Examining the Relationship Between Social Anxiety and Positive Social Attention

A thesis presented to
the faculty of
the College of Arts and Sciences of Ohio University

In partial fulfillment
of the requirements for the degree
Master of Science

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August 2015

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This thesis titled
Examining the Relationship Between Social Anxiety and Positive Social Attention

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Abstract

NECZYPOR, BETHANY N., M.S., August 2015, Clinical Psychology

Examining the Relationship Between Social Anxiety and Positive Social Attention

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According to psycho-evolutionary models, self-conscious emotions operate as warning signals pertaining to threats to one’s social rank, and trigger submissive behavioral responses, which serve to appease group members. Although negative social interactions may provoke fear of rejection, positive social interactions may provoke fear that one will come into conflict with more powerful others who may become threatened by an individual’s social gains (e.g., see Weeks, Jakatdar, & Heimberg, 2010). The proposed study examined emotional (e.g., state anxiety) and behavioral (e.g., submissive head orientation) responses to positive attention. To study these effects, participants were randomly assigned to either: (1) experience more positive attention than expected by social norms (i.e., overinclusion) or (2) a control condition (i.e., a reasonably expected amount of positive attention [inclusion]) during a simulated “getting acquainted” task. It was hypothesized that trait levels of social anxiety would interact with experimental condition to predict (1) self-reported state levels of anxiety and (2) submissive displays. Although state anxiety did not vary by experimental condition, the interaction of trait social anxiety and condition predicted submissive head movements. Specifically, highly socially anxious participants tilted their heads leftward during the task (reflecting increased self-conscious emotions), and this relationship was strongest in response to greater positive attention (overinclusion), whereas less socially anxious participants
tended to tilt their heads rightward when receiving greater positive attention. It appears that positive social attention can trigger involuntary displays of self-conscious emotions in the absence of *explicit* reports of anxiety.
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Introduction

Social connections to others are fundamental to human wellbeing and survival (Baumeister & Leary, 1995). Social relationships are a source of support and comfort, but they may also produce stress, conflict, and anxiety. Although some degree of social anxiety is commonly experienced by healthy individuals, levels of social anxiety can reach clinically severe levels for some individuals and interfere significantly with one’s daily routine and functioning. Social anxiety disorder (SAD; i.e., social phobia; American Psychiatric Association [APA], 2013) is a condition which represents such extreme levels of social anxiety, and is one of the most prevalent mental disorders across the lifespan (Wittchen & Fehm, 2003), with a lifetime prevalence estimated to be as high as 12.1% (Kessler et al., 2005).

Social anxiety is associated with tendencies to view oneself as inferior to others (e.g., see Gilbert & Trower, 1990). For example, highly socially anxious individuals tend to perceive themselves as having low social status within peer groups. Gilbert (2001) proposed that highly socially anxious individuals not only fear rejection, but also fear becoming threatening to others if they experience gains in social status. Consistent with Gilbert’s (2001) model, social anxiety is related to both fear of negative evaluation (FNE) and fear of positive evaluation (FPE), in that both types of evaluation may lead to decreases or increases in social status respectively (Weeks & Howell, 2012). Gilbert and Trower (1990) proposed that an individual’s ability to command positive attention is indicative of one’s social standing (i.e., social attention holding power [SAHP]). Thus, it seems reasonable to assume that receiving positive attention would lead to increased self-
conscious emotions, as well as compensatory behaviors in socially anxious individuals, with the latter serving to signal inferiority and minimize perceived threat to others due to gains in SAHP. However, no study to date has tested this assumption within an experimental design. The proposed study was designed to address this gap in the literature and further elucidate the nature of social anxiety.
Monitoring Social Status

