Using the Implicit Association Test to Assess Fears of Positive and Negative Evaluation in Social Anxiety Disorder

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This thesis titled
Using the Implicit Association Test to Assess Fears of Positive and Negative Evaluation
in Social Anxiety Disorder

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ABSTRACT

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Research on implicit associations in psychopathology suggests that socially anxious individuals may have implicit associations congruent with the core cognitive constructs/concerns in social anxiety, such as stronger negative associations for social stimuli and fears of evaluation. The literature also indicates that implicit associations are useful for predicting spontaneous behavioral reactions. The present study recruited two groups (n=25 for each group) of persons high in social anxiety versus persons low in social anxiety (i.e., N = 50). Participants engaged in three implicit tests that assessed their attitudes towards: general social stimuli, positive social stimuli, and negative social stimuli. Participants then delivered an impromptu speech task, after which they completed each of the implicit tests once more. It was hypothesized that: (a) groups would differ significantly on implicit associations for social stimuli and fears of evaluation, such that persons high in social anxiety would demonstrate more negative implicit associations across social stimuli compared to low socially anxious persons; and (b) implicit measures would predict behavioral anxiety ratings based on performance during a speech task within the overall sample. Results were in partial support of the study hypotheses: (a) partially consistent with hypotheses, highly socially anxious persons demonstrated significantly greater negative implicit associations for negatively valenced social stimuli (but not general or positive social stimuli); and (b) implicit
measures assessing associations for general social stimuli, and negatively valenced social stimuli, significantly to marginally predicted observer-rated eye gaze during the speech task. There was also a significant decrease in the strength of implicit associations for positively-valenced social stimuli following the impromptu speech task. Treatment and assessment implications, and limitations to the study, will be discussed.
Dedicated to my family.

Dedicated to my family.
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CHAPTER 1: USING THE IMPLICIT ASSOCIATION TEST TO ASSESS FEARS OF POSITIVE AND NEGATIVE EVALUATION IN SOCIAL ANXIETY DISORDER

Social anxiety disorder (SAD), also commonly known as social phobia, is the fourth most common psychological disorder (Kessler et al., 2005). SAD is marked by excessive fears of social or performance situations in which the person may be evaluated by others, according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association [APA], 2000; [DSM-5]; APA, 2013).

Landmark cognitive-behavioral models of SAD (Clark & Wells, 1995; Rapee & Heimberg, 1997) featured fear of negative evaluation (FNE) as the core cognitive feature of SAD. According to these models, socially anxious individuals believe that others are inherently critical and have standards that cannot be personally met. Although previous findings have provided much empirical support for FNE as an important feature of social anxiety (e.g., see Heinrichs & Hofmann, 2001; Stopa & Clark, 1993), there is increasing evidence that socially anxious individuals fear evaluation in general, including positive evaluation (e.g., see Weeks, Heimberg, & Rodebaugh, 2008). Weeks, Heimberg, Rodebaugh, and Norton (2008) demonstrated that fear of positive evaluation (FPE) was associated with ratings of discomfort due to receipt of positive feedback. Furthermore, FPE has also been shown to account for variance in social anxiety above that accounted for by FNE (e.g., see Weeks, Heimberg, Rodebaugh, Goldin, & Gross, 2012; Weeks, Heimberg, Rodebaugh, & Norton, 2008).

The theoretical conceptualization of FPE as a cognitive component of social anxiety has been incorporated into a cognitive-behavioral model: the Bivalent Fear of Evaluation (BFOE) model of social anxiety. According to the BFOE model, FPE and
FNE are highly related, yet distinct, core cognitive components of SAD (Weeks & Howell, 2012). Weeks and Howell showed that FPE is uniquely (with regard to FNE and social anxiety) related to reduced experiences of positive thoughts and feelings. This implicates FPE as an important positivity deficit that is found in SAD (Kashdan, Weeks, & Savostyanova, 2011). Weeks and Howell (2012) also found that FPE is related to the disqualification of positive social outcomes, suggesting that those with SAD may disqualify positive social experiences to alleviate FPE; in other words, disqualification of positive social outcomes may function as a mental safety behavior to reduce the anxiety associated with FPE. Importantly within the context of the present study, the tendency for socially anxious individuals to disqualify positive social outcomes has further been proposed to reduce conscious awareness of FPE (see Weeks & Howell, 2012). In essence, if socially anxious individuals convince themselves that they do not deserve/will not receive positive evaluation, then the (otherwise threatening) prospect of positive evaluation will be less salient/minimized. Ergo, the potentially reduced awareness of the automatically activated threat of FPE suggests that implicit measures may be ideal for assessing negative automatic thoughts in response to positively-valenced evaluative stimuli.

Assessing Implicit Associations.

Implicit tests provide a means of measuring the strength of automatic association (Greenwald, McGhee, & Schwartz, 1998). The main purported advantage of using implicit measures is that they do not suffer from some of the limitations that traditional self-report measures may hold. To illustrate, self-report measures can be easily influenced by self-presentational strategies. The validity of self-report measures can,
thus, be affected by malingering and response biases, as well as poor introspective abilities (Greenwald et al., 2002). However, implicit measures such as the implicit association test (IAT) are resistant to conscious distortion of responses, given that they assess automatic associations that are involuntary and cannot be faked (Egloff & Schmukle, 2002).

Another reason to use implicit measures in psychological research relates to the important role that automatic associations play in the development and maintenance of psychopathology. Cognitive models have long considered automatic associations to be the core component of psychopathology, and different dysfunctional beliefs or automatic associations are found across different psychological disorders (e.g., see Beck, 1976). Although explicit attitudes are known to influence behavior, Perugini (2005) reported that implicit and explicit attitudes are independent processes which work synergistically to activate the same behavior. Moreover, there is evidence for the existence of dual attitudes, whereby implicit attitudes predict spontaneous behaviors, whereas explicit attitudes predict deliberate behaviors (Wilson, Lindsey, & Schooler, 2000). This latter pattern has been termed a double dissociation model (Asendorpf, Banse, & Mücke, 2002). The present study was designed to examine the relationship between implicit and explicitly assessed anxiety, based on the predictions of the double dissociation model.

**Implicit Associations in Social Anxiety Disorder**

Studies that have administered implicit measures with the goal of examining social anxiety tendencies have, to date, focused on aspects such as self-esteem, attention bias, evaluation of anxiety responses, and social situations. Overall, these studies have yielded results that are consistent with cognitive-behavioral models of SAD (e.g., see
Rapee & Heimberg, 1997). Socially anxious individuals typically endorse negative self-statements, indicating that they are characterized by poor self-esteem and reduced self-perceived worth (Heinrichs & Hofmann, 2001; Moscovitch & Hofmann, 2007). Socially anxious individuals have negative self-representations (Moscovitch & Hofmann, 2007) and these are demonstrated in their reduced positive associations for the self (Tanner, Stopa, & De Houwer, 2006). Individuals diagnosed with SAD show stronger, automatic associations between the concepts of self and anxiety stimuli, compared to weaker associations between the self and non-anxiety stimuli (e.g., see Clerkin & Teachman, 2010). Findings from other studies have revealed that, although high socially anxious individuals endorse similar levels of positive self-esteem in comparison to low socially anxious individuals, highly socially anxious individuals perceived evaluations of themselves by others as less favorable, compared to low socially anxious individuals (e.g., see de Jong, 2002).

Individuals with SAD show attention biases while attending to social threat-related information such as increased attention towards negative social stimuli (i.e., angry faces) (Gilboa-Schechtman, Foa, & Amir, 1999); furthermore, faster automatic processing (Amir, Foa, & Coles, 1998; Mogg & Bradley, 2002) of potentially negative socially threatening information is associated with hyper-vigilance to social stimuli (positive and negative facial expressions) under social threat conditions (Sposari & Rapee, 2007). Studies using the Stroop paradigm, which taps automatic processing (Cohen, Dunbar, & McClelland, 1990), have also demonstrated that individuals diagnosed with SAD show faster and selective attention to social threat-related information (Lundh & Öst, 1996; Mattia, Heimberg, & Hope, 1993). In summary, it
seems reasonable to assume that this hypervigilance by socially anxious individuals towards any signs of evaluation (positive or negative) from others (Heimberg, Brozovich, & Rapee, 2010; Weeks & Howell, 2012) is responsible for reducing available cognitive resources, thereby leading to deficits in social performance (Macleod & Mathews, 1991).

To the author’s knowledge, none of the studies conducted to date have attempted to assess implicit associations of positively-valenced evaluative stimuli. Previously conducted studies have also failed to properly examine the relationship between implicit and explicit measures of fears of evaluation, given that these have used explicit measures of social anxiety in general, in contrast to measures of distinctly-valenced fears of evaluation (i.e., FPE and FNE). Thus, the explicit measures of social anxiety used in previous studies are not true parallels to the implicit measures that have been employed to assess negative evaluative social stimuli. Considering that FNE and FPE are distinct cognitive components of SAD (e.g., see Weeks & Howell, 2012), implicit measures of distinctly-valenced fears of evaluation are essential to comprehensively assess these constructs. In addition to having negative implicit associations for social stimuli in general (i.e., general social anxiety), it is expected that socially anxious individuals will have negative implicit associations for both negatively-valenced (i.e., FNE) and positively-valenced (i.e., FPE) social stimuli.

Implicit Association Task

As outlined by De Houwer, Teige-Mocigemba, Spruyt, and Moors (2009), implicit measures are designed to assess automatic processes. The core reasoning behind the IAT is that the speed of the categorization (i.e., response latencies) depends on the degree to which categories that have been assigned to the same key are associated in
memory. Faster responses to categories sharing the same response key indicate a stronger cognitive association between the categories. The response latencies can thus be translated into attitudes towards distinct categories.

One of the disadvantages of the original IAT is that it requires two opposing target/category items. This is a limitation, because there are certain constructs (e.g., social anxiety) that do not have a direct logical counterpart.\(^1\) In order to test constructs that do not have an opposing comparison category using the IAT, the single-target version of the IAT (i.e., ST-IAT) was developed (Wigboldus, Holland, & van Knippenberg, 2004). The ST-IAT has been found to demonstrate sufficient reliability (Bluemke & Friese, 2008) and predictive validity (Dotsch & Wigboldus, 2008). The ST-IAT is very similar to the original IAT, except that the simultaneously measured counter-category is removed. The response latencies are, therefore, presumed to reflect implicit attitudes towards a single target concept.

Other accepted implicit measures include physiological responses and nonverbal behaviors that occur involuntarily or outside the person’s conscious awareness. For example, nervous mouth movements, voice quality, gaze avoidance, fidgeting, and blushing are considered to be nonverbal measures of anxiety (e.g., see Edelmann & Baker, 2002; Fydrich, Chambless, Perry, Buergener, & Beazley, 1998). Cardiovascular measures and skin conductance are also considered to be implicit measures that assess threat and anxiety reactions (e.g., see Fazio & Olson, 2003). Other physiological parameters such as amygdala response, facial electromyographs, and eye blink startle response have also been used as implicit measures (e.g., see Fazio & Olson, 2003).
Several studies have used the IAT paradigm to assess automatic associations involving social stimuli in high socially anxious versus low socially anxious individuals. For example, a study investigating self-esteem in participants who were identified as low or high in FNE (recalling that FNE is evidenced to be a core cognitive feature of social anxiety; e.g., see Heimberg, Brozovich, & Rapee, 2010, for a review) found that, following a social-threat activation task (being told to give a speech), the high FNE group had weaker positive associations for the self, compared to the low socially anxious group (Tanner et al., 2006). These findings are consistent with those of de Jong (2002), who found that there was a reduced self-favoring tendency reflected in IAT responses amongst highly socially anxious women. Furthermore, Sasaki, Iwanaga, Kanai, and Seiwa (2010) reported that the automatic negative evaluations of words representing anxiety responses (e.g., blush, sweating, quaver) were stronger for those who were high versus low in fear of public scrutiny (i.e., fear of social performance).

The initial investigation of automatic associations of the self in highly socially anxious samples (de Jong, 2002; Gamer, Schmukle, Luka-Krausgrill, & Egloff, 2008; Sasaki et al., 2010; Tanner et al., 2006; Westberg, Lundh, & Jönsson, 2007) conforms to the expected pattern of low self-esteem and fear of social situations that is characteristic of social anxiety (Stopa & Clark, 2000). However, although the above studies have demonstrated the existence of negative associations for social situations and negatively-valenced social word stimuli (e.g., “criticism”, “rejection”), none of these previous studies investigated positively-valenced stimuli (e.g., “applause”, “reward”). In order to assess whether socially anxious individuals experience increased levels of anxiety and
discomfort on receiving positive social feedback, the IAT can be used to measure associations for positively-valenced word stimuli. Given previous support for FPE as a core cognitive component of social anxiety (e.g., see Weeks et al., 2012), it is expected that socially anxious individuals will demonstrate negative associations for positively-valenced stimuli.

