Fear of Evaluation in Social Anxiety: Mediation of Attentional Bias to Human Faces

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Abstract

Social anxiety disorder (SAD) is a debilitating psychological disorder characterised by excessive fears of one or more social or performance situations, where there is potential for evaluation by others. A recently expanded cognitive-behavioural model of SAD emphasizes that both the fear of negative evaluation (FNE) and the fear of positive evaluation (FPE) contribute to enduring symptoms of SAD. Research also suggests that socially anxious individuals may show biases toward threat relevant stimuli, such as angry faces. The current study utilised a modified version of the pictorial dot-probe task in order to examine whether FNE and FPE mediate the relationship between social anxiety and an attentional bias. A group of 38 participants with moderate to high levels of self-reported social anxiety were tested in groups of two to four people and were advised that they would be required to deliver an impromptu speech. All participants then completed an assessment of attentional bias using angry-neutral, happy-neutral, and angry-happy face pairs. Conditions were satisfied for only one mediation model, indicating that the relationship between social anxiety and attentional avoidance of angry faces was mediated by FPE. These findings have important clinical implications for types of treatment concerning cognitive symptoms of SAD, along with advancing models of social anxiety. Limitations and ideas for future research from the current study were also discussed.

KEYWORDS: Social Anxiety Disorder; Social Phobia; Attention Bias; Fear of Negative Evaluation; Fear of Positive Evaluation.

Fear of Evaluation and Social Anxiety: Mediation of Attentional Biases to Human Faces

Social anxiety disorder (SAD) is a debilitating psychological disorder characterised by persistent and excessive fears of one or more social or performance situations, where there is potential of evaluation by others (American Psychiatric Association, 2013; Rapee & Heimberg, 1997). Epidemiological data suggests 12 month prevalence rates of 4.5% for SAD (males 3.0%, females 4.6%; Somers, Goldner, Waraich, & Hsu, 2005). The disorder can be severely incapacitating with significant impairment in educational, occupational and social functioning, often resulting in deterioration of an individual's physical and psychological well-being (APA, 2000; Katzelnick et al., 2001). Despite increasing research interest (Boschen, 2008), further research aimed at identifying the causes and maintenance of social anxiety are of considerable importance.

Cognitive Theories of Social Anxiety

Cognitive-behavioural models attempt to explain the processes that shape and maintain social anxiety, with emphasis on the preferential allocation of attentional resources to threat, and excessive self-focused attention due to fears of negative evaluation from others (Clark & Wells, 1995; Hirsch & Clark, 2004; Rapee & Heimberg, 1997). Fear of negative evaluation (FNE) is a core component of cognitive-behavioural models of social anxiety with extensive empirical support (Clark & Wells, 1995; Rapee & Heimberg, 1997). More recently, researchers have recognised that fear of evaluation in general is important in social anxiety, including both FNE and fear of positive evaluation (FPE; Weeks, Heimberg, & Rodebaugh, 2008). FPE has also been incorporated into an expanded cognitive-behavioural model of social anxiety (Heimberg, Brozovich, & Rapee, 2010). Given that both attentional bias and fear of evaluation are implicated in the cognitive mechanisms that shape and maintain social anxiety, it is the nature and relationship of these factors that is the focus of the current research.

Fear of Evaluation

Consistent with psycho-evolutionary models of social anxiety, it has been suggested that FPE and FNE may serve separate and distinct adaptive goals (Gilbert, 2001; Weeks & Howell, 2012). For example, those who view themselves as socially inferior to others may avoid giving a positive impression that could be regarded as a threat by other group members (FPE), whilst also motivated not to appear so socially unfavourable as to be excluded from the social group (FNE; Weeks, Rodebaugh, Heimberg, Norton, & Jakatdar, 2009).

According to this theory, social anxiety is a protective mechanism intended to balance the risks of moving up the hierarchy too quickly versus falling out of the hierarchy entirely, suggesting that anxiety should be triggered by concerns of either positive and/or negative evaluation (Gilbert, 2001; Rodebaugh, Weeks, Gordon, Langer, & Heimberg, 2012).

Previous research suggests that FPE and FNE are related, but distinct, cognitive components of social anxiety, as shown in both clinical (Weeks, Heimberg, Rodebaugh, Goldin, & Gross, 2012) and undergraduate student samples (Weeks, Heimberg, & Rodebaugh, 2008; Weeks, Heimberg, Rodebaugh, & Norton, 2008). Given that both FPE and FNE represent distinct valences of social evaluation, this expanded notion of social anxiety-related fear has been labelled the bivalent fear of evaluation model (BFOE; Weeks & Howell, 2012). Current interventions which emphasize FNE, cognitive restructuring, and exposure work, typically do so with regards to situations involving apprehension of negative appraisal. As a result, FPE may not be specifically, systematically addressed (Weeks, Heimberg, & Rodebaugh, 2008). Understanding how each of these constructs contributes to aspects of social anxiety may improve understanding of the condition, and lead to more comprehensive treatment packages that address all of the important contributors to the maintenance of the disorder.

Attentional Bias

In an effort to measure attentional bias, many researchers have employed well established research paradigms such as the emotional Stroop task and the dot-probe task. These techniques are the most frequently used paradigms for studying attentional bias in social anxiety (Lee & Telch, 2008), resulting in accumulated evidence for attentional vigilance toward negative stimuli with socially anxious individuals (Mogg & Bradley, 2002).

