social Anxiety*	10.15 (3.55)	0-14	2.88 (2.30)	0-7
School* Avoidance	2.92 (2.18)	0-8	.56 (.71)	0-2

		n (% of total)	n (% of total)	$x^2(p)$
Sex				
	Male	10 (23.8)	10 (40)	1.96 (.13)
	Female	32 (76.2)	15 (60)	
Race				
	Caucasian	34 (82.9)	21 (84.00)	1.62 (.65)
	Non-caucasian			
	Other	3 (7.3)	3 (.12)	
	African American	2 (4.9)	1 (.04)	
	Hispanic	2 (4.9)	0 (.00)	
Diagnoses				
	GAD	7 (17.1)		
	ADHD- I	1 (2.4)		
	ADHD-C	1 (2.4)		
	MDD	1 (2.4)		
	SAD	2 (4.9)		
	SP	1 (2.4)		

Note.

Significant between-group differences are indicated by * ($p < .01$)

BFNE: BFNE straightforward total score

WASI-2: Wechsler Abbreviated Scale of Intelligence-Second Edition

NA: Not Available for Sample

SCARED: Screen for Child Anxiety Related Disorders, child and parent version. Five scales make up the total anxiety: Panic/Somatic, Generalized Anxiety (GAD), Separation Anxiety, Social Anxiety, and School Avoidance.

Diagnoses based on ADIS-5:

GAD: Generalized Anxiety Disorder

ADHD-I: Attention Deficit/Hyperactivity Disorder-Primarily Inattentive Presentation

ADHD-C: Attention Deficit/Hyperactivity Disorder-Combined Presentation

MDD: Major Depressive Disorder

SAD: Separation Anxiety Disorder

SP: Specific Phobia

Table 2

Means and Standard Deviations for Attention Bias Variables by Group to Anger Faces

	SAD group (n = 42), *M(SD)*	Control group (n = 25), *M(SD)*	$t(p)$
Direction of first fixation	.52 (.14)	.52 (.09)	.09 (.93)
Latency of first fixation (ms)	445.61 (114.74)	654.80 (188.74)	-5.04 (.00)
Dot Probe Bias scores	-1.87 (26.46)	3.49 (24.45)	-.82 (.41)

Table 3.

Correlations within SAD Group

	2.	3.	4.	5.	6.	7.
1. Sex	.09	.01	-.20	-.11	.39*	.31
2. Age	--	.16	.02	.11	.26	.27
3. Average Latency for Anger		--	-.43**	-.12	.08	.06
4. % FFD toward Anger			--	.25	-.08	-.20
5. Dot Probe Bias Score				--	-.06	-.31
6. BFNE					--	.66***
7. SCARED-Social Anxiety						--

Table 4.

Correlations within Control Sample

	2.	3.	4.	5.	6.	7.
1. Sex	-.25	.35	-.03	-.12	.12	-.15
2. Age	--	-.14	-.31	-.14	-.46*	-.42*
3. Average Latency for Anger		--	-.18	-.10	.04	-.22
4. % FFD toward Anger			--	-.32	.13	.11
5. Dot Probe Bias Score				--	-.03	.11
6. BFNE					--	.40*
7. SCARED-Social Anxiety						--

