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Fear of Negative Evaluation, Social Anxiety and Response to Positive and Negative Online Social Cues

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Abstract

High social anxiety is associated with negative interpretations of social feedback, maladaptive attributions for success and failure, and excessive attention to internal and external threat cues. In the present study, 40 undergraduate participants with either high or low levels of social anxiety engaged in a series of social interactions with varying types of social feedback: negative, mixed-negative, mixed-positive, and positive. Given the increasing engagement in computer-mediated communication among individuals with high levels of social anxiety, these interactions took place via instant messaging software. Compared to participants with low social anxiety, participants with high social anxiety experienced more self-focused thoughts, negative thoughts, and state anxiety in response to increases in negative feedback. Participants with low social anxiety experienced fewer self-focused thoughts in response to increased negative feedback, resulting in a significant crossover interaction. Qualitative and quantitative differences regarding cognitive processes and computer-mediated communication among individuals with high and low social anxiety are discussed.

Keywords: social anxiety, fear of negative evaluation, social feedback, computer-mediated, communication, Internet use

Introduction

Social anxiety is a common experience that can range from mild, transient distress to excessive and persistent fear that leads to significant impairment (Rapee 1995). For example, a national survey revealed that 21.2% of American adults experience excessive public speaking anxiety (Ruscio et al. 2008), and many more are affected at a nonclinical level (Kessler et al. 2005).

Prominent models of social anxiety emphasize the importance of cognition. According to the cognitive model of Clark and Wells (1995), one distinctive characteristic of social anxiety is a set of dysfunctional beliefs and self-schemata regarding social interactions. For example, unconditional beliefs about the self ("I am inadequate"), perfectionistic standards for social performance ("I must be liked by everyone"), and beliefs about the consequences of social failure ("If I make a mistake, then I will be rejected") contribute to the development and maintenance of social anxiety (Clark and Wells 1995). Socially anxious individuals may also form mental representations of themselves informed by physical sensations, thoughts, behaviors, and perceived external feedback, which are then compared to their excessively high standards (Heimberg et al. 2010). Heimberg et al. (2010) posit that social anxiety is maintained by the discrepancy between the mental representation of the self and the high personal standards for performance. Both of these models indicate a strong cognitive component of social anxiety disorder involving negative beliefs about the self and distorted views of social events.

Negative beliefs and self-evaluations are maintained by various types of biases in social information processing (Hirsch and Clark 2004). Specifically, socially anxious individuals have demonstrated excessive self-monitoring (Clark and Wells 1995) and excessive attention to threatening social stimuli (Heimberg et al. 2010; Asmundson and Stein 1994; Hope et al. 1990). Socially anxious individuals also tend to interpret social information in an overly negative way (Beard and Amir 2009; Hirsch and Clark 2004) and attribute positive social feedback to factors other than personal ability (Wallace and Alden 1995; Alden et al. 2008). Additionally, emerging evidence suggests that socially anxious individuals experience fear in response to both negative and positive evaluation (Weeks et al. 2010). Thus, socially anxious individuals have demonstrated biases at multiple levels of cognition including attention, interpretation, and thought content, which all contribute to the maintenance of social anxiety.

While most of the literature on cognitive bias in socially anxious individuals has used multiple-choice measures and rank ordering tasks, some have employed thought listing techniques to achieve a more direct assessment of cognitive content. Thought listing has been used to examine various aspects of cognition in socially anxious individuals including rumination, focus of attention, and social expectancies (Vassilopoulos 2008; Chansky and Kendall 1997; Hofmann 2000). Most of these studies have examined the percentages or ratios of thoughts rated based on valence and focus of attention according to the technique of Cacioppo et al. (1997). However, studies of interpretation bias have tended to utilize more closed or force-choice formats (e.g., Stopa and Clark 2000).

The traditional methodology used in interpretation bias research relies on participants rank ordering a set of interpretations of hypothetical social events. This represents a methodological weakness as rank ordering depends on the relative positioning of the options and not strictly the individual's beliefs about the social event. Although Stopa and Clark (2000) incorporated open-ended responses to ambiguous social feedback, they did not measure interpretation bias related to the individuals' own experience of social anxiety. Personal investment in the scenario is also important in investigating interpretation bias as socially anxious individuals have been shown to evaluate themselves differently in social events than they evaluate others or hypothetical characters (Stopa and Clark 1993).

