12-16-2010

Evaluating Changes in Attentional Biases following Cognitive Behavioral Therapy for Social Phobia

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EVALUATING CHANGES IN ATTENTIONAL BIASES FOLLOWING COGNITIVE BEHAVIORAL THERAPY FOR SOCIAL PHOBIA

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ABSTRACT

The purpose of the current study was to evaluate changes in attentional biases following CBT for Social Phobia. It was found that 1.) consistent with previous investigations, the overall sample displayed vigilance toward threatening facial stimuli prior to receiving treatment, and 2.) participants' pattern of responding to threatening facial stimuli changed following treatment, but only when the sample was divided into those who were vigilant and those who were

avoidant prior to treatment. Findings provide support for the presence of two distinct sub-groups with differing attentional styles, one with a tendency for vigilance toward social threats, and a second with a tendency to avoid threat cues. These findings have important implications for how individuals may differentially respond to treatment and may help explain some of the mixed findings in the extant literature on Social Phobia and attention bias.

INDEX WORDS: Attention bias, Social anxiety, Cognitive behavioral therapy

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A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of

Master of Arts

in the College of Arts and Sciences

Georgia State University

2010

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December 2010

ACKNOWLEDGEMENTS

I would like to thank Drs. Page Anderson, Erin Tone, and Akihiko Masuda for the invaluable support and guidance they provided throughout the writing of this thesis and throughout my academic career.

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1 INTRODUCTION

1.1 Social Phobia

Social Phobia is a marked and persistent fear of exposure to unfamiliar people or possible scrutiny by others in social or performance situations. Socially phobic individuals fear being negatively evaluated and acting in a way that will be humiliating or embarrassing. Feared situations are typically avoided or else endured with intense anxiety or distress; examples of feared situations include public speaking, conversing with others, and eating, drinking, or writing in front of other people. Individuals with Social Phobia, Generalized subtype exhibit intense and pervasive fears across most social situations including, but not limited to, initiating or maintaining conversations, dating, speaking to authority figures, and going to parties (APA, 2000). Lifetime prevalence rates range from 10-13% in the general population, making Social Phobia the third most prevalent psychological disorder (Magee, Eaton, Wittchen, McGonagle, & Kessler, 1996) and the most common anxiety disorder in the United States (Kessler, Chiu, Demler, & Walters, 2005). Fear of public speaking is the most commonly reported form of social anxiety in clinical samples (Furmark, Tillfors, Stattin, Ekselius, & Fredrikson, 2000); one study found that 34% of adults in a community sample had substantial public speaking fears (Stein, Torgrud, & Walker, 2000). Social Phobia has an enormous impact on its sufferers; socially phobic individuals have fewer years of education, are less likely to be married, and are of a lower socioeconomic status (Schneier, Johnson, Hornig, & Liebowitz, 1992; Stein & Kean, 2000).

1.2 The Role of Attention in Anxiety

General cognitive models of anxiety propose that anxious individuals preferentially attend to threatening stimuli (e.g, Eysenck, 1997; Mogg & Bradley, 1998; Williams, Watts, MacLeod, & Mathews, 1997). Evolutionary models suggest that the purpose of this differential allocation is to notify an individual as early as possible of potential threat so that the individual can protect him- or herself from harm (Ohman, 1996). In the case of Social Phobia, threatening stimuli take the form of cues that signal potential negative evaluation from others. Thus, general cognitive models predict that people with Social Phobia allocate attentional resources to social threat. Specific models of Social Phobia, however, yield varying hypotheses about the direction of attentional bias, with some models suggesting an attentional bias toward external threat cues and other models suggesting an attentional bias away from external threat cues. The following section describes two prominent models of Social Phobia that emphasize the central role of attentional processes in the maintenance of social anxiety, one which predicts attentional vigilance (Rapee & Heimberg, 1997), and the other which predicts attentional avoidance (Clark & Wells, 1995).

1.3 The Role of Attention in Social Phobia

Rapee and Heimberg (1997) propose that socially anxious individuals show enhanced selective attention to threat cues indicative of negative evaluation or rejection. Their model predicts that socially anxious individuals will scan their environment for signs of impending social disapproval or criticism (e.g., frowns, signs of boredom, etc), will detect such signs rapidly, and have difficulty disengaging attention from them. The bias to attend preferentially to such signs of disapproval or criticism results in a negative and unbalanced appraisal of social situations,

which, in turn, results in increased anxiety or distress. The model also states that socially phobic individuals simultaneously attend to their mental representations of themselves as seen by their perceived audience; however, this level of attention processing usually remains below their awareness. This model of Social Phobia predicts attentional vigilance to threat, consistent with general cognitive models of anxiety.

Conversely, Clark and Wells (1995) posit that directing attention away from external threat cues plays an important role in maintaining social anxiety. According to this model, preferential processing is directed toward the socially anxious individual's internal world, i.e., their attention becomes self-focused. Self-focused attention, in turn, contributes to the maintenance of the disorder because, by attending to internal cues such as body-state information (e.g., heart rate, blushing), social phobics may miss external cues that they are actually being perceived more positively than they may think. This idea is consistent with the clinical observation that socially anxious individuals tend to avoid looking at other people, which may make these individuals appear uninterested or bored and interfere with their social performance, thus reducing the probability of positive responses from others.

Clark and Wells (1995) and Rapee and Heimberg (1997) both suggest that attention to threatening stimuli is critical in the maintenance of social anxiety, and both models emphasize the role of the socially anxious individual's internal representations during social situations. However, Clark and Wells assert that socially anxious persons attend almost exclusively to internal cues, such as negative thoughts and self-imagery, whereas Rapee and Heimberg contend that, in addition to internal cues, socially anxious persons are vigilant to threat cues in the external environment. Empirical studies that have explored attentional processes in the socially

anxious have yielded mixed findings, with some studies suggesting hypervigilance to external threat cues, and other studies showing the opposite: avoidance of external threat cues (for a review see Heinrichs & Hofmann, 2001).

1.4 Methods of Assessing Attentional Bias

Most studies exploring attentional bias in Social Phobia have used either the emotional Stroop task, a modified version of the classic Stroop task (Stroop, 1935), or the dot probe task (MacLeod, Mathews, & Tata, 1986) to measure attention bias. In the emotional Stroop task, subjects view words printed in different colors and are asked to name the print color of each word while ignoring word content. Longer delays in color-naming are assumed to reflect interference, defined as the extent to which processing resources are allocated to the word content, and are interpreted as indicating increased attention to the word. Several studies have used this paradigm to explore attention bias in social anxiety (Amir, McNally, Riemann, & Burns, 1996; Hope, Rapee, Heimberg, & Dombeck, 1990; Lundh & Ost, 1996; Maidenberg, Chen, Craske, & Bohn, 1996; Mattia, Heimberg, & Hope, 1993; McNeil, Ries, Taylor, & Boone, 1995; van Niekerk, Moller, &, Nortje, 1999). Results generally show that people with Social Phobia take longer to name the colors of social threat words like “stupid”, “ridiculous”, or “failure” than non-socially anxious controls, a finding interpreted as indicating an attentional bias toward social threat words within the anxious group.

The emotional Stroop task has, however, been criticized as an ambiguous measure of attentional bias. For example, slowed response times to name the colors of threat-related words on the Stroop task may indicate an emotional response rather than attentional bias to anxiety-

relevant materials. When anxious individuals see a threat word, they feel temporarily more anxious, and it is this momentary elevation in arousal that disrupts their task performance and leads to slower color naming, rather than preferential allocation of attention (Mogg & Bradley, 1998). Another common criticism of the emotional Stroop task is the ecological validity of the task. That is, whether the words chosen accurately reflect the constructs being examined (e.g., whether the word "stupid" sufficiently evokes a social phobic's evaluative concerns). Lastly, the lexical demands may render the emotional Stroop task too difficult for individuals who read at a lower level (Mogg & Bradley, 1998).

Some researchers have argued that the dot probe paradigm provides a more direct measure of the allocation of visual attention (MacLeod et al., 1986). In a typical dot probe experiment, participants are first presented with a fixation marker (e.g. a "+" sign) in the middle of a computer screen, followed by a pair of words presented either horizontally (one next to the other) or vertically (one directly above the other). On typical critical trials, one of the words in the pair is neutral (e.g., table) and the other threatening (e.g., humiliation). Other trials may consist of two neutral words, or one positive and one neutral word. Each pair of words appears on the screen for a brief duration, usually in the range of 500 to 1500 milliseconds. Immediately following the disappearance of the word pair from the screen, a probe (a dot or an asterisk) appears in the position just occupied by one of the words. Participants must then press one of two buttons on a keyboard to identify the location of the probe (left versus right or top versus bottom) on the screen. Presumably, participants respond more quickly to a probe stimulus presented in an attended to, rather than an unattended to, region of display. Therefore, faster res-

ponses to probes presented in place of threatening words reflect bias toward threat cues (hypervigilance), and slower responses reflect bias away from threat cues (avoidance).

The dot probe task offers several advantages over the Stroop task. First, reaction time across individual trials is considered a more precise measure of attentional bias than interference, which has traditionally been measured as total time taken to complete the task. Secondly, reaction time is less susceptible to interpretations of emotional bias than interference because the dot probe paradigm requires subjects to provide a neutral response (button pressing) to a neutral stimulus (visual probe). Attentional orienting responses to the emotional word stimuli are therefore not in direct competition for processing resources (as they are in the Stroop task) with the dot probe's primary task requirement of providing manual responses to the probes which appear after the words (Mogg & Bradley, 1998). Third, the dot probe task has the added benefit of directionality; it provides measures of preferential attention away from, as well as toward, threatening stimuli. Lastly, with the dot probe task, researchers have the option of using pictorial stimuli instead of verbal stimuli, which 1) do not require effortful semantic processing and 2.) may be more direct representations of stimuli that are likely to be encountered in a feared situation and thus more emotionally salient for a given population. For example, Lavy and Van den Hout (1993) found that people with a specific phobia of spiders showed an attentional bias to pictures of spiders as measured by a modified version of the dot probe task. Indeed, previous research has shown that single words tend to be evaluated as weaker emotional stimuli than pictures (Kindt & Brosschot, 1997).