Figure 1. NIMH-ChEFS stimuli depicting angry-neutral face pair

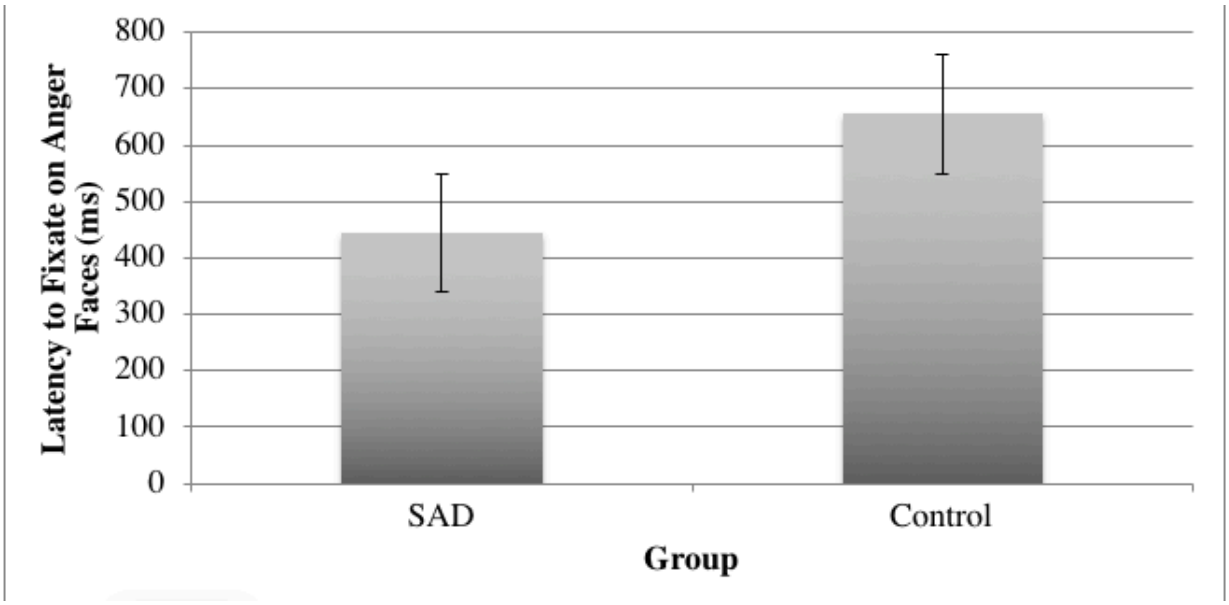

Figure 2. Latency to Fixate on Anger Faces.

Appendix A

Parental Consent Form for Socially Anxious Group

Informed Consent for Participation in Research Projects Involving Human Subjects
Informed Consent Form for Primary Caregiver

TITLE OF RESEARCH PROJECT: Attention Training for the Treatment of Childhood Social Anxiety Disorder

1. PURPOSE OF THE RESARCH/PROJECT

You are invited to participate in a study that will explore the effectiveness of an experimental treatment for children with social anxiety. This project will compare your child's social anxiety before the experimental treatment to their social anxiety during the treatment, directly after treatment, and again at a 3 month follow-up. The experimental treatment involves ten computer-based sessions (over a 5 week period), designed to assess attentional processes related to social anxiety. Basically, socially anxious children tend to be vigilant to social cues that might signal danger or embarrassment and to pay too much attention to those cues. In this study, we hope to train them to attend to neutral cues and to perceive those cues in a non-anxious way. The treatment is experimental because it has not been tried with children before. The treatment is free to you and your child.

2. PROCEDURES:

To accomplish the goals of this project, you and your child will be randomly (by chance) assigned to either an active treatment condition or a control treatment condition. It is necessary for us to have a control condition so that we can determine if any change in your child's social anxiety occurs simply due to the passage of time and the fact that you brought your child in to see us for an assessment and treatment. Treatment sessions in both conditions will be approximately 30 minutes long. The two treatments differ in the amount of exposure to social anxiety cues. Between the fifth and sixth session of the experimental and control treatment, we will ask you and your child to undergo an assessment at the clinic. We will ask you and your child to return to the clinic for additional assessment approximately one week after treatment and again 3 months after treatment so that we can assess how things are going.

In order to determine whether the experimental treatment is effective, you will be asked a variety of questions and administered a semi-structured diagnostic interview about your child prior to the beginning of the experimental treatment, following treatment, and at 3-month follow-up. These questions will be focused on your child's level of social anxiety and his or her temperament. Most of the sessions you and your child attend at the clinic will be

videotaped. Videotaping is done for the purpose of reliability, to document that our interviewers and therapists carefully followed the research protocol. We also videotape during some of the assessments (for example, during the computer assessment tasks) so we can be sure your child is attending to the displayed tasks.

If we determine, as a result of our assessments, that treatment was not successful for your child, we will refer you to the Psychological Services Center or to a professional therapist from the community. However, payment for such services will need to be borne by you.

In sum, the information collected from the questionnaires and the interviews will help us to determine how much progress your child has made in the experimental or control treatment.