To date, no study has compared the cognitive content of high and low socially anxious individuals under varying levels of critical feedback to understand how interpretation bias may be reflected in cognitive content. Furthermore, nearly all of the existing research on interpretation bias has made use of between-groups designs in which one group receives negative or positive feedback and the other receives neutral feedback (e.g., Constans et al. 1999; Stopa and Clark 2000). In a pilot study (Chappell and Ham 2012), it appeared that the cognitive and affective responses of high and low socially anxious participants were overly dependent on how explicit and robust the operationalization of the social feedback was. Non-socially anxious participants became anxious but still had positive thoughts in the negative feedback condition. The ambiguity of a neutral feedback condition elicited excessive anxiety among socially anxious participants. No known studies have used within-groups designs in which the participants experience a series of social interactions with varying types of feedback. A within-groups design varying social feedback across a number of social interactions may reveal shifts in thought patterns, such how positive feedback must be to evoke more positive cognitive and affective reactions in socially anxious individuals. Conversely, it may reveal whether individuals with low levels of social anxiety ever exhibit the negative self-focused thoughts characteristic of high social anxiety when presented with negative feedback. A within-groups design is consistent with real-world interactions in which different people vary in their reactions and social feedback. The pilot study also revealed the challenges of carefully titrating amounts of positive and negative exchanges in face-to-face interactions. A method of maintaining experimental control while keeping interactions realistic is needed.

Computer-Mediated Communication

Computer-mediated communication (CMC) refers to any interpersonal interaction that takes place through the use of computers, particularly via the internet (Lamerichs and Te Molder 2003). Trefflich et al. (2014) reported that 99% of American college students and 79.5% of the general population are active internet users. The same survey indicated that 90% of college student internet users go online every day to engage in computer-mediated communication. Some studies have found that socially anxious individuals are even more likely to use the internet for social interaction (e.g., Morahan-Martin and Schumacher 2003). Caplan (2007) found that socially anxious individuals report a strong preference for CMC over face-to-face (FtF) social interaction, presumably due to the increased control

over self-presentation. However, in a survey by Erwin et al. (2004), socially anxious individuals reported that their existing beliefs that people are critical and rejecting are reinforced through internet use and CMC. Erwin et al. (2004) also found that CMC can provide social support that is difficult for socially anxious individuals to obtain elsewhere, though the sense of security offered by the internet may also enable individuals with social anxiety to avoid face-to-face social interaction.

Of course, social interaction via the internet has some important differences compared to FtF interaction. Caplan (2007) points to a lack of nonverbal cues as an appealing characteristic of CMC for socially anxious individuals. However, newer studies indicate that recent developments in CMC have reintroduced those nonverbal cues through the use of emoticons, images, avatars, and video (Derks et al. 2008). Derks et al. (2008) found that emoticons can act as nonverbal communication in that they reflect and enhance semantic meaning in CMC. Importantly, this can lead to the same type of ambiguity experienced in FtF communication, in which nonverbal cues can be interpreted differently depending on the individual and on the incongruence of the nonverbal cue with the verbal message (Constans et al. 1999).

In one of few CMC-based studies addressing cognitive biases, Heeren et al. (2012) employed an online ball game task to nonverbally induce social exclusion. Some participants completed a dot-probe task to induce attentional bias to threatening stimuli prior to playing the game while others did not. The participants in the attentional bias induction group experienced more social anxiety when they were excluded during the Cyberball game than the individuals who were not primed to attend to threatening stimuli (Heeren et al. 2012). The results of this study indicate that nonverbal cues in CMC can be powerful, and that cognitive biases demonstrated in FtF interactions may also be present in CMC. However, no known studies have used the Cyberball task or other CMC tasks to examine interpretation bias in socially anxious individuals.

Due to the complex relationship between social anxiety and computer-mediated communication, it is important that more research be conducted in this area. Fortunately, using CMC may also solve some of the previous methodological issues in studying interpretation bias in socially anxious individuals. Unlike studies using vignettes, a CMC task increases external validity by placing individuals in social situations in which they are personally engaged. CMC methodology also provides increased control over the content of social interactions compared to studies with FtF social interaction tasks, thus reducing procedural nonequivalence for each participant. While this may also reduce the subtleties of nonverbal cues, there is evidence that these can be reintroduced using a variety of nonverbal online cues (Derks et al. 2008). Compared to FtF tasks, CMC makes it easier to collect data throughout the social interaction. Detailed timing and content of response are easily available in CMC and participants can readily switch between windows to answer questions in real time about the interaction without disrupting the conversation.

Hypotheses

The primary purpose of the present study was to examine the effects of varying degrees of positive and negative feedback on state anxiety and cognition about social interactions in socially anxious individuals and non-socially anxious individuals. We hypothesized that

participants with high levels of social anxiety would experience more state anxiety, more negative thoughts, and more self-focused thoughts in response to more negative social feedback compared to participants with low levels of social anxiety. We predicted that participants with high social anxiety would report an increase in positive thoughts only in the most positive condition, while participants with low social anxiety would increase positive thoughts with each condition containing more positive feedback. Another purpose of the present study was to investigate the feasibility of computer-mediated communication as a methodological tool for studying social anxiety.