Gilbert (2001) posited that the capacity for relationships evolved to provide individuals with valuable resources such as group protection and care. Psychological mechanisms which inform individuals that rejection (and, thus, loss of these valuable resources) is likely to occur would have been adaptive to early humans. Acute embarrassment has been proposed as one such mechanism (Miller, 2010). According to social-evaluation models of embarrassment (e.g., Edelmann, 1987), embarrassment occurs when individuals suspect that they have made an undesired impression. Indeed, embarrassment relates positively to FNE (Miller, 2009) and occurs when social norms and conventions have been violated (Lewis, 1993). Embarrassment is also associated with feeling exposed and feeling that one is the center of unwanted attention (Miller, 2010). Although embarrassment is unpleasant, appropriate expression of this emotion aids in impression management, ultimately helping to maintain acceptance in one’s social group. For example, behavioral signs of social discomfort improved evaluations of individuals who had done something embarrassing (Semin & Manstead, 1982). Behavioral signals of embarrassment include blushing, smiling, and covering of the face (Miller, 2010) and moving one’s head down and to the left (Keltner, 1995).

Social anxiety and embarrassment are related constructs (Clark & Wells, 1995; Lundh & Sperling 2002) with similar autonomic correlates (Hofmann, Moscovitch, & Kim, 2006). However, whereas embarrassment is usually defined as being entirely reactionary in nature, social anxiety can occur both on a reactionary level and when individuals anticipate that they will be evaluated and/or rejected by others in the future.
(Hofmann & Barlow, 2002). Baumeister and Tice (1990) proposed that possible exclusion from important social groups is a primary source of social anxiety. Although findings in this area are somewhat mixed, individuals with SAD appear to allocate heightened attentional resources toward detecting threat or rejection in comparison to non-socially anxious individuals (Ledley et al., 2008). Psycho-evolutionary models (e.g., see Gilbert, 2001) suggest that social anxiety facilitates avoidance of harm/rejection from more dominant group members. Trower, Gilbert, and Sherling (1990) suggested that social anxiety operates as an early warning signal that others may present a social threat. This early signal triggers downstream behavioral effects, such as submissive posture (e.g., slouching), in order to defuse tension and de-escalate social conflict.

Numerous studies have provided support for Trower et al.’s (1990) theory. State and trait social anxiety were positively related to displays of submissiveness by men during a socially competitive interaction task (Weeks, Heimberg, & Heuer, 2011). Social anxiety is related to greater submissive cognitions (Weeks, Rodebaugh, Heimberg, Norton, & Jakatdar, 2009), interpersonal passivity (e.g., Leary, Knight, & Johnson, 2012), and lessened displays of dominance (Walters & Hope, 1998). In addition, social anxiety has been shown to be associated with a tendency to display a variety of submissive behaviors including avoidance of eye gaze (e.g., Schneier, Rodebaugh, Blanco, Lewin, & Liebowitz, 2011) and increased vocal pitch (Weeks et al., 2012).

*Body collapse* (i.e., slumped, closed posture) is a well-established submissive display in nonhuman primates, in that this posture causes one to appear smaller and therefore less threatening to more dominant others (de Waal, 1998), and has recently
been proposed to be a social anxiety-related submissive gesture in humans (e.g., see Weeks et al., 2011). Emerging evidence by Weeks, Neczypor, and Srivastav (2015) suggests that head bow, an important component of body collapse, may be an objective display of submissiveness in socially anxious individuals. In a prior study, patients diagnosed with SAD and healthy controls (demographically matched to the SAD patients on age, sex, and racial/ethnic background) were exposed to social threat via a social simulation task (see Weeks, Howell, & Goldin, 2013 for details). During this social simulation task, participants were covertly monitored via a high speed, head-tracking eye tracker system, which also measured the extent to which participants’ heads collapsed or “bowed” in response to social threat. Head bow related positively to social anxiety symptoms, fear of positive evaluation, and concerns of social reprisal (Weeks et al., in preparation). In the present study, head bow was examined as an index of submissive display. Because horizontal movement of the head may also be an important sign of self-conscious emotions (Keltner, 1995) movement of the head to the right/left was also examined.
Social Anxiety and Positive Social Events

FNE, a cognitive feature of social anxiety, has been the focus of much research and has served as the emphasis of cognitive-behavioral models of SAD (e.g., Clark & Wells, 1995; Rapee & Heimberg, 1997). For example, research has shown that FNE correlates with measures of social anxiety and avoidance in social situations (e.g., see Jones, Briggs, & Smith, 1986). However, recent research suggests that anxiety about being evaluated favorably – FPE – is also an important cognitive feature of social anxiety (see Weeks & Howell, 2014, for a review). For example, Weeks, Heimberg, and Rodebaugh (2008) demonstrated that FPE predicted social interaction anxiety above and beyond FNE. In light of this research, Weeks and Howell (2012) provided a novel conceptualization of social anxiety, the bivalent fear of evaluation model of social anxiety, in which FPE and FNE are co-core cognitive components of social anxiety.