3. RISKS:

There may be some risks from your participation in this study. It is possible that you may become upset when asked to talk about thoughts, feelings, and behaviors that are related to your child's social anxiety. However, to minimize this discomfort and to help you and your child manage the discomfort should it occur, all project staff are highly trained. The therapists and graduate student clinicians working on the project have experience working with children and families, and are being supervised by Dr. Ollendick, a licensed clinical psychologist with over 40 years of experience working with children. You do not have to answer any questions or discuss any topics that make you feel uneasy nor will you ever be asked to do anything you are not prepared to do. Of course, you may stop participating in the project at any time if you feel too uncomfortable or simply wish to discontinue the project.

4. BENEFITS:

Results of this study may help us determine whether this experimental treatment is effective for youth with social anxiety. Such a development would allow us to share this information with other mental health professionals and to assist them in working with other children and adolescents.

5. EXTENT OF ANONYNITY AND CONFIDENTILAITY:

Results of this study will be kept strictly confidential. At no time will we release your results to anyone without your written consent unless you have indicated that you will hurt or harm yourself or someone else, or that your child has indicated that someone is hurting or harming himself/herself, or that he/she has or intends to hurt himself/herself or someone else. In that situation, by law it would be necessary for us to report that information to the appropriate authorities. In all other cases, the information you provide will have your name removed and only a subject number will identify you during analyses and any write-up of the research.

The experimental and control treatment sessions will be conducted by graduate clinicians enrolled in the doctoral program in clinical psychology at Virginia Tech. All clinicians will be supervised by Dr. Ollendick. As noted above, all sessions will be videotaped. The videotapes will be reviewed by research assistants (undergraduate and graduate students in the Psychology Department at Virginia Tech) and evaluated to ensure that the treatments are being implemented appropriately. The videotapes will be erased at the end of the study. The videotapes and all notes from the sessions will be kept in a locked file in the Child Study Center.

6. COMPENSATION:

The experimental or control treatments will be offered to you free of charge. In addition, you and your child will each receive $25 for each assessment session you each complete, for a possible total of $100 each. However, if as a result of the project, it is determined that you or members of your family should seek additional counseling, a list of local services will be provided. As noted above, additional counseling outside of our Center would be at your own expense.

7. FREEDOM TO WITHDRAW:

You are free to withdraw from participation in this study at any time without penalty. Should you chose to withdraw there will not be any penalty regardless of the reason for your decision to do so. You are also free to not answer any questions that you choose without penalty.

8. USE OF RESEARCH DATA:

The information from this research may be used for scientific or educational purposes. It may be presented at scientific meetings and/or published and reproduced in professional journals or books, or used for purposes that Virginia Tech's Department of Psychology considers proper in the interest of education, knowledge, or research. Only persons directly affiliated with the project, such as the Principal Investigators, Consultant, graduate students in psychology affiliated with the project, or trained undergraduate research assistants will have access to confidential participant information.

9. REVIEW OF RESEARCH:

This research project has been reviewed by the Human Subjects Committee of the Department of Psychology and by the Institutional Review Board of Virginia Tech, as required for all university-based research projects.

10. SUBJECT'S RESPONSIBILITIES:

I voluntarily agree to participate in this study. I have the following responsibilities:

- Completing and returning the questionnaires
- Participation in four interviews about my child
- Granting permission for my child to participate in the project
- Making sure my child attends sessions

11. SUBJECT'S PERMISSION:

I have read the above description of the study. I have had an opportunity to ask questions and have them ansared. I hereby acknowledge the above and give my voluntary consent for my participation in this study.

I further understand that if I participate I may withdraw at any time without penalty.

I understand that should I have any questions regarding this research and its conduct, I should contact any of the persons named below.

PRIMARY RESEARCHER: Thomas H. Ollendick, Ph.D. PHONE: 231-6451 EMAIL: tho@vt.edu
CHAIR, HSC: D.W. Harrison, Ph.D. PHONE: 231-6581 EMAIL: dwh@vt.edu
CHAIR, IRB: David Moore, DVM PHONE: 231-4991 EMAIL: moored@vt.edu

ADOLESCENT'S NAME:
_____

PARENT/GUARDIAN'S NAME:_____Date:
_____

PARENT/GUARDIAN'S
SIGNATURE:_____Date:_____

WITNESS:_____Date:_____
_____

Appendix B

Assent Form for Socially Anxious Group

ADOLESCENT ASSENT FORM

You have been asked to be in a study about teens who become nervous or scared in social situations. These situations involve experiences such as being around other kids your age or with adults, and can occur at parties, restaurants, shopping centers, speaking in front of your classmates at school, or when meeting new people for the first time.