Method

Participants

Participants were recruited from an undergraduate psychology student pool at a large Midwestern university. Students in this pool completed a number of screening measures for several studies across eight different labs. They received invitations from up to 25 different studies throughout the semester and they had a choice of which ones they would like to accept. The present study was one of approximately 25 studies being conducted at the time using the mass screening student pool. Students scoring in the highest quartile ($M = 37.45$, $SD = 3.97$) and lowest quartile ($M = 13.45$, $SD = 4.51$) on the Brief Fear of Negative Evaluation scale (BFNE; Leary 1983) were invited to participate in the present study. These scores are within one standard deviation of BFNE scores from a previous study involving a clinical sample ($M = 46.1$, $SD = 9.5$) (Weeks et al. 2005). Of 1252 students who completed mass screening across two semesters, 220 students consented to being contacted for future studies and also met the BFNE criteria. Invitations were sent to 160 potential participants ($n = 84$ lowest quartile, $n = 76$ highest quartile). In total, 42 individuals agreed to be in the study. Mass screening data from the two semesters were later combined to determine the final BFNE quartiles. As a result, two participants' data were excluded because they no longer fell in the highest quartile. No participants opted to withdraw from the study. The remaining participants from the high social anxiety group (HSA; $n = 20$) and the low social anxiety group (LSA; $n = 20$) were included in data analyses.

In the present sample, 60% of participants were women ($n = 24$) and the average age was 19.13 years ($SD = 1.62$). The majority of participants self-identified as European American/White ($n = 36$; 90%). A total of 2 participants (5%) identified as African American/Black, 1 participant (2.5%) identified as Hispanic/Latino, and 1 participant (2.5%) identified as Native American/American Indian. All participants self-identified as heterosexual except for one, who identified as bisexual (2.5%).

Design

The present study was a 2 (Fear of negative evaluation/ Social anxiety: high, low) \times 4 (Feedback: negative, mixed-negative, mixed-positive, and positive) mixed factorial design with repeated measures on the second factor. Self-reported state anxiety and thought listing were the primary dependent variables.

Measures

Brief Fear of Negative Evaluation

The Brief Fear of Negative Evaluation (BFNE; Leary 1983) consists of 12 items that measure the extent to which participants fear that others have unfavorable views of them (i.e., fear of negative evaluation), a core feature of social anxiety disorder. Respondents are asked to rate how characteristic of them each item is on a scale ranging from 1 (Not at all characteristic of me) to 5 (Extremely characteristic of me). Total scores range from 12 to 60, with higher scores indicating higher levels of fear of negative evaluation. There is some evidence that eliminating reverse-worded items provides a score with greater convergent validity with other measures of social anxiety (Weeks et al. 2005). However, the original BFNE was used in the present study to maximize comparability with other studies utilizing similar samples and methodology (e.g., Stopa and Clark 2000). Also, the BFNE is highly correlated with self-report measures of social anxiety (e.g., Weeks and Howell 2012) and is not linked to specific feared situations, an important consideration given the heterogeneity of fears in social anxiety (Collins et al. 2005). Thus, the BFNE was used as a measure of social anxiety.

Subjective Units of Distress Scale (SUDS)

The Subjective Units of Distress Scale was used to assess the participants' subjective anxiety levels throughout the study. Participants were asked to report SUDS ratings on a 0 (No anxiety) to 100 (Highest anxiety level) scale before, during, and after each conversation.

Thought Listing

Thoughts were collected and rated based on the technique of Cacioppo et al. (1997). After each of four conversations, participants were asked to recall two thoughts they had during the conversation task. These thoughts were evaluated by two independent raters, both unaware of feedback condition and social anxiety group, for focus of attention and valence. Focus of attention was categorized as self-focused, other-focused (i.e., about the confederate), and situation-focused (i.e., about the topic or computer task itself). Valence was categorized as positive, negative, or unspecifiable. The observed Cohen's Kappa for focus of attention was .83 (95% CI .78–.89), and Cohen's Kappa for valence was .80 (95% CI .75–.86), indicating strong interrater reliability for both ratings. Discrepancies were reconciled by the principal investigator, who was also unaware of feedback condition.

Manipulation Check

After each conversation, participants answered five questions about their subjective experience during the conversation task. The key item asked participants to rate their conversation partners (the confederates) on how judgmental they seemed on a 5-point Likert-type scale (1 = Not at all, 5 = Extremely). Other items were included to enhance the plausibility of the study as an experiment examining how individuals get to know each other via the internet (e.g., "I was able to get to know my conversation partner during our conversation.").