With relation to psycho-evolutionary models, Gilbert (2001) proposed that “fear of doing well” (p. 742) could be explained by fear of conflict with more dominant individuals who could be threatened by the social gains of others in the group. Because dominant group members often have the power to exclude individuals from the group (Leary & Kowalski, 1995), conflict with dominant members may threaten a person’s very basic and powerful need to belong. Just as excessive negative evaluation may prompt conflict and expulsion from the group, excessive positive evaluation may do the same. Indeed, self-reported FPE related positively to fears of social reprisal due to positive social impressions, and FPE related significantly more strongly to these concerns than did FNE (Weeks & Howell, 2012).
Extending Gilbert’s (2001) theory of SAHP, fear of positive attention should be related to FPE. Akin to positive evaluation, positive attention could also be interpreted as a social resource and social gain; therefore, receipt of the valuable and limited resource of positive attention (SAHP) by someone who feels socially anxious/inferior could be perceived as potentially threatening to other more powerful group members. For example, increased positive attention may be interpreted as “stealing the spotlight” from other group members (see Weeks & Howell, 2012). The goal of the present study was to investigate this possibility, and explore the relationships between positive attention, social anxiety, and FPE.
Present Research

In the present study, the degree of positive social attention that participants received was manipulated via interaction with other “players” who, unbeknownst to the participants, were not live interaction partners, but merely simulated by the experimenter. Participants were told that they would complete several tasks/games with the other “players”: (1) an “introduce yourself” task in which participants would type answers to “get to know you” questions on the computer, (2) a “getting acquainted” task in which participants would speak to the “players” over an intercom, (3) a face-to-face meeting with the other participants, and (4) a computer game with the other players. In actuality, participants only completed tasks (1) and (2) above; completion of these tasks allowed for (a) a social hierarchy to be established between participants and (simulated) individuals of standardized social dominance and, subsequently, (b) standardized manipulation of positive attention received by the participants, respectively. Participants were informed of alleged tasks (3) and (4) as a means of inducing social threat, but these were not completed.

During the getting acquainted task (i.e., task 2), from the participant’s perspective, he/she and the simulated interaction partners answered and asked “get to know you” questions over an intercom and gave/received “likes” for each response as a cue of approval/positive attention. Participants either experienced excessive positive attention (i.e., overinclusion), or a reasonably expected level of positive attention (i.e., a control condition; inclusion). Self-reported state anxiety was assessed at various time points during the getting acquainted task and when participants believed they were about to
meet the other players face-to-face. Submissive gesturing was assessed via head movements during the getting acquainted task. Head movements can be assessed in real-time and covertly, making them ideal gestures to examine in the present study. Finally, the amount of dominance versus submissiveness that the participants intended to project was assessed by selection of avatars that ranged in stature (from more dominant to more submissive) to represent themselves during a computer game that they were informed they would play.

The main objective of the present study was to evaluate the relationships between positive attention, trait social anxiety, state social anxiety, and submissive displays. Given that social anxiety has been shown to relate to concerns of positive (as well as negative) social evaluation (e.g., see Weeks & Howell, 2012), it was hypothesized that trait social anxiety would interact with the amount of positive attention received (i.e., *inclusion vs. overinclusion*) to predict state social anxiety, such that individuals with high trait levels of social anxiety would experience greater state anxiety in response to overinclusion than inclusion, but this effect would not be as strong in individuals with low levels of social anxiety. Similarly, it was hypothesized that trait social anxiety would interact with the amount of attention received (i.e., *inclusion vs. overinclusion*) to predict submissive gestures (i.e., head bowing [objectively assessed] and selection of avatar postures), such that individuals with high trait levels of social anxiety would demonstrate more submissive displays in response to overinclusion than inclusion, but that this effect would not be as strong in individuals with low levels of social anxiety.
Methods