Dot-probe task. The dot-probe task is generally preferred to alternative methods of assessing attention bias (e.g., Stroop tasks) as it does not rely on interference effects (Bradley, Mogg, & Millar, 2000). The original version of the dot-probe task developed by MacLeod, Mathews and Tata (1986) utilised pairs of words (e.g., negative and neutral) which were briefly shown (500ms) followed by a small dot-probe appearing immediately in the location of one of the words. Consistent with the vigilance-for-threat postulate, anxious individuals respond faster to probes that replace negative compared to neutral stimuli (Broadbent & Broadbent, 1988; MacLeod, Mathews, & Tata, 1986; Mogg, Bradley, & Williams, 1995).

While many studies have shown biases toward negative stimuli in anxiety (Williams, Watts, MacLeod, & Mathews, 1997), other studies propose that this bias occurs for emotional stimuli in general, including both positive and negative information, termed the “emotionality hypothesis” (Martin, Williams, & Clarke, 1991; Mogg & Marden, 1990). However, evidence for this has mainly come from studies utilising the Stroop task, which has been criticised for its lack of ecological validity (Bradley et al., 2000). As single words are not representative of naturalistic anxiety-provoking stimuli, pictorial information of facial expressions (e.g., angry faces) appear to be more ecologically valid and salient for humans (Bradley et al., 2000). Thus, Bradley et al. (1997) generated a modified version of the dot-probe task utilising pairs of faces. The modified dot-probe task is suggested to overcome this weakness with studies providing evidence that runs counter to the emotionality hypothesis (Bradley, Mogg, Falla, & Hamilton, 1998; Bradley et al., 2000). For example, by using pictorial stimuli, rather than

verbal stimuli, many researchers have provided evidence that the anxiety-related attention bias found is vigilance for angry faces, and avoidance of happy faces (Bradley et al., 1998; Bradley et al., 2000; Taylor, Bomyea, & Amir, 2010). Incongruent findings between verbal and pictorial stimuli may be attributable to word stimuli being prone to confound effects between their threat value and subjective frequency of use and also between their degree of personal relevance and subjective word frequency effects (Bradley et al., 1998). Pictorial stimuli avoid such confounds, thus minimising any interpretive difficulties.

Vigilance for negative, avoidance of positive stimuli pattern. Bradley, Mogg and Millar (2000) used the modified dot-probe task with a student sample measuring high, moderate and low on state anxiety and found: (1) shorter durations (500ms) produced an opposing pattern of bias for happy versus angry faces; (2) those with moderate and high levels of state anxiety showed vigilance for angry faces; and (3) as state anxiety increased, the tendency to avoid happy faces increased. These results suggest that a threshold effect appears evident with the transition from low to medium state anxiety resulting in the attentional bias pattern found. Similarly, Bradley, Mogg, Falla and Hamilton (1998) found the same bias pattern as that of Bradley et al. (2000) in a sample measuring high and low on trait anxiety. In comparison to previous studies of attentional bias, it has been suggested that vigilance toward negative stimuli depends on particularly high levels of anxiety implying a somewhat different threshold effect (Broadbent & Broadbent, 1988; MacLeod et al., 1986), however these studies of attentional bias have utilised single words as stimuli which may have relatively mild threat value. It appears that the subjective threat value of a stimulus is a crucial factor in determining attentional biases, with severe or real threats more likely to capture attention (Mogg & Bradley, 1998). Thus, whether an attentional bias is found at moderate levels of anxiety depends on the intensity of the stimuli, with more naturalistic and

ecologically valid stimuli (e.g., angry faces) capturing attention at lower levels of anxiety than less salient stimuli such as words (Bradley et al., 2000).

Avoidance of negative and positive stimuli. Conversely, by using modified dot-probe tasks, several studies have found that social anxiety is associated with the tendency to preferentially orient attention away from both positive stimuli (Chen, Ehlers, Clark, & Mansell, 2002; Mansell, Clark, Ehlers, & Chen, 1999; Pishyar, Harris, & Menzies, 2004), and negative stimuli (Mansell et al, 1999; Mansell, Ehlers, Clark, & Chen, 2002). Furthermore, this pattern of avoidance for both positive and negative stimuli is predominantly observed for those with moderate to high self-reported levels of social anxiety under conditions of concurrent social-evaluative threat (Mansell et al., 1999; Taylor et al., 2010). This type of social stressor typically involves a social threat induction where participants are informed they will be required to deliver an impromptu speech which will be video recorded and rated for its quality (Mansell et al., 1999; Taylor et al., 2010). For example, Mansell, Clark, Ehlers and Chen (1999) used a sample of high and low socially anxious university undergraduates and found: (1) an attentional bias away from positive and negative faces under conditions of social-evaluative threat compared to no-threat; and (2) when controlling for trait anxiety and negative affect, the attentional avoidance effect remained significant, indicating that the avoidance pattern found under conditions of social-evaluative threat may be due to individual differences in susceptibility to social anxiety, rather than to more general differences in trait anxiety or negative affectivity. In summary, it appears that vigilance may predominate when it is ambiguous as to whether a real social threat is present, whereas avoidance may predominate as a defense mechanism when the individual already feels negatively evaluated (Bögels & Mansell, 2004). This conclusion parallels Rapee and Heimberg's (1997) model of social anxiety which maintains that attention can be directed to threatening internal stimuli and that safety behaviours may result in avoidance.