Procedure

The procedure for the study was approved by the university's Institutional Review Board. Participants who met the BFNE screening criteria were contacted via e-mail and invited to participate in a study of social interactions on the internet. They were scheduled to meet in the research room with four confederates, whom the participants believed were other participants, and the experimenter. Care was taken by the experimenter to treat the participants and confederates the same from the beginning to the end of the study. After providing informed consent, the participant and confederates verbally introduced themselves to one another. This was done to increase the credibility of the confederates as other participants in the study. Each person was then assigned to a computer in one of two adjacent rooms. The experimenter positioned himself or herself between the doors to be able to address participants in both rooms simultaneously.

Each computer was equipped with Skype, an online video chatting and instant messaging software. The video chat feature was not used for the present study. After being assigned to a computer, the participant and confederates personalized their Skype profiles by taking a picture of themselves using a webcam and changing the profile name to their first name. The participant then completed self-report measures including demographic information and state anxiety (SUDS) on the computer.

After participants completed the initial measures, the experimenter verbally explained the study procedure. The experimenter, participant, and confederates joined a group instant messaging conversation on Skype where the experimenter provided instructions throughout the remainder of the study. The group was informed that they would have a conversation with each of the other four participants. For each conversation, the experimenter would announce a topic for everyone to discuss and then assign each participant to another participant as a conversation partner. These instructions took place in the group instant messaging conversation.

When the conversation partners were assigned, the participant opened a separate conversation window with the assigned partner and then discussed the topic for 5 min. Confederates not assigned to speak to the participant pretended to type as if they were discussing the topic with another participant. After 2 min, the experimenter gave a verbal cue to complete a SUDS rating in the questionnaire window and then return to the conversation. At the end of 5 min, the experimenter verbally cued the group to stop their conversations and provide a SUDS rating and two thoughts they had during the conversation. They also answered questions containing the manipulation check. Then, the group returned to the group instant messaging conversation to wait for the next assignment. Participants first completed a practice round with the experimenter as a conversation partner to ensure that they understand the procedure. They then completed a total of four conversations, one with each confederate who was assigned to provide one of four types of feedback (negative, mixed-negative, mixed-positive, or positive). The order of feedback conditions was counterbalanced and approximately two minutes were allowed between each conversation to avoid carryover effects.

Debriefing

Before debriefing participants about the confederates, participants were asked if they noticed anything unusual about the study or if they previously knew any of the other participants. Two participants noted that they were confused by some of the overly negative comments of the confederates because they did not think a typical undergraduate student would react in that manner. However, no participants guessed that their conversation partners were confederates. The experimenter explained to the participants that deception was necessary for the study to examine anxiety in a realistic social interaction. All participants verbally re-consented after the deception was revealed and all participants agreed not to share the study's deception with other potential participants.

Conversation Topics

Six topics were chosen from a popular book of discussion questions (Stock 1987) prior to the study and four were randomly selected for each participant. All of the topics contained a moral dilemma which forced an either/or opinion and created a situation in which the confederate could be friendly and agreeable or negative and judgmental, depending on the condition. Topics included hypothetical questions about euthanasia, willingness to commit murder to end world hunger, leaving a note after scratching a car, informing a server about a missing item on a restaurant bill, cheating on a test, and releasing a medication with a one percent fatality rate.

Confederates and Training

One male and 11 female undergraduate research assistants were trained on all feedback conditions and included in the study procedure on a rotational basis. Each research assistant completed multiple practice conversations which were rated by the principal investigator with the conditions masked. A selection of practice conversations were also rated by individuals unaware of the study procedure and hypotheses. Research assistants were allowed to act as confederates in the study after their practice conversations were determined to be consistent with one another and with written guidelines for each condition.

Guidelines for the four feedback conditions included specific phrases and nonspecific verbal and nonverbal cues to be incorporated in conversation. Confederates in the negative feedback condition disagreed with the opinion of the participant and included scripted comments such as, "That doesn't make sense. Explain it better." and, "You really wouldn't feel bad for hurting another person?" Nonverbal cues included increased response times, shorter responses, and not laughing at jokes made by the participant by typing "lol" or "haha," and emoticons when appropriate (Derks et al. 2008). By contrast, the mixed-negative condition involved the confederate disagreeing with the participant with mixed, but mostly negative, cues. Specific comments included, "Your reasoning does not make sense to me. Can you explain it differently?" Nonverbal cues were similar to those in the negative condition but to a lesser degree. Confederates aimed for 75% negative cues in the mixed-negative condition compared to 100% negative cues in the negative condition.

The positive and mixed-positive condition followed a similar pattern. In both conditions, confederates agreed with the opinions of the confederates. In the positive condition, the confederate was more enthusiastic and made comments such as, "That's a really good

point! I didn't even think about that!" Nonverbal cues included exclamation marks, emoticons, and increased participation in the conversation (quicker response time, helpful probes to maintain conversation flow). The positive and mixed-positive conditions aimed to be 100% and 75% positive, respectively. The order of feedback conditions was randomly assigned for each participant to control for order effects. All confederates gave feedback in all conditions.