_Predictive Validity of Implicit Measures._

Implicit measures have been found to demonstrate predictive validity for various psychopathological behaviors (Roefs et al., 2011). The IAT has shown predictive validity for relevant behaviors, including panic symptoms (Teachman, Smith-Janik, & Saporito, 2007), responses to feared objects in the context of specific phobias (Teachman, 2007), and depressive symptoms (Steinberg, Karpinski, & Alloy, 2007). The _double dissociation model_ proposes that, in addition to moderate correlations between implicit and explicit measures, implicit measures uniquely predict spontaneous or highly automatized behavior, whereas explicit measures uniquely predict voluntary or controlled behavior (Asendorpf et al., 2002). Specifically, implicit measures have been found to predict eye blinking, gaze avoidance, and experimenter-rated anxiety, as well as other global and behavioral anxiety indicators (Egloff & Schmukle, 2002). Studies also suggest that implicit attitudes can enhance our understanding of behavior because they show a unique ability to predict physiological responses such as changes in cardiovascular activity (Egloff, Wilhelm, Neubauer, Mauss, & Gross, 2002) and amygdala activation (Phelps et al., 2000).
CHAPTER 2: MAIN HYPOTHESES

The present study was designed to extend the examination of fears of evaluation in social anxiety by using implicit measures to assess fears of both negative and positive evaluation. Automatic associations for social stimuli in general, positively-valenced evaluative stimuli, and negatively-valenced stimuli were designed and examined (see Implicit Measures section below for details).

The secondary aim of the present study was to investigate whether implicit assessments of two distinct evaluative fears in social anxiety (i.e., FPE and FNE) would exhibit any incremental value in predicting spontaneous behaviors compared to explicit measures of these fears. Specifically, a speech task was used to assess whether implicit social anxiety-related scores would uniquely predict behavioral displays of anxiety above corresponding explicit measures.

Lastly, the present study examined whether implicit measures were sensitive to social threat in response to delivering a public speech. In order to do so, the implicit measures were administered both before and after the speech task. Importantly regarding this element of the present study, administering the same IAT twice in close succession has not yielded significantly different results in prior studies, thereby suggesting that practice effects are minimal (Schmukle & Egloff, 2004).

The following hypotheses were tested: (Hypotheses 1-3) highly socially anxious individuals would demonstrate stronger, negative implicit associations for [1] social stimuli in general, [2] positively-valenced evaluative stimuli (i.e., consistent with FPE), and [3] negatively-valenced evaluative stimuli (i.e., consistent with FNE), on relevant
ST-IATs in comparison to non-socially anxious controls. (4) ST-IAT response latencies would adequately predict ratings of anxiety-related behaviors during a speech task, above and beyond the variance explained by explicit measures of social anxiety, in line with the double-dissociation hypothesis (Asendorpf et al., 2002). The present study also tested the unique predictive validity of each of the three IAT response latencies (i.e., ST-IAT for general social stimuli, ST-IAT for positively-valenced evaluative stimuli, and ST-IAT for negatively-valenced evaluative stimuli) in predicting anxiety ratings. The present study also examined changes in implicit measures due to social threat by examining pre-speech to post-speech changes in the three ST-IAT response latencies.
CHAPTER 3: METHOD

Participants

A sample of 50 participants was recruited. A screening measure of social anxiety symptoms (see Social Phobia Scale section below) was used to select and recruit two groups of participants: a low socially anxious group and a high socially anxious group. A cutoff score of 24 has been previously established for classifying individuals who experience clinically severe social anxiety symptoms from those who do not (Brown et al., 1997), and this cutoff was used to classify participants into the two study groups.

In the Low Socially Anxious group, 54.2\% (n=13) were females, and 87.5\% (n=21) identified as White/Caucasian. In the High Socially Anxious group, 58.3\% (n=14) were females, and 95.8\% (n=23) identified as White/Caucasian. The mean age for participants in the Low Socially Anxious group was 21.00 years (SD =5.46), and 19.04 years (SD = 1.40) for the High Socially Anxious group. See Table 1 for distributions of participants across study groups. The proportion of participants in the two groups did not differ on gender $\chi^2 (1, 47) = 0.085, p = .77$, ethnicity $\chi^2 (1,47) = 3.07, p=.38$, or age $t (45)=1.66, p=.10$.

Speech data and post-speech IAT data were not available for three of the study participants ($n = 3$). Of these three, two participants (one high socially anxious participant and one low socially anxious participant) opted to discontinue study procedures upon being informed about the speech task. A second high socially anxious participant initially agreed to continue with study procedures after being informed of the speech task, but later declined to complete the speech task due to anxiety; thus, the speech task was
discontinued. The data for participants who did not continue after being informed about the speech task were not included for analyses focusing on speech and post-speech data.

Assessments and Measures

All participants completed the following measures (see Appendix D for a copy of all study measures).

Demographics Questionnaire

The demographics questionnaire instructed participants to indicate the following: age, (self-identified) gender, occupation (e.g., full-time student; major; part-time job), sexual orientation, and race/ethnicity.

Clinician-Administered Measures

Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1987)

The LSAS is a 24-item clinician-administered measure that assesses fear and avoidance regarding a range of social interaction and performance situations. The LSAS has been found to demonstrate excellent internal consistency (α = .96; Heimberg et al., 1999). The LSAS exhibits strong convergent validity (Heimberg et al., 1999; Heimberg, Mueller, Holt, Hope, & Liebowitz, 1992). The discriminant validity of the LSAS is supported by weaker correlations between LSAS scores and measures of depression and anxiety in general in comparison to measures of social anxiety (Heimberg et al., 1999). The LSAS demonstrated excellent internal consistency in the present sample (α = .93).

Self-Report Measures of Social Anxiety

State social anxiety ratings. Participants were asked to report their state anxiety on a 0-100 Subjective Units of Distress Scale (SUDS), which is a verbal report of
perceived levels of emotional distress, at: 3 minutes before giving the speech, immediately before giving the speech, immediately after concluding the speech, and 3 minutes after having completed the speech. Participants also reported peak SUDS levels experienced during speech.

*Social Phobia Scale (SPS; Mattick & Clark, 1998)*. The SPS is a 20-item measure which assesses fear of public scrutiny. It is scored on a 5-point Likert-type rating scale ranging from 0 (Not at all characteristic or true of me) to 4 (Extremely characteristic or true of me). The SPS has demonstrated good internal consistency (α’s range from .89 to .94) in undergraduate, community, and clinical samples (Mattick & Clarke, 1998). Mattick and Clarke also demonstrated that scores on the SPS adequately discriminated among patients with anxiety disorders (i.e., social anxiety disorder, agoraphobia, specific phobia), as well as between individuals with social anxiety disorder and control groups (undergraduate and community samples). The SPS was used as a screening measure for the present study to select and recruit a highly socially anxious group and a low-socially anxious group. Specifically, participants who scored at or above the empirically replicated cut-off score of 24 on the SPS (see Heimberg et al., 1992) were recruited for inclusion in the high socially anxious group. Participants who scored below the cut-off score of 24 on the SPS were recruited for inclusion in the low socially anxious group. The SPS was administered twice to the overall sample: first, as a screening measure for the purpose of selecting/recruiting, and second, while taking part in the study. The SPS (when administered as part of the study procedures) demonstrated excellent internal consistency in the present sample (α = .93). Of the participants who were classified as highly socially anxious on the basis of the prescreen assessment of the SPS, 8 participants
scored lower than 24 on the re-administration of the SPS; however, the average deviation of these participants’ scores from the cutoff was only 2 points. Similarly, out of the participants who were screened as low socially anxious, 6 persons scored at or above 24 on the re-administration of the SPS; however, their average deviation from the cutoff was only 2.33 points. In addition, the majority of the analyses in the present study were within groups, and not between groups; furthermore, it is possible that the preceding study procedures (e.g., the public speaking task) in some way influenced responses to the second administration of the SPS. Thus, the original group assignments, as determined by participants’ responses to the pre-screen administration of the SPS, were retained for all analyses.

*Social Interaction Anxiety Scale-Straightforward Items (SIAS-S; Rodebaugh, Woods, & Heimberg, 2007).* The original Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998) is a 20-item measure designed to assess anxiety related to initiating and maintaining interactions with people in social situations. However, Rodebaugh et al. (2007) found that the 17 straightforward (-S) items are more valid indicators of social interaction anxiety than the three reverse-scored items, in both undergraduate and clinical samples. The SIAS-S has demonstrated good internal consistency (α = .93) and construct validity (Rodebaugh et al., 2007). Although the present study administered the 20-item SIAS, only the straightforward (i.e., SIAS-S) items were utilized in the present analyses. The SIAS demonstrated good internal consistency in the present sample (α = .86).

*Brief Fear of Negative Evaluation Scale-Straightforward Items (BFNE-S; Rodebaugh et al., 2004; Weeks et al., 2005).* The original BFNE (Leary, 1983) is a 12-item self-report measure of trait fear of negative evaluation. However, Rodebaugh et al.
(2004) and Weeks et al. (2005) have suggested using only the 8 straightforward (-S) items to index fear of negative evaluation, given evidence that this provides a psychometrically stronger score compared to scores which include the reverse-scored BFNE items. The BFNE-S has demonstrated excellent internal consistency (all α’s > .92) and construct validity in both undergraduate and clinical samples (Rodebaugh et al., 2004; Weeks et al., 2005). Even though the BFNE was administered in the current study, only the BFNE-S items were utilized to index FNE. The BFNE-S demonstrated excellent internal consistency in the present sample (α = .94).

Fear of Positive Evaluation Scale (FPES; Weeks, Heimberg, & Rodebaugh, 2008). The FPES is a 10-item self-report measure that assesses trait levels of fear of positive evaluation on a 10-point Likert-type rating scale ranging from 0 to 9. Although two reverse scored items are included in the scale they are not utilized in calculating the total score. The FPES has shown strong internal consistency (all α’s > .80) in undergraduate (Weeks, Heimberg, & Rodebaugh, 2008) and clinical (Fergus et al., 2009) samples. The FPES has also demonstrated strong convergent and discriminant validity (Fergus et al., 2009; Weeks, Heimberg, & Rodebaugh, 2008). Convergent validity of the FPES is demonstrated by its strong, positive correlations with social anxiety and fear of negative evaluation (e.g., see Weeks et al., 2008). The FPES is also more strongly related to social interaction anxiety than to symptoms of generalized anxiety, depression or worry, demonstrating discriminant validity (Weeks et al., 2012). The FPES demonstrated good internal consistency in the present sample (α = .78).

Subjective Rating of Speech Task. Modified Social Performance Rating Scale (Modified SPRS; Harb, Eng, Zaider, & Heimberg, 2003). The original SPRS (Fydrich et
al., 1998) is a *midi-level* rating scale designed to assess behavioral indicators of anxiety on five specific dimensions, with ratings to be made while reviewing videotaped social interaction role-plays. A midi-level scale goes beyond micro measurement scales (which are based on frequency counts), and also provides for qualitative judgments of social skills that could be related to psychopathology, by providing behavioral anchors. It was modified by Harb et al. (2003) to assess public speaking anxiety. The modified SPRS also exhibited significant, positive correlations with measures of fear and avoidance of performance situations. Discriminant validity of the SPSR is evidenced by the lack of association between SPRS ratings based on a public-speaking task, and measures of fears and avoidance of social interactions (Harb et al., 2003).

For the present study, two research assistants were trained to the use the modified SPRS to rate videos of the participants’ speeches. Training consisted of viewing several speeches, rating speeches on criteria outlined in the SPRS, discussion of these ratings, and successful agreement on the standards provided by the SPRS. Both raters were blind to the hypotheses of the study, as well as to participants’ group assignment. The modified SPRS exhibited good internal consistency ($\alpha = .82$) and acceptable inter-rater reliability ($r$ values ranging from .69 to .81).

*Implicit Measures*

Single Target Implicit Association Tests (ST-IAT; Wigboldus, et al., 2004). The Single-Target IAT uses a single target category and two attribute categories. There were three separate ST-IAT tasks designed for and administered in the present study: *social anxiety-general, positively-valenced-social*, and *negatively-valenced-social*; however, each IAT used the same attribute categories. Specifically, there were two attribute
categories: Positive (i.e., “good”, “pleasant”, “perfect”, “great”, “superior”, and “wonderful”) and Negative (i.e., “bad”, “unpleasant”, “defective”, “inferior”, “substandard”, and “awful”). The words comprising the target category (i.e., social threat) were different for each IAT. For precise details on the ST-IAT methodology used in the present study, please see Appendix A.

To generate word-stimuli for the three separate target categories (i.e., social anxiety-general, positively-valenced-social, and negatively-valenced-social), one of several strategies was used. First, earlier studies that assessed implicit social anxiety were reviewed, and IAT stimuli used in these studies were included as potential target word-stimuli for the present ST-IAT, particularly for the social anxiety-general-ST-IAT, as well as the negatively valenced-social ST-IAT. Second, in the absence of previously-utilized target words in prior ST-IAT studies (i.e., for the positively valenced-social ST-IAT), words were selected from the Affective Norms for English Words database (ANEW; Bradley & Lang, 1999) that demonstrated high arousal ratings, so as to increase the intensity of the participants’ responses. For the positively valenced-social ST-IAT, words that were rated as highly pleasant on affective valence were chosen, whereas for the negatively valenced-social ST-IAT, words that were rated as highly negative on affective valence were selected for inclusion in the present study. Some of these target word-stimuli overlapped with previous IAT stimuli used in other studies (e.g., see Egloff et al., 2002; Sasaki et al., 2010). Finally, in cases where more than six words met the above initial inclusion criteria for a given ST-IAT task, a rational approach was used to select the six word-stimuli that best represented predominant theoretical interpretations of the
relevant traits being assessed by each of the ST-IATs (e.g., see Heimberg, Brozovich, & Rapee, 2010, for a review).