Participants

A total of 57 Ohio University undergraduate students who identified as either White/Caucasian or Black/African-American\(^1\) were recruited for the present study and were compensated with course credit. Participants were required to be at least 18 years of age, and the mean age of the sample was 19.62 years (SD=0.95). The majority of the sample was made up of women (64.91%) and was White/Caucasian (89.47%). Fifteen participants (26.32% of the sample) qualified for a probable diagnosis of SAD on the basis of a cutoff score\(^2\) on a self-report questionnaire of social anxiety (Social Interaction Anxiety Scale-Straightforward [SIAS-S]; see Social Interaction Anxiety Scale section for details).\(^3\)

Manipulations

Manipulations of social dominance.

Photographs. During the introduce yourself and getting acquainted tasks, participants were seated at a computer where they viewed headshots of the other players (and were told that the other players viewed photographs of themselves that the experimenter had taken). Although participants were led to believe that they were viewing photographs of other participants, the photographs were actually obtained from the Center for Vital Longevity's Face Database (Minear & Park, 2004). The individuals in the photographs ranged in age from 19 to 23 years, similar in age to the study participants. The faces were matched to each individual participant’s race and sex, to reduce possible confounding effects that race and sex of the simulated players would
have upon participants’ perceptions of inclusion/overinclusion (see Appendix A for photographs used in the present study).

In the current study, simulated interaction partners who were intended to be perceived as more socially dominant (i.e., players 1 and 4) were represented by headshots of individuals rated high on social dominance on the basis of results obtained from a pilot study, and the player intended to be perceived as less dominant (i.e., player 2) was represented by a headshot of an individual rated low on social dominance on the basis of results obtained from the pilot study (see Appendix B).

**Statements.** During the introduce yourself task, participants were led to believe that three other interaction partners typed answers to two “get to know you” questions (e.g., *What is your favorite vacation you have taken or what is your favorite vacation activity?*). The dominance of the players was manipulated through the nature of the responses to these questions (see Appendix C). Simulated players intended to be perceived as more socially dominant (i.e., players 1 and 4) provided “responses” that were perceived to be socially dominant in a pilot study (see Appendix B), and the simulated interaction partner intended to be less dominant (i.e., player 2) provided responses that were perceived to be significantly less socially dominant by participants in the pilot study. In the pilot study, the writers of these statements were rated as relatively ambiguous with regard to either race or sex (consistent with their design), suggesting that these statements represent a credible manipulation of social dominance regardless of participants’/simulated players’ race and sex.
**Voting Results.** After the introduce yourself task, participants were asked to indicate how much they liked the other players and the degree to which they would like to lead the computer game (which they were led to believe they would play but never actually completed). They were also asked to cast a preliminary vote for which player they wanted to lead the group in the game. Non-veridical results based on votes from the simulated players revealed that player 4 “won” the vote, further establishing him/her as the dominant group member.

**Manipulation of positive social attention.** The amount of positive social attention that the participants received was manipulated during the getting acquainted task. First, in this task, the participants were asked to speak to two players over an intercom system while the fourth player (i.e., player 4) listened in. To standardize the simulated players’ verbal feedback, the “responses” of the interaction partners were pre-recorded before any participants were run. During the getting acquainted task, the participants were asked to take turns asking and answering questions chosen from a provided list, and were allowed to give zero to two “likes” to other players’ responses. They were also told that they could receive “likes” from the other players for their responses (a “like” appeared as a “thumbs up” emoticon on the display monitor).

Participants viewed *headshots* of the simulated players when speaking to another player or being asked a question (i.e., simulating direct gaze towards the participant [attention]). They viewed *profiles* of the simulated players’ faces when the other players “spoke to one another” (i.e., simulating lack of gaze towards the participant [non-attention]). Gaze and body orientation toward another person is generally indicative of
attentiveness and social inclusion, whereas gaze and orientation away from individuals has been used previously to induce social rejection (Stroud, Salovey, & Epel, 2002). The amount of positive social attention that the participants received was manipulated in terms of: (1) the percentage of questions directed towards the participant (and consequently, the amount of time participants viewed headshots vs. faces in profile) and (2) the number of “likes” the interaction partners gave the participant for his/her responses in the getting acquainted task (see Table 1 for details on standardized positive attention delivered per experimental condition).