Overview of diverse findings. While most literature reveals an attentional bias for socially anxious individuals, others have not found evidence of an attentional bias for positive social stimuli in social anxiety (Gotlib, Kasch, Traill, Joormann, Arnow, & Johnson, 2004), however it appears this may be accounted for in part by methodological differences across studies (Taylor et al., 2010). For example, attentional allocation away from positive social stimuli is more often found when stimuli are presented for shorter (e.g., 500ms, Pishyar et al., 2004) rather than longer durations (e.g., 1000ms, Gotlib et al., 2004), and stimulus materials used in prior research have not always reflected positive social-evaluative content (Taylor et al., 2010).

Aims, Overview and Hypotheses

While there is a body of literature investigating attentional biases, and research that supports the prominence of FNE as a core cognitive component of social anxiety, FPE is a relatively novel construct with limited knowledge on the importance of this construct. Furthermore, it remains unknown whether fear of evaluation mediates the relationship between social anxiety and attentional bias. Therefore, the current study aimed to replicate and extend earlier work on attentional biases more specific to social anxiety in order to investigate these pathways. First, a modified version of the dot-probe task was employed utilising pairs of facial stimuli as this appears more representational of real-life threat cues. Second, the shorter presentation interval (500ms) commonly used by most studies (Bradley et al., 1998; Bradley et al., 2000; Mansell et al., 1999) was applied in order for the stimuli to be consciously perceived for a cognisant bias to be detected. Third, an undergraduate sample of non-clinical participants were sought, with final sample selection favouring those scoring in the mid to high range of social anxiety symptoms experienced. This was determined on the basis that a threshold effect appears evident with the transition from low to medium anxiety levels resulting in attentional bias observations (Bradley et al., 2000). Fourth, in order to

specifically assess attentional biases for social anxiety rather than more generalised trait anxiety, participants were tested under conditions of social-evaluative threat similar to that of Mansell et al. (1999). Fifth, a further modification was made regarding testing conditions to extend previous literature by testing participants in groups of two to four individuals to assess whether group testing influenced the outcome of these pathways, rather than testing individually. Finally, measures of trait anxiety, positive and negative affect were taken in order to determine whether differences observed were due to individual differences in propensity to social anxiety or to more general differences in generalised trait anxiety, or negative or positive affectivity. Thus, based on cognitive-behavioural theories of social anxiety and previous literature, a series of *a priori* hypotheses were generated. Consistent with previous research, it was predicted that under conditions of social-evaluative threat, social anxiety would be associated with an avoidance of angry compared to neutral facial stimuli, along with an avoidance of happy compared to neutral facial stimuli. It was also expected that FNE would either completely or partially mediate the relationship between social anxiety and attentional avoidance of angry facial stimuli, and that FPE would either completely or partially mediate the relationship between social anxiety and attentional avoidance of happy facial stimuli.

Method

Participants

A total of 81 undergraduate students volunteered in exchange for partial course credit. Students with social/performance anxiety experiences were strongly encouraged to participate in order to yield a sample of individuals scoring higher than non-anxious samples on mean levels of social anxiety. Only those scoring in the middle and upper quartile ranges (a total score of > 27) on the Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998) were used in the analysis ($n = 40$). The SIAS was deemed an appropriate measure of

selection given that participants were tested in groups. Selection criteria based on social interaction anxiety (SIAS) was determined as more relevant to the group testing conditions as opposed to more general social phobia symptoms measured by the Social Phobia Scale (SPS; Mattick & Clark, 1998). Another two participants were further excluded due to being assessed without the presence of an audience. Thus, the final sample consisted of 38 participants (11 males, 27 females) with an age range of 17 to 40 years ($M = 23.00$, $SD = 6.35$). All participants indicated they had normal or corrected-to-normal vision.

Measures

State and trait anxiety. The 40-item State-Trait Anxiety Inventory (STAI; Spielberger, 1983) was used to measure anxiety symptoms. The State subscale of the STAI was used to assess change in participant anxiety following exposure to the social threat. This was assessed both prior to (STAI-S baseline) and after the social threat induction (STAI-S post). The Trait subscale of the STAI was used to assess trait levels of anxiety symptoms.

Social anxiety. The Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998) and Social Phobia Scale (SPS; Mattick & Clarke, 1998) are companion scales designed to measure fear of social interaction in dyads or groups, and the fear of being observed, respectively. Each questionnaire is a 20-item measure which uses a Likert-type scale ranging from 0 (*not at all characteristic or true of me*) to 4 (*extremely characteristic or true of me*) with participants indicating the extent to which the statement is characteristic of them (e.g., SIAS; *I have difficulty making eye-contact with others*; e.g., SPS; *I can get tense when I speak in front of other people*).