The goal of this study is to see how helpful an experimental treatment is for this nervousness. If you agree to be in the study, you will be randomly assigned to the experimental treatment or a control treatment. Random means that we will flip a coin and you will be assigned to the treatment associated with "heads" or "tails". For example, if we flip the coin and it lands on "heads" you will be assigned to the experimental treatment. If it lands on "tails," you will be assigned to the control treatment. The experimental treatment and the control treatment each consists of 10 sessions lasting about 30 minutes for each of the sessions. In these sessions, you will be asked to look at some angry and neutral faces of adolescents and adults on a computer screen and then indicate where on the screen you saw two different letters that will follow the faces. The sessions will be over a 5-week period and we will meet twice a week for the sessions. The treatment sessions are free to you and your family. After the fifth session, we will ask you to complete an evaluation to see if the treatment is helping you. Immediately following the experimental or control treatment, we will ask you to return to the clinic to see how you are doing and then 3 month later to see if there are any other changes in your life. If your treatment has not been helpful to you, we will refer you for additional treatment at our Psychological Services Center or refer you to another counselor in our community.

The assessment sessions and the treatment sessions will be videotaped so we can watch them later to make sure they are done the correct way. The videotapes will be kept in a safe place and will be erased when we are done with the study. Everything you tell us will be kept confidential. That means that we will not tell anyone else what you said or what you did unless you want us to, or you tell us that someone is hurting or harming you, or you tell us that you are hurting or harming yourself or someone else or that you plan to do any of these things.

To see if the experimental or control treatments work, we will ask you some questions about your feelings, your behaviors, and problems that might be bothering you. We will ask you questions about how you feel and what you do each day. The questions and interviews are to help us find out whether or not the experimental treatment or control treatment is helpful to you. We will also ask you to complete some activities on the computer. These various questions and activities will be given to you before treatment, in the middle of treatment, after treatment, and 3

months later. The first assessment will take two sessions and each will last about 2 hours. The other assessments will last about 2 hours each.

Some of the questions that we will ask you and the things we will ask you to do during the experimental treatment or control treatment may upset you or make you uncomfortable or embarrassed. This is expected since you are agreeing to work on your thoughts, feelings, and behaviors and it is necessary to talk about these things if we are to be of any help to you. If you have any questions during the study or after the study is finished, you can call your therapist or his/her supervisor, Dr. Ollendick, at (540) 231-6451.

For each assessment you complete (before, mid-treatment, after, and at 3 months), you and your parents will each receive a $25 check for your participation. You will receive up to $100.00 depending upon the extent of your participation.
Remember, it is up to you to decide whether you want to be in the study. If you decide to be in the study, it is important that you know that you can stop being in the study at any time with or without a reason. If you find some questions uncomfortable, you do not have to answer them. You can decide at any time that you do not want to come to sessions any more. If you do not want to be a part of the study, you or your parents just have to let us know.

By choosing to be in the study, you will help us understand more about teens who are nervous or scared in social situations and you will help us learn about treatments that might work for other kids and their families.

I understand that should I have any questions regarding this research and its conduct, I should contact any of the persons named below.

PRIMARY RESEARCHER: Thomas H. Ollendick, Ph.D. PHONE: 231-6451 EMAIL: tho@vt.edu
CHAIR, HSC: D.W. Harrison, Ph.D. PHONE: 231-6581 EMAIL: dwh@vt.edu
CHAIR, IRB: David Moore, DVM PHONE: 231-4991 EMAIL: moored@vt.edu

If you want to be in the study, please sign this form to let us know that you understand what the study is about, you know who to ask if you have questions, and that you understand that you can stop at any time.

"I agree to be in the study."

Name:
_____

Signature: _____Date:
_____

The adolescent named above voluntarily gave his/her assent to participate in the study.