For the social anxiety-general-ST-IAT, the words that were used for the target category were “conversation”, “interview”, “meeting” “party”, “speech”, and “dating”. The first three words were chosen on the basis of a precedent IAT task (Sasaki et al., 2010); the word “party” was obtained from the ANEW database; and the words “speech” and “dating” were rationally generated by the author for inclusion in the socially relevant target category.

The words that were used for the positively-valenced-social ST-IAT were, “famous”, “applause”, “confident”, “admired”, “compliment”, and “successful”. The first four words were obtained from the ANEW database, whereas “compliment” and “successful” were rationally generated by the author. The words that were used for the negatively-valenced-social ST-IAT were “rejected”, “embarrassed”, “humiliate”, “fault” “disapprove” and “criticize”. The first four words were obtained from the ANEW database, whereas “disapprove” and “criticize” were rationally generated by the author. As noted previously, the ST-IAT (Wigboldus, et al., 2004) is very similar to the original IAT, except that it does not have a simultaneously measured counter-category. Bluemke and Friese (2008) have demonstrated that the ST-IAT has sufficient reliability (α = 0.61-0.69) and validity in a study that examined and compared attitudes towards multiple distinct German political parties. The ST-IAT has also demonstrated predictive validity of various criterion variables (Bluemke & Friese, 2008; Dotsch & Wigboldus, 2008; Richetin, Perugini, Adjali, & Hurling, 2007).
In the current study, the internal consistency of the ST-IATs was calculated following the Bluemke and Friese (2008) method of computing trial-by-trial difference scores between the two phases of the task. These analyses revealed modest levels of internal consistency for all six of the ST-IATs at pre-speech and post-speech (social anxiety general ST-IAT: Cronbach’s $\alpha = 0.57-0.62$; positively valenced social ST-IAT: Cronbach’s $\alpha = 0.59-0.64$; and negatively valenced social ST-IAT: Cronbach’s $\alpha = 0.56-0.57$).

Measures for Assessment of Other Constructs

*Beck Depression Inventory-II (Beck, Steer, & Brown, 1996).* The BDI-II is a 21-item self-report measure of depressive symptoms, with items rated on a scale of 0 to 3. The internal consistency demonstrated by the BDI-II in outpatient ($\alpha = .92$) and undergraduate ($\alpha = .93$) samples is excellent (Beck, Steer, & Brown, 1996). The BDI-II has also shown strong convergent validity (Beck et al., 1996). Because there is significant comorbidity between social anxiety and depression (Stein, Tancer, Gelernter, Vittone, & Uhde, 1990), the current study included BDI-II in order to statistically control for co-occurring depressive symptoms if relevant, to increase the specificity of the obtained results.

*Social Desirability Scale-17 (Stöber, 2001).* The SDS-17 is a 16-item measure that assesses social desirability. The SDS-17 has demonstrated good internal consistency ($\alpha = .80$). The convergent validity of the SDS-17 is also satisfactory, given that it has demonstrated strong correlations (e.g., $r = .68$) with other measures of social desirability. The SDS-17 exhibited sensitivity towards instructions that provoked social desirability (Stöber, 2001). In the current study, the SDS-17 was used to examine whether social
desirability may moderate the relationship between implicit and explicit responses (see Appendix B).

Procedure

For the present study, participants who completed the department-wide prescreen (i.e., SONA systems) were recruited based on their responses to the pre-screen administration of the SPS (see Explicit Measures of Social Anxiety: Social Phobia Scale, above). Those participants who scored above the cut-off score of 24 on the Social Phobia Scale (Brown et al., 1997; Heimberg et al., 1992) comprised the high socially-anxious group and those who scored below 24 comprised the low socially-anxious group. Eligible participants received an invitation to participate in the study, which was advertised as a study on “Examining Social Attitudes Using Computer Games” via email through SONA systems, along with a brief description of the study. The study description mentioned the completion of a speeded reaction time computer task, but did not mention the speech task.  

The order of procedures was such that the ST-IATs and speech tasks were completed first and the clinician-administered measures along with self-report questionnaires were completed last. This ordering was used so as to avoid the study procedures being influenced by anxiety that could potentially be generated during the clinician-administered diagnostic interview. Participants were asked to give informed consent after a brief description of the study, which informed them of the study procedures. The description of the study did not feature the implicit and explicit nature of assessment, nor the study hypotheses. The participants were not informed ahead of time about the speech task; instead, they were informed that they would be completing a
brief interview, a series of questionnaires, and some computer tasks to assess their social attitudes. The participants were informed that they would have a single audience member who would evaluate their speech performance; in actuality, the rater was an experimental confederate. These aspects of the study were reviewed during Debriefing, and post-study consent was requested for utilizing all study data, given the use of deception.

Each participant completed all three ST-IATs. The order of presentation of social anxiety-general ST-IAT, positively-valenced-social ST-IAT, and negatively-valenced-social ST-IAT was randomly determined. The ST-IATs were administered using Inquisit 3 software (Millisecond Software, Seattle, WA) in a closed, quiet room. The participant was then asked to deliver an impromptu speech on a subject of their choice for four minutes, which was recorded using a video camera. Participants were also informed that they would be evaluated by a single audience member who had been trained for speech evaluation. The audience member was actually an experimental confederate, who was trained to maintain a neutral facial expression and body posture for the duration of the speech. For the purposes of standardization, all confederates in the study were female. Participants were asked to provide current/anticipatory SUDS (i.e., state anxiety) 3 minutes prior to beginning the speech, and also immediately before delivering the speech – the participants were given 3 minutes to prepare for their speech. Participants were not allowed to use any notes while delivering the speech. Immediately after completing the speech task, participants were asked to report their current SUDS. Participants were also asked to retrospectively rate their peak SUDS during the speech task (see also Figure 1 for state variables examined in exploratory analyses). Participants were also asked to
report their SUDS 3 minutes after completing the speech task, in order to estimate recovery of state anxiety.

Once the participants completed the speech task, they were asked to sit quietly for another 10 minute period to examine skin conductance recovery. Following the recovery period, all participants were asked to complete the ST-IATs again for a second time, in an order that was randomly determined. The presentation of the two phases was switched in an effort to control for practice effects, i.e., blocks 1, 2, and 3 were now presented as blocks, 4, 5, and 6; whereas blocks that previously appeared as blocks 1, 2, and 3 were presented as blocks 4, 5 and 6. The principal investigator then administered the clinician-administered measure (i.e., LSAS) as well as the self-report questionnaires.

Debriefing

Upon completing all study procedures, a debriefing session was held and the purpose of the study was explained to the participants. Participants were asked if they suspected any deception involving any of the tasks that they completed, and if so, to explain the basis for their suspicions. Participants were then asked for post-study consent to use their research data after informing them of all study deception elements (i.e., the implicit assessment of attitudes by the computer task). All participants granted permission for their data to be analyzed and used in the study after having been fully debriefed.
CHAPTER 4: DATA ANALYSIS AND RESULTS

Data Considerations and Preliminary Analyses

Based on recommended IAT methodology (Greenwald et al., 2003), the responses for two participants on select ST-IATs (specifically, on the post-speech negatively-valenced social ST-IAT and positively-valenced social ST-IAT) were excluded because their response times on those tasks were less than 300 milliseconds (indicating that these responses could not have been valid) on more than 10% of the trials and/or because their error rates exceeded 20% (indicating lack of sufficient understanding of task instructions/careless responses). However, the responses from these participants to all other ST-IATs in the present study were retained in relevant analyses, given that no response biases were exhibited on these tasks.

Preliminary Analyses/Social Anxiety across Groups

The present study utilized corrections for multiple comparisons based on the false discovery rate (FDR; Benjamini & Hochberg, 1995), and accordingly, preliminary analyses were evaluated with regard to \( \alpha = (\frac{3}{6} \times .05) = .025 \). As expected, participants in the high socially anxious group reported significantly greater levels of (a) social anxiety experienced during the past week (i.e., LSAS scores), \( t = 4.01, p < .001 \); (b) trait anxiety relating to initiating and maintaining interactions with people in social situations (i.e., SIAS-S scores), \( t = 4.33, p < .001 \); (c) trait fears of negative evaluation (i.e., BFNE-S scores), \( t = 3.77, p < .001 \); (d) trait fears of positive evaluation (per FPES scores), \( t = 2.61, p < .01 \); and (e) marginally significant state anxiety levels during the speech task (per peak SUDS ratings), \( t = 2.18, p = .036 \), compared to the low-socially anxious group (See
Figures 2 and 1, respectively). However, contrary to expectations, the two groups exhibited similar (f) levels of social desirability (i.e., SDS-17 scores), $t = 0.53, p = .60$.

A $t$-test was also conducted to examine differences in levels of depression between the two groups, in order to assess potential confounding effects of depression. Participants in the two groups reported similar levels of depression (i.e., BDI-II scores), $t = 1.292, p = .20$. Due to non-significant differences in levels of depression between groups, the remaining hypotheses did not include depression as a covariate, in order to maximize statistical power.

**Potential Confounding Variables/Additional Analyses**

Analyses were conducted to ensure that all primary study variables were normally distributed. All variables of interest were normally distributed across the full sample (all Skewness values < 0.77; all Kurtosis values < 0.89). Behavioral measures of anxiety were obtained by means of two trained judges. These judges were unaware of the scores on the anxiety measures of the participants, the hypotheses of the present study, or the participants’ group assignment. The judges rated the videotapes of the speeches on three behavioral expressions of anxiety using the Modified Social Performance Rating Scale (Modified SPRS; see Assessments and Measures). The judges rated the participants on their vocal quality, speech flow, and discomfort. Two-way mixed intraclass correlation coefficients were calculated and found to be satisfactory (mean ICC = .81). Eye gaze ratings were obtained in real time from the speech evaluator. We used real time ratings for eye-gaze (as opposed to video-coding raters), given that it seemed reasonable to expect that participants may not be looking at the video camera due to the presence of the speech evaluator. In addition, it was easier for a live audience member to assess the
extent to which participants may have been making eye contact or staring at the camera, compared to video-coding raters who could only evaluate the extent to which participants stared at the camera.

Hypotheses 1, 2 and 3

It was hypothesized that highly socially anxious participants would have stronger, negative implicit associations for general social stimuli (social anxiety-general ST-IAT), positively-valenced stimuli (positively-valenced social ST-IAT), and negatively-valenced stimuli (negatively-valenced social ST-IAT) compared to low socially anxious participants. Per FDR corrections,\(^5\) hypotheses were tested against \(\alpha = [3/3 \times .05] = .05\).

Contrary to Hypotheses 1 and 2, both groups exhibited equally positive implicit associations for general social stimuli (i.e., pre-speech social anxiety-general ST-IAT), \(t = 0.07, p = .85\), Cohen’s \(d = .02\) as well as for positively-valenced stimuli (i.e., pre-speech positively-valenced social ST-IAT), \(t = 0.95, p = .35\), Cohen’s \(d = .27\). The only between groups difference in implicit measures scores that emerged as significant at pre-speech was implicit associations for negatively-valenced stimuli.

Consistent with Hypothesis 3, the high socially anxious group exhibited more negative implicit associations for negatively-valenced stimuli (i.e., negatively-valenced social ST-IAT) compared to the low-socially anxious group, \(t = -2.48, p = .017\), Cohen’s \(d = .71\) (See Figure 3).

Hypothesis 4

It was also hypothesized that implicit measures of social anxiety would predict variance in behavioral displays of anxiety during a speech, above and beyond variance explained by explicit measures of anxiety. Linear regression analyses were conducted to
test these hypotheses. Only the results for the implicit associations for negatively-valenced stimuli (i.e., negatively-valenced social ST-IAT) have been reported here, since social anxiety group differences were significant only on the aforementioned implicit task (see Hypotheses 1, 2 and 3). Full results for the remaining implicit associations (i.e., positively-valenced social ST-IAT and social anxiety-general ST-IAT) have been reported in Appendix B. An FDR correction for Hypothesis 4 was calculated as follows \((\alpha = [3/12 \times .05] = .0125).^5\)

**Hypotheses 4a. Predicting vocal quality.** A linear regression analysis was conducted to determine whether responses to the negatively-valenced ST-IAT predicted variance in vocal quality ratings of participants by objective observers during the speech task, above and beyond variance explained by a corresponding explicit measure of FNE. When testing the model with BFNE-S scores and negatively-valenced social ST-IAT scores as simultaneous predictors, the omnibus effect for the model was non-significant, \(F(2,44) = 1.42, p = .25, \eta^2_p = .003.\)

**Hypothesis 4b. Predicting discomfort ratings.** A linear regression analysis was conducted to determine whether responses to the negatively-valenced ST-IAT predicted variance in discomfort ratings of participants by objective observers during the speech task, above and beyond variance explained by a corresponding explicit measure of FNE. When testing the model with BFNE-S scores and negatively-valenced social ST-IAT scores as simultaneous predictors, the omnibus effect for the model was non-significant, \(F(2,44) = 1.35, p = .27, \eta^2_p = .06.\)

**Hypothesis 4c. Predicting Speech Flow Ratings.** A linear regression analysis was conducted to determine whether responses to the negatively-valenced ST-IAT predicted
variance in speech flow ratings of participants by objective observers during the speech task, above and beyond variance explained by a corresponding explicit measure of FNE. When testing the model with BFNE-S scores and negatively-valenced social ST-IAT scores as simultaneous predictors, the omnibus effect for the model was non-significant $F(2,44) = .35, p = .71, \eta^2_p = .001$.