Fear of negative evaluation. The Brief Fear of Negative Evaluation Scale (BFNE; Leary, 1983) is a 12-item scale used to assess participants' fear of negative evaluation by others. Responses range from 0 (*not at all characteristic of me*) to 4 (*extremely characteristic of me*). The BFNE has shown good four-week test-retest reliability ($r = .75$;

Leary, 1983), along with excellent internal consistency ($\alpha = .92$), factorial validity, and construct validity in undergraduate (Rodebaugh et al., 2004) and clinical samples (Weeks et al., 2005).

Fear of positive evaluation. The Fear of Positive Evaluation Scale (FPES; Weeks, Heimberg, & Rodebaugh, 2008) is a 10-item scale used to measure fear of positive evaluation from others, with items structured to incorporate social hierarchy dynamics. The FPES uses a 10-point Likert-type scale, ranging from 0 (*not at all true*) to 9 (*very true*), to indicate the extent to which each item pertains to individuals that he or she “does not know very well” (e.g., *I generally feel uncomfortable when people give me compliments*). The FPES has demonstrated good internal consistency ($\alpha = .80$), and five-week test-retest reliability ($r = .70$) in undergraduate samples (Weeks, Heimberg, & Rodebaugh, 2008). This measure has also demonstrated strong convergent and discriminant validity (Weeks, Heimberg, & Rodebaugh, 2008; Weeks, Heimberg, Rodebaugh, & Norton, 2008).

Positive and negative affect. Participants completed the Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988) in order to assess positive and negative mood state during the past week. Using a 5-point Likert-type scale from 1 (*very slightly, or not at all*) to 5 (*extremely*), participants indicated the extent to which they felt a given emotion (e.g., *Irritable*).

Video for social threat induction. A video recording depicted a female student delivering a three-minute speech about business privatisation in the city where the experiment was conducted. The student was seated in front of a video camera, at a range of approximately two metres.

Facial stimuli. The NimStim Faces Set (Tottenham et al, 2009) is a valid and reliable standard set of facial images, depicting differing emotional expressions. Twenty-four colour photographs taken from the NimStim Faces Set were used for the dot-probe task.

Photographs were the same as that used by Mogg, Holmes, Garner and Bradley (2008) comprising eight male individuals (models 23, 24, 29, 33, 34, 37, 40, and 42; each face with an open mouth). Three different emotional expressions were portrayed by each individual, namely angry, happy and neutral. Each face pair, including angry-neutral, happy-neutral, and angry-happy, depicted the same individual and each individual was shown twice for each pair of photographs.

Dot-probe task. The DMDX experimental software package (Forster & Forster, 2003) was used to administer a pictorial version of the dot-probe task which was conducted on an IBM-compatible computer with a 17inch LCD screen. All eight facial stimuli sets were presented as pairs of photographs comprising angry-neutral, happy-neutral, and angry-happy faces. Each face pair of photos was presented 32 times and counterbalanced for photo presentation (left, right) and probe position (left, right) resulting in four combinations per pair. The order of trials was randomised for each participant and consisted of 10 practice trials followed by 96 experimental trials.

Participants were seated with their eyes 80cm from the monitor and level with the centre of the screen. Colour images (45 × 70mm) were displayed on a black background, with a distance of 70mm between the inner edges of the two photos and a distance of 115mm between the two probe positions.

Beginning with the presentation of a white central fixation cross displayed for 500ms and then followed by a face pair for 500ms, participants were required to locate a single, small, white dot-probe (5mm diameter) which followed immediately in the location of one of the faces, by pressing the left or right <Shift> key on the keyboard within 2000ms. The inter-trial duration varied randomly between 750 and 1250 ms to prevent participants responding in a rhythmic pattern. Reaction times and errors locating the probe were measured.

Procedure

Participants attended in groups of two to four people in order to generate fear associated with a perceived audience. After obtaining written consent, demographics and baseline levels of anxiety were measured using the STAI-S. Subsequently, participants were directed to another room and seated in a group where they were given a standardised social threat induction as adapted from Mansell et al. (1999): “Part of this experiment is an assessment of your social skills and public speaking ability. At the end of the experiment you will be required to deliver an impromptu three-minute speech about a self-chosen topic that will be video recorded and rated by other students for its quality. You will have thirty seconds to prepare before I start the camera and you begin the speech.” Participants were then shown a video which they were told was of a previous participant giving an impromptu speech, in order to ensure further speech performance anxiety. After the video, participants were guided back to separate computers and completed self-report measures including a post induction measure of the STAI-S in conjunction with the STAI-T, SIAS, SPS, BFNE, FPES and PANAS.

Once participants completed all questionnaires, instructions regarding the dot-probe task were given verbally, commencing with ten practice trials to ensure familiarity with the task before carrying out the full experimental trial. On completion of the dot-probe task, participants were directed back into the anxiety induction room as a group where they were advised that they do not need to perform an impromptu speech. Participants were debriefed and advised to remain in the experimental room until their anxiety reduced to a manageable level.