Witness' name:
_____

Witness' Signature: _____Date:
_____

Appendix C

Parental Consent Form for Non-Anxious Group

PARENT PERMISSION TO PARTICIPATE IN A RESEARCH PROJECT
SUBJECT INFORMATION AND CONSENT FORM

TITLE: *Fear of Negative Evaluation in Relation to Attention Bias in Non-Anxious Teenagers*
VT IRB NO: 16-868

Investigators
Principal Investigators:
Susan White, Ph.D., Associate Professor, Psychology Dept., Virginia Tech

Purpose of the Study
The purpose of this study is to see how non-anxious teens respond to social stimuli. Within the context of this study, we hope to see how non-anxious teens differ from socially anxious teens in terms of attention to social and neutral pictures. Approximately 25 teenagers without an anxiety diagnosis will participate in this study, which takes up to forty-five minutes to one hour to complete.

In order to decide whether or not you wish your son or daughter to be a part of this research study, you should know enough about its risks and benefits to make an informed decision. This consent form gives you detailed information about the research study, which a study investigator will also discuss with you if you choose to come to participate.

Description of the Study and Your Child's Involvement

If you and your child decide to be in this research study, you will be asked to sign this permission form after you have had all your questions answered and understand what will happen to your child. At the appointment, you will first meet with a study investigator to discuss this consent form and to address any questions you may have. Once you have all your questions answered, you will sign the consent form if you wish to continue with the session. Your visit should last between forty-five minutes to one hour.

At the start of the session, your child will be asked to fill out some questionnaires, which will ask questions about anxiety. While completing the tasks described above, you will be asked to fill out several questionnaires with information about your child.

After providing consent for participation, your son or daughter will complete a few short tasks. S/he will be asked to sit near a computer and observe some pictures that appear on the screen. These pictures will show different types of emotions (e.g., happy, disgust, neutral, and angry).

We will ask your child to look at the picture in anyway that he/she would like. While your child completes these tasks, the eye tracking system will record his/her eye gaze patterns. Following the completion of the eye tracking tasks, your child will complete a computerized task where they will respond to different faces. All data will be tied to an ID number instead of your or your child's name.

Risks and Benefits

There are minor risks involved in this study. You might experience discomfort in the knowledge that your child's face is being recorded by the eye tracking system. The video recorded from the eye tracking system will be stored on a password protected computer which can only be accessed by study personnel. The video recording of your child's eye gaze patterns will be deleted promptly after the project's completion. Furthermore, your child will be asked to view videos of people expressing different emotions such as happiness, disgust, anger, and neutral faces.

A final risk is related to confidentiality, or keeping what you tell us private. We have procedures to ensure protection of your personal information (see below) to make sure that your information is safe and secure. There is no immediate benefit to you for participating in this study. However, we hope that results of this project can help in designing future research to benefit other adolescents.

Costs and Payment for Participation

There is no cost to you for participating in this study, aside from the time that is involved. As a token of appreciation, you and your child will receive one payment of $20 total for participation in the study after the completion of the tasks.

Confidentiality

All identifiable information that is obtained in connection with this study will remain private (confidential), and personal information will be shared only as required by U.S. or State law. Examples of information that we are legally required to share include suspected abuse of a child or elderly person, suicidality, and intention to harm identifiable others.

Each person who participates in this study will be assigned a unique identifying number. This number will be used to identify all research data within our database. The master list, which will contain your name and the unique identifying number, will be kept separate from all other data. Only the investigators of the study will have access to this master list.

The video recording of your child's eye gaze patterns will be kept on a password-encrypted computer which can only be accessed by study personnel.

It is possible that Virginia Tech's Institutional Review Board (IRB) may view this study's collected data for auditing purposes. The IRB is responsible for the oversight of the protection of human subjects involved in research. These individuals are required to keep all information confidential.

Freedom to Withdraw

Your child does not have to participate in this study. If your child does participate, he or she can stop at any time and without penalty. If you decide to not participate or to withdraw from the study, your involvement in any future study will not be jeopardized.

Questions

Please feel free to ask about anything you do not understand. In addition, consider this research and the consent form carefully – as long as you feel is necessary – before you make a decision. If you would like to speak with a member of the research team, please contact Dr. Susan White (540-231-8511, sww@vt.edu).