1.5 Empirical Evidence of Attentional Bias

Numerous studies have utilized the dot probe task to measure attention allocation to perceptually salient stimuli within clinically-significant and normal-range anxiety samples (reviewed in Mogg & Bradley, 1998; Mogg & Bradley, 1999). Findings, however, are not uniform. In the first study to use the dot probe paradigm to examine attention bias in Social Phobia, Asmundson and Stein (1994) did not find that social phobics shifted their attention to the location of social threat words. The authors instead found that on critical trials (paired social threat/neutral words) social phobics were faster than controls to detect the probe regardless of probe position, which they interpreted as an increased vigilance to the environment and enhanced processing of social threat cues.

Notably, Asmundson and Stein's interpretation represents only one approach to explaining their data. Chen, Ehlers, Clark, and Mansell (2002) suggest an alternative explanation in which the participants avoided detailed processing of social cues, shifting their attention away from the social threat (the words) and toward the nonsocial cues (the probe). This alternative interpretation is consistent with Clark and Wells' (1995) model of social anxiety, which emphasizes the role of reduced processing of external cues. It is also interesting to note that Asmundson and Stein's findings were in contrast to the pattern observed in the context of Generalized Anxiety Disorder (GAD), in which individuals with GAD were faster than normal controls to respond to probes that replaced threat words rather than neutral words (e.g., MacLeod et al., 1986; Mogg, Mathews, & Eysenck, 1992).

More recent research on attentional bias in socially anxious populations has used a modified version of the dot probe task that incorporates facial pictorial stimuli instead of verbal

stimuli. Facial expressions are a major source of information about the reactions of others in a social interchange (Planalp, DeFrancisco, & Rutherford, 1996); and, according to cognitive models of social anxiety, social phobics closely monitor the facial expressions of others for signs of disapproval or rejection and preferentially attend to negative facial expressions (Rapee & Heimberg, 1997). This bias to attend preferentially to others' negative facial expressions could result in a negative and unbalanced appraisal of social situations and result in increased anxiety and distress. A dot probe task modified to use facial pictorial stimuli therefore has the potential to provide a more ecologically valid measure of attention bias in individuals with Social Phobia.

Studies examining attentional bias samples using facial stimuli on the dot probe task have yielded contradictory findings. Consistent with Clark and Wells (1995), some research has found evidence of attentional avoidance (Mansell, Clark, Ehlers, & Chen, 1999; Chen et al., 2002). In contrast, other studies find socially anxious individuals to exhibit attentional vigilance (Mogg & Bradley, 2002; Mogg, Philippot, & Bradley, 2004; Pishyar, Harris, & Menzies, 2004; Sposari & Rapee, 2007), which is consistent with Rapee and Heimberg (1997). An additional subset of studies has failed to identify any attentional bias to certain face expressions in socially anxious adults (Bradley, Mogg, Millar, & Bonham-Carter, 1997; Pineles & Mineka, 2005). The following section reviews this body of research, focusing first on studies conducted in non-clinical socially anxious samples.

Nonclinical Samples. Mansell et al. (1999) presented individuals who were identified as having either high or low levels of social anxiety, according to self-report, with pairs of pictures consisting of a face (positive, neutral, or negative) and a household object. Participants completed the dot probe under one of two conditions: social evaluative threat (an upcoming

speech task) or no threat. Compared to low socially individuals, the high socially anxious showed an attentional bias away from both positive (happy) and negative (anger, sadness, fear, and disgust) emotional faces, though this effect was only observed under the social-evaluative threat condition.

Mogg & Bradley (2002) found that high socially anxious individuals have a selective pre-attentive bias toward socially threatening cues. In this study, pre-attentive bias was measured by presenting high and low socially anxious participants with pairs of emotional (angry or happy) and neutral faces for a very brief period of time (17 milliseconds), then covering the faces with masks created by jumbling up pieces of neutral faces. High socially anxious participants were faster to detect probes that replaced threat masks, suggesting that they show a pre-attentive bias for threat faces. According to the authors, these findings are consistent with the view that anxiety-related bias operates automatically in pre-attentive processes for biologically prepared threat stimuli, such as angry facial expressions.

Pishyar et al. (2004) found that participants with high social anxiety displayed an attentional bias toward negative (disgusted/judgmental) faces and that participants with low social anxiety displayed a bias toward positive faces when they were paired with neutral faces (Experiment 1). In Experiment 2, the researchers replaced half of the neutral faces with a picture of the participant's own face to examine the direction of attention when one's own image was present. The rationale for this manipulation was that, according to cognitive models of Social Phobia, self-focused processing should lead to a shift of attention away from the phobic threat (negative face) and toward oneself. The results of Experiment 2 were consistent with those of Experiment 1; higher levels of social anxiety were associated with an attentional bias toward

negative facial stimuli, regardless of whether or not one of the neutral faces in the pair was the individual's own.

Two studies in nonclinical samples found no clear evidence for either attentional avoidance or vigilance. Bradley et al. (1997) presented undergraduate students scoring in the upper and lower tertiles on the Fear of Negative Evaluation scale (FNE; Watson & Friend, 1969) with neutral-happy and neutral-angry face pairs (Experiment 1). No attempt was made to evoke social anxiety during the task. Overall there was a significant main effect for face valence (threatening vs. happy), with subjects being generally more avoidant of threatening faces than happy faces; however, there was no evidence of a social anxiety-related attentional bias. Pineles & Mineka (2005) assessed whether socially anxious individuals exhibit an attentional bias toward internal cues of potential threat (heart-rate information), toward external cues of potential threat (threatening faces), or both. Two types of stimulus pairs were used in this study: pairs of faces (threatening versus neutral, happy versus neutral, and threatening versus happy) and pairs of visual depictions of the subject's ostensible heart rate versus perceptually similar visual depictions of sound waves. The results indicated that high but not low socially anxious individuals showed preferential attention to information about their heart rate relative to a sound wave, but there were no significant group differences in attention to threatening versus neutral faces, although there was a trend among participants who were informed that they would have to give a speech at the end of the session. Those participants attended slightly more to threat faces when paired with neutral faces as compared with the low social anxiety group which seemed to show a bias away from threat faces. The authors warn that these results should be interpreted cautiously however, because the speech manipulation did not affect state anxiety

levels of the socially anxious participants as indicated by scores on the State-Trait Anxiety Inventory—State version (STAI-S; Spielberger, Gorusch, & Lushene, 1970).

In summary, studies that have examined attention bias in non-clinical samples have found evidence of avoidance of threatening faces (Mansell et al., 1999), hypervigilance to threatening faces (Mogg & Bradley, 2002; Pishyar et al., 2004), and no attention bias (Bradley et al, 1997; Pineles & Mineka, 2005). The next section reviews studies that have used a modified dot probe task to examine attention bias in clinical samples of individuals diagnosed with Social Phobia.

Clinical Samples. Chen et al. (2002) presented individuals diagnosed with Generalized Social Phobia pairs of pictures consisting of a face (positive, neutral, or negative) and a household object. The authors used the same methodology as Mansell et al. (1999), only they used a clinical sample and did not include a social-evaluative threat condition. Consistent with Mansell et al.'s findings in a non-clinical sample, Chen et al., found that patients with Generalized Social Phobia identified the probe more quickly when it occurred in the location of the household objects compared to the control group, who exhibited no attentional preference. In contrast to Mansell et al.'s findings, socially phobic patients in Chen's clinical sample directed their attention away from all faces (positive, negative, and neutral), not just emotional ones. The authors interpret their findings as indicating that, when given a choice, socially anxious people will look away from people's faces toward nonsocial cues and cite models of Social Phobia that emphasize the role of self-focused attention and reduced processing of external social cues in maintaining social anxiety (e.g., Clark & Wells, 1995; Hartman, 1983; Hope, Gansler, & Heimberg, 1989; Schlenker & Leary, 1982).

The most recent study to examine attentional biases in a clinical sample (Sposari & Rapee, 2007) also attempted to replicate the findings of Mansell et al., (1999) in a sample of people diagnosed with Generalized Social Phobia. Unlike Chen et al. (2002), the researchers administered the task to all participants in the context of anticipated social threat, using Mansell et al.'s procedures for evoking social-evaluative threat. Using the same method and experimental paradigm, the authors found the opposite of Mansell et al. The clinical participants demonstrated a preference for attending to faces rather than household objects, regardless of facial expression, and they exhibited this preference significantly more than controls. The authors interpret their finding as evidence that anxious individuals prefer to attend to social cues of potential threat.