**Hypothesis 4d. Predicting eye-gaze ratings.** A linear regression analysis was conducted to determine whether responses to the negatively-valenced ST-IAT predicted variance in eye gaze ratings of participants by an objective observer during the speech task, above and beyond the variance explained by a corresponding explicit measure of FNE. When testing the model with BFNE-S scores and negatively-valenced social ST-IAT scores as simultaneous predictors, the omnibus effect for the model was marginally significant, $F(2,44) = 3.24, p = .049$ (upon FDR correction). Scores on the negatively-valenced-social ST-IAT emerged as the single marginally significant (recall that the FDR correction yielded an $\alpha = [3/12 \times .05] = .0125$) predictor of eye gaze ratings $t(2,44) = 2.545, p = .014; \beta = .366, \eta^2_p = .13$ (See Table 2).

**Exploratory Hypothesis 1**

The extent to which implicit measures may be sensitive to state variations in social anxiety was examined, by having participants complete the three implicit measures both before and after a stress-inducing task (i.e., the impromptu speech task). Independent sample $t$-tests were conducted to determine if scores changed significantly from pre- to post-speech. The family-wise error rate was controlled using FDR procedures ($\alpha = [3/3 \times .05] = .05$).
There were no significant changes in participants’ scores on either the social anxiety-general ST-IAT, nor on the negatively-valenced-social ST-IAT, both $t$s (45) < .23, $p$s > .13. However, there was a significant decrease after the speech task on the positively-valenced-social ST-IAT scores, $t$ (45) = 2.39, $p$ = .021 (see Figure 4).
CHAPTER 5: DISCUSSION

Existing literature suggests that socially anxious individuals have negative implicit associations for social stimuli in general (e.g., Heinrichs & Hofmann, 2001). However, to the author’s knowledge, none of the studies previously examining implicit associations in social anxiety have attempted to assess associations for positively-valenced and negatively-valenced evaluative stimuli separately – such an investigation was warranted, in light of the Bivalent Fear of Evaluation (BFOE) model of social anxiety (Weeks & Howell, 2012). In addition, although previous studies have studied implicit associations regarding negative-evaluative social stimuli, they used explicit measures of social anxiety in general, therein failing to employ corresponding and analogous measures.

Although preliminary analyses revealed expected group differences on various explicit trait measures of fear of public scrutiny, social interaction anxiety, FNE, and FPE, as well as explicit measures of state anxiety in response to the speech task (i.e., SUDS), only responses to the negatively-valenced social ST-IAT varied significantly across groups at pre-speech. Specifically, consistent with hypothesis, the high socially anxious group exhibited greater negative implicit associations for negatively-valenced stimuli in comparison to the low socially anxious group. In other words, highly socially anxious individuals were quicker than low socially anxious individuals to respond when pairing negatively-valenced social stimuli with negative associations. These results replicated previous findings that socially anxious individuals have stronger negative implicit associations for negatively-valenced social stimuli (Mattia et al., 1993; Sasaki et al., 2010).
In contrast, and inconsistent with hypothesis, both groups exhibited statistically equivalent, and positive, implicit associations for general social stimuli and positively-valenced social stimuli prior to the speech. In other words, both groups were quicker to respond to the implicit tasks when pairing social stimuli (both general and positively-valenced) with *positive* rather than negative attributes. Although these positive implicit associations were numerically stronger for the low socially anxious group compared to the high socially anxious group, these differences were not statistically significant; however, it is worth noting that the effect size for the between groups difference regarding positive implicit associations was small-to-moderate in strength ($d = .27$).

The issue of non-significant group differences for the social anxiety-general and positively valenced-social ST-IATs at pre-speech warrants discussion. Although some studies have yielded findings suggesting increased negative implicit associations for general social situations, and specific social stimuli such as positive and negative facial expressions, in highly socially anxious persons (see de Jong et al., 2001; Heuer, Rinck, & Becker, 2007), other studies detected statistically equivalent positive associations for self-referent esteem between high and low socially fearful undergraduates (e.g., see de Jong, 2002; Tanner et al., 2006). This inconsistency in the literature on implicit associations related to social anxiety has also been noted by Roefs et al. (2011) in a meta-analysis, the results of which suggested that studies examining implicit associations in social anxiety have found results inconsistent with the expected presentation of symptoms in socially anxious persons.

Another factor that may be contributing to the lack of significant differences in implicit associations towards general and positive social stimuli between the two study
groups may have to do with the stimuli that were used in the present implicit tasks. For example, a previous study found that both high and low spider-fearful individuals unexpectedly exhibited equivalent negative implicit associations for spider-related word stimuli (de Jong, van den Hout, Rietbroek, & Huijding, 2003). Part of the reason for the insubstantial differences was attributed to the use of word stimuli, which may not have induced sufficiently acute threat (Huijding & de Jong, 2005). However, other studies that examined spider-phobia using pictures found expected differences between high- and low-spider-fearful groups (Rinck & Becker, 2007; Teachman, Gregg, & Woody, 2001). It is possible that socially relevant stimuli such as faces may have been more successful at activating threat associations. That being said, the current study utilized word stimuli given that this was a first-step study examining implicit associations within the context of the BFOE model of social anxiety (Weeks & Howell, 2012), and that the vast majority of prior studies examining social anxiety-related implicit associations have utilized word stimuli (see Roefs et al., 2011, for a review).

Regarding Hypothesis 4, it was found that implicit associations adequately predicted behavioral anxiety as measured by objectively-rated eye-gaze tendencies of the participants during the speech task. The assessed implicit associations were unsuccessful at predicting other criteria of behavioral anxiety such as speech flow, discomfort, and vocal quality (see Appendix B for full results). Specifically, regarding the significant prediction by negatively-valenced word stimuli of eye gaze ratings (per follow-up analysis to a marginally significant omnibus effect), less negative associations were associated with increased eye-gaze ratings during the public speaking task. This suggests that those participants who were faster at pairing negative social stimuli with negative
(rather than positive) attributes exhibited eye gaze during the speech task that was
evaluated as less strong, and corresponding to impaired social performance, relative to
those participants who were slower at pairing negative social stimuli with negative (rather
than positive) attributes. This finding is consistent with eye tracking findings that
individuals diagnosed with social anxiety disorder hold less eye contact with actors in
dynamic video clips in comparison to non-socially anxious individuals (Weeks, Howell,
& Goldin, 2013).

The lack of consistency for predictive validity across different behavioral ratings
may be attributable to the implicit measures designed for the present study, which may
not have been robust enough to capture the nuanced differences in automatic associations
that could have been affecting behavioral anxiety. Another factor that may explain the
lack of significant findings in the present study is the nature of behavioral criteria that
were rated. Vocal quality, discomfort, and speech flow were not significantly predicted by
ST-IAT scores. As outlined in the Procedures section, these behaviors were included as
video-based ratings so as to reduce cognitive pressure on the speech evaluators, who were
carrying out several tasks during the speech (i.e., timing the length of the speech,
recording the speech, signaling start and stop times, and rating participants on eye gaze).
It is possible that ratings based on video recordings were not as accurate as ratings
performed during the speech (possibly due to difference between experiencing events
“live” and in real-time, as opposed to the somewhat de-contextualized nature of video
ratings). Although there have been several studies that have examined social anxiety and
linguistic correlates, the most robust evidence for this relationship has been obtained
from studies examining objectively analyzed vocal pitch (e.g., Weeks et al., 2012) and
nonverbal audio cues (Laukka et al., 2008). However, in the current study, the behavioral anchors for *vocal quality* and *speech flow* focused on affective tones, verbal expression, and participants’ ability to speak continuously and logically (see *Assessments and Measures – Modified Social Performance Rating Scale*). Thus, it may be the case that these ratings were less specific to social anxiety than expected, and than other behaviors demonstrating greater specificity to social anxiety in prior studies (e.g., vocal pitch [Weeks et al., 2012], eye gaze avoidance [e.g., see Weeks et al., 2013]), and that raters may have been largely influenced by verbal cues. Alternatively, it remains possible that the low socially anxious participants may not have been motivated with regard to their speech performance in the present study, and thus, may not have perform strongly in delivering their speeches. If true, this would mean that the low socially anxious participants would have received poorer behavioral ratings than expected, which were expected only for the high socially anxious participants.

Regarding behavioral anchors for *discomfort*, increased fidgetiness, rigidity, and self-touching actions have been associated with increased anxiety (Harrigan, Wilson, & Rosenthal, 2004). However, these are not specific to *social* anxiety. While there are certain bodily cues which have been proposed to be specific to social anxiety, such as body collapse (Weeks, Heimberg, & Heuer, 2011), head tilt (Vrijsen, Lange, Becker, & Rinck, 2010), and non-Duchenne smiles (Ohman, 1986; Prkachin & Silverman, 2002), these were not assessed specifically in the present study – this is because the latter behaviors are assessable only by using either objective measurement equipment (e.g., laser-targeted stature meter [Weeks et al., 2011]) or by highly skilled raters trained on the Facial Action Coding System (Ekman & Friesen, 1978), neither of which was feasible to
implement in the present, first-step study design to examine social anxiety-related implicit associations within the context of the BFOE model of social anxiety (Weeks & Howell, 2012). Thus, the lack of distinction between social anxiety-specific behaviors and general-anxiety behaviors may have influenced the obtained results.

In contrast, eye gaze avoidance has been purported to help control arousal by turning one’s attention away from the threatening stimulus – importantly, eye gaze avoidance has been more consistently linked throughout the literature to social anxiety by studies which have employed objective raters (e.g., see Langer & Rodebaugh, 2013). Thus, this could account for the significant results that were obtained for ratings of eye gaze in the present study.

Results from the first exploratory analysis revealed that there were no significant changes in the strength of implicit associations for general social stimuli and negatively-valenced social stimuli from before versus after the speech task. This suggests that implicit associations are not easily influenced by social threat, and replicates the findings of the two studies conducted by Schmukle and Egloff (2004).

Intriguingly, however, there was a significant decrease in the strength of implicit associations for positively-valenced social stimuli from before to after the speech task, such that these implicit associations became less positive after the speech task, across the entire sample. This suggests that there was an increase in the extent to which participants evaluated positive stimuli negatively following the speech task. It is possible that the absence of positive evaluation cues from the confederate speech evaluators during the speech (who had been trained to behave neutrally) reduced the generally positive social biases that participants exhibited prior to the speech. ©
Research Implications

The results of the present study suggest that assessing for implicit associations specific to negatively-valenced (but not to positively-valenced or general) social stimuli may help us to differentiate between highly socially anxious and low socially anxious persons; furthermore, the obtained results suggest that implicit associations specific to negatively-valenced stimuli predict social anxiety-related behavior, such as impaired eye-gaze patterns during performance situations. The present study extends the results reported by Egloff and Schmukle (2002), who found that self-referent implicit anxiety associations predicted anxiety ratings based on nervous mouth movements, speech dysfluency, hand movements, and global anxiety ratings.

Although no statistically significant differences in implicit associations were obtained for general social and positively-valenced social stimuli between the high socially anxious and low socially anxious groups, the current study is the first to attempt to assess for implicit associations regarding social stimuli of varying emotional valences. Although high socially anxious participants did endorse less positive associations for positively-valenced social stimuli and general social stimuli (as expected), these differences were not statistically significant. However, as noted above, it is worth pointing out that the effect size for the between groups difference regarding positive implicit associations was small-to-moderate in strength ($d = .27$), suggesting that the present study may have simply been underpowered to detect this effect at the level of statistical significance. Thus, future research in this area is warranted.

The non-significant group differences in implicit associations for general social stimuli and positively-valenced stimuli in the present study may be explained by
extrapersonal associations. Extrapersonal knowledge refers to cultural knowledge about associations, and does not necessarily reflect one’s own opinions (Olson & Fazio, 2004). It is interesting to note that even though non-significant differences were observed between groups for implicit associations targeting positively-valenced stimuli and general social stimuli, the high socially anxious group had overall reduced positive associations on both tasks compared to the low socially anxious group. Given that significant differences on parallel explicit measures (i.e., FPES and SIAS) were obtained, it is possible that the implicit tasks were only partially capturing these affective judgments, and were not tapping into the nuanced, personal reaction that individuals might be having towards these specific ST-IAT stimuli. It is possible that the cultural valence of the target stimuli (e.g., “reward”, “famous”) was overwhelmingly obvious to both groups, such that personal associations were not adequately captured. Such extrapersonal associations can usually be controlled for by personalizing the IAT to the individual (e.g., see Houben & Wiers, 2007). In addition, the author recommends that future studies examining the relations between social anxiety and implicit associations to distinctly valenced social stimuli should separate the positive/negative dimension into positive-neutral and negative-neutral dimensions, via a unipolar IAT. A unipolar IAT allows for more accurate assessment of associations compared to a traditional IAT, in much the same way that elimination of a counter target category does in ST-IATs (e.g., Jajodia & Earleywine, 2003).