If you should have any questions about the protection of human research participants regarding this study, you may contact Dr. David Moore, Chair of the Virginia Tech Institutional Review Board, and Associate Vice President for Research Compliance, telephone: (540) 231-4991; e-mail: moored@vt.edu.

The following are some local resources, should you need someone to talk with about mental health services. There is no guarantee that the listed services will be available and it is your responsibility to pay any fees associated with such services. Cook Counseling Center provides services free of charge to Virginia Tech students who have paid their student health fees. The Raft Crisis Hotline is free to call. All other services may charge fees for their services.

ACCESS/Raft Crisis Hotline
(Emergency services clinicians)
(540) 961-8400; http://www.nrvcs.org/services.htm

Center for Family Services
(703) 538-8470; http://www.nvc.vt.edu/cfs

Cook Counseling Center
(540) 231-6557; http://www.ucc.vt.edu/

Mental Health Association of the New River Valley
(540) 951-4990; (800) 559-2800; http://www.mhanrv.org/

New River Valley Community Services
(540) 961-8400 ; http://www.nrvcs.org/

VT Psychological Services Center
(540) 231-6914 ; http://www.psyc.vt.edu/centers/psc/

PERMISSION

I have read this Consent Form and conditions of this project. I have had all my questions answered. My signature says that I am allowing both myself and my child to participate in this study. I hereby acknowledge the above and give my voluntary consent for data involving my child's eye gaze patterns and behavioral responses to a computer task to be collected and used by Virginia Tech researchers.

_____
Name of Child

_____ _____
Name of Parent or Legal Guardian Relationship to Child

_____ _____
Signature of Parent/Guardian Date

(Optional) Please sign below IF you would like to be contacted in the future about other research studies which may be of interest to you, conducted by or in affiliation with Dr. Susan White and her lab.

Yes, I would like to be contacted about future studies.

_____ _____
Signature of Parent/Guardian Date

Appendix D

Assent for Non-Anxious Group

INFORMATION FORM FOR RESEARCH PROJECT
Youth Assent Form
Project Title: *Fear of Negative Evaluation in Relation to Attention Bias in Non-Anxious Teenagers*

Investigators
Principal Investigators:
Susan White, Ph.D., Associate Professor, Psychology Dept., Virginia Tech

Purpose of the Study
The goal of this study is to see how non-anxious teens respond to social stimuli. Within the context of this study, we hope to see how non-anxious teens differ from socially anxious teens in terms of attention to social and neutral pictures. Approximately 25 teenagers without an anxiety diagnosis will participate in this study, which takes up to 45 minutes to 1 hour to complete.

In order to decide whether or not you wish to be a part of this research study, you should know enough about its risks and benefits to make an informed decision. This form gives you detailed information about the research study, which a study investigator will also discuss with you if you choose to come to participate.

What will happen if I choose to be in this study?

If you choose to be in this research study, you will come to our lab [at 460 Turner Street] for an appointment. At the appointment, you and your parent will first meet with someone to discuss this study and to address any questions you may have. Once you have all your questions answered, you will sign the consent form if you wish to continue with the session.

After you agree to be in the study, you will complete some computerized and paper and pencil tasks, as well as an eye tracking task. In these tasks, you will be asked to respond to faces which show angry, happy, disgust, and neutral faces. While working on the eye tracking task, we will record your eye gaze patterns. The data will be tied to an ID number instead of your name.

Risks and Benefits
There are minor risks involved in this study. You might experience discomfort in the knowledge that your face is being recorded by the eye tracking system. Furthermore, you will be asked to view videos of people expressing different emotions such as happiness, disgust, anger, and neutral faces.

A final risk is related to confidentiality, or keeping what you tell us private. We have procedures to ensure protection of your personal information (see below) to make sure that your information is safe and secure. There is no immediate benefit to you for participating in this study. However, we hope that results of this project can help in designing future research to benefit other adolescents.

What do I get if I am in this study?
You will receive $20.00 (given to your parent) after you complete the study. You can choose to end the study at any time without penalty.

Confidentiality
All identifiable information that is obtained in connection with this study will remain private (confidential), and personal information will be shared only as required by U.S. or State law. Examples of information that we are legally required to share include suspected abuse of a child or elderly person, suicidality, and intention to harm identifiable others. Each person who participates in this study will be assigned a unique, identifying number to help protect your privacy.