In an attempt to reconcile these discrepant findings, Mogg et al. (2004) used the dot probe task to examine an alternative model of attention processing in Social Phobia: the two-stage hypervigilance-avoidance hypothesis. Briefly, the hypervigilance-avoidance hypothesis states that it is possible that both the hypervigilance and avoidance hypotheses both validly capture aspects of attentional processing in social anxiety (e.g., Williams, Watts, MacLeod, & Mathews, 1988; Mogg & Bradley, 1998). In this model, the direction of bias changes as a function of time. Specifically, socially anxious individuals demonstrate an automatic, pre-attentive vigilance for external social threat cues. Then, after initially orienting to the threat, they direct their attention away from it in order to avoid detailed processing and minimize their anxiety. Mogg et al. tested the hypervigilance-avoidance hypothesis by examining selective attention to angry faces at 500 milliseconds and 1250 milliseconds in a clinical sample of socially anxious adults. Vigilance for angry faces was found at 500 milliseconds; however, neither vigilance nor

avoidance was observed at 1250 milliseconds. These findings are in line with general cognitive models of anxiety that propose vigilance operating early in information processing. They fail, however, to support the hypothesis of avoidance of threat at longer exposure durations. The authors propose that one explanation for their lack of significant findings is an unstable attentional response pattern. After initially orienting to threat, anxious individuals may repeatedly shift their attention toward and away from the threat; as such, the 1250 millisecond duration only allows for one "snapshot" of attention in time. Garner, Mogg, & Bradley (2006) attempted to address this limitation and clarify the nature and time course of attentional biases using eye movement monitoring. The authors used a non-clinical socially anxious sample and two experimental conditions: a no-stress condition and a social-evaluative threat condition. In the no-stress condition, it was found that regardless of their level of social anxiety (high or low), participants were more likely to look initially at and maintain their gaze on emotional faces relative to neutral faces, and on neutral faces relative to objects. The only difference between the two groups was that individuals with high levels of social anxiety initially directed their gaze to neutral faces, relative to objects, more often than participants with lower levels of social anxiety. In Experiment 2, when participants were told they would have to give a speech after the attention task, it was found that individuals with higher levels of social anxiety were quicker to look at emotional faces than at neutral faces, but looked at emotional faces for less time than individuals with lower levels of social anxiety, findings the authors interpret as consistent with the vigilant-avoidant pattern of bias.

Like studies in non-clinical samples, studies that have examined attention bias in individuals diagnosed with Social Phobia have found evidence both for avoidance of threatening

faces (Chen et al., 2002) and hypervigilance to threatening faces (Sposari & Rapee, 2007; Mogg et al., 2004). Direct comparison of these studies, however, is complicated by methodological differences. Unless otherwise specified, face pairs in all cited studies were presented for 500 milliseconds, but other sample and/or task differences like type of sample (clinical versus non-clinical), type of stimuli (facial versus object), facial expression ("negative" versus threatening), and level of social threat may all have contributed to these mixed results.

In summary, attention figures importantly in models of social anxiety, with some models predicting vigilance toward external threat cues, and others predicting avoidance. Ways of empirically assessing threat bias have evolved in recent years. Currently, the facial dot probe task is considered the most methodologically sound measure of attention bias. Although findings within this body of work are mixed, individuals with untreated social anxiety appear to attend differently to facial threat cues than do less anxious peers. Just as models of Social Phobia highlight the role of attentional bias in the etiology and maintenance of the disorder, treatments for Social Phobia have targeted attention bias as a potential mechanism for change. The following section reviews common approaches to the treatment of Social Phobia, highlighting how these approaches target attentional processes, as well as the small body of literature examining whether or not attention bias changes as a result of treatment.

1.6 The Treatment of Social Phobia

Many studies have demonstrated the efficacy of cognitive, behavioral, and cognitive-behavioral therapy (CBT) for the treatment of Social Phobia (Rowa & Antony, 2005; Mattick & Peters, 1988; Mattick, Peters & Clarke, 1989; Scholing & Emmelkamp, 1993). Currently, cognitive behavioral group therapy (CBGT; Heimberg, Dodge, Hope, & Kennedy, 1990) is considered

the standard-of-care in the treatment of Social Phobia (Heimberg, 2002; Rodebaugh, Holaway, & Heimberg, 2004).

Treatments for Social Phobia commonly target hypervigilant patterns of attention to social threat. For example, one aim of Heimberg's (1990) CBGT for Social Phobia is to help clients form accurate perceptions of the audience and the self as perceived by the audience. Teaching clients to pay attention to non-threatening aspects of the social environment may help them re-appraise social situations in a more balanced and accurate manner, thus reducing their anxiety. Anxiety can also be reduced by teaching clients to direct their attentional resources away from the mental representation of the self as perceived by the audience. These resources can be more effectively utilized if directed toward the task at hand and onto the more positive aspects of the audience.

Conversely, it has been argued that continuing to pay attention to perceived threat, rather than diverting attention away from it, can lead to healthier reappraisals of social situations as well as improved proficiency. For example, Clark and Wells (1995) propose that socially phobic individuals may avoid attending to a social situation as a form of safety behavior (e.g., reducing eye contact so as not to be brought into the conversation). The purpose of reducing attentional avoidance in therapy is not to enhance vigilance for threats; rather it is to challenge clients' perception of danger through blocking their attempts to escape and seek safety (Bogels & Mansell, 2004). Clients are encouraged to sustain their attention on the existing threat and reappraise it in the wider, non-threatening, context. Treatments that include this type of inter-

vention have been associated with reductions in self-focused attention and symptom relief (Woody, Chambless, & Glass, 1997).

A small body of literature has examined the efficacy of computerized attention training programs in reducing symptoms of social anxiety. Schmidt, Richey, Buckner, and Timpano (2009) randomly assigned 36 individuals meeting criteria for Generalized Social Phobia to either an attention modification program (AMP) or attention control condition (ACC). The AMP was designed to facilitate attentional disengagement from threatening faces by having participants respond to a probe that always followed neutral faces when paired with a threatening face, thereby directing attention away from threat (in the ACC, the probe appeared with equal frequency in the position of the threatening and neutral faces). Participants in the AMP condition exhibited significantly greater reductions in social anxiety compared with those in the control condition. At post-assessment, 72% of participants in the active treatment condition no longer met diagnostic criteria for Generalized Social Phobia, relative to 11% of participants in the control condition. These gains were maintained at 4-month follow-up.

Using the same attention modification program in a randomized, double-blind placebo-controlled trial, Amir et al. (2009) found that participants in the AMP condition had significantly greater reductions in clinician- and self-reported symptoms of social anxiety at postassessment, relative to participants in the ACC. The percentage of participants no longer meeting criteria for Generalized Social Phobia at postassessment was 50% in the AMP and 14% in the ACC. These gains were also maintained at 4-month follow-up. This study also extended previous literature by having participants complete an independent measure of attention to social threat words at pre- and postassessment. It was found that AMP facilitated attention disengagement from so-

cial threat words; at postassessment, participants' responses were similar to those nonanxious individuals have displayed in previous research with this task (see Amir, Elias, Klumpp, Przeworski, 2003). Taken together, the results from Schmidt et al. (2009) and Amir et al. (2009) suggest that altering attention patterns to facilitate disengagement from threatening faces may reduce social anxiety symptoms in clinical samples, and 2.) computerized attention modification programs may be an effective tool for altering these attention patterns.

In summary, researchers are increasingly recognizing the role of attention in Social Phobia. The preponderance of literature suggests that socially anxious individuals attend to threatening stimuli differently than do non-socially anxious controls. Both vigilance for and avoidance of threatening stimuli have been theorized to contribute to social anxiety symptoms. Empirical research using a variety of methodologies has found support for both theories, though the majority of research provides evidence for the hypothesis that individuals with Social Phobia preferentially attend to threatening stimuli. Treatment commonly targets attention, and there is persuasive evidence that attention processes are indeed related to change in Social Phobia.

Only three studies, however, have examined changes in attention bias toward threat cues following treatment for Social Phobia. Two of those studies (Mattia et al., 1993; Lundh & Ost, 2001) found that attentional biases, as measured with the Stroop task, decreased after treatment for Social Phobia. In the first study, Mattia et al. randomly assigned 33 participants to receive CBGT, the MAO Inhibitor phenalzine, or a pill placebo. In the second study, Lundh & Ost nonrandomly assigned to 24 participants to one of the three treatment conditions: individual CBT, CBGT, or a self-treatment manual. Both studies used the Anxiety Disorders Inventory

Schedule-Revised (ADIS-R) to establish Social Phobia diagnosis and, following treatment, divided their sample into responders and nonresponders before analyzing changes in attentional bias. In both studies the authors found that reductions in attention bias were evidenced among the treatment responders but not the nonresponders. However, neither study design included a control group or examined whether the reductions in bias were maintained during a follow-up period.

Only one study (Pishyar, Harris, & Menzies, 2008) has examined the responsiveness of attentional vigilance to treatment for Social Phobia using the dot probe paradigm. In that study, the authors randomly assigned 32 participants to one of two treatment conditions: CBGT or a waitlist control (WLC) group that was offered treatment after eight weeks. All participants met DSM-IV criteria for Social Phobia based on an initial telephone screening interview and a follow-up assessment. The authors found that the attention bias scores of both the CBGT and WLC groups were significantly different from zero in the positive direction (vigilant) at Time 1, but that at Time 2, the responses of the CBGT group had reversed such that they were significantly different from zero in the negative direction (avoidant; $t(15) = 6.19$, $p < .001$, Cohen's $d = 1.86$). The authors also found significant positive correlations between vigilance-avoidance change scores for threatening faces and all the social anxiety self-report measures. This study is the first to demonstrate changes in responding on a dot probe measure following treatment for Social Phobia, and the number of participants was relatively small (n = 32), as were the number of trials used in the dot probe task (n = 40; 20 positive-neutral pairs, 20 negative-neutral pairs). The authors also note that initial diagnoses were not based on a recognized structured interview and that the reliability of their diagnoses may be questioned.