Clinical Implications

The present study provides preliminary results that may have implications for assessment and treatment outcomes for individuals with social anxiety disorder. Given
the biased automatic attention processes associated with social anxiety, it is possible that attention retraining in socially anxious persons may reduce their fears of negative evaluation. Training using a conditioning paradigm has been found to reduce negative implicit associations (e.g., Clerkin & Teachman, 2010). The lack of significant results for biased processing of positively-valenced social stimuli, and general social stimuli, suggests that biased processing of negatively-valenced social stimuli may be the ideal stimuli to be targeted in attention retraining. It is also possible that if changes in biased attention processes result from treatment of social anxiety, implicit associations to negative stimuli could serve as a treatment outcome indicator for other treatment modalities (e.g., cognitive-behavioral therapy).

Moreover, there is a growing body of research that suggests that socially anxious individuals suffer from actual deficits in social and interpersonal skills (e.g., see Voncken & Bögels, 2008). The present study suggests that implicit measures may be able to predict eye gaze avoidance tendencies and by extension could help to assess potential deficits in social skills. Assessing for social skills deficits such as appropriate eye contact during performances and social interactions, and planning treatment that is aimed at addressing these deficits for those who exhibit such deficits, may help this subsample of socially anxious individuals to reduce their concerns about social interactions and performances. It may even assist them in navigating exposures successfully, and help to elicit social engagement from others with whom they socialize. Assessing implicit associations may be a quick way to assess for performance deficiencies that a socially anxious person may struggle with outside of clinic settings.
Limitations and Future Directions

The present study is the first to assess for implicit associations for positively-valenced stimuli in highly socially anxious people. Accordingly, there are several limitations which may inform future research. First, this study used a single-target IAT which allowed for the evaluation of a single target stimulus without including an opposing category. Although using the single-target IAT allowed us to assess for implicit associations relating to constructs such as FPE and FNE separately, modifying the attribute categories to reflect neutral versus positive, or neutral versus negative attributes (i.e., via a unipolar IAT) may have been more useful (Jajodia & Earleywine, 2003). Using positive versus negative attribute categories may have caused it to become a more conceptual, cognitive decision making task reflecting cultural knowledge rather than one that assesses for affect-driven, personal beliefs (Han, Olson, & Fazio, 2006; Karpinski & Hilton, 2001; Olson & Fazio, 2004). Another way to improve the ST-IAT would be to personalize it so that it doesn’t capture contextual effects (e.g., by removing corrective feedback on IAT tasks, by replacing attribute categories with labels encouraging the demonstration of personal preferences, etc.). In addition, research in this area would be strengthened by examining the predictive validity of implicit associations for behavioral anxiety in social situations other than speech tasks. It is worth noting that several of the participants in the control group reported experiencing severe anxiety during the speech task, and it is possible that this design issue may have affected the predictive validity of implicit associations. Using a task such as a social interaction role-play with a confederate may yield greater systematic variability in stress-induction across study groups, and would also allow for the prediction by IATs of interpersonal social skills that
are different from performance deficits found in speeches to be examined; indeed, inclusion of such a social interaction role-play task could arguably be more relevant to the day-to-day experiences of those who struggle with social anxiety. Also, the present study made use of only female speech evaluators (in an effort to standardize procedures of the study); it may also be important to examine whether the gender of the evaluating person could differentially affect experience of anxiety and related implicit associations. Finally, in order to examine the clinical implications of the study, the results need to be replicated in clinical samples of patients diagnosed with SAD.
ENDNOTES

1 Although it may seem that extraversion would be an opposing category to social anxiety, extraversion does not imply only the absence of social anxiety, but also indicates *social ease* (Rodebaugh, Woods & Heimberg, 2007).

2 It is worth noting that Tanner, Stopa and de Hower (2006) and de Jong (2002) have used the older method of analyzing IAT data (see Greenwald et al., 1998). This makes it difficult to interpret and compare their findings with studies using the latest IAT scoring algorithm (Greenwald, Nosek & Banaji, 2003).

3 It is worth noting that prior studies which have used single target implicit measures have found similar levels of internal consistency, which are deemed acceptable for this type of assessment (e.g., see Bluemke & Friese, 2008; Karpinski & Steinman, 2006).

4 Participants were not informed of the speech task when they arrived to the prescheduled study sessions (i.e., following prescreening and recruitment); instead, they were informed of the speech task after they had completed the first set of ST-IATs. This element of deception was introduced in order to increase the baserate of highly socially anxious participants recruited to complete the proposed study.

5 According to the False Discovery Rate (FDR; Benjamini & Hochberg, 1995) approach, the following formula was used in the present study to correct for family-wise error rate: \( P \leq i/m(\alpha) \times q^* \), in which “\( P \)” = corrected \( p \) value (to be solved for, per family of hypotheses involving multiple comparison), “\( i \)” = the total number of families of hypotheses involving multiple \( p \) values to be tested in the present study (fixed for overall study), “\( m \)” = the number of hypotheses within a given family (\( x \)) to be tested (tailored to
each family of hypotheses), and “$q^{*}$” = overall alpha correction level for the present study (i.e., $\alpha = .05$, fixed). For the present study, a priori FDR alpha values were calculated and used in testing whether the hypothesized effects were statistically significant. For the present study, there were two families of hypotheses. For the first family, there were three sets of analyses that involved testing the family of $p$ values. Specifically, the FDR correction procedure was applied to: the preliminary analyses that explored group differences for explicit social anxiety measures (for which $x$ in $m(x) = 6$); the group difference tests for implicit social anxiety measures (for which $x$ in $m(x) = 3$); and the regression analyses examining the predictive validity of implicit measures for behavioral ratings of anxiety (3 ST-IATs × 4 Behavioral Criteria) during a speech task (for which $x$ in $m(x) = 12$). Accordingly, $P \leq 3/ m(x) \times .05^*$ for the overall study, yielded the following alpha correction values (tailored for each hypothesis): preliminary analyses $= 3/3 \times .05$; tests for implicit social anxiety measures $= 3/3 \times .05$; Regression analyses $= 3/12 \times .05$.

The exploratory hypotheses were examined as a separate set of family hypotheses which involved three sets of analyses. Specifically, the FDR correction procedure was applied to: examining pre-post speech changes in implicit social anxiety measures (for which $x$ in $m(x) = 3$); regression analyses examining the predictive validity of social desirability for implicit measures (for which $x$ in $m(x) = 3$); and regression analyses examining predictive validity of electrodermal activity for implicit measures (for which $x$ in $m(x) = 3$). Accordingly, $P \leq 3/ m(x) \times .05^*$ for the exploratory analyses yielded the following alpha correction values tailored for each hypothesis: pre-post changes in implicit social anxiety $= 3/3 \times .05$; predictive validity of social desirability $= 3/3 \times .05$.
predictive validity of electrodermal activity = 3/3 \times 0.05.

\textsuperscript{6} The remaining exploratory analyses can be found in Appendix B.
TABLES AND FIGURES

Table 1

*Distribution of Participants across Study Groups*

<table>
<thead>
<tr>
<th>Condition</th>
<th>Count</th>
<th>M</th>
<th>F</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Socially Anxious</td>
<td>25</td>
<td>10</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>40%</td>
<td>60%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>20%</td>
<td>30%</td>
<td>50%</td>
</tr>
<tr>
<td>Low Socially Anxious</td>
<td>25</td>
<td>11</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>44%</td>
<td>56%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>22%</td>
<td>28%</td>
<td>50%</td>
</tr>
</tbody>
</table>

*Notes:* M = male participants; F = female participants.
Table 2.

*Regression Weights from Hierarchical Regression Analyses Examining the Unique Variance in Objective Ratings of Eye-Gaze Accounted for by Implicit Measures*

<table>
<thead>
<tr>
<th>Variable</th>
<th>$B$</th>
<th>SE $B$</th>
<th>$\beta$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LSAS</td>
<td>0.01</td>
<td>0.04</td>
<td>-0.18</td>
<td>0.86</td>
</tr>
<tr>
<td>Step 2:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LSAS</td>
<td>0.01</td>
<td>0.03</td>
<td>-0.06</td>
<td>0.69</td>
</tr>
<tr>
<td>ST-IAT Social Anxiety General</td>
<td><strong>6.6</strong>&lt;sup&gt;*&lt;/sup&gt;</td>
<td>2.27</td>
<td><strong>0.4</strong>&lt;sup&gt;*&lt;/sup&gt;</td>
<td><strong>0.006</strong>&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Step 1:

| BFNE-S                         | 0.01 | 0.07   | 0.01     | 0.93      |

Step 2:

| BFNE-S                         | 0.03 | 0.07   | -0.06    | 0.67      |
| ST-IAT Negatively Valenced     | **6.4**<sup>†</sup> | 2.5 | **0.37**<sup>†</sup> | **0.014**<sup>†</sup> |

*Note. LSAS = Liebowitz Social Anxiety Scale; BFNE-S = Brief Fear of Negative Evaluation- Straightforward. * $p < 0.0125$ following FDR correction. 5 (values in bold font indicate significant predictors); † $p = .014$ (i.e., marginally significant difference following FDR correction); $n = 47$ due to missing data.*
Figure 1. Mean Subjective Units of Distress Scale (SUDS) scores for high socially anxious and low socially anxious participants in response to the speech task. Notes: † = p < .025 (i.e., marginally significant difference following FDR correction); 5 n = 47 due to missing data.
Figure 2. Scores on social anxiety-related measures across study groups.

Notes: Measures are not equivalent in scale; * $p < .025$ level (following FDR correction); $n = 48$ due to missing data.
Figure 3. Mean D scores on measures of pre-speech implicit associations across study groups.

Notes: * p < .05 (after FDR correction); n = 47 due to missing data.
Figure 4. Change in D scores on the Positively-Valenced Social Single Target-Implicit Association Test (ST-IAT) from before to after the public speaking task for the full study sample.

Notes: * p < .05 (After FDR correction); \(^5\) n = 47 due to missing data.
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APPENDIX A: ASSESSING AUTOMATIC PROCESSES USING IMPLICIT MEASURES

Automatic processes occur even when the person does not have any conscious goals and is not expending significant cognitive effort. As noted in the document, dysfunctional automatic processes and thoughts are assumed to be central to most form of psychopathology (Beck, 1976). These can be implicit in that the person is not aware of their occurrence, yet they can influence behavior automatically.

Several implicit measures have been developed to assess for automatic processes. One of the most popular implicit measures is the Implicit Association Task (IAT) developed by Greenwald et al. (1998). The IAT measures the strength of associations between target stimuli and one or more attribute dimensions. The strength of association is determined by analyzing the reaction times of participants, who categorize the stimuli appearing on the screen using two response keys. To illustrate the paradigm of a typical IAT, the Race-IAT, which assesses racial attitudes towards African Americans and Caucasians (Mitchell, Nosek, & Banaji, 2003), is detailed here. In the first step, participants were asked to categorize stimuli related to African Americans and Caucasians (e.g., typical names of African Americans and Caucasians or photographs of African American and Caucasian individuals). In the next phase, they were asked to categorize words on an attribute dimension such as pleasant or unpleasant. The stimuli in the latter set usually consists of clearly valenced words (e.g., poison and gift are clearly positive and negative words). The critical phase of the IAT involves combining the two categories; thus each response key has two meanings (e.g., the first response key represents African Americans/pleasant and the other response key denotes responses of
This block of trials is then repeated after switching the responses assigned to the keys (e.g., the keys now represent African American/unpleasant versus Caucasians/pleasant). The strength of associations/attitudes towards African Americans is determined by examining the extent to which the participant is responding faster with an African American/positive pairing than with an African American/negative pairing, or vice versa. This means that if a participant responded faster on the African American-negative task than on the Caucasian-positive task, this would imply that he/she had stronger associations with the African American-negative pairing than with the Caucasian-positive pairing, and that the stronger associations were more easily accessed.

The ST-IAT procedure comprised six blocks across two phases, which were administered in counterbalanced order. The six blocks of trials included 24 attribute practice trials (blocks 1 and 4), 24 initial test trials (blocks 2 and 5), and 48 combined test trials (blocks 3 and 6). During all trials, “Positive” attribute stimuli were assigned to one response key (the letter “E” on the keyboard), and “Negative” attribute stimuli were assigned to another response key (the letter “I” on the keyboard), as recommended by Greenwald et al. (1998). For combined trials during phase 1 (e.g., social anxiety-general + positive), social anxiety-general and positive stimuli were assigned to the same (random) response key and negative stimuli were assigned to a different (random) response key. For combined trials during phase 2, (e.g., social anxiety-general + negative), social anxiety and negative stimuli were assigned to the same response key on the keyboard and positive stimuli were assigned to the other response key on the keyboard.

As mentioned previously, there are two phases of 3 blocks of trials each (for a total of 6 blocks). Participants practiced the discrimination of attribute categories
(positive versus negative) for the first 24 trials (block 1 and block 4). After the first 24 trials, which included only the attribute category (positive versus negative), the stimuli from the target category (e.g., social anxiety-general) was added back to the task. Participants then did 24 initial test trials (blocks 2 and 5) on the combined task. Once all the trials had been completed, the participant attempted the last 48 combined test trials (blocks 3 and 6) that were analyzed to obtain a ST-IAT score.