Results

Preliminary Analyses

A Chi square test indicated that there were significantly more women in the HSA group compared to the LSA group, $\chi^2(1) = 6.67, p = .01, r = .41$. Given the potential confound presented by this difference, a series of one-way ANOVAs were conducted to examine differences between men and women on the primary dependent variables. The ANOVAs revealed no differences between men and women on SUDS, $F(1, 39) = 1.04, p = .31, d = .32$, the percentage of negative thoughts, $F(1, 39) = 1.43, p = .24, d = .37$, the percentage of positive thoughts, $F(1, 39) = 1.47, p = .23, d = .38$, or the percentage of self-focused thoughts, $F(1, 39) = 1.73, p = .20, d = .41$. These results suggested that significant differences in state anxiety and cognitions are unlikely to be due to gender. The HSA and LSA groups did not differ on age, $F(1, 39) = 0.01, p = .92, d = 0.03$, or ethnicity, $\chi^2(2) = 2.11, p = .55, r = .23$. Prior to the study, participants were asked a number of questions about their typical internet usage. Similar to recent studies (e.g., Jones et al. 2008), 95% of the present sample reported at least some internet use while 85% reported using the internet multiple times per day or more. Participants in the HSA group indicated more frequent use of the internet compared to the LSA group, $F(1, 39) = 7.48, p = .01, d = 0.85$. However, on days when participants used the internet there was no significant difference between the social anxiety groups in the number of hours spent online, $F(1, 39) = 0.76, p = .39, d = 0.27$. Differential familiarity with internet use did not present a confound between groups.

A series of analyses examined potential methodological confounds. The HSA and LSA groups did not differ on which of the six experimenters conducted the study procedure, $\chi^2(5) = 4.04, p = .54, r = .30$, or which of the 12 confederates provided feedback, $\chi^2(8) = 6.99, p = .54, r = .39$.

The data were examined for violations of statistical assumptions of normality. The thought listing data were within normal limits, with skewness of 0.34 ($SE = .37$) and kurtosis of -0.001 ($SE = .73$) for valence rating, and skewness of 0.77 ($SE = .38$) and kurtosis of -0.06 ($SE = .76$) for focus ratings. The SUDS data were non-normally distributed, with skewness of 1.55 ($SE = 0.37$) and kurtosis of 1.56 ($SE = 0.73$). Logarithmic transformation was performed to improve the normality of these data. The transformation was successful in reducing skewness to 0.21 and kurtosis to 0.46, placing them within normal limits. Results of all following analyses were conducted using the transformed data, but the raw means are reported to convey differences in the original scales.

Manipulation Check

The success of the experimental manipulation was assessed using participants' ratings of how judgmental their conversation partners were. A 2 (Social anxiety: high, low) × 4 (Feedback: negative, mixed-negative, mixed-positive, positive) mixed factorial ANOVA revealed a main effect of feedback, $F(3, 45) = 20.33, p < .001, \eta^2_p = .58$, but not for social anxiety, $F(3, 45) = 2.33, p = .15, \eta^2_p = .13$. The main effect of feedback indicated that each condition with more negative feedback resulted in more negative ratings compared to conditions with less negative feedback (using LSDmmd = .058). There was no significant interaction between social anxiety and feedback, $F(3, 45) = 2.23, p = .10, \eta^2_p = .13$. Table 1 shows the means for these ratings.

Table 1. Thought ratings and conversation partner ratings by social anxiety group and feedback type

Variable	Social anxiety group	Feedback type			
		Positive M (SD)	Mixed-positive M (SD)	Mixed-negative M (SD)	Negative M (SD)
Partner ratings	High	2.14 (0.69)	2.71 (1.11)	3.00 (0.58)	4.50 (0.53)
	Low	1.70 (0.67)	2.50 (0.85)	3.50 (0.71)	3.60 (1.07)
% Negative thoughts	High	7.50 (18.32)	12.50 (22.21)	57.5 (37.26)	92.50 (24.47)
	Low	2.50 (11.18)	7.50 (18.32)	32.50 (37.26)	45.00 (45.60)
% Positive thoughts	High	75.00 (34.41)	37.50 (41.68)	5.00 (15.39)	2.50 (11.18)
	Low	75.00 (34.41)	60.00 (42.53)	17.50 (29.36)	5.00 (12.54)
% Self-focused thoughts	High	30.00 (37.70)	40.00 (38.39)	42.50 (37.26)	57.50 (40.64)
	Low	50.00 (36.27)	47.50 (37.96)	35.00 (40.07)	17.50 (29.36)

For partner ratings, higher scores signify negative impressions of the conversation partner
SUDS Subjective Units of Discomfort Scale