Data Preparation and Preliminary Analysis

Dot-probe task. Data analysis for the dot-probe task was based on reaction times for correct responses. Response latency data was prepared in keeping with recommendations from Ratcliff (1993). First, reaction times (RTs) for errors were removed from the data. For

each participant, outliers were removed by excluding response latencies less than 200ms or greater than 2000ms and ± 2 *SD* from each participant's mean response latency. Mean reaction times were calculated for each combination of the experimental trials, and were averaged across all valid responses to produce a mean score. An index of attentional bias was then calculated from the RT data for each emotional face pair. The bias score was calculated by subtracting the mean RT when the emotional face and probe were in the same position, from the mean RT when the emotional face and probe were in different positions.

$$\text{Bias Score: } 0.5 \times ((\text{FRPL} - \text{FLPL}) + (\text{FLPR} - \text{FRPR}))$$

Where F = emotional face, R = right position, P = probe, L = left position. Positive values of the bias score for angry faces reflect faster RTs when the probe appears in the same position as angry rather than neutral faces, indicating vigilance toward angry faces, whereas negative values signify an avoidance of angry faces. Attentional bias scores were similarly calculated for the happy-neutral and angry-happy face pairs.

Analyses. All analyses were conducted using SPSS, using a critical α level of 0.05. There were no univariate or multivariate outliers. Bootstrapping methods were used to test for significance of the mediation analyses, and effect sizes are reported as standardised coefficients.

Results

The means, standard deviations and ranges of all the measures used and attentional bias scores are presented in Table 1. A paired samples *t*-test revealed a statistically significant difference between STAI-S baseline and post-induction scores ($t_{(37)} = 9.35, p < .001$), with higher anxiety scores after induction, indicating that the social threat induction increased participant's state anxiety.

Mediation Analyses

In order to evaluate the presence of mediating effects, Baron and Kenny's (1986) conditions required to statistically test mediation were employed. Table 2 presents bivariate correlations between measures, demonstrating that conditions were only satisfied to test mediation with FPE mediating the relationship between social anxiety (SPS) and an attentional bias away from angry faces (Angry/Neutral bias).

Bootstrapping methods were used to test the hypothesis that FPE mediates the relationship between social anxiety and an attentional avoidance of angry faces (Preacher & Hayes, 2004; Shrout & Bolger, 2002). Bootstrapping is a non-parametric technique that provides a sensitive way of determining whether the indirect effect of the independent variable (SPS) on the dependent variable (Angry/Neutral bias: Attentional bias away from angry faces) through the mediator (FPE) is statistically significant in smaller samples. Unlike the Sobel test (1982), bootstrapping tests the indirect effect through the development of confidence intervals, making no assumptions about the shape of the sampling distribution of the indirect effect, which is inclined to be asymmetric (Preacher & Hayes, 2004; Shrout & Bolger, 2002). Figure 1 presents results of the mediating model for the 95% confidence interval of the indirect path (*ab*) obtained using 5000 resamples.

Social anxiety and FPE accounted for significant variance in attentional bias away from angry faces, $R^2 = .21$, $F_{(2, 35)} = 4.52$, $p = .02$. Higher levels of social anxiety was associated with greater avoidance of angry faces when social anxiety was entered alone in the regression model, $\beta = -.32$, $t_{(36)} = 2.04$, $p = .05$ (path *c*) and was positively associated with FPE, $\beta = .34$, $t_{(36)} = 2.16$, $p = .04$ (path *a*). Furthermore, higher levels of FPE predicted a greater avoidance of angry faces while controlling for level of social anxiety, $\beta = -.34$, $t_{(36)} = 2.11$, $p = .04$ (path *b*). The indirect effect (*ab*) of social anxiety through FPE for an attentional avoidance of angry faces was significant such that the 95% confidence interval did not overlap with zero (lower limit = -.3320, upper limit = -.0095). The direct effect of social

anxiety on attentional bias away from angry faces was no longer significant when controlling for FPE, supporting full mediation, $\beta = -.21$, $t_{(36)} = -1.30$, $p = .20$ (path c').

Mediation Analyses Controlling for Group Size and Positive Affect

To examine whether the number of participants in each group, FNE, current level of positive and negative affect, or trait anxiety accounted for the previous mediation model, the analyses were repeated after first entering group size and positive affect (PANAS-PA) as covariates, and subsequently with FNE (BFNE), negative affect (PANAS-NA), and trait anxiety (STAI-T) as covariates.

Group size, $\beta = .15$, $t_{(34)} = .93$, $p = .36$, and Positive affect, $\beta = .02$, $t_{(34)} = .114$, $p = .91$, were entered separately as covariates and were not significant predictors in the regression model. Furthermore, the indirect effect of social anxiety on an attentional avoidance of angry faces through FPE remained significant when group size (95% confidence interval: lower limit = $-.3698$, upper limit = $-.0042$) and positive affect (95% confidence interval: lower limit = $-.3636$, upper limit = $-.0057$) were entered as covariates, indicating that the number of participants in a group and positive affect did not influence the outcome of the mediated path.

Mediation Analyses Controlling for FNE, Negative Affect and Trait Anxiety

FNE, $\beta = -.01$, $t_{(34)} = -.04$, $p = .97$, negative affect, $\beta = .04$, $t_{(34)} = .215$, $p = .83$, and trait anxiety, $\beta = -.06$, $t_{(34)} = -.29$, $p = .77$, were entered separately as covariates and were also non-significant predictors in the regression model. However, the indirect effect of social anxiety on an attentional avoidance of angry faces through FPE was no longer significant when, FNE (95% confidence interval: lower limit = $-.3197$, upper limit = $.0084$), negative affect (95% confidence interval: lower limit = $-.4766$, upper limit = $.0321$), and trait anxiety (95% confidence interval: lower limit = $-.2686$, upper limit = $.0714$) were entered as covariates, indicating that FNE, negative affect, and trait anxiety contributed to the mediated pathway.