The main difference between phases 1 and 2 is the initial coupling of the target variable with the attribute variable. For blocks 2 and 3, the Positive attribute response key was coupled to the target category, while for blocks 5 and 6, the Negative attribute response key was coupled to the target category. This procedure was followed for all three ST-IATs (i.e., social anxiety-general, negatively-valenced-social, and positively-valenced social). All target and attribute stimuli were presented in random order.

The basic ST-IAT task instructions were displayed at the beginning of each phase, and a brief reminder of the instructions regarding the categorization task and key assignments of the upcoming set of trials was given prior to all 6 blocks of the task. The participant was reminded that the task was timed and that the objective was to work both quickly and accurately. The inter-stimulus interval after each correct response was set to 400 milliseconds. If participants answered incorrectly, a red “X” appeared on the screen, and participants were unable to proceed to the next trial until a correct response was given. Thus, the time latency recorded for each trial included the total time taken to make a correct response (Greenwald et. al., 2003).

The scoring procedures recommended by Greenwald et al. (2003) were used to obtain an IAT D-score. Before computing the D-score, those participants whose response
times were less than 300 milliseconds or more than 3000 milliseconds on more than 10% of the trials (reflective of careless responses), or whose error rates exceeded 20%, were excluded from the analysis (Greenwald et al., 2003). Of those participants who were retained following these exclusion criteria, any trial lasting longer than 3,000 milliseconds was replaced with the mean within-participant response time to avoid skewing the computations (Greenwald et al., 1998). Finally, the D-scores were calculated by analyzing the difference scores between trials in the first block (e.g., social anxiety-general + Positive) and the second block (e.g., social anxiety-general + Negative). This involves calculating the average response times of blocks 2 and 3 (e.g., social anxiety-general + positive), which is then subtracted from the average response times of blocks 5 and 6 (e.g., social anxiety-general + negative), respectively. Each difference score was then divided by the standard deviation of all response items within initial test blocks 2 and 5 and likewise within test blocks 3 and 6. Finally, the ST-IAT D-score was computed by averaging these two values. Lower D-scores indicate slower responses, wherein social anxiety-general is paired with “positive” stimuli relative to “negative” stimuli. It is assumed that slower responses reflect a weaker association of the underlying concepts (i.e., in this case, social anxiety-general stimuli are more strongly associated with negative stimuli than to positive stimuli).

Predictive Validity of Implicit Measures

The mutual incremental validity of implicit association tests has been demonstrated in studies using criterion measures involving interracial and intergroup behavior. The social sensitivity of the psychological construct being assessed affects predictive validity. For psychological constructs that are high in social sensitivity, the
predictive validity of self-report measures is low, while the incremental validity of IAT measures is relatively high (Greenwald, Poehlman, Uhlmann, & Banaji, 2009). Given the socially sensitive nature of SAD, it is expected that IAT measures will demonstrate high incremental validity.

One of the main purported advantages of implicit measures over explicit measures is that responses are not affected by social desirability, and are thus immune to conscious distortion. Several studies have been conducted to examine if IAT methods are indeed resistant to efforts at faking. Findings showed that participants were unable to fake the IAT when given simple, general instructions to create a good impression (Asendorpf et al., 2002; Banse, Seise, & Zerbes, 2001; Egloff & Schmukle, 2002; Kim, 2003). The participants were largely successful in manipulating explicit measures, thus underscoring the utility of implicit measures. However, there are also some findings that suggest that people may be able to partially fake scores on implicit measures when they are given specific, detailed instructions about how the IAT works and how they should respond to do so (Fiedler & Bluemke, 2005; Kim, 2003). Although more research is required on participants’ potential ability to fake IAT responses, the current literature suggests that a naïve individual would not be able to influence IAT outcomes.

Psychometric properties of the Single Target IAT

Although previous studies have not used an ST-IAT to examine social anxiety specifically, IATs have been used in several studies to assess anxiety in general. These studies suggest that the IAT-Anxiety has good internal consistency, with mean α values of approximately .80 (Banse et al., 2001; Egloff, Schwerdtfeger, & Schmukle, 2005). The test-retest reliability coefficient for IAT-Anxiety has been found to range between $r = .58$
(time interval of 1 week) and $r = .47$ (time interval of 1 year) (Egloff & Schmukle, 2002; Egloff et al., 2005). The internal consistency of IATs is typically stronger than retest reliability, and this pattern is common to other IAT variants as well. Although the internal consistency of IATs is sometimes not as strong as explicit measures, the stability of the IAT has been found to be comparatively stronger than that of other implicit measures, suggesting that it is the most stable implicit measure (Egloff et al., 2005 Nosek, Greenwald, & Banaji, 2007). Although previous studies have not used or reported on the psychometric properties of a social anxiety-specific ST-IAT, given that the IAT-Anxiety, as well as ST-IATs in general, have demonstrated adequate reliability and validity (e.g., see Banse et al., 2001; Bluemke & Friese, 2008), it was reasonable to assume that the ST-IATs designed for and used in the present study would show satisfactory reliability and validity.
APPENDIX B: FULL DATA ANALYSES AND RESULTS FOR HYPOTHESIZED NON-SIGNIFICANT RELATIONSHIPS AND EXPLORATORY ANALYSES

Hypothesis 4a. Predicting vocal quality.

Multiple linear regression analyses were conducted to determine whether responses to the implicit tasks (specifically, the social-anxiety general ST-IAT and the positively-valenced ST-IAT) predicted variance in vocal quality ratings by objective observers of participants during a speech task, above and beyond variance explained by corresponding explicit measures of anxiety (i.e., LSAS and FPES scores, respectively). For both equations, the explicit measure and corresponding implicit measure were entered as simultaneous predictors. Both models were non-significant, all $F$s (2, 44) $\leq 1.42$, all $p$s $>.25$ all $\hat{\eta}^2$s $\leq .004$.

Hypothesis 4b. Predicting discomfort ratings.

Linear regression analyses were conducted to determine whether responses to the social-anxiety general ST-IAT and positively-valenced ST-IAT predicted variance above and beyond variance explained by LSAS and FPES scores, respectively. The method of entering predictors remained the same as analyses carried out for hypothesis 4a; only the dependent variable was changed to ratings of discomfort during the speech task. Both models were non-significant, all $F$s (2,44) $\leq 1.30$, all $p$s $>.28$, all $\hat{\eta}^2$s $\leq .03$.

Hypothesis 4c. Predicting speech flow ratings.

Regression analyses were conducted to determine whether responses to the social-anxiety general ST-IAT and positively-valenced ST-IAT predicted variance in speech flow ratings of participants during the speech task, above and beyond variance explained by corresponding explicit measures of social anxiety (LSAS and FPES scores,
respectively). The method of entering predictors remained the same as analyses carried out for Hypotheses 4a and 4b; only the dependent variable was changed to ratings of speech flow. The model that included scores on the social anxiety-general ST-IAT and LSAS was found to be non-significant, $F(2,44) = 1.33, p = .28$. Although the omnibus effect of the model which included scores on the positively-valenced ST-IAT was significant $F(2,44) = 3.44, p = .041$, the scores on the positively-valenced ST-IAT did not emerge as a significant predictor $t = 1.57, p = .12$, all $\eta^2_p \leq .05$.

_Hypothesis 4c. Predicting eye gaze ratings._

Regression analyses were conducted to determine whether responses to the social-anxiety general ST-IAT and positively-valenced ST-IAT predicted variance in eye gaze ratings by an objective observer of participants during the speech task, above and beyond the variance explained by corresponding measures of social anxiety (LSAS and FPES scores, respectively). The method of entering predictors remained the same as in analyses carried out for testing Hypotheses 4a-4c; only the dependent variable was changed to ratings of _eye gaze_ during the speech task.

When testing the model with LSAS and social anxiety-general ST-IAT scores as predictors, the model was significant, $F(2,44) = 4.25, p = .021$. Scores on the social anxiety-general ST-IAT emerged as the single significant predictor of eye gaze ratings $t(2,44) = 2.91, p = .006; \beta = 0.403, \eta^2_p = .16$. The model was not significant when FPES and positively-valenced-social ST-IAT scores were entered as predictors, $F(2,44) = .22, p = .84, \eta^2_p = .001$. 
Exploratory Hypothesis 2

In addition, given the generally low correlations reported between implicit and explicit measures throughout the literature (e.g., see Greenwald et al., 2009), as well as the susceptibility of explicit measures to response biases and faking tendencies, it was examined whether social desirability could moderate the relationship between implicit and explicit measures of social anxiety.

Thus, the present study examined the extent to which social desirability accounted for variance in explicit measures after controlling for scores on implicit measures. Three separate regression analyses were conducted, wherein each of the implicit measures (i.e., social anxiety-general ST-IAT, negatively-valenced social ST-IAT, and positively-valenced social ST-IAT) and social desirability (i.e., SDS-17 scores) were entered as predictors. The corresponding explicit measure score to the implicit measure (i.e., LSAS, BFNE-S, and FPES scores, respectively) was entered as the dependent variable. An FDR correction was used to control for family-wise error (\( \alpha = [3/3 \times .05] = .05 \)). In order to test the moderation effect, the interaction term between social desirability and the relevant implicit test was also included as one of the independent variables. In accordance with procedures recommended for testing interactions, the variables were mean-centered (Aiken & West, 1991).

When testing the model with social anxiety-general ST-IAT, SDS-17 scores, and their interaction as predictors, and LSAS scores as the dependent variable, the model was marginally significant, \( F (2,45) = 2.73, p = .056 \). Social desirability emerged as the single marginally significant predictor of LSAS scores, \( t (2,45) = -2.00, p = .052; \beta = -0.31 \). The remaining models were not significant, both \( Fs (2,45) \leq 1.17 \), both \( ps \geq .55 \).
Discussion

Despite the lack of a significant group difference in scores obtained for the social anxiety-general-ST-IAT across the high and low socially anxious groups, implicit associations for general social-stimuli were found to predict eye gaze ratings, such that increased positive implicit associations for general social stimuli were correlated with increased eye-gaze ratings by objective raters. A similar pattern of results was obtained regarding implicit associations towards negatively-valenced (but not positively-valenced) social stimuli (See Data Analysis and Results: Hypothesis 4). Furthermore, the implicit associations for general social-stimuli and positively-valenced social stimuli did not significantly predict variance in any other behavioral criteria.

The results of the second exploratory analyses suggest that after controlling for implicit associations regarding general social anxiety, social desirability is one of the factors partially affecting explicit reports of anxiety such that increasing social desirability correlates with decreasing anxiety scores. However, this did not generalize to implicit associations measuring positively and negatively-valenced social stimuli. More research is needed to examine whether socially anxious people may perceive their anxiety in social situations as undesirable, unattractive and unappealing to others, and as such, may be particularly motivated to conceal their anxiety.
APPENDIX C: EXPLORATORY ANALYSES OF ELECTRODERMAL ACTIVITY

The present study also included exploratory analyses examining whether implicit associations pertaining to social stimuli would uniquely predict anxiety responses as indexed by physiological changes in skin conductance in response to a public speaking task, given that findings from past studies have shown that implicit measures can predict physiological measures (e.g., see Quirin, Kazén, Rohrmann, & Kuhl, 2009).

Skin Conductance Measure

Electrodermal activity was assessed using the Affectiva Q Sensor (www.qsensortech.com) which is a wearable, wireless biosensor that measures emotional arousal via skin conductance. The Q sensor complies with safety standards for laboratory equipment established by Industrial Equipment Control, and with relevant product safety standards for North America and Europe. The Q sensor is small, light-weight, and can be worn comfortably on the wrist without distraction.

Self-Ratings of Physiological Arousal (SRPA)

The participants were asked to retrospectively rate their perceived physiological arousal during the speech task (e.g., see Mauss, Wilhelm, & Gross, 2004, for details). For the purposes of this study, these will be referred to as the Self-Ratings of Physiological Arousal (SRPA) scale. Specifically, they were asked to rate their experience of increased: sweating, heart rate, and breathing using three separate 11-point Likert scales, ranging from 0 (none at all) to 10 (extremely).

After obtaining informed consent, the Q sensor was strapped onto the participants’ wrist and a resting baseline recording of skin conductance was obtained for a period of 10 minutes. During this time, the participant was asked to sit quietly and read
a magazine. Once the baseline was recorded, the rest of the study procedures were initiated. The participant wore the Q sensor for the duration of the study. Once all the study procedures were completed, the Q sensor was taken off.

Three sets of regression analyses were conducted, one for each of the implicit measures. The scores on the relevant implicit measure (e.g., social anxiety general ST-IAT scores) and participants’ subjective ratings of somatic arousal (i.e., SRPA scale scores) were entered as predictors, and changes in electrodermal activity between baseline and speech were entered as the dependent variables. Contrary to expectations, none of the models was significant, all $F$s (2,44) ≤ 0.94, all $p$ ≥ .40.