State Anxiety

To examine the effect of the experimental manipulation on state anxiety, participants' *SUDS* ratings after each conversation were submitted to a two-way mixed factorial ANOVA. A significant main effect of social anxiety indicated that participants in the HSA group experienced more state anxiety throughout the study compared to participants in the LSA group, $F(1, 38) = 13.61, p = .001, \eta^2_p = .26$. A main effect of feedback condition indicated that, as expected, the sample as a whole experienced more state anxiety in the conditions with more negative feedback than in the conditions with less negative feedback, $F(3, 114) = 18.71, p < .001, \eta^2_p = .33$. *SUDS* declined significantly as each condition became more positive, except there was no difference between the mixed-positive and positive feedback conditions (using LSDmmd = 0.11).

A significant interaction, $F(3, 114) = 3.293, p = .02, \eta^2_p = .08$, revealed that participants in the HSA group reported significantly higher *SUDS* in every feedback condition except for the positive condition (using LSDmmd = 0.32). State anxiety increased as the amount of negative feedback increased for participants in the HSA group, but this pattern was not found for participants in the LSA group (using LSDmmd = 0.32). See Figure 1.

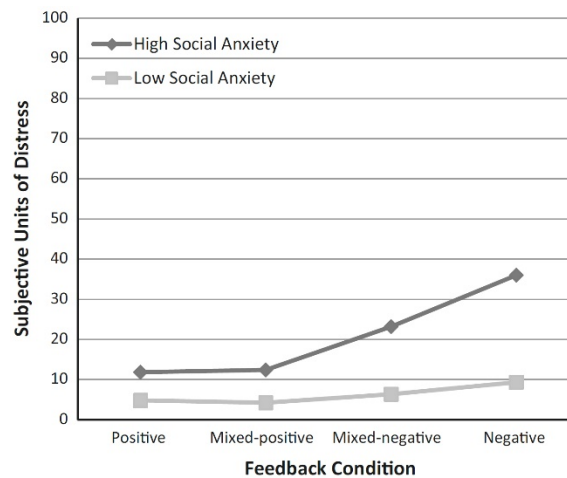


Figure 1. SUDS by social anxiety group and feedback condition. **Note:** SUDS Subjective Units of Discomfort Scale

Thoughts

Since participants provided multiple thoughts in each condition, these data were analyzed using the percentage of negative thoughts, percentage of positive thoughts, and percentage of self-focused thoughts within the full set of thoughts reported by each participant. Positive and negative ratings were mutually exclusive, but the valence and focus of attention ratings were not.

Valence

It was hypothesized that the HSA group would have more negative thoughts in each condition with more negative feedback, while the LSA group would only report more negative thoughts in the most negative condition. To examine this hypothesis, a two-way mixed factorial ANOVA was conducted using the percentage of thoughts rated as negative as the dependent variable. The Greenhouse-Geisser correction was used when Mauchly's Test of Sphericity was violated.

There was a main effect of feedback condition indicating that thoughts were more negative when more negative feedback was provided, $F(3, 114) = 52.55, p < .001, \eta^2_p = .58$. This effect was observed between each feedback condition except for the comparison between the mixed-positive and positive conditions (using $LSD_{mmd} = 12.74$). There was a main effect of social anxiety in that participants in the HSA group reported more negative thoughts overall, $F(1, 38) = 13.17, p = .001, \eta^2_p = .28$. Finally, there was a significant interaction between feedback condition and social anxiety, $F(3, 114) = 5.91, p = .002, \eta^2_p = .14$. See Figure 2. Both groups experienced more negative thoughts in the negative feedback conditions compared to the positive conditions, and tests of simple effects indicated that the difference across conditions was significantly greater for the HSA group. Further, the HSA group reported significantly more negative thoughts compared to the LSA group only in the two negative conditions. See Table 1.

It was hypothesized that participants in the HSA group would only report any positive thoughts in the most positive condition, while the LSA group would report increased positive thoughts with each increase in positive feedback. A two-way mixed factorial ANOVA was conducted using the percentage of participants' thoughts rated as positive as the dependent variable. The main effect of social anxiety was nonsignificant, $F(1, 38) = 0.27, p = .61, \eta^2_p = .007$. The main effect of feedback condition was significant in the expected direction, $F(3, 114) = 66.47, p < .001, \eta^2_p = .64$. Positive thoughts decreased as feedback became more negative except in the mixed-negative and negative comparison (using LSDmmd = 12.90). Means for each group and condition can be found in Table 1. There was a significant interaction between social anxiety and feedback condition, $F(3, 114) = 2.99, p = .04, \eta^2_p = .07$. For both social anxiety groups, percentage of positive thoughts increased significantly with each increase in positive feedback except for the comparison between the negative and mixed-negative conditions (using LSDmmd = 18.24). For participants in the HSA group, there was also no significant difference between the positive and mixed-positive conditions. See Figure 3.