In conclusion, two studies have used the Stroop task to show that attentional bias toward threat cues decreases after treatment for Social Phobia (Mattia et al., 1993; Lundh & Ost, 2001), but only one study (Pishyar et al., 2008) has examined changes in attention biases using the dot probe paradigm, which offers several methodological advantages over the Stroop task in measuring attention bias. In that study, following treatment, participants shifted from displaying attentional vigilance to threat cues to displaying attentional avoidance, a pattern some theorists (e.g., Clark & Wells, 1995) have argued is equally as problematic as vigilance. Unless and until the findings of Pishyar et al. are replicated, it remains unclear whether successful treatment for Social Phobia alters atypical patterns of selective attention to emotional faces.

1.7 Study Aims and Hypotheses

In the present study, a modified dot probe task was used to compare attentional bias for emotion faces in a clinical sample of socially anxious adults before and after receiving CBT for fear of public speaking. The study uses the same methodology (i.e., visual probe task with emotional faces) used in previous studies of attention bias (see Mogg & Bradley, 1999).

It was hypothesized that 1) socially phobic individuals would show heightened vigilance to threatening faces before treatment; 2) they would be significantly less vigilant to threatening faces following treatment; and 3) improvement on measures of social anxiety and fear of public speaking would be positively correlated with change scores in threat bias. Furthermore, because some models of social anxiety predict attentional avoidance and some predict vigilance, the sample was divided into those who showed attentional avoidance at pretreatment and those who showed attentional vigilance to test the hypothesis that participants would show less threat bias (vigilance or avoidance) at post-treatment, relative to pre-treatment (Hypo-

theses 4 & 5). This study was the first to divide attentional bias styles into either avoidant or vigilant at pretreatment and examine whether these styles of attention shifted after treatment.

2 METHODS

The present study is part of two larger treatment studies. The first study was funded by the National Institutes of Mental Health (NIMH) and compared Cognitive Behavioral Group Therapy (CBGT) and Virtual Reality Exposure Therapy (VRE) for Social Phobia to wait-list controls (WL) using a randomized, controlled design. The attention bias task was added to this study toward the end of participant recruitment. The second study was funded by the Anxiety Disorders Association of America (ADAA) and examined amygdala activity as a predictor of treatment response to VRE using functional magnetic resonance imaging (fMRI), in an uncontrolled trial with a small sample. The attention bias task was included in this study from its inception. For the purposes of this study, the procedures are the same, with the exception that participants in the fMRI study were not randomly assigned to treatment; they all received VRE.

Figures 2.1 and 2.2 were prepared in accordance with guidelines outlined in the CONSORT (Consolidated Standards of Reporting Trials; Altman, et al., 2001) and TREND (Transparent Reporting of Evaluations with Nonrandomized Designs; Des Jarlais, Lyles, Crepaz, 2004) statements. The figures show the flow of participants through the two treatment studies. The present study used a subset of these participants who completed the dot probe task at pretreatment and post-treatment (n = 14 from the randomized, controlled clinical trial and n = 10 from the uncontrolled trial).