The exploratory analyses examining whether implicit measures would demonstrate incremental predictive validity for physiological measures of arousal (i.e., electrodermal activity), above what was explained by corresponding explicit measures, did not yield any significant results. Although previous studies have found that implicit associations can uniquely predict physiological responses such as cardiovascular activity (e.g., see Egloff et al., 2002), implicit associations for general social, positively-valenced, and negatively valenced social stimuli did not account for variance in changes in electrodermal activity between the baseline and speech task. Further analyses showed that the two groups showed similar levels of electrodermal activity at all periods of time (i.e., at baseline, during speech, during the recovery period after the speech, and while engaged in both implicit tests), all $t$s (45) ≤ 1.57, all $p$s ≥ .13. Previous studies have also found similar levels of physiological arousal for socially anxious and non-socially anxious persons during a public speaking task (e.g., see Mauss, Wilhelm, & Gross, 2003).
Demographics Questionnaire

Age: ________

Gender
Female
Male

Ethnicity/Race:

Are you: (Check all that apply)

White
Black or African American
Latino
American Indian or Alaskan Native
Asian
Native Hawaiian or Pacific Islander
other (specify)________________________

Note: If you can describe your ethnicity more specifically (e.g., primary country or countries of origin), please do so here:

______________________________

Primary Language

English
Spanish
other (specify)________________________

Religion

Protestant
Catholic
Jewish
Muslim
other (specify)________________________

Yearly Family Income _______ $__________,000.

Current Relationship Status (check one):
Single
Romantically involved, but not exclusively
Romantically involved, exclusively (monogamously)

**Sexual Orientation (check one):**

- Exclusively heterosexual
- Heterosexual, with some homosexual experience
- Bisexual
- Homosexual, with some heterosexual experience
- Exclusively homosexual
- Unsure/Questioning
Anxiety Disorders Interview Schedule for the DSM-IV; Lifetime Version

Social Phobia Section

Note To Interviewer: There are several 0-8 rating scales in this section. Do not provide the scale to the patient, rather make a judgment of the rating based on the patient’s response(s). Remember, a clinically meaningful rating (one which suggests need for treatment) is indicated by a rating of 4 or above.

1. Currently, in social situations where you might be observed or evaluated by others or when you are meeting new people, do you feel fearful, anxious or nervous?

   YES____

   NO_____

2. Currently, are you overly concerned that you may do and/or say something that might embarrass or humiliate yourself in front of others, or that others may think badly of you?

   YES____

   NO_____  

   I am going to describe some situations of this type and ask how you would feel in each situation and to what extent you avoid these situations.

For each situation, make separate ratings for level of fear and degree of avoidance using the following scale:

0-----------1---------2---------3---------4---------5---------6---------7---------8

No fear/ Mild fear/ Moderate fear/ Severe fear/ Very severe fear/
Never avoids Rarely avoids Sometimes avoids Often avoids Always avoids

FEAR

AVOID COMMENTS
Parties 3. _____ 4. _____

Participating at meetings/classes 5. _____ 6. _____

Talking in front of a group/formal speaking 7. _____ 8. _____

Speaking with unfamiliar people 9. _____ 10. _____

Eating in public 11. _____ 12. _____

Using public restrooms 13. _____ 14. _____
Writing in public (signing checks, filling out forms) 15. _____ 16.

_____       _____

Dating situations 17. ____ 18. _____

_____       _____

Talking to persons in authority 19. ____ 20. _____

_____       _____

Being assertive, e.g.:
- Refusing unreasonable requests 21. ____ 22. _____

_____       _____

- Asking others to change their behavior 23. ____ 24. _____

_____       _____

Initiating a conversation 25. ____ 26. _____

_____       _____

Maintaining a conversation 27. ____ 28. _____

_____       _____

Other _________________________ 29. ____ 30. _____

_____       _____

31. ____ 32. _____

Now I want to ask you a series of questions about your current anxiety in social situations.

List most problematic situations:

__________________________________________

What are you concerned will happen in these situations?

________________________________________________________________________

33. Do you experience the anxiety nearly every time you encounter _____________________? YES______

NO______

34. Does the anxiety occur as soon as you enter the situations or about to enter the situations, or is the anxiety sometimes delayed or unexpected? IMMEDIATE______

DELAYED_____
I now want to ask you about a number of symptoms you may experience while in _____ (situations ≥ 4). For each, I want you to tell me if you usually experience the symptom.
If so, how severe is it?
(If client experiences different symptoms depending on the situation, rate the severity of symptoms that seem to occur most frequently across situations.)

0-----------1-----------2-----------3-----------4-----------5-----------6-----------7---
----------8

severe

None Mild Moderate Severe Very

35. Palpitations, pounding heart, or accelerated heart rate ______
36. Sweating ______
37. Trembling or shaking ______
38. Shortness of breath or smothering sensations ______
39. Feeling of choking ______
40. Chest pain or discomfort ______
41. Nausea or stomach distress ______
42. Chills, hot flushes, or blushing ______
43. Dizziness, unsteady feelings, lightheadedness, or faintness ______
44. Feelings of unreality or being detached from oneself ______
45. Numbing or tingling sensations ______
46. Fear of dying ______
47. Fear of going crazy ______
48. Fear of doing something uncontrolled ______
49. Rate interference: ________________

In what ways has your anxiety interfered with your life (e.g., daily routine, job, social activities)? How much are you bothered by these fears?

________________________________________________________________________

________________________________________________________________________

Has your current job or educational attainment been influenced by your anxiety?

________________________________________________________________________

________________________________________________________________________

0-----------1-----------2-----------3-----------4-----------5-----------6-----------7---
----------8

None Mild Moderate Severe

Very severe

49. Rate interference: ________________

50. Distress:________________________

END OF INTERVIEW
**RATE CURRENT SEVERITY OF SOCIAL PHOBIA**

<table>
<thead>
<tr>
<th>Absent</th>
<th>Mild</th>
<th>Moderate</th>
<th>Marked</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0------</td>
<td>1----</td>
<td>2--------</td>
<td>3------</td>
</tr>
<tr>
<td></td>
<td>------</td>
<td>----------</td>
<td>--------</td>
</tr>
<tr>
<td>None</td>
<td>Slightly</td>
<td>Definitely</td>
<td>Markedly</td>
</tr>
<tr>
<td>Very severely disturbing/</td>
<td>disturbing/</td>
<td>disturbing/</td>
<td></td>
</tr>
<tr>
<td>disabling</td>
<td>not really</td>
<td>disabling</td>
<td>disabling</td>
</tr>
<tr>
<td>disabling</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DSM-IV DIAGNOSIS**

<table>
<thead>
<tr>
<th>PRIMARY DIAGNOSIS</th>
<th>SEVERITY RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>AXIS I SOCIAL PHOBIA</td>
<td></td>
</tr>
</tbody>
</table>
Liebowitz Social Anxiety Scale (LSAS)

**AVOIDANCE**

<table>
<thead>
<tr>
<th>Activity</th>
<th>ANXIETY (S)</th>
<th>ANXIETY (P)</th>
<th>AVOID (S)</th>
<th>AVOID (P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephoning in public (P)</td>
<td></td>
<td>52)</td>
<td>53)</td>
<td></td>
</tr>
<tr>
<td>Participating in small groups (P)</td>
<td></td>
<td>54)</td>
<td>55)</td>
<td></td>
</tr>
<tr>
<td>Eating in public places (P)</td>
<td></td>
<td>56)</td>
<td>57)</td>
<td></td>
</tr>
<tr>
<td>Drinking with others in public places (P)</td>
<td></td>
<td>58)</td>
<td>59)</td>
<td></td>
</tr>
<tr>
<td>Talking to people in authority (S)</td>
<td>60)</td>
<td></td>
<td>61)</td>
<td></td>
</tr>
<tr>
<td>Acting, performing or giving a talk in front of an audience (P)</td>
<td></td>
<td>62)</td>
<td>63)</td>
<td></td>
</tr>
<tr>
<td>Going to a party (S)</td>
<td>64)</td>
<td></td>
<td>65)</td>
<td></td>
</tr>
<tr>
<td>Working while being observed (P)</td>
<td></td>
<td>66)</td>
<td></td>
<td>67)</td>
</tr>
<tr>
<td>Writing while being observed (P)</td>
<td></td>
<td>68)</td>
<td></td>
<td>69)</td>
</tr>
<tr>
<td>Calling someone you don’t know very well (S)</td>
<td>70)</td>
<td></td>
<td></td>
<td>71)</td>
</tr>
<tr>
<td>Talking with people you don’t know very well (S)</td>
<td>72)</td>
<td></td>
<td>73)</td>
<td></td>
</tr>
<tr>
<td>Meeting strangers (S)</td>
<td>74)</td>
<td></td>
<td></td>
<td>75)</td>
</tr>
<tr>
<td>Urinating in a public bathroom (P)</td>
<td></td>
<td>76)</td>
<td>77)</td>
<td></td>
</tr>
<tr>
<td>Entering a room when others are already seated (P)</td>
<td>78)</td>
<td></td>
<td>79)</td>
<td></td>
</tr>
<tr>
<td>Being the center of attention (S)</td>
<td>80)</td>
<td></td>
<td></td>
<td>81)</td>
</tr>
<tr>
<td>Speaking up at a meeting (P)</td>
<td></td>
<td>82)</td>
<td>83)</td>
<td></td>
</tr>
<tr>
<td>Taking a test (P)</td>
<td></td>
<td>84)</td>
<td>85)</td>
<td></td>
</tr>
<tr>
<td>Expressing a disagreement or disapproval to people you don’t know very well (S)</td>
<td></td>
<td>86)</td>
<td>87)</td>
<td></td>
</tr>
<tr>
<td>Looking at people you don’t know very well in the eyes (S)</td>
<td></td>
<td>88)</td>
<td>89)</td>
<td></td>
</tr>
</tbody>
</table>
FEAR OR ANXIETY

None
Mild - Tolerable
Moderate - Distressing
Severe - Disruptive

AVOIDANCE

Never (0%)
Occasionally (1% - 33%)
Often (33% - 67%)
Usually (67% - 100%)
Social Phobia Scale (SPS)

For each statement, please select the appropriate numbered response on the scale provided to indicate the degree to which you feel the statement is characteristic of you. The rating scale is as follows:

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Not at all characteristic or true of me</td>
</tr>
<tr>
<td>1</td>
<td>Slightly characteristic or true of me</td>
</tr>
<tr>
<td>2</td>
<td>Moderately characteristic/true of me</td>
</tr>
<tr>
<td>3</td>
<td>Very characteristic or true of me</td>
</tr>
<tr>
<td>4</td>
<td>Extremely characteristic or true of me</td>
</tr>
</tbody>
</table>

1. I become anxious if I have to write in front of other people.
3. I can suddenly become aware of my own voice and of others listening to me.
4. I get nervous that people are staring at me as I walk down the street.
5. I fear I may blush when I am with others.
6. I feel self-conscious if I have to enter a room where others are already seated.
7. I worry about shaking or trembling when I’m watched by other people.
8. I would get tense if I had to sit facing other people on a bus or a train.
9. I get panicky that others might see me faint, or be sick or ill.
10. I would find it difficult to drink something if in a group of people.
11. It would make me feel self-conscious to eat in front of a stranger at a restaurant.
12. I am worried people will think my behavior odd.
13. I would get tense if I had to carry a tray across a crowded cafeteria.
14. I worry I’ll lose control of myself in front of other people.
15. I worry I might do something to attract the attention of other people.
16. When in an elevator, I am tense if people look at me.
17. I can feel conspicuous standing in a line.
18. I can get tense when I speak in front of other people.
19. I worry my head will shake or nod in front of others.
20. I feel awkward and tense if I know people are watching me.
Social Interaction Anxiety Scale (SIAS)

For each statement, please select the appropriate numbered response on the scale provided to indicate the degree to which you feel the statement is characteristic of you. The rating scale is as follows:

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Not at all characteristic or true of me</td>
</tr>
<tr>
<td>1</td>
<td>Slightly characteristic or true of me</td>
</tr>
<tr>
<td>2</td>
<td>Moderately characteristic/true of me</td>
</tr>
<tr>
<td>3</td>
<td>Very characteristic or true of me</td>
</tr>
<tr>
<td>4</td>
<td>Extremely characteristic or true of me</td>
</tr>
</tbody>
</table>

1. I get nervous if I have to speak with someone in authority (teacher, boss).
2. I have difficulty making eye contact with others.
3. I become tense if I have to talk about myself or my feelings.
4. I find it difficult mixing comfortably with the people I work with.
5. I find it easy to make friends of my own age.
6. I tense up if I meet an acquaintance in the street.
7. When mixing socially, I am uncomfortable.
8. I feel tense if I am alone with just one person.
9. I am at ease meeting people at parties, etc.
10. I have difficulty talking with other people.
11. I find it easy to think of things to talk about.
12. I worry about expressing myself in case I appear awkward.
13. I find it difficult to disagree with another’s point of view.
14. I have difficulty talking to attractive persons of the opposite sex.
15. I find myself worrying that I won’t know what to say in social situations.
16. I am nervous mixing with people that I don’t know well.
17. I feel I’ll say something embarrassing when talking.
18. When mixing in a group, I find myself worrying I will be ignored.
19. I am tense mixing in a group.
20. I am unsure whether to greet someone I know only slightly.
Brief Fear of Negative Evaluation (BFNE)

Read each of the following statements carefully and indicate how characteristic it is of you. Select the appropriate numbered response on the scale provided to indicate how characteristic the statement is of you.