Do I have to be in this study?
You do not have to be in this study. If you choose to, you can stop at any time and without penalty, by telling the researchers that you want to stop the study. If you decide to not participate or to withdraw from the study, your involvement in any future study will not be jeopardized.

Questions
Please feel free to ask about anything you do not understand. In addition, read and consider this form carefully – as long as you feel is necessary – before you make a decision. If you would like to speak with a member of the research team, please contact Dr. Susan White (540-231-8511, sww@vt.edu).

If you should have any questions about the protection of human research participants regarding this study, you may contact Dr. David Moore, Chair of the Virginia Tech Institutional Review Board, and Associate Vice President for Research Compliance, telephone: (540) 231-4991; e-mail: moored@vt.edu.

Subject's Responsibility
As a participant in this study, you voluntarily agree to be in this study. You have the following responsibilities:

1. Ask any questions you have about the study and the consent process.
2. Complete the research appointment.

_____	_____	_____
Subject Name	Signature	Date
_____	_____	_____
Study Investigator Name	Investigator Signature	Date

Appendix E

Brief Fear of Negative Evaluation Scale (BFNE)

Please read each of the following statements carefully and indicate how characteristic it is of you according to the following scale:
1= Not at all characteristic of me, 2= Slightly characteristic of me, 3= Moderately characteristic of me, 4= Very characteristic of me, 5= Extremely characteristic of me

	1 Not at all characteristic of me	2 Slightly characteristic of me	3 Moderately characteristic of me	4 Very characteristic of me	5 Extremely characteristic of me
1. I worry about what other people will think of me even when I know it doesn't make any difference.					
2. I am unconcerned even if I know people are forming an unfavorable impression of me.					
3. I am frequently afraid of other people noticing my shortcomings.					
4. I rarely worry about what kind of impression I am making on someone.					
5. I am afraid that others will not approve of me.					
6. I am afraid that people will find fault with me.					

7. Other people's opinions of me do not bother me.
8. When I am talking to someone, I worry about what they may be thinking about me.
9. I am usually worried about what kind of impression I make.
10. If I know someone is judging me, it has little effect on me.
11. Sometimes I think I am too concerned with what other people think of me.
12. I often worry that I will say or do the wrong thing.

Appendix F

Screen for Child Anxiety Related Disorders (SCARED)-Child

Screen for Child Anxiety Related Disorders (SCARED)
CHILD Version—Page 1 of 2 (to be filled out by the CHILD)

Developed by Boris Birmaher, M.D., Suneeta Khetarpal, M.D., Marlane Cully, M.Ed., David Brent, M.D., and Sandra McKenzie, Ph.D., Western Psychiatric Institute and Clinic, University of Pittsburgh *(October, 1995)*. *E-mail:* birmaherb@upmc.edu

See: Birmaher, B., Brent, D. A., Chiappetta, L., Bridge, J., Monga, S., & Baugher, M. (1999). Psychometric properties of the Screen for Child Anxiety Related Emotional Disorders (SCARED): a replication study. *Journal of the American Academy of Child and Adolescent Psychiatry, 38*(10), 1230–6.

Name: _____ Date: _____

Directions:
Below is a list of sentences that describe how people feel. Read each phrase and decide if it is "Not True or Hardly Ever True" or "Somewhat True or Sometimes True" or "Very True or Often True" for you. Then, for each sentence, fill in one circle that corresponds to the response that seems to describe you *for the last 3 months*.