Discussion

Cognitive-behavioural theories of social anxiety place emphasis on the preferential allocation of attentional resources to threat, and excessive self-focused attention due to fears of evaluation (Clark & Wells, 1995; Hirsch & Clark, 2004; Rapee & Heimberg, 1997). However, when socially anxious participants are tested under conditions of social-evaluative threat, the bias pattern found is avoidance of angry faces relative to neutral faces and avoidance of happy faces compared to neutral faces using a pictorial dot-probe task (Mansell et al., 1999; Taylor et al., 2010). Thus, the *a priori* aims of the current study were to examine whether FNE mediates the relationship between social anxiety and an attentional avoidance of angry facial stimuli, and whether FPE mediates the relationship between social anxiety and an avoidance of happy facial stimuli. Other potential mediating effects were also examined. The following sections provide a summary of the study's findings, integration with previous research, implications, limitations of the current study and recommendations for future research within the field.

Summary of Findings

Higher levels of social anxiety were associated with a greater avoidance of angry facial stimuli relative to neutral faces. On the other hand, the association between social anxiety and an avoidance of happy facial stimuli relative to neutral faces was not evidenced as predicted. A possible reason for this discrepant finding may be due to suggestions by some, that the tendency to shift attention away from happy faces relative to neutral faces may be associated with increased dysphoria (Bradley et al., 1998; Bradley et al., 2000) rather than social anxiety per se.

Both the hypothesised mediation models could not be tested due to the absence of an association between FNE and an avoidance of angry facial stimuli, and the non-significant relationship between FPE and an avoidance of happy facial stimuli. The direction of these

relationships were in the expected direction, however the small sample size ($n = 38$) in the present study may have lacked sufficient power to detect this effect at the level of statistical significance. Furthermore, it is noteworthy to mention that the relationship between FPE and an avoidance of happy relative to neutral faces was numerically stronger ($r = -.29$) than any other variable. This suggests that FPE may be meaningfully related to attentional avoidance of happy faces. Despite this, conditions to examine FPE as a mediator between social anxiety and an avoidance of angry faces were met. Thus, the relationship between social anxiety and an avoidance of angry faces compared to neutral faces was explained by increased levels of FPE.

Both positive affect and the number of participants in a group did not affect the outcome of the mediated pathway, suggesting that the presence of an audience is not a function of group size for small groups such as used in this research. This corresponds with Rapee and Heimberg's (1997) cognitive-behavioural model of social anxiety, which posits that the presence of an "audience" may refer to only one other person, or a group of people, where there is potential for interaction or observation leading to evaluation by the audience. In contrast, FNE, negative affect and trait anxiety all contributed to the mediated pathway, indicating that general differences in participants' trait anxiety, FNE and negative affect had an influence on the outcome as opposed to individual differences in propensity to heightened speech anxiety (Mansell et al., 1999).

Integration with Previous Research

Results obtained in this study for angry and happy facial stimuli used in the modified dot-probe paradigm replicated previous research (Mansell et al., 1999). The finding that social anxiety was associated with an avoidance of angry facial stimuli is consistent with previous probe detection studies documenting that socially anxious individuals show a greater avoidance of angry facial stimuli under conditions of social-evaluative threat (Mansell

et al., 1999; Mansell, Clark, & Ehlers, 2003). Potential functional consequences of attentional avoidance under conditions of social-evaluative threat suggests a likely explanation: Avoiding eye contact, or looking away from other people's faces is likely to reduce particular aspects of threat for a socially anxious individual as it is more difficult for other people to engage them in conversation when eye contact is broken (Mansell et al., 1999). In accordance, attentional avoidance reduces some of the more threatening aspects of a social situation, by providing a psychological escape. This explanation concurs with cognitive-behavioural models of social anxiety (Clark & Wells, 1995; Hirsch & Clark, 2004; Rapee & Heimberg, 1997) which suggest that reduced attention to external social cues is accompanied by increased self-focused attention due to fears of evaluation which may maintain social anxiety.

The mediated outcome in the current study is consistent with the hypothesis that fear of evaluation *in general* is important to social anxiety (Weeks, Heimberg, & Rodebaugh, 2008). This adds to a small but growing empirical literature documenting the important contribution of FPE to conceptualisations of social anxiety (Weeks, Heimberg & Rodebaugh, 2008; Weeks, Heimberg, Rodebaugh & Norton, 2008).