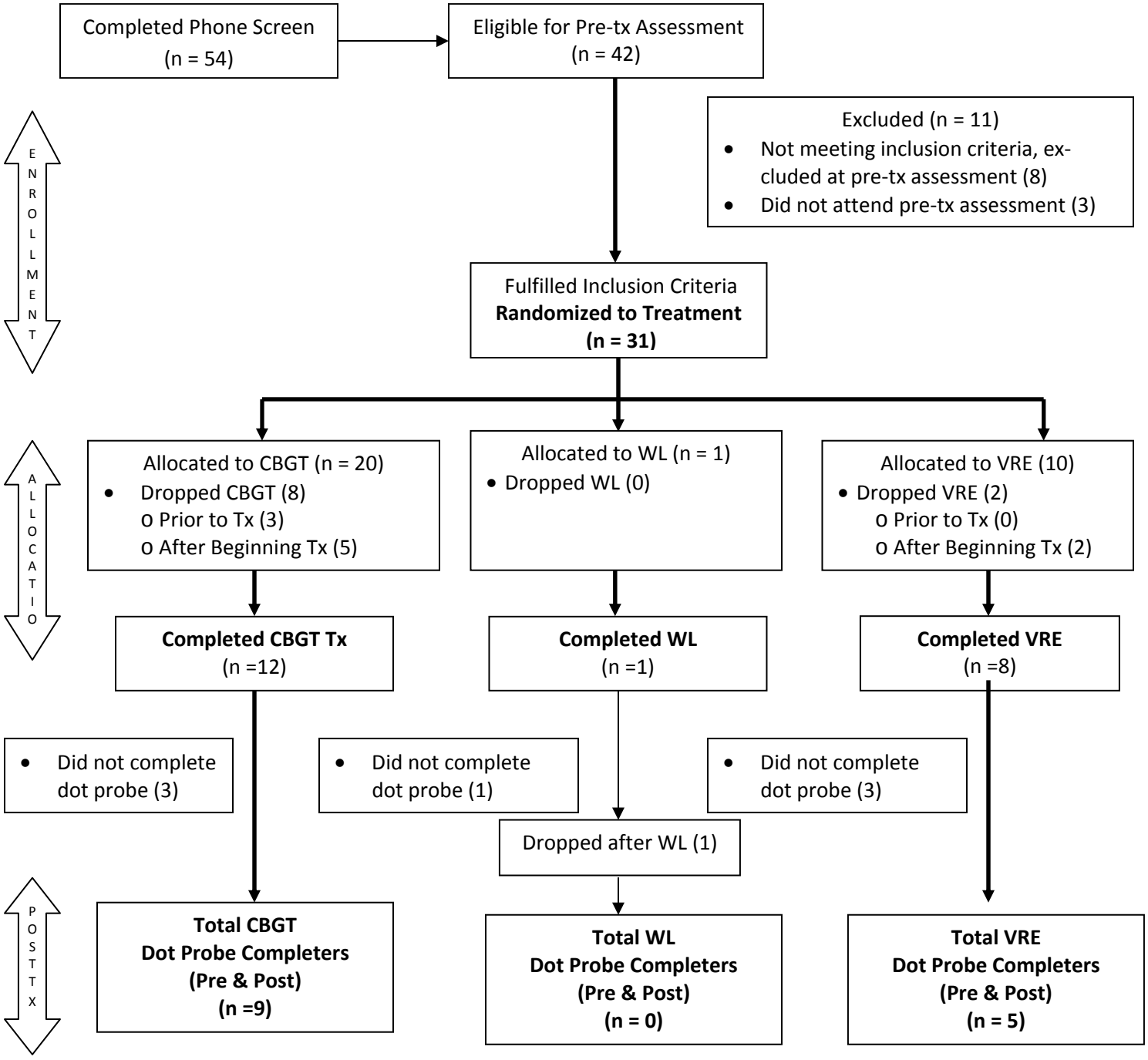

Figure 2.1 Participant Flow Chart for Study 1

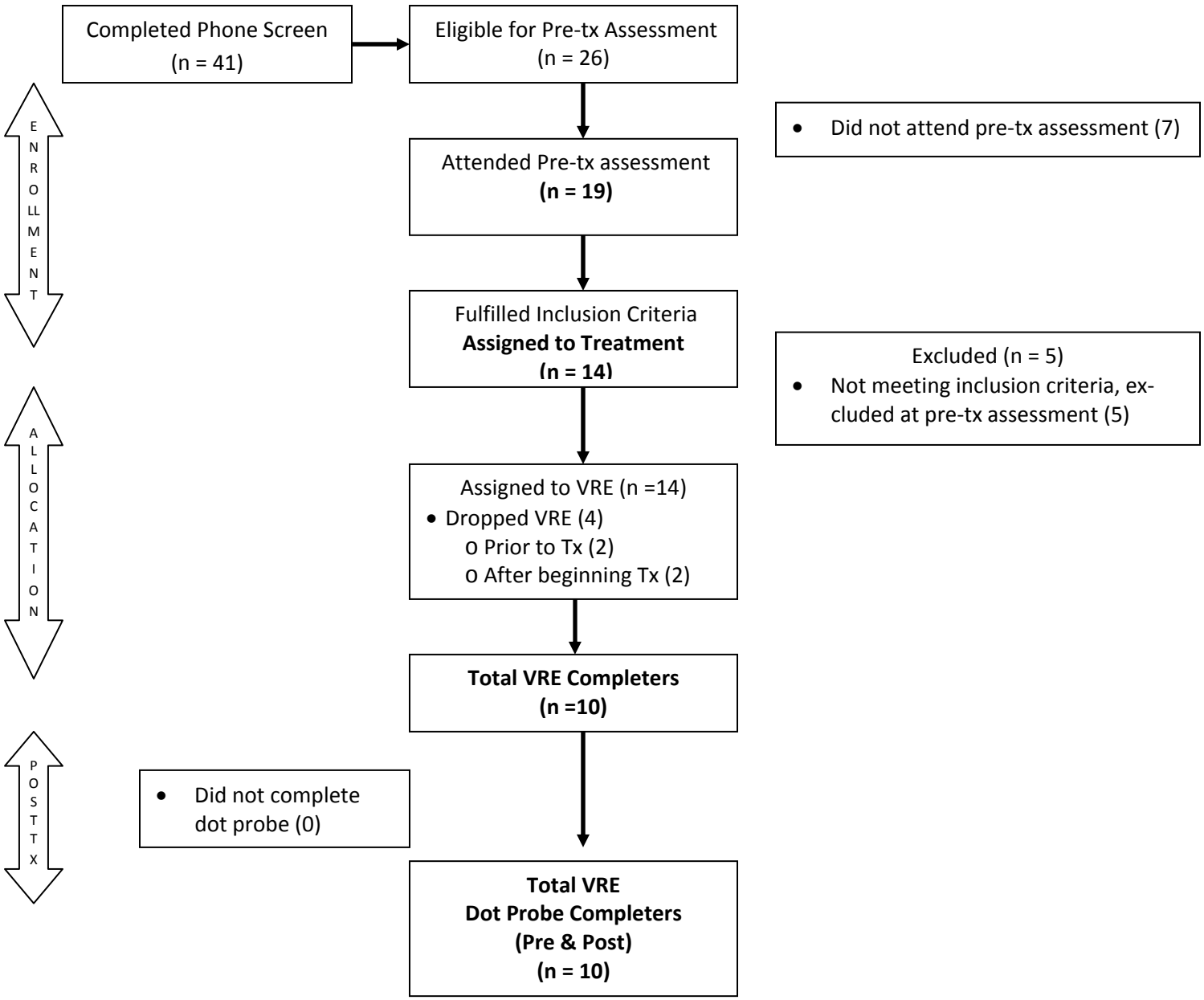

Figure 2.2 Participant Flow Chart for Study 2

2.1 Participants

Participants were 24 individuals who met DSM-IV (APA, 2000) criteria for a primary diagnosis of Generalized (n = 9) or Non-generalized Social Phobia (n = 15), identifying public speaking as their most feared social situation, and who completed treatment for Social Phobia. Eligible participants on psychoactive medication were required to be stabilized on their current medication(s) and dosage(s) for at least 3 months and to remain on the stabilized regimen throughout the course of the study. Exclusion criteria included (a) history of mania, schizophrenia, or other psychoses; (b) recent prominent suicidal ideation; (c) current alcohol or drug abuse or dependence; (d) inability to wear the virtual reality helmet; (e) history of seizures; and (f) inability to undergo an fMRI (e.g., claustrophobia, metallic implants; Study 2 only). Additionally, participants were required to be literate in English.

Most participants (n = 21; 87.5%) received a diagnosis of Social Phobia alone. The secondary diagnoses were Specific Phobia (n = 2) and Panic Disorder (n =1). The sample consists of 29.2 % females (n = 7) and 70.8% males (n = 17). Participants' ages ranges from 20 to 67 with a mean age of 41.38 (SD = 11.26). The ethnic distribution of the sample was representative of the setting in which recruitment took place (urban Atlanta). Most participants self-identified as "Caucasian" (n = 11; 45.8%) or "African American" (n = 6; 25%). 2 participants self-identified as "Hispanic" (8.3%), 2 as "Asian American" (8.3%), and 3 as "Other" (12.5%). Seventy-one percent reported that they had completed college, 58.3% were married or living with someone as though married, and 58.3% had an annual income of $50,000 or greater.

2.2 Measures

Demographic Questions. A series of questions were developed to assess demographic information (see Appendix A).

Dot Probe Task. A modified version of the dot probe task was used to assess attentional bias toward threatening faces relative to neutral and positive faces. The stimuli and task were the same as those used by Mogg and Bradley (1999) and consisted of 128 stimulus faces from 64 different models, each posing two facial expressions: one neutral and the other either threatening or happy. Thus, there were 32 threatening faces and 32 happy faces, each matched with a neutral face of the same person. There were 128 critical trials in which each of the 64 face pairs was presented twice, once with the emotional face on the left, and once on the right. Thus, there were 64 threat-neutral face pairs and 64 happy-neutral pairs. In addition to the 128 critical trials, there were 32 filler trials of neutral-neutral face pairs. In total, the dot probe task comprised 160 experimental trials presented in a new random order to each participant. A brief practice trial of five face pairs preceded the task.

Participants were seated approximately 120 cm in front of a computer screen and instructed to “hover” the first two fingers of their dominant hand over the “1” and “2” buttons of the keyboard. Participants were then informed they would see faces presented on the screen in pairs, one on the left side of the screen and one on the right side of the screen. They were advised that when the faces disappeared, a small dot would appear in the spatial location of one of the faces, and that when this occurred, they were to press the “1” or “2” button on the keyboard to identify the location of the dot (left or right) as quickly as possible. On each trial a fo-

cus stimulus (a "+") appeared in the center of the screen for 500 ms followed by a face pair for 500 ms. The probe was presented immediately after the offset of the face pair and remained on the screen for 1100 ms. It appeared on the left and right sides of the screen an equal number of times. The inter-trial interval varied randomly between 500 and 1250 ms. The images were digitally sized to approximately 45 x 70 mm.

Emotion bias scores are calculated by subtracting response time to emotion-incongruent stimuli (probes that replace neutral pictures) from response time to emotion-congruent stimuli (probes that replace happy or threatening pictures). These bias scores can be further decomposed into threat and happy bias scores. For threat bias, a positive value indicates a shift of attention toward the threatening face relative to the neutral face (vigilance), and a negative value indicates a shift away from the threatening face toward the neutral face (avoidance). Previous research conducted with this task suggests that it validly discriminates between adults diagnosed with Social Phobia and normal controls (Mogg et al., 2004), as well as between controls and adults diagnosed with GAD (Bradley, Mogg, White, Groom, & de Bono, 1999).

Diagnostic Measure. *Structured Clinical Interview for the DSM-IV* (SCID; First, Gibbon, Spitzer, & Williams, 2002). The SCID is a structured diagnostic clinical interview used to assess psychological disorders based upon the criteria of the DSM-IV. The instrument is designed to be administered by a trained mental health professional. Several studies (Basco et al., 2000, Fenning, Craig, Lavelle, Kovasznay, & Bromet, 1994; Kranzler, Kadden, Babor, & Tennen, 1996) have demonstrated superior diagnostic validity of the SCID over standard clinical interviews at in-

take. The administration time of the SCID can range from about 15 minutes for a subject with virtually no psychopathology or psychiatric history to up to several hours for a subject with extensive psychiatric comorbidity. The administration time of the full SCID for a psychiatric patient averages around 90 minutes. For the current project, the SCID was used to determine eligibility status and the diagnostic status of a variety of Axis I conditions falling within the mood, alcohol/substance use, and anxiety disorders modules.

Social Anxiety. Fear of Negative Evaluation-Brief (FNE-B; see Appendix B). The FNE-B (Leary, 1983) is a widely used self-report measure of people's expectations of negative evaluations across a number of social settings, including public speaking. The FNE-B contains 12 items; for example, "I am afraid that people will find fault with me." Items are rated on a 5-point Likert scale ranging from 1 ("not at all characteristic of me") to 5 ("extremely characteristic of me"). Scores range from 12 to 60, with higher scores reflecting higher levels of evaluative concern. The FNE-B correlates highly with the original FNE (r = .96; Leary). In addition, the FNE-B is reported to have excellent internal consistency (α = .97) and test-retest reliability (r = .94; Collins, Westra, Dozois, & Stewart, 2005).

Fear of Public Speaking. Personal Report of Confidence as a Speaker (PRCS; Paul, 1966; see Appendix C): The PRCS is a 30-item self-report questionnaire that measures public speaking confidence across three dimensions: before, during, and after delivering a speech. Items are presented in true-false format and are designed to measure participants' feelings about their most recent speech. Summary scores range from 0 to 30 with higher scores indicating more public speaking discomfort. The PRCS has demonstrated good internal consistency α = .91

(Klorman, Weerts, Hastings, Melamed, & Lang, 1974) and adequate validity (Lombardo, 1988). In addition, this measure has been normed in a sample of African American students (Phillips, Jones, Rieger, & Snell, 1997). The internal consistency of the PRCS has also been established in a sample of African American undergraduate students at Georgia State University (Cronbach's alpha $\alpha = .84$). Because the PRCS focuses on the measurement of public speaking fears (a primary target of both treatment interventions) and has demonstrated good psychometric properties in African American samples it, along with the FNE- B, will be used as the primary outcome measure at the conclusion of treatment and at follow-up.

2.3 Procedure

This study was approved by the Georgia State University Institutional Review Board, and written informed consent for study procedures was obtained. Participants were self-referred or recruited through area professionals, newspaper advertising, posted flyers, and publicity efforts. Eligibility for the study was determined through a two-part process consisting of a brief telephone screening and a subsequent in-person, pre-treatment assessment. After expressing interest and consenting to complete a telephone screening, study candidates completed a short phone interview to determine if they met obvious exclusion criteria (e.g., current substance abuse, metallic implants in Study 2 only). Initial telephone screenings were conducted by doctoral students in the clinical psychology program at GSU and consisted of a series of questions related to mood, anxiety, and substance use. Those who were not excluded during the telephone screening were given the opportunity to participate in an in-person, pre-treatment assessment at Georgia State University. Consent was obtained prior to the in-person pre-treatment assessment as well. In Study 1, the pre-treatment assessment included a structured

diagnostic clinical interview (SCID), administered by a doctoral student, a battery of self-report measures, and the dot probe task. Eligible participants were then randomly assigned to VRE, CBGT, or WL (See Figure 2.1). In Study 2, the pre-treatment assessment was identical to that of Study 1 except it included an additional "mock" fMRI to ensure participants could tolerate an actual fMRI. Following the pre-treatment assessment, eligible participants then underwent an fMRI at a nearby hospital. These participants were not randomly assigned to treatment groups, and all received VRE Therapy (See Figure 2.2).

Treatment. Prior to administering therapy, study therapists attended a two-day training workshop led by the developers of the respective treatments. Each of the study therapists also received weekly supervision by the primary investigator of the study. Ratings of treatment integrity and competence were completed by the developers of the respective treatments for a randomly selected subset of the sessions.

