Journal of Anxiety Disorders 33 (2015) 35–44

Contents lists available at ScienceDirect

Journal of Anxiety Disorders

A randomized controlled trial of attention modification for social anxiety disorder

R. Nicholas Carleton[a,*], Michelle J.N. Teale Sapach[a], Chris Oriet[a], Sophie Duranceau[a], Lisa M. Lix[b], Michel A. Thibodeau[a], Samantha C. Horswill[a], Jordan R. Ubbens[a], Gordon J.G. Asmundson[a]

[a] Department of Psychology University of Regina, Regina, SK, Canada
[b] Department of Community Health Sciences, University of Manitoba, Winnipeg, MB, Canada

ARTICLE INFO

Article history:
Received 15 January 2015
Received in revised form 21 March 2015
Accepted 22 March 2015
Available online 20 April 2015

Keywords:
Attentional bias
Attention modification protocol
Social anxiety disorder
Randomized controlled trial
Longitudinal study

ABSTRACT

Social Anxiety Disorder (SAD) models implicate social threat cue vigilance (i.e., attentional biases) in symptom development and maintenance. A modified dot-probe protocol has been shown to reduce SAD symptoms, in some but not all studies, presumably by modifying an attentional bias. The current randomized controlled trial was designed to replicate and extend such research. Participants included treatment-seeking adults ($n = 108$; 58% women) who met diagnostic criteria for SAD. Participants were randomly assigned to a standard (i.e., control) or modified (i.e., active) dot-probe protocol condition and to participate in-lab or at home. The protocol involved twice-weekly 15-min sessions, for 4 weeks, with questionnaires completed at baseline, post-treatment, 4-month follow-up, and 8-month follow-up. Symptom reports were assessed with repeated measures mixed hierarchical modeling. There was a main effect of time from baseline to post-treatment wherein social anxiety symptoms declined significantly ($p < .05$) but depression and trait anxiety did not ($p > .05$). There were no significant interactions based on condition or participation location ($ps > .05$). Reductions were maintained at 8-month follow-up. Symptom reductions were not correlated with threat biases as indexed by the dot-probe task. The modified and standard protocol both produced significant sustained symptom reductions, whether administered in-lab or at home. There were no robust differences based on protocol type. As such, the mechanisms for benefits associated with modified dot-probe protocols warrant additional research.

1. Introduction

Social Anxiety Disorder (SAD; American Psychiatric Association, 2013) has significant lifetime (12.1%) and 12-month (7.1%) prevalence rates (Ruscio et al., 2008), and comparable rates for men and women (American Psychiatric Association, 2013). The disorder is marked by nervousness or discomfort in social situations (Antony & Swinson, 2000), resulting from fears of being evaluated, embarrassed (Weeks, Carleton, Asmundson, McCabe, & Antony, 2010; Weeks, Jakatdar, & Heimberg, 2010), or making a bad impression (Antony & Swinson, 2000). SAD typically lasts for 12 or more years (Grant et al., 2005), has low remission rates (Massion et al., 2002), and high depression comorbidity (Stein & Stein, 2008). The associated social isolation and high rates of comorbid depression may explain some of the increased suicide risk for patients with SAD relative to those without (Thibodeau, Welch, Sareen, & Asmundson, 2013), wherein 35% contemplate suicide regularly and 14% attempt suicide (Cougle, Keough, Riccardi, & Sachs-Ericsson, 2009).

Models of SAD emphasize the central role of attentional processes and suggest that (1) heightened self-focused attention and (2) vigilance for external social threat cues influence the development and maintenance of SAD (e.g., Heimberg, Brozovich, & Rapee, 2010; Hofmann, 2007). People with SAD more rapidly engage with and spend more time attending to external social threat cues and emotional faces in anxiety-provoking social situations (Asmundson & Stein, 1994; Chen, Ehlers, Clark, & Mansell, 2002; Lee & Telch, 2008), and demonstrate biases in interpretation, attention, and imagery relative to non-anxious individuals (Hirsch & Clark, 2004). Together, these attentional processes may narrow attention, interfere with beneficial processing, and maintain SAD.

Participants in a dot-probe protocol observe a screen on which randomly paired stimuli are presented (for ~500 ms), one stimulus above the other. One stimulus is neutral (e.g., the word *table*)

* Corresponding author. Tel.: +13063372473.

http://dx.doi.org/10.1016/j.janxdis.2015.03.011
0887-6185/

and the other is associated with threat (e.g., the word *snake*). After the stimuli presentation, a probe appears in a location (top/bottom) corresponding to where one of the stimuli appeared. Participants press a key as quickly as possible to indicate the probe location (top/bottom). People with clinically significant anxiety respond faster when probes appear in the location of threat stimuli related to their anxiety (i.e., congruent) versus the location of neutral stimuli (i.e., incongruent), regardless of location (top/bottom). In contrast, people without clinically significant anxiety (i.e., controls) respond comparably to threat and neutral words, producing no difference in response times across congruent, incongruent, and neutral trials (i.e., two neutral words presented).