The functional nature of avoidance of positive evaluation requires some elaboration. Consistent with psycho-evolutionary models of social anxiety (e.g., Gilbert, 2001), socially anxious individuals who “fear doing well” (FPE; Gilbert, 2001) may do so on the basis that it will draw attention to themselves and into direct competition for social attention. External cues, such as threatening angry faces, may trigger concerns of giving a positive impression that could be regarded as a threat by other members (Weeks et al., 2009), which may lead to safety behaviours resulting in avoidance as a defence mechanism. This finding also supports a central premise of the BFOE model (Weeks & Howell, 2012), that FPE is tied to increased concerns of appearing “too good” representing a distinct valence of social evaluation,

separate from FNE (Weeks, Heimberg, & Rodebaugh, 2008; Weeks, Heimberg, Rodebaugh, & Norton, 2008; Weeks et al., 2009). With that said, FNE, negative affect and trait anxiety each contributed to the mediated path, subsequently nullifying the significance of the outcome. Thus, the results of the mediation model should be interpreted with caution. This finding suggests that the effects of the mediation model may not be specific to social anxiety given that variance accounted for by co-occurring symptoms of FNE, negative affect and trait anxiety contributed to the pathway. Nonetheless, further research replicating our findings with a larger sample size is needed in order to make any final conclusions regarding the role of both FPE and FNE and their association to attentional biases.

Implications

The present findings have several implications for understanding and treating social anxiety. Central to conceptualisations of social anxiety has been the critical role of FNE (Rapee & Heimberg, 1997), however the present findings provide further support to a growing literature (Weeks, Heimberg, & Rodebaugh, 2008; Weeks, Heimberg, Rodebaugh, & Norton, 2008; Weeks et al., 2009) highlighting the important and unique contribution of FPE to conceptualisations of social anxiety. In this sense, FPE represents a distinct valence of social evaluation (Weeks & Howell, 2012), that provides impetus for further expansion of theoretical models of social anxiety (Clark & Wells, 1995; Hirsch & Clark, 2004).

Social phobia symptoms as measured by the SPS were associated only with angry-neutral attention bias, and not when happy faces were used in the stimulus pairs. The finding of a mediated model whereby the effect of social anxiety symptoms on attention bias was mediated by FPE is a novel finding that has not been assessed or observed previously. It is also noteworthy that we did not find a similar model with FNE as the mediator, or when happy human faces were used in the attention bias task. These findings provide further initial

support to the importance of the assessment of FPE in social anxiety, highlighting the potentially unique associations of FPE with other important social anxiety constructs.

It has been suggested that cognitive-behavioural therapy should incorporate FPE focussed strategies to address FPE-related automatic thoughts, along with implementation of *in vivo* exposures to challenge FPE-related fears (Weeks, Heimberg, & Rodebaugh, 2008). According to the present findings, cognitive-behavioural interventions involving FPE-related strategies may reduce cognitive symptoms of SAD leading to diminished behavioural avoidance of external threat-relevant cues used as a defence mechanism. This in turn, should alleviate anxiety associated with these fears.

Limitations of the Current Study and Future Directions

Despite this novel finding from the current research, several limitations and ideas for future research must be mentioned. First, the data obtained in the present study was acquired from an undergraduate sample. Although findings provide support for the unique contribution of FPE toward explanations of the attentional bias that is characteristic of social anxiety, it is unclear how well these findings can be generalised to clinical and community samples. Nonetheless, the final sample consisted of individuals scoring higher than non-anxious samples on mean levels of social anxiety. Second, while statistical mediation was successfully demonstrated, the cross-sectional design restricted the ability to explicate causal relationships among variables, thus longitudinal designs are necessary before more definitive causal inferences can be made.

Third, the study's findings may be susceptible to cohort, or group effects. Given that group sessions were conducted with different participants at different times, results may have been influenced by other factors unaccounted for, such as familiarity with the audience for particular participants, or day of testing.

Fourth, although two measures of social anxiety were assessed (SPS; SIAS), a significant association was only found between the SPS (and not the SIAS) and an avoidance of angry faces. Given that each measure is used to assess differing aspects of social fears that feature prominently in social anxiety (Mattick & Clark, 1998), results from the mediation model were in the context of participants' belief that they would be required to deliver an impromptu speech. The SPS was developed to measure the fear of being observed, thus the significant association found between the SPS and an avoidance of angry faces may have been more relevant compared to the SIAS in the context of the study design.

Fifth, although the 500ms stimulus presentation time used in the current study is the most commonly applied duration to detect biases as demonstrated by previous research (Bradley et al., 1998; Bradley et al., 2000; Mansell et al., 1999), it has been suggested that such a duration may be long enough to allow multiple shifts of attention (Mogg et al., 2000). For example, it is possible that socially anxious individuals under conditions of social-evaluative threat may have shown vigilance toward threat faces, as opposed to an avoidance of threat, if the stimuli had been presented for shorter durations. Despite this possibility, it appears that the absence of a vigilance effect for threat was not just a function of stimulus duration, given that anxiety-related vigilance for threat has also frequently been observed at this duration in the dot-probe paradigm (Bradley et al., 2000; Bradley et al., 1998). Nonetheless, future research using shorter stimulus durations are needed to definitively assess this possibility. Furthermore, it would be worthwhile to employ paradigms that go beyond observed behaviour, such as the use of eye-tracking devices, in order to index the timing of these biases. For example, it's been suggested that dot-probe tasks produce only a snapshot of attention, at a single point in time (Chen, Clarke, Macleod, & Guastella, 2012). Although dot-probe tasks provide a sensitive measure of covert attentional shifts (Bradley et al., 2000), dot-probe bias scores have been criticised for having low reliability, which tends to vary

depending on the experimental methodology used (Waechter, Nelson, Wright, Hyatt, & Oakman, 2013). Eye tracking allows for overt assessments of attention (Chen et al., 2012). Therefore, it would be of interest to examine whether the present mediated results can be replicated using overt behavioural response latencies in socially anxious individuals.