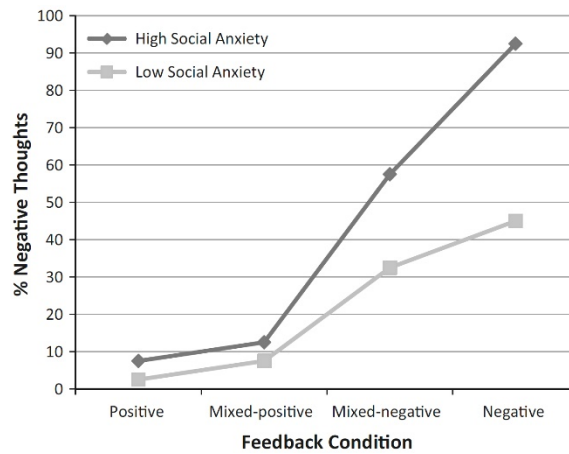


Figure 2. Percentage of negative thoughts by social anxiety group and feedback condition.

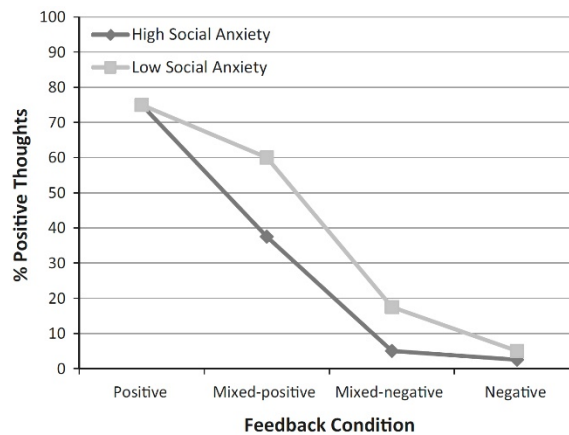


Figure 3. Percentage of positive thoughts by social anxiety group and feedback condition.

Focus

It was hypothesized that participants in the HSA group would report more self-focused thoughts in more negative conditions while participants in the LSA group would not differ across feedback conditions. A two-way mixed factorial ANOVA was conducted using the percentage of participants' thoughts that were rated as self-focused. The main effect of feedback condition was nonsignificant, $F(3, 114) = 0.22, p = .89, \eta^2_p = .006$. The main effect of social anxiety was also nonsignificant, $F(1, 38) = 0.66, p = .42, \eta^2_p = .02$. However, the nonsignificant main effects are likely explained by the crossover pattern in the significant interaction between feedback condition and social anxiety, $F(3, 114) = 4.97, p = .003, \eta^2_p = .17$. This interaction indicates that participants in the HSA group reported significantly more self-focused thoughts in response to negative feedback, while participants in the LSA group reported more self-focused thoughts in response to positive feedback. The interaction effect is displayed in Figure 4 and means for each group and feedback condition can be found in Table 1.

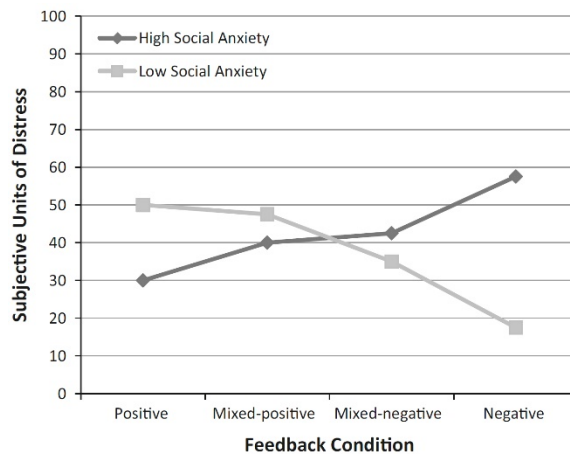


Figure 4. Percentage of self-focused thoughts by social anxiety group and feedback condition.

Discussion

Cognitive models have suggested that there are differences in the way socially anxious and non-socially anxious individuals attend to and interpret social information (Clark and Wells 1995; Heimberg et al. 2010). The present study provided support for these differences by examining cognitive and affective responses to social feedback among participants with high and low fear of negative evaluation.

Response to Social Cues

Heimberg et al. (2010) proposed that social anxiety is maintained by an interactive cycle in which excessive attention to external threat cues leads to increased self-monitoring. Results of the present study demonstrate this cycle of cognitive processing, which was present

only for socially anxious individuals. Participants with high social anxiety reacted to negative feedback with more negative, self-focused thoughts and greater state anxiety. Participants with low social anxiety reported more negative thoughts in response to negative feedback, but the focus of attention shifted away from themselves and on to the confederate or the conversation task. The non-socially anxious participants' increase in negative, other-focused thoughts was not associated with increased state anxiety. This represents a qualitative difference in the way the two groups attended to and processed negative social feedback.