	0 Not True or Hardly Ever True	1 Somewhat True or Sometimes True	2 Very True or Often True	
1. When I feel frightened, it is hard to breathe	O	O	O	**PN**
2. I get headaches when I am at school.	O	O	O	**SH**
3. I don't like to be with people I don't know well.	O	O	O	**SC**
4. I get scared if I sleep away from home.	O	O	O	**SP**
5. I worry about other people liking me.	O	O	O	**GD**
6. When I get frightened, I feel like passing out.	O	O	O	**PN**
7. I am nervous.	O	O	O	**GD**
8. I follow my mother or father wherever they go.	O	O	O	**SP**
9. People tell me that I look nervous.	O	O	O	**PN**
10. I feel nervous with people I don't know well.	O	O	O	**SC**
11. I get stomachaches at school.	O	O	O	**SH**
12. When I get frightened, I feel like I am going crazy.	O	O	O	**PN**
13. I worry about sleeping alone.	O	O	O	**SP**
14. I worry about being as good as other kids.	O	O	O	**GD**
15. When I get frightened, I feel like things are not real.	O	O	O	**PN**
16. I have nightmares about something bad happening to my parents.	O	O	O	**SP**
17. I worry about going to school.	O	O	O	**SH**
18. When I get frightened, my heart beats fast.	O	O	O	**PN**
19. I get shaky.	O	O	O	**PN**
20. I have nightmares about something bad happening to me.	O	O	O	**SP**

Screen for Child Anxiety Related Disorders (SCARED)

CHILD Version—Page 2 of 2 (to be filled out by the CHILD)

	0 Not True or Hardly Ever True	1 Somewhat True or Sometimes True	2 Very True or Often True	
21. I worry about things working out for me.	O	O	O	**GD**
22. When I get frightened, I sweat a lot.	O	O	O	**PN**
23. I am a worrier.	O	O	O	**GD**
24. I get really frightened for no reason at all.	O	O	O	**PN**
25. I am afraid to be alone in the house.	O	O	O	**SP**
26. It is hard for me to talk with people I don't know well.	O	O	O	**SC**
27. When I get frightened, I feel like I am choking.	O	O	O	**PN**
28. People tell me that I worry too much.	O	O	O	**GD**
29. I don't like to be away from my family.	O	O	O	**SP**
30. I am afraid of having anxiety (or panic) attacks.	O	O	O	**PN**
31. I worry that something bad might happen to my parents.	O	O	O	**SP**
32. I feel shy with people I don't know well.	O	O	O	**SC**
33. I worry about what is going to happen in the future.	O	O	O	**GD**
34. When I get frightened, I feel like throwing up.	O	O	O	**PN**
35. I worry about how well I do things.	O	O	O	**GD**
36. I am scared to go to school.	O	O	O	**SH**
37. I worry about things that have already happened.	O	O	O	**GD**
38. When I get frightened, I feel dizzy.	O	O	O	**PN**
39. I feel nervous when I am with other children or adults and I have to do something while they watch me (for example: read aloud, speak, play a game, play a sport).	O	O	O	**SC**
40. I feel nervous when I am going to parties, dances, or any place where there will be people that I don't know well.	O	O	O	**SC**
41. I am shy.	O	O	O	**SC**

SCORING:

A total score of ≥ **25** may indicate the presence of an **Anxiety Disorder**. Scores higher than 30 are more specific. **TOTAL =**

A score of **7** for items 1, 6, 9, 12, 15, 18, 19, 22, 24, 27, 30, 34, 38 may indicate **Panic Disorder** or **Significant Somatic Symptoms**. **PN =**

A score of **9** for items 5, 7, 14, 21, 23, 28, 33, 35, 37 may indicate **Generalized Anxiety Disorder**. **GD =**

A score of **5** for items 4, 8, 13, 16, 20, 25, 29, 31 may indicate **Separation Anxiety SOC**. **SP =**

A score of **8** for items 3, 10, 26, 32, 39, 40, 41 may indicate **Social Anxiety Disorder**. **SC =**

A score of **3** for items 2, 11, 17, 36 may indicate **Significant School Avoidance**. **SH =**

For children ages 8 to 11, it is recommended that the clinician explain all questions, or have the child answer the questionnaire sitting with an adult in case they have any questions.

The SCARED is available at no cost at www.wpic.pitt.edu/research under tools and assessments, or at www.pediatric bipolar.pitt.edu under instruments.

March 27, 2012

Appendix G

Eye-Tracking Metrics Definitions and Calculations

Eye-Tracking Metric	**Definition**	**Calculation** (if applicable)
First fixation direction	Percentage of trials with initial fixation toward emotional face AOI, relative to calm face AOI	$\frac{\text{\# of trials with first fixation on target picture}}{\text{Total \# of trials with target picture present}}$
Latency	Time from stimulus onset to first fixation on a face region, or how long it takes for a participant to fixate on a face region for the first time	