The VRE and CBGT treatment groups were designed to be as similar as possible, with the exception of the modality for the delivery of exposure. Both treatments specifically targeted public speaking fears via exposure therapy. Furthermore, both treatments sought to address specific aspects of Social Phobia identified in psychopathology literature, including self-focused attention, perceptions of self and others, perceptions of emotional control, rumination, and realistic goal setting for social situations. The mechanism and setting through which exposure was delivered varied for each of the two treatment groups. Individual study therapists relied on the virtual environment to facilitate exposure to public speaking fears (VRE), while group the-

rapists relied on other group members to help facilitate exposure (CBGT). The majority of participants (n=15) completed VRE, and the remaining (n=9) completed EGT.

Virtual Reality Exposure (VRE). VRE was implemented according to a manualized treatment protocol and was administered individually by either a licensed psychologist (N = 2) or an advanced doctoral student in the clinical psychology program (N = 3). VRE treatment consisted of eight therapy sessions conducted over a period of approximately eight weeks. During session one, participants were introduced to the VRE treatment rationale and taught how to identify and rate their anxiety on a subjective units of discomfort scale (SUDS). Breathing training was also introduced. Session two began with a review of the treatment rationale and then focused on teaching the concept of cognitive restructuring, including its purpose and practice. Session three focused on self perceptions during public speaking. During this session, participants reviewed video of their pretreatment speeches and were asked to compare how anxious they looked on the video to how anxious they rated themselves while giving the speech. Session four focused on identifying the role that both safety behaviors and self-focused attention can play in the maintenance of Social Phobia. Participants were first videotaped demonstrating their most commonly used safety behaviors while giving a prepared talk. Next, participants were instructed to focus their attention on the audience and to refrain from using safety behaviors while being videotaped giving the same talk. Then, participants were able to observe the two videos to see how their performance and anxiety differed when they focused on the audience while giving their talk versus when they engaged in safety behaviors and self-focused attention while speaking. Exposure exercises were conducted during sessions five through eight using the virtual audience. During VRE exposure exercises

participants were fitted with a head mounted display containing screens for each eye, stereo headphones and a head tracking device, through which they were exposed to one of three virtual environments. VR exposure environments included a virtual conference room (~5 audience members), a virtual classroom (~35 audience members), and a virtual auditorium (appearance of 100+ audience members). VRE therapists had the ability to manipulate the reactions of the audience in a number of ways including making them appear interested/bored, supportive/hostile, distracted (i.e., cell phone ringing), as well as the ability to manipulate the difficulty of questions that were posed by the audience. Virtual environments were manipulated according to the client's goals for treatment and their pre-constructed fear hierarchy. Participants were exposed to each item on their hierarchy until their reported fear was reduced by 50 percent before being exposed to their next item on the hierarchy. Treatment concluded with a review of the different anxiety management and relapse prevention strategies.

Cognitive Behavioral Group Therapy (CBGT). CBGT (Hofmann, 2002) consisted of eight group sessions of manualized treatment over a period of eight weeks which were co-led by a licensed clinical psychologist and an advanced doctoral student. Groups consisted of up to five participants. During session one, participants were introduced to the CBGT treatment rationale, including the theoretical basis for exposure therapy. Session two began with a review of the treatment model; participants were then asked to engage in their first exposure exercise which consisted of giving a brief speech about the Social Phobia treatment models in front of the group. Furthermore, self perceptions were addressed in session two, and video from each client's treatment model speech was used as a mechanism to help participants highlight discre-

pancies between how anxious they appeared on video and how anxious they rated themselves prior to viewing the video. Group members were also asked to provide each other with positive feedback when the videotaped speeches were reviewed. Sessions three through six followed a similar model to that of session two. Session seven includes real-world exposure exercises. During this session participants exited the lab to engage in social mishap exercises on the GSU Campus. The social mishap exercise provided participants with the opportunity to evaluate their beliefs about social threats and costs by intentionally engaging in flawed social behaviors in a real world setting, while still in the presence of continued support from other group members/therapists. The final session provided participants with tools to prevent relapse and included a review of what was learned over the course of therapy.

2.4 Data Analysis

The Statistical Package for the Social Sciences, version 16.0 (SPSS) was used for data entry, storage, and analyses. Accuracy and quality of data entry were monitored through the process of double entry.

Threat bias. Data from trials with errors were excluded from analysis. Error rates were low; no participant had an error rate greater than 1.0%. Reaction times less than 200 ms and greater than two standard deviations above the participant's mean reaction time were defined as outliers and discarded. Threat bias scores were calculated using the difference formula described by MacLeod and Mathews (1988), where average reaction time to probes following neutral faces is subtracted from average reaction time when probes follow threatening faces. Using this formula, positive scores indicate faster responses to dots following threatening sti-

muli compared to neutral stimuli (vigilance), negative scores indicate slower responding to dots following threatening stimuli compared to neutral stimuli (avoidance), and scores around zero indicate neither vigilance toward nor avoidance of threatening stimuli. Mean threat bias scores for each subject were computed at Time 1 (pretreatment) and Time 2 (post-treatment) by averaging bias scores across all trials.

Assumptions. Prior to conducting any analyses, data were inspected for errors, normality, skewness, excessive missing cases, and outliers using the approach described in Tabachnik & Fidell (2007). To detect outliers, boxplots and histograms were graphed, using the criterion of greater than or equal to three standard deviations above or below the mean of the distribution. No outliers were detected. To test for skewness, the data were visually inspected and the skew statistic was divided by the standard error of the skew. Any value +/- two standard deviations above or below the mean was considered skewed. The distribution of threat bias scores at pretreatment was positively skewed; therefore, a logarithmic transformation was conducted to normalize the data. Due to the formula for calculating threat bias, a significant proportion of scores were negative; therefore, a constant of 30 was added to each subject's score prior to the transformation so that all scores would be positive. Because the analyses revealed comparable results, the analyses of untransformed scores are reported.

Preliminary analyses. Descriptive statistics for all variables of interest are provided in Table 2.1. To determine whether the scales showed internal consistency in this sample, Cronbach's α was computed for each scale at Time 1 and Time 2. As shown in Table 2.1, each scale

had acceptable to moderately high reliability, with internal consistencies ranging from .60 to .89.

Table 2.1 *Descriptive Statistics for Clinical Variables at Time 1 and Time 2*

	Time 1			Time 2		
	M	*SD*	*Alpha*	*M*	*SD*	*Alpha*
PRCS	24.13	2.88	0.60	14.43	6.13	0.73
FNE-B	40.88	8.74	0.89	33.48	7.19	0.86
Threat Bias	9.21	19.61	—	6.84	14.40	—

Note. PRCS = Personal Report of Confidence as a Speaker; FNE-B = Fear of Negative Evaluation-Brief.

Correlational analyses were conducted to test whether there were any significant relations among pretreatment threat bias scores, demographics, and responses to the self-report measures at the pretreatment assessment. The only significant correlation was between gender and scores on the FNE-B, such that males scored significantly higher on the FNE-B than did females (M_{Males} = 43.6; $M_{Females}$ = 34.3; r = -.494, p < .05). Correlations between attention bias scores and the social anxiety and fear of public speaking measures are presented in Table 2.2.

Table 2.2 *Intercorrelations among Threat Bias, Social Anxiety, and Fear of Public Speaking at Pretreatment*

Variables	1	2	3
Threat Bias	1	-.282	.050
PRCS		1	.339
FNE-B			1

Note. PRCS = Personal Report of Confidence as a Speaker; FNE-B = Fear of Negative Evaluation-Brief.

2.5 Power Analysis

An a priori power analysis (G*Power, Germany) was conducted to test that our obtained sample size and degrees of freedom were sufficient to detect an effect of treatment if indeed such an effect did occur. It was found that with a sample size of n = 12 and error probability of α = .05, power = 0.80, suggesting that this study had adequate power to detect an effect the size of that found in Pishyar et al. (2008; *d* = 1.86).

3 RESULTS

To test the hypothesis that socially phobic individuals would show heightened vigilance to threatening faces before treatment (Hypothesis 1), a single-sample t-test was conducted to determine whether the scores came from a population with a mean of zero. Threat bias scores at pretreament were positive and statistically different from zero, $t(23) = 2.30$, p .05, indicating that the overall sample prior to treatment showed vigilance toward threatening faces.

To test whether socially phobic individuals would be less vigilant to threatening faces following treatment (Hypothesis 2), a paired samples t-test was conducted. Results showed no

significant differences in response to threatening faces between Time 1 and Time 2, $t(23)$ = 0.49, p = ns, suggesting that, contrary to hypotheses, the overall sample did not become less vigilant following treatment.

Hypothesis 3, that change scores in attention bias from Time 1 to Time 2 would be positively correlated with change scores on the FNE-B and PRCS from Time 1 to Time 2, was tested using correlational and multiple hierarchical linear regression methods. Because males scored significantly higher on the FNE-B than females, before conducting the correlational analyses between change scores on the FNE-B and threat bias, the sample was split by gender. Contrary to hypotheses, change scores on the FNE-B were not correlated with change scores in threat bias for either males or females (r_{Males} = .04; $r_{Females}$ = -.03; p = ns), and change scores on the PRCS were not correlated with threat bias scores within the overall sample (r = .12; p's = ns).

Next, two hierarchical linear regression analyses were conducted. In the first regression analysis, threat bias change scores were regressed onto Gender in Block 1 of the model, and FNE-B change scores in Block 2 of the model. Gender was included as a covariate in the model to control for the difference between males and females in pre-treatment symptom severity on the FNE and dummy-coded such that male and female were represented by 0 and 1 respectively. As shown in Table 3.1, there was no significant relation between change scores on the FNE-B and changes in threat bias (B = .10, SE_B = .55, F(2, 22) = 1.01, p = .ns.