1 = Not at all characteristic of me  
2 = Slightly characteristic of me  
3 = Moderately characteristic of me  
4 = Very characteristic of me  
5 = Extremely characteristic of me

1. I worry about what other people will think of me even when I know it doesn’t make a difference.

2. I am unconcerned even if I know people are forming an unfavorable impression of me.

3. I am frequently afraid of other people noticing my shortcomings.

4. I rarely worry about what kind of impression I am making on someone.

5. I am afraid that others will not approve of me.

6. I am afraid that people will find fault with me.

7. Other people’s opinions of me do not bother me.

8. When I am talking to someone, I worry about what they may be thinking about me.

9. I am usually worried about what kind of impression I make.

10. If I know someone is judging me, it has little effect on me.

11. Sometimes I think I am too concerned with what other people think of me.

12. I often worry that I will say or do the wrong things.
Fear of Positive Evaluation Scale (FPES)

Read each of the following statements carefully and select the appropriate numbered response on the scale provided to indicate the degree to which you feel the statement is characteristic of you. For each statement, respond as though it involves people that you do not know very well. Rate each situation from 0 to 9.

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all True</td>
<td>Somewhat true</td>
<td>Very True</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. I am uncomfortable exhibiting my talents to others, even if I think my talents will impress them.
2. It would make me anxious to receive a compliment from someone that I am attracted to.
3. I try to choose clothes that will give people little impression of what I am like.
4. I feel uneasy when I receive praise from authority figures.
5. If I have something to say that I think a group will find interesting, I typically say it.
6. I would rather receive a compliment from someone when that person and I were alone than when in the presence of others.
7. If I was doing something well in front of others, I would wonder whether I was doing “too well”.
8. I generally feel uncomfortable when people give me compliments.
9. I don’t like to be noticed when I am in public places, even if I feel as though I am being admired.
10. I often feel under-appreciated, and wish people would comment more on my positive qualities.
Behavioral Anchors for the Social Performance Rating Scale (SPRS)

We would like you to rate the speakers on a scale of 1 to 5 on the features listed below. For each feature, specific guidelines have been suggested for the different scores that you can give to the speakers. Use these guidelines to determine the appropriate score.

A.1. GAZE

(1) Very Poor: Participant completely avoids looking at the audience or stares continually.

(2) Poor: Participant avoids eye contact (or stares) for majority of time. Disruptive to performance.

(3) Fair: Participant frequently avoids eye contact (or stares). Gaze pattern is mildly disruptive to performance.

(4) Good: Participant occasionally avoids eye contact or tends to look too much (stares).

(5) Very Good: Participant keeps eye contact during the speech, does not stare; shifts focus during pauses.

A.2. VOCAL QUALITY

(1) Very Poor: (a) Participant speaks in a flat, monotonous voice; or (b) speaks at a low volume or mumbles; or (c) speaks overly loudly, or has intrusive tone (harsh or unpleasant voice quality).

(2) Poor: (a) Participant demonstrates no warmth, enthusiasm, or interest in verbal expression; or (b) volume somewhat low and speech somewhat unclear; or (c) speaks a little bit too loudly, or tone is somewhat intrusive or sarcastic.

(3) Fair: (a) Participant shows some warmth in verbal expression but at most times sounds unenthusiastic or uninterested; and (b) speaks in appropriate volume (given partner's volume); has clear voice quality; and (c) does not have an intrusive or sarcastic tone.

(4) Good: (a) Participant shows moderate warmth and but inconsistent enthusiasm or interest. Could also be too 'gushy' (seems fake or forced); and (b) and (c) are as in Fair.

(5) Very Good: Participant is warm and enthusiastic in verbal expression without sounding condescending or gushy.

A.3. DISCOMFORT

(1) Very High: Complete rigidity of arms, legs or whole body. Constant leg movements or fidgeting with hands, hair or clothing. Extremely still face or constant facial tics. Frequent nervous throat clearing, swallowing, or stuttering. Frequent inappropriate giggling or laughing.

(2) High: Rigidity or fidgeting for majority of time. Difficulty sitting still is somewhat disruptive to conversation. Still face or frequent facial tics. Some nervous throat clearing or swallowing.
Some inappropriate giggling or laughing. Participant shows signs of discomfort by frequently looking around.

(3) Moderate: No rigidity. Slight movement of legs, fidgeting, throat clearing, or swallowing. Participant shows only brief periods of discomfort.

(4) Low: No rigidity, nervous throat clearing, or swallowing. Minimal fidgeting that is not disruptive to performance. No notable signs of discomfort. At times may appear relaxed and at ease (smiling or gesturing).

(5) Very Low: Relaxed body posture and natural body movement. Participant laughs and smiles at appropriate times. S/he shows effective gesturing (to be distinguished from fidgeting). Participant focuses on the speech task all the time, does not appear at all uncomfortable, but at ease in situation.

A.4. SPEECH FLOW

(1) Very Poor: Participant is unable to speak continuously and logically on the topic. Participant speaks in fragments of speech, often loosely connected or marked by grammatically incorrect conjunctions. Participants’ speech is marked by unintentional long pauses. The speech appears to be a collection of random ideas and thoughts.

(2) Poor: Participant is able to speak continuously, but is only successful about half the time. The speech does not flow smoothly, and appears to have little direction or purpose. Participant often repeats ideas and may repeatedly flit between subtopics without any justification.

(3) Fair: For the most part, the participant is able to maintain the flow, even if they sound somewhat awkward and stall at times. Participant may occasionally repeat themselves, but demonstrate reasonable organization of ideas in their speech.

(4) Good: Participant is able to maintain the flow of the speech well, presenting his ideas in a logical manner. Participant uses appropriate illustrations or elaborates thoughts in an effective manner. Participant makes clear his opening and summary to the speech. No obvious deficits.

(5) Very Good: Participant easily maintains the logical flow of the speech, presenting main ideas of the speech in a well thought out framework. Participant introduces new ideas fluidly and frequently uses examples to ensure clarity. Participant demonstrates proficient use of syntax and appropriate vocabulary.
Self Ratings of Physiological Arousal (SRPA)

Please rate the extent to which you experienced an increase in the following symptoms during the speech task. Rate each symptom from 0 to 10. Please indicate a single rating for each symptom.

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>None at all</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Extremely</td>
</tr>
</tbody>
</table>

1. Sweating
   0 1 2 3 4 5 6 7 8 9 10

2. Heart Rate
   0 1 2 3 4 5 6 7 8 9 10

3. Breathing
   0 1 2 3 4 5 6 7 8 9 10
Beck Depression Inventory – II

This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the one statement in each group that best describes the way you have been feeling during the past two weeks, including today. If several statements in the group seem to apply equally well, select the numbered response that corresponds to the highest number for that group.

1. **Sadness**
   ① – I do not feel sad.
   ② – I feel sad much of the time.
   ③ – I am sad all the time.
   ④ – I am so sad or unhappy that I can't stand it.

2. **Pessimism**
   ① – I am not discouraged about my future.
   ② – I feel more discouraged about my future than I used to be.
   ③ – I do not expect things to work out for me.
   ④ – I feel that my future is hopeless and will only get worse.

3. **Past Failure**
   ① – I do not feel like a failure.
   ② – I have failed more than I should have.
   ③ – As I look back, I see a lot of failures.
   ④ – I feel I am a total failure as a person.

4. **Loss of Pleasure**
   ① – I get as much pleasure as I ever did from the things I enjoy.
   ② – I don't enjoy things as much as I used to.
   ③ – I get very little pleasure from the things I used to enjoy.
   ④ – I can’t get any pleasure from the things I used to enjoy.

5. **Guilty Feelings**
   ① – I don't feel particularly guilty.
   ② – I feel guilty over many things I have done or should have done.
   ③ – I feel quite guilty most of the time.
   ④ – I feel guilty all of the time.

6. **Punishment Feelings**
   ① – I don't feel I am being punished.
   ② – I feel I may be punished.
   ③ – I expect to be punished.
   ④ – I feel I am being punished.
7. **Self-Dislike**
   ① – I feel the same about myself as ever.
   ② – I have lost confidence in myself.
   ③ – I am disappointed in myself.
   ④ – I dislike myself.

8. **Self-Criticalness**
   ① – I don't criticize or blame myself more than usual.
   ② – I am more critical of myself than I used to be.
   ③ – I criticize myself for all of my faults.
   ④ – I blame myself for everything bad that happens.

9. **Suicidal Thoughts or Wishes**
   ① – I don't have any thoughts of killing myself.
   ② – I have thoughts of killing myself, but I would not carry them out.
   ③ – I would like to kill myself.
   ④ – I would kill myself if I had the chance.

10. **Crying**
    ① – I don't cry anymore than I used to.
    ② – I cry more than I used to.
    ③ – I cry over every little thing.
    ④ – I feel like crying, but I can’t.

11. **Agitation**
    ① – I am no more restless or wound up than usual.
    ② – I feel more restless or wound up than usual.
    ③ – I feel so restless or agitated that it’s hard to stay still.
    ④ – I am so restless or agitated that I have to keep moving or doing something.

12. **Loss of Interest**
    ① – I have not lost interest in other people or activities.
    ② – I am less interested in other people or things than before.
    ③ – I have lost most of my interest in other people or things.
    ④ – It’s hard to get interested in anything.

13. **Indecisiveness**
    ① – I make decisions about as well as ever.
    ② – I find it more difficult to make decisions than usual.
    ③ – I have much greater difficulty in making decisions than I used to.
    ④ – I have trouble making any decisions.
14. **Worthlessness**
   ① – I do not feel I am worthless.
   ① – I don’t consider myself as worthwhile and useful as I used to.
   ② – I feel more worthless as compared to other people.
   ③ – I feel utterly worthless.

15. **Loss of Energy**
   ① – I have as much energy as ever.
   ① – I have less energy than I used to have.
   ② – I don’t have enough energy to do very much.
   ③ – I don’t have enough energy to do anything.

16. **Changes in Sleeping Pattern**
   ① – I have not experienced any change in my sleeping pattern.
   ①
     **EITHER**
     – I sleep somewhat more than usual.
     **OR**
     – I sleep somewhat less than usual.
   ②
     **EITHER**
     – I sleep a lot more than usual.
     **OR**
     – I sleep a lot less than usual.
   ③
     **EITHER**
     – I sleep most of the day.
     **OR**
     – I wake up 1-2 hours early and can’t get back to sleep.

17. **Irritability**
   ① – I am no more irritable than usual.
   ① – I am more irritable than usual.
   ② – I am much more irritable than usual.
   ③ – I am irritable all the time.

18. **Changes in Appetite**
   ① – I have not experienced any change in my appetite.
   ①
     **EITHER**
     – My appetite is somewhat less than usual.
     **OR**
     – My appetite is somewhat greater than usual.
   ② **EITHER**
– My appetite is much less than before.
   OR
   – My appetite is much greater than usual.

3  EITHER
   – I have no appetite at all.
   OR
   – I crave food all the time.

19. **Concentration Difficulty**
   ⁰ – I can concentrate as well as ever.
   ¹ – I can’t concentrate as well as usual.
   ² – It’s hard to keep my mind on anything for very long.
   ³ – I find I can’t concentrate on anything.

20. **Tiredness or Fatigue**
   ⁰ – I am no more tired or fatigued than usual.
   ¹ – I get more tired or fatigued more easily than usual.
   ² – I am too tired or fatigued to do a lot of the things I used to do.
   ³ – I am too tired or fatigued to do most of the things I used to do.

21. **Loss of Interest in Sex**
   ⁰ – I have not noticed any recent change in my interest in sex.
   ¹ – I am less interested in sex than I used to be.
   ² – I am much less interested in sex now.
   ³ – I have lost interest in sex completely.
### Social Desirability Scale-17

Below you will find a list of statements. Please read each statement carefully and decide if that statement describes you or not. If it describes you, check the box under “true”; if not, check the box under “false”.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I sometimes litter.</td>
</tr>
<tr>
<td>2.</td>
<td>I always admit my mistakes openly and face the potential negative consequences.</td>
</tr>
<tr>
<td>3.</td>
<td>In traffic I am always polite and considerate of others.</td>
</tr>
<tr>
<td>4.</td>
<td>I have tried illegal drugs (for example, marijuana, cocaine, etc.).</td>
</tr>
<tr>
<td>5.</td>
<td>I always accept others’ opinion, even when they don’t agree with my own.</td>
</tr>
<tr>
<td>6.</td>
<td>I take out my bad moods on others now and then.</td>
</tr>
<tr>
<td>7.</td>
<td>There has been an occasion when I took advantage of someone else.</td>
</tr>
<tr>
<td>8.</td>
<td>In conversations I always listen attentively and let others finish their sentences.</td>
</tr>
<tr>
<td>9.</td>
<td>I never hesitate to help someone in case of emergency.</td>
</tr>
<tr>
<td>10.</td>
<td>When I have made a promise, I keep it – no ifs, ands or buts.</td>
</tr>
<tr>
<td>11.</td>
<td>I occasionally speak badly of others behind their back.</td>
</tr>
<tr>
<td>12.</td>
<td>I would never live off other people.</td>
</tr>
<tr>
<td>13.</td>
<td>I always stay friendly and courteous with other people, even when I am stressed out.</td>
</tr>
<tr>
<td>14.</td>
<td>During arguments I always stay objective and matter-of-fact.</td>
</tr>
<tr>
<td>15.</td>
<td>There has been at least one occasion when I failed to return an item that I borrowed.</td>
</tr>
<tr>
<td>16.</td>
<td>I always eat a healthy diet.</td>
</tr>
<tr>
<td>17.</td>
<td>Sometimes I only help because I expect something in return.</td>
</tr>
</tbody>
</table>