Clinically, another fruitful avenue for research may be to incorporate FPE-related interventions to socially anxious individuals in order to assess whether this does indeed diminish attentional avoidance to external negative cues. The consequences of such research would further illustrate the importance of FPE in terms of its contribution to social anxiety, and expand upon the current findings by providing added confirmation toward addressing this construct in treating those with SAD.

Conclusion

In conclusion, the current findings are encouraging given that they are the first to address the unique contribution of FPE in explaining the relationship between social anxiety and an avoidance of angry faces under conditions of concurrent social-evaluative threat. Such findings provide added insight with respect to the underlying aetiology and maintenance of SAD and add to the nascent literature which promotes the importance of FPE to conceptualisations of social anxiety. In this manner, greater understanding of this clinical condition should facilitate expansion of the assessment and treatment interventions for those with SAD.

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Table 1.

Means, standard deviations, and range of scores for the primary measures (N=38)

Measure	<i>M</i>	<i>SD</i>	Minimum	Maximum
STAI-S (Baseline)	17.47	10.17	0	43
STAI-S (Post-anxiety)	35.21	13.80	7	57
STAI-T	27.42	8.93	11	43
SIAS*	45.13	12.20	29	75
SPS*	33.42	15.28	8	67
BFNE*	31.50	7.80	12	46
FPES*	37.16	12.10	18	67
PANAS-NA	22.84	6.73	10	38
PANAS-PA	31.16	7.81	17	45
Angry/Neutral bias	5.41	17.64	-34.50	43.40
Happy/Neutral bias	-2.19	18.76	-27.15	58.15
Angry/Happy bias	9.26	15.55	-20.05	61.80

Note: STAI-S = Spielberger State and Trait Anxiety Inventory-State version; STAI-T = Spielberger State and Trait Anxiety Inventory-Trait version; SIAS = Social Interaction Anxiety Inventory; SPS = Social Phobia Scale; BFNE = Brief Fear of Negative Evaluation Scale; FPES = Fear of Positive Evaluation Scale; PANAS-NA = Positive and Negative Affect Scale-Negative Affect Scale; PANAS-PA = Positive and Negative Affect Scale-Positive Affect Scale. *Undergraduate sample means of measures from other studies: SIAS = 19.00-23.03; SPS = 13.25-14.1; BFNE = 19.72-20.65; FPES = 22.26-23.39 (Mattick & Clark, 1998; Weeks, Heimberg, & Rodebaugh, 2008; Weeks Heimberg, Rodebaugh, & Norton, 2008; Weeks & Howell, 2012; Weeks et al., 2009). When comparing sample means, note that the current sample consisted of only moderate to high socially anxious participants.

Table 2.

Bivariate Correlation Matrix and Internal Consistency Statistics

Measure	1	2	3	4	5	6	7	8	9	10	11	12
1 STAI-S (Baseline)	(.92)											
2 STAI-S (Post)	.56**	(.95)										
3 STAI-T	.63**	.63**	(.90)									
4 SIAS	.60**	.55**	.72**	(.88)								
5 SPS	.60**	.54**	.57**	.56**	(.92)							
6 BFNE	.22	.40*	.69**	.58**	.43**	(.88)						
7 FPES	.29	.12	.43**	.48**	.34*	.32*	(.74)					
8 PANAS-NA	.77**	.68**	.63**	.57**	.63**	.35*	.25	(.83)				
9 PANAS-PA	-.44**	-.35*	-.56**	-.32	-.20	-.16	-.23	-.29	(.90)			
10 Angry/Neutral bias	-.18	-.28	-.30	-.20	-.32*	-.20	-.41*	-.19	.14			
11 Happy/Neutral bias	-.20	.22	-.10	-.13	.02	-.17	-.29	.07	.00	.16		
12 Angry/Happy bias	-.02	-.15	-.13	-.13	.05	-.16	-.01	-.04	.28	.06	.05	
13 Group Size	.04	.04	-.01	.00	-.07	.05	-.26	-.09	-.08	.24	.01	.27

Note. * $p < .05$, ** $p < .01$, Internal consistency measures (Cronbach's α) are shown on the diagonal for multi-item questionnaires. STAI-S = Spielberger State and Trait Anxiety Inventory-State version; STAI-T = Spielberger State and Trait Anxiety Inventory-Trait version; SIAS = Social Interaction Anxiety Inventory; SPS = Social Phobia Scale; BFNE = Brief Fear of Negative Evaluation Scale; FPES = Fear of Positive Evaluation Scale; PANAS-NA = Positive and Negative Affect Scale-Negative Affect Scale; PANAS-PA = Positive and Negative Affect Scale-Positive Affect Scale

Figure 1. Mediation model for fear of positive evaluation as a mediator between social anxiety and attentional bias toward angry faces with standardised regression coefficients ($*p < .05$). The indirect effect (ab) was significant at the 95% confidence interval (lower limit = $-.3320$, upper limit = $-.0095$).

Note: Negative path coefficients involving “Attention bias towards angry faces” indicate avoidance