Table 3.1. *Summary of Regression Analysis for Change Scores on the Fear of Negative Evaluation Scale (FNE-B) Predicting Changes in Threat Bias*

Variable	B	*SE B*	β	R^2_{change}
Step 1				
Gender	-12.286	9.138	-.293	.091
Step 2				
FNE-B (T1-T2)	.095	.550	-.038	.092

Note. FNE-B = Fear of Negative Evaluation-Brief

In the second regression analysis, threat bias change scores were regressed on PRCS change scores. As shown in Table 3.2, there was not a significant relation between changes in scores on the PRCS and changes in threat bias (B = .34, SE_B = .63, F(1, 21) = .29, p = .ns).

Table 3.2 *Summary of Regression Analysis for Change Scores on the Personal Report of Confidence as a Speaker Scale (PRCS) Predicting Changes in Threat Bias*

Variable	B	*SE B*	β	R^2_{change}
Step 1				
PRCS (T1-T2)	.340	.634	.119	.014

Note. PRCS = Personal Report of Confidence as a Speaker

Lastly, to test Hypotheses 4 and 5, the sample was first divided into participants who showed attentional avoidance (defined as threat bias scores less than zero) and those who showed vigilance (defined as threat bias scores greater than zero) at pretreatment. It was found that, at pretreatment, the majority of participants (n = 15; 62.5%) showed vigilance toward

threatening faces (indicated by threat bias scores greater than zero), and 37.5% (n = 9) showed avoidance of threatening faces (indicated by threat bias scores less than zero; see Table 3.3 for means and standard deviations). Paired samples t-tests were then conducted to test whether 1.) participants who were hypervigilant prior to treatment became less hypervigilant following treatment (Hypothesis 4), and 2.) participants who were avoidant prior to treatment became less avoidant following treatment (Hypotheses 5).

Table 3.3 *Descriptive Statistics of Threat Bias Scores of the Divided Sample at Pre- and Post-treatment*

	Time 1	Time 2
Vigilant (n = 15)	18.99 (18.24)	8.38 (14.29)
Avoidant (n = 9)	-7.09 (6.66)	4.28 (15.07)

As hypothesized, following treatment, the avoidant group was significantly less avoidant, $t(8) = -2.832$, $p < .05$. The direction of the bias actually reversed, such that participants who were in the avoidant group at pretreatment became vigilant in post-treatment. The vigilant group was also less vigilant, although this finding did not reach statistical significance, $t(14) = 1.603$, $p = .069$ (see Figure 3.1).

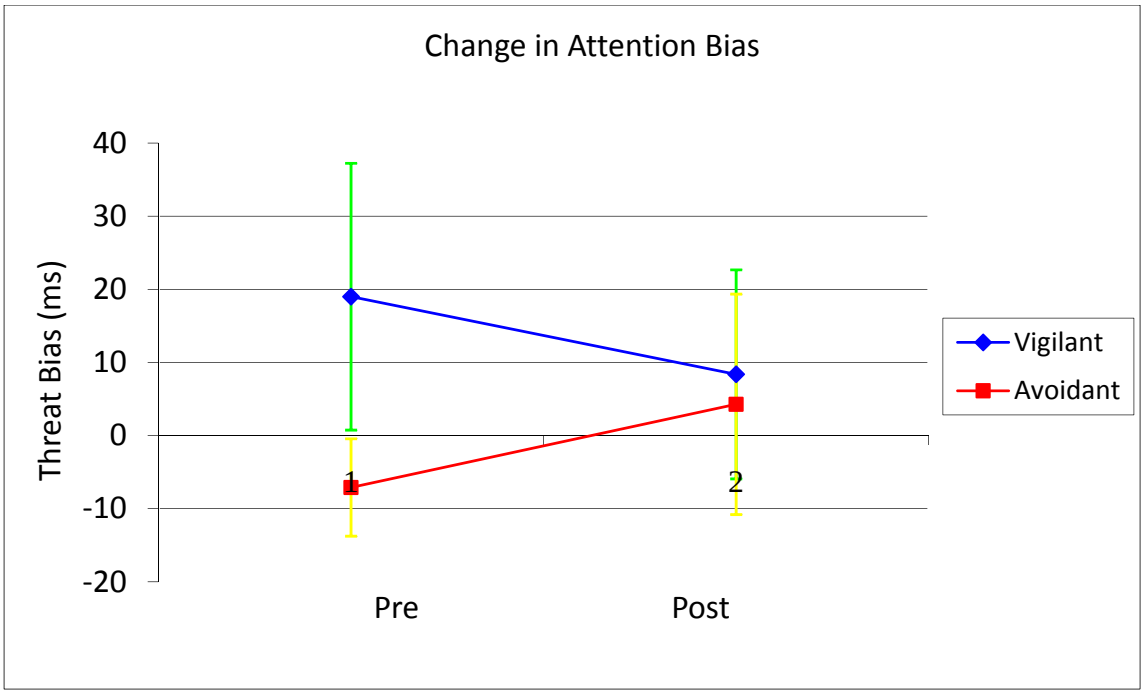

Figure 3.1 Changes in attention bias by subgroup following treatment.

4 DISCUSSION

The primary purpose of the present investigation was to evaluate changes in attentional biases following CBT for Social Phobia. Using an uncontrolled methodology, findings generally show that performance on the dot probe task changes following treatment for Social Phobia. These findings are consistent with models of social anxiety that emphasize a biased allocation of attentional resources to cues for negative evaluation (Beck & Emery, 1985; Clark & Wells, 1995; Rapee & Heimberg, 1997). Further investigation into the nature of attention bias in this sample presents a more complex picture, however.

The first finding, that the sample was vigilant to external threat cues prior to receiving treatment, is consistent with the preponderance of empirical investigations that have examined

attention bias in clinical and non-clinical samples of socially anxious adults (i.e., Pishyar et al. 2004; Mogg, Philippot, & Bradley, 2004; Sposari & Rapee, 2007). Results of these studies and the present study suggest that when attentional responses are assessed in response to stimuli presented for 500 ms, individuals with Social Phobia show enhanced attention to visual threat cues. This finding is commensurate with an extensive body of theoretical and empirical work concerning clinical and non-clinical anxiety. It is compatible both with expectations from cognitive models of anxiety that propose vigilance for threat cues in anxiety disorders generally (e.g., Williams et al., 1997) and for indicators of negative social evaluation in Social Phobia specifically (e.g., Rapee & Heimberg, 1997).

That our sample did not become significantly less vigilant to threatening faces following treatment was in contrast to findings from the only other study to date that has examined changes in attentional bias following treatment for Social Phobia using the dot probe paradigm (Pishyar et al., 2008). Methodological differences between the Pishyar et al. (2008) study and the present investigation may have accounted for the discrepant findings. For example, the dot probe task used by Pishyar et al. positioned faces on the screen vertically instead of horizontally. Also, compared to the present study, Pishyar et al.'s sample size was smaller (n = 16 versus n = 24) as was their number of target (threatening versus neutral facial expression) trials (n = 20 versus n = 64). Given the robustness of their findings, however, it remains unclear why these results would not have been replicated in a larger sample that employed a greater number of trials. The lack of a finding is also inconsistent with studies that have used the Stroop interference paradigm to evaluate changes in attentional bias in socially phobic samples (i.e., Mattia et al., 1993; Lundh & Ost, 2001). As noted above, however, the slowed response times to name

the colors of threat related words on the modified Stroop task found in these two studies may indicate an emotional response rather than attentional bias to anxiety-relevant materials. Decreased response times after successful treatment could similarly be explained by a reduction in this general emotional responding. One strength of the present investigation is that, because it employs the dot probe paradigm to measure attention bias, its findings are not susceptible to this alternative interpretation.

Also, contrary to our hypothesis and in contrast with Pishyar et al., was the finding that change scores on the self-report outcome measures were neither correlated with nor predictive of changes in attentional bias. The use of different outcome measures may have contributed to the discrepant findings between the two studies. Pishyar et al. used the full form of the FNE scale, the Social Phobia Scale (SPS) and Social Interaction Anxiety Scale (SIAS) as outcome measures, whereas the present study used the PRCS, which specifically addresses public speaking fears, and the brief form of the FNE.

Lastly, it was found that participants' pattern of responding to threatening facial stimuli did change significantly following treatment when the sample was divided into those who were vigilant to external threat cues prior to treatment and those who were avoidant. At the start of treatment, 62.5% of the sample displayed attentional vigilance, and 37.5% displayed avoidance. After eight weeks of treatment, a greater proportion of participants displayed a vigilant bias (70.8% vigilant versus 29.2% avoidant), though the overall sample was slightly but not significantly less vigilant than at pretreatment. Participants who had initially displayed avoidance of external threat cues were significantly less avoidant and, in fact, exhibited an overall hypervigi-

lant pattern of response at post-treatment. Similarly, people who had been vigilant prior to treatment were less vigilant after treatment, though this finding fell short of statistical significance. It is interesting to note that, taken together, these findings suggest that the two subsamples became more similar to one another in terms of the nature of their bias over the course of treatment. Perhaps the two groups became more similar because all participants were treated using a manualized treatment protocol and received identical psychoeducation and skills training about how to process social information in a more adaptive manner.

That participants who were avoidant at pretreatment actually became vigilant after treatment raises an interesting question about what constitutes "improvement" in attention bias (i.e., is improvement a reduction in vigilance, a reduction in avoidance, or a lack of bias altogether?). Previous investigations of attention bias in clinical and non-clinical samples have found that healthy controls and participants scoring low on measures of social anxiety are likely to show a small bias *away* from threatening faces (Bradley, Mogg, et al., 1997; Mansell et al., 1999; Chen et al., 2002; Pishyar et al., 2004; Sposari & Rapee, 2007) or a neutral pattern of response (Mogg, Bradley, and Philippot, 2004; Pineles and Mineka, 2005), which calls into question whether the avoidant group becoming vigilant in the present study is indicative of progress. The lack of correlation with change scores, considered in conjunction with the avoidant group becoming more vigilant presents a complex picture in which it is unclear if reductions in attention bias are actually important for and/or conducive to psychological well-being.