Modifying attentional biases using an adapted dot-probe protocol as a treatment for social anxiety has received increasing interest (Koster, Fox, & MacLeod, 2009; MacLeod, Rutherford, Campbell, Ebsworthy, & Holker, 2002). The adapted protocol involves two conditions: (1) the Attention Control Condition (ACC), in which neutral and threat stimuli are replaced by probes with equal frequency, and (2) the Attentional Modification Condition (AMC), in which the probe consistently replaces neutral stimuli. In the AMC participants implicitly learn to direct their attention away from the threat stimulus to detect and respond to the probe, which is thought to modify the attentional bias and reduce symptoms. In one of the original studies exploring the adapted dot-probe protocol as a treatment for SAD symptoms (Schmidt, Richey, Buckner, & Timpano, 2009), participants in the AMC ($n = 18$), but not in the ACC ($n = 18$), reported a significant reduction in SAD symptoms (i.e., $p < .01$; $d > .50$). Since then, several studies have provided additional support for AMC as a method to reduce SAD symptoms (Amir et al., 2009; Amir, Taylor, & Donohue, 2011; Amir, Weber, Beard, Bomyea, & Taylor, 2008; Schmidt et al., 2009). Training attention away from threat appears more effective for reducing social anxiety than training attention toward threat, neutral, or positive stimuli (Heeren, Lievens, & Philippot, 2011; Heeren, Reese, McNally, & Philippot, 2012); however, studies have also found evidence that the AMC and ACC can both reduce symptoms, with no significant differences in those reductions between the conditions (e.g., Enock, Hofmann, & McNally, 2014; Heeren, Mogoase, McNally, Schmitz, & Philibert, 2015; Julian, Beard, Schmidt, Powers, & Smits, 2012).

Much of the attention training research with social anxiety has used a static set of pre-selected word stimuli to assess for the attentional biases, but then used pictures of faces as the stimuli for modifying any such biases (Amir, Beard, Taylor, et al., 2009; Heeren et al., 2015). The intent was to avoid experimental conflation of repeated exposure to the stimuli with changes in attentional biases. That said, related research supporting the success of AMC relative to ACC for generalized anxiety disorder symptoms used words for both assessment and training (Amir, Beard, Cobb, & Bomyea, 2009), with those researchers recommending research exploring the use of only words for SAD as well (Amir et al., 2011). Furthermore, tailored stimuli, rather than a pre-selected static set, should be more salient and therein produce stronger effect sizes.

Part of the appeal associated with the attention modification protocols involves the potential for wide spread cost-effective dissemination through the Internet. Indeed, such administration could be particularly suited to persons with social anxiety. At least four separate randomized controlled trials have administered the attention modification protocol remotely via the Internet to samples diagnosed with SAD found similar results (Boettcher, Berger, & Renneberg, 2012; Carlbring et al., 2012; Neubauer et al., 2013; Rapee et al., 2013); however, in all cases participants in *both* the AMC and ACC reported social anxiety symptom reductions of small to large effects sizes with no statistically significant differences between conditions. Furthermore, the studies did not report robust evidence of attentional biases before or after treatment, changes in an attentional bias over the course of treatment, or a relationship between attentional bias and symptom changes.

A recent meta-analysis indicated that attentional biases were much smaller for studies administering the protocols through the Internet than for those administered in laboratories (Mogoase, David, & Koster, 2014). Nonetheless, the range of effect sizes for symptom changes was quite large for Internet studies (i.e., Hedges $g = .05–.97$) and for laboratory studies (i.e., Hedges $g = .02–.82$). The authors of the meta-analysis noted "the available evidence regarding ABM clinical utility [outside] the laboratory is currently limited" (Mogoase et al., 2014, p. 18) and recommended additional research exploring Internet administrations that include extended follow-up assessments (e.g., 4+ months).

The current randomized controlled study was designed to: (1) replicate and extend the initial findings presented by Schmidt et al. (2009) and Amir et al. (2008) by using word stimuli [in line with evidence from Heeren et al. (2015), Mogoase et al. (2014), and Rapee et al. (2013)] that were idiosyncratically selected; (2) evaluate the comparative impact of participation in a laboratory setting relative to remotely at home, adding to the currently limited literature; and (3) provide extended follow-up assessments evaluating the endurance of the AMC changes (i.e., at 4 and 8 months). There were five hypothesized outcomes. First, participants completing the AMC in the laboratory were expected to report significant reductions in SAD symptoms relative to participants completing the ACC in the laboratory. Second, participants completing the AMC remotely were expected to report significant reductions in SAD symptoms relative to participants completing the ACC remotely. Third, participants completing the AMC in the laboratory were expected to report greater SAD symptom reductions relative to those participating remotely. The additional symptom reduction was expected in the laboratory condition because it was thought of as an additive exposure to social situations. Fourth, participants in the AMC were expected to maintain symptom changes at 4 and 8 months after participation relative to participants in the ACC. Fifth, participants showing the greatest change in attentional biases in AMC were expected to show the greatest SAD symptom reduction, based on initial theory suggesting that AMC protocols lead to symptom improvement via change in attentional bias (Bar-Haim, 2010; Clarke, Notebaert, & MacLeod, 2014).

2. Method

2.1. Participants

Participants included treatment-seeking community members ($n = 108$; 45 men [$M_{age} = 34.22$; $SD = 11.77$] and 63 women [$M_{age} = 36.92$; $SD = 14.02$]) recruited through print and social media. The advertisements solicited potential participants from people who self-identified as having symptoms of social anxiety and were interested in participating in a computer treatment study. Previous research demonstrated large effect sizes for differences in reported symptom reductions between the AMC and ACC groups with relatively small samples in each group (i.e., $n = 18$, Schmidt et al., 2009; $n = 14$, Amir et al., 2009); these results were used in selecting the sample size for the current study.

Interested individuals were told previous research suggested the treatment was effective in changing subconscious thought patterns and that they might experience a reduction in SAD symptoms, but reductions were not guaranteed. The purpose of comparing Internet and in-lab administrations of the dot-probe program was explained, followed by an explanation for having double-blinded treatment and control conditions. Those who agreed to participate were then administered (1) the Structured Clinical Interview for DSM-IV (SCID-I; First, Gibbon, Spitzer, & Williams, 2002) SAD