Other research has suggested that socially anxious and non-socially anxious individuals respond differently to positive social feedback (Wallace and Alden 1995; Alden et al. 2008) and may fear positive evaluation as well (Weeks et al. 2010). In the present study, there were two main differences between the social anxiety groups in their cognitive responses to positive feedback. First, socially anxious individuals overly attended to negative cues and discounted positive ones, demonstrating the social information processing bias noted in cognitive theories of social anxiety disorder (e.g., Hirsch and Clark 2004). Despite the substantial increase in positive feedback from the negative to mixed-negative feedback conditions, the means are very similar for the percentage of positive thoughts experienced by socially anxious participants. Positive thoughts did increase from the mixed-positive to the positive conditions for both groups, and the percentages of positive thoughts were similar for the two social anxiety groups in the most positive condition. However, in the mixed-positive condition—in which the majority of feedback was positive but some was negative—socially anxious participants had significantly fewer positive thoughts compared to non-socially anxious participants. Thus, socially anxious individuals demonstrated a bias toward negative social cues even when positive feedback is provided.

Second, socially anxious participants demonstrated a dysfunctional bias when processing positive social feedback (Clark and Wells 1995). While they reported more positive cognition in response to increased positive feedback, they reported fewer self-focused thoughts. This suggests that socially anxious participants may have attributed positive social feedback to external features of the conversation or the confederate rather than to their own social performance. The opposite was true for non-socially anxious participants' focus of attention, whose thoughts became more self-focused as positive feedback increased.

Methodological Contributions

An important implication of this study is that computer-mediated communication is a viable approach for research on social anxiety. The results of the present study were comparable to similar studies conducted using face-to-face interactions (Constans et al. 1999; Stopa and Clark 1993), which suggests that similar cognitive and affective processes are taking place online and in person. There were also a number of advantages of using computer-mediated communication rather than face-to-face tasks. Although beyond the scope of the present study, the online conversations can be saved for further examination of response times and relevant content variables. Online surveys can be used to collect self-report data during a CMC study easily and with minimal interruption. Further, increased control of stimuli presented to participants increases the internal validity. In the present study, this

also allowed for a relatively large number of different confederates and experimenters without introducing systematic differences between groups.

Limitations

There were a number of limitations to the present study. The sample size was relatively small, which may have limited the power to detect certain effects. Effect sizes were reported and guided the interpretation of the results. In addition, there were significantly more women in the high social anxiety group than in the low social anxiety group, which is consistent with the over-representation of women diagnosed with social anxiety disorder (Kessler et al. 2005). Analyses indicated that gender was not associated with the difference in state anxiety or thought valence and focus. However, caution is warranted when generalizing the results to men with high social anxiety. Further, only one of the confederates in the study was male. The genders of the participants and confederates were not systematically matched, but analyses indicated no differences in same- or opposite-gender pairings across social anxiety groups. Fear of negative evaluation was utilized to define groups because the intent was to look at cognitive and affective responses to social feedback. A measure specifically of interaction anxiety may yield different findings and this should be examined in future research. Finally, the study utilized a non-clinical sample of undergraduate students, which may limit the generalizability of results in regard to both social anxiety and internet use. The inclusion of only the highest- and lowest-scoring respondents may also limit the interpretation of the findings as it exaggerates the difference between the groups while in reality social anxiety is a continuous variable. Future studies may benefit from including a wider demographic range to examine patterns of internet use, and individuals with clinical levels of social anxiety to assure generalizability to that population.

Conclusions

The present study replicated and extended previous findings in support of cognitive theories of social anxiety disorder (Clark and Wells 1995; Heimberg et al. 2010). Socially anxious participants showed disproportionate attention to negative feedback, which was associated with negative self-cognition and elevated state anxiety. The present study also demonstrated that computer-mediated communication is a useful tool for studying social anxiety, offering greater control than is possible with face-to-face conversations. This is an important development as socially anxious individuals are increasingly engaged in online activities and computer-mediated communication. Finally, this study provides further evidence that treatments that target self-focused attention and negative interpretations of social feedback are targeting a key feature of social anxiety.

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Conflict of Interest – Chandra L. Bautista and Debra A. Hope declare that they have no conflict of interest.

Informed Consent – All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments. Informed consent was obtained from all individual participants included in the study prior to their participation and again after the study's deception was revealed to them.

Animal Rights – All study procedures were approved by the Institutional Review Board at the University of Nebraska–Lincoln. This article does not contain any studies with animals performed by any of the authors.

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