To the best of our knowledge, this study is the first of its kind to address the significant heterogeneity within socially phobic samples by classifying participants according to the direc-

tion of their attentional bias. Findings provide preliminary support for the presence of two subgroups with differing attentional styles, one with a tendency for vigilance toward social threats, and a second with a tendency to avoid threat cues. This study thus extends/clarifies previous investigations of the role of attention bias in Social Phobia by providing a more nuanced description of attention allocation in this population. The unrecognized heterogeneous nature of socially phobic samples may have contributed to the discrepant findings between previous investigations of attention bias which have heretofore been attributed primarily to methodological differences. In the present investigation, for example, when testing whether the overall sample became less vigilant following treatment (Hypothesis 2), it was found that there were no significant changes in threat bias scores from pre- to post-treatment. However, by dividing the sample according who was vigilant or avoidant at pre-treatment, it becomes apparent that attention bias does indeed change; however, those changes were hidden in the overall sample by the counterbalancing effect of the two subsamples becoming more similar to one another at post-treatment. Failure of previous studies to recognize this variability within socially phobic samples may have obscured other important observations of attentional processing in this population. Future research is needed to determine if indeed such subgroups exist and if it is clinically useful/meaningful to classify participants according to the direction of their attentional biases.

At least in theory, these subgroups might benefit from exposure therapy differently and/or show distinctive patterns of response to treatment. For example, individuals who are avoidant prior to treatment may be less likely than those who were vigilant to benefit from exposure-based therapies, given that optimal treatment response is thought to occur when par-

ticipants are fully present and aware of the exposures (Foa & McNally, 1996; Moscovitch, Antony, Swinson, & Stein, 2009). On the other hand, a vigilant person, who is already overly attending to external cues, may benefit more from psychoeducation regarding how vigilance toward threatening cues affects one's ability to put his or her energy and attention toward performing and accomplishing the task at hand. Future research should examine the possibility that pretreatment vigilance and avoidance for threat cues could differentially predict treatment response to exposure-based CBT for Social Phobia.

The presence of distinct attentional subgroups has implications for attention training programs as well. Attention retraining has been shown to alter attention biases and reduce Social Phobia symptoms in a group presenting with vigilance for socially threatening information (Amir et al., 2009). This study did not, however, identify who in their sample was avoidant and who was vigilant prior to treatment (only that the overall sample became less vigilant). Thus, it is uncertain at this time whether attention retraining programs are beneficial for individuals with an avoidant bias. On the one hand, an attentional training program that reduces avoidant biases could, in theory, make an avoidant bias worse, given that the probe always follows a neutral face. On the other hand, such a program might also prepare avoidant individuals to engage in and benefit from traditional exposure therapy. Clearly more research is needed to characterize the effectiveness of attention retraining for socially phobic individuals with an avoidant attention bias.

The current study has several limitations. First, our sample (n = 24), though larger than that of Pishyar et al., was small, which may have limited our power to detect small to medium

effect sizes and increased our risk of error. The high degree of variability in the vigilant group in particular may explain why that finding approached but did not attain statistical significance. Second, this study design did not include a control group. Future investigations should recruit a control group to ensure that changes in attention bias are not merely an effect of the passage of time.

Additionally, the correlation between the fear of public speaking measure and the social anxiety measure in this study was surprisingly low (r = .34, p = ns). The correlation between the two measures may have been affected by the internal consistency of the PRCS, which in the present investigation was only adequate (α = .60). The lack of correlation between the two outcome measures could also be related to substantive/qualitative differences between participants who met criteria for generalized Social Phobia (n = 9, 37.5%) and those whose evaluative fears were limited to public speaking (n = 15, 62.5%). Treatment focused on public speaking anxiety, which may have resulted in smaller change scores on the FNE-B, which measures broader evaluative concerns. Future research should examine generalized and non-generalized social phobics as discrete subtypes and explore whether attention processes differ between the two groups.

It should be emphasized that the dot probe paradigm, though to date the most methodologically sound measure of attention bias available, does not address the question of whether attentional biases have a causal role in social anxiety or are merely symptomatic of those with social anxiety. A longitudinal study following up on participants in the present study to examine patterns of relapse could help clarify this issue by seeing if people whose attention bias

changed, in either direction, were more or less likely to experience full relapse or some residual symptoms. Additionally, investigations that have used the dot probe paradigm to measure attention bias in anxious and non-anxious samples have historically not reported reliability statistics. Recently, two investigations have reported poor reliability estimates for the original dot probe task (Schmukle, 2005), a modified version that uses pictorial stimuli depicting threatening environmental scenes (e.g., assault scenes, mutilated bodies; Schmukle, 2005), and a version that uses photographs of human faces (Staugaard, 2009). One notable difference between these two studies and the present investigation, however, is that we used a clinical sample of adults diagnosed with Social Phobia, whereas both Schmukle and Staugaard used a nonclinical sample of college students. Attentional bias for threat has been demonstrated more consistently in samples of patients diagnosed with an anxiety disorder than in nonclinical samples. Nonetheless, the lack of reliability information is concerning, and continued research on the reliability of the dot probe task is much needed. Future investigations should report internal consistency of the bias indices and design studies that test the dot probe's test-retest reliability (e.g., have participants retake an alternate version of the same task after a one week interval).

Finally, given that this study only partially replicated the findings of the only other study to demonstrate changes in responding on the dot probe measure after treatment for Social Phobia, replication of study findings in future investigations is still much needed. Future research should incorporate multiple methods of assessing treatment response (e.g., physiological measures, observer-report) instead of relying solely on self-report data to better understand whether and how attention bias is associated with other measures of social anxiety.

In conclusion, the present study suggests that attention bias for external threat cues does change following CBT for Social Phobia, though future research is needed to further clarify the extent, conditions, and meaning of this change. Our more nuanced description of attention bias in the present study helps explain some of the mixed findings in the extant literature on Social Phobia and attention bias. Future research should examine the utility of using attention bias subtypes to better understand and treat social anxiety.

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APPENDICES

Appendix A

Demographic Information

Gender:

- O Male
- O Female

Age: _____

Date of Birth: _____

Racial/Ethnic Origin:

- O African American
- O Caucasian
- O Hispanic
- O Asian American
- O Pacific Islander
- O American Indian
- O Other _____

Highest level of Education Completed:

- O Some high school
- O Completed high school
- O Some college (1-2 years)
- O Some college (3+ years)
- O Completed college degree
- O Some graduate school
- O Completed graduate degree

Current Marital Status:

- O Single
- O Married
- O Separated
- O Divorced
- O Living with someone
- O Widowed

Current Total Annual Household Income:

- O Less than $ 5,000
- O $ 5,000 - $ 10,000
- O $ 10,000 - $ 20,000
- O $ 20,000 - $ 30,000
- O $ 30,000 - $ 50,000
- O More than $ 50,000

Appendix B

Fear of Negative Evaluation – Brief Form

Read each of the following statements and then use the scale below to indicate the degree to which each statement applies to you, use the blank to enter the number that corresponds to your answer for each question.

1	2	3	4	5
Not at All	Slightly	Moderately	Very	Extremely

1. I worry about what other people will think of me even when I know that it doesn't make any difference. _____
2. I am unconcerned even if I know people are forming an unfavorable opinion of me. _____
3. I am frequently afraid of other people noticing my short comings. _____
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 in 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. Sometime I think I am too concerned with what other people think of me. _____
12. I often worry that I will say or do wrong things. _____

Appendix C

PRCS

This instrument is composed of 30 items regarding your feelings of confidence as a speaker. Try to decide whether "true" or "false" most represents your feelings associated with your most recent speech. Then write "T" or "F" next to each question to indicate your answer. Work quickly and don't spend much time on any one question. We want your first impression on this questionnaire.

1. I look forward to an opportunity to speak in public. _____
2. My hands tremble when I try to handle objects on the platform. ____
3. I am in constant fear of forgetting my speech. _____
4. Audiences seem friendly when I address them. _____
5. While preparing a speech I am in a constant state of anxiety. _____
6. At the conclusion of a speech I feel that I have had a pleasant experience. _____
7. I dislike to use my body and voice expressively. _____
8. My thoughts become confused and jumbled when I speak before an audience. _____
9. I have no fear of facing an audience. _____
10. Although I am nervous just before getting up I soon forget my fears and enjoy the experience. ____
11. I face the prospect of making a speech with complete confidence. _____
12. I feel that I am in complete possession of myself while speaking. _____
13. I prefer to have notes on the platform in case I forget my speech. _____
14. I like to observe the reactions of my audience to my speech. _____

15. Although I talk fluently with friends I am at a loss for words on the platform. ____

16. I feel relaxed and comfortable while speaking. _____

17. Although I do not enjoy speaking in public I don't particularly dread it. _____

18. I always avoid speaking in public if possible. ____

19. The faces of my audience are blurred when I look at them. ____

20. I enjoy preparing a talk. _____

21. My mind is clear when I face an audience. _____

22. I am fairly fluent. _____

23. I perspire and tremble just before getting up to speak. _____

24. My posture feels strained and unnatural. _____

25. I am fearful and tense all the while I am speaking before a group of people. _____

26. I find the prospect of speaking mildly unpleasant. _____

27. It is difficult for me to calmly search my mind for the right words to express my thoughts. _____

28. I am terrified at the thought of speaking before a group of people. _____

29. I have a feeling of alertness in facing an audience. _____

30. I feel disgusted with myself after trying to address a group of people. _____