Inclusion was expected to serve as a better control condition in the present study than exclusion because exclusion would simulate social rejection (i.e., compare two putative forms of social threat; overinclusion versus exclusion [e.g., see Weeks & Howell, 2012]). Participants tend to expect to be included, and not excluded, in social interactions (Eisenberger, Lieberman, & Williams, 2003), and inclusion can be conceptualized as a commonplace, relatively neutral, experience.

Measures

Participants completed a number of study measures. Measures pertinent to the primary study hypotheses and results are outlined below. Overall, primary study measures demonstrated good to excellent internal consistency (as ranged from .83 to .92), with one exception (see Perceptions of Dominance section below for details). See Appendix D for a description of all additional measures that were included in the study (e.g., pertaining to exploratory analyses).
Demographics Questionnaire. Participants indicated the following: age, date of birth, sex, sexual orientation, and racial/ethnic background.

Manipulation Checks.

Perceptions of Dominance. Following the introduce yourself task, using a 9-point Likert-type rating scale, participants rated all players on dominance, competitiveness, leadership, popularity, and submissiveness traits. Ratings (with the exclusion of ratings of submissiveness) were averaged to create a social dominance score. Reverse coded submissiveness ratings were excluded due to poor internal consistency with this item included (α = .52); internal consistency for this measure was within tolerable limits following exclusion of this item (α = .66).

Perceptions of Positive Attention. Participants were asked to estimate: (1) what percentage of the time “player 1” directed a question to the participant versus “player 2”, (2) what percentage of the time “player 2” directed a question to the participant versus toward “player 1”, and (3) what percentage of the time the participant directed a question to “player 1” versus “player 2”. They also estimated the number of “likes” each player received on average.

Perceived Closeness. Participants’ perceptions of their group’s social dynamics were assessed as an integrity check. Participants were asked to select one of six pictures of overlapping circles (adapted from Aron, Aron, & Sollan, 1992; see Appendix E) that best described the relationship between the interaction partners. They were asked to choose a picture for each possible relationship (e.g., the relationship between “player 1” and “player 2”).


**Trait measures.**

**Social Interaction Anxiety Scale (SIAS).** The original Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998) is a 20-item self-report measure of anxiety in dyads and groups (see Appendix F). Rodebaugh, Woods, and Heimberg (2007) and Rodebaugh et al. (2011) recommended using only the 17 straightforward items in calculating the SIAS score. This 17-item score, which will be referred to hereafter as the SIAS-Straightforward (i.e., SIAS-S) score, has demonstrated excellent internal consistency and construct validity in both undergraduate and clinical samples (Rodebaugh et al., 2007).

**Brief Fear of Negative Evaluation Scale- Straightforward items (BFNE-S).** The BFNE (Leary, 1983) is a 12-item self-report measure of fear and distress related to negative evaluation from others (see Appendix F). Rodebaugh et al. (2004) and Weeks et al. (2005) have suggested using only the eight straightforward items to calculate the BFNE score. This eight-item score, which will be referred to hereafter as the BFNE-Straightforward score (i.e., BFNE-S), has demonstrated excellent internal consistency, factorial validity, and construct validity in undergraduate (Rodebaugh et al., 2004) and clinical (Weeks, et al., 2005) samples.

**Fear of Positive Evaluation Scale (FPES).** The FPES (Weeks, Heimberg, & Rodebaugh, 2008) is a 10-item self-report measure of fear and distress related to positive evaluation from other (see Appendix F). Two reverse-coded items are included to reduce response biases (i.e., the tendency of an individual to provide the same response to every item), but are not used when calculating the total score.
Head orientation. Head orientation was assessed using a D6 high-speed (120 Hz) desk-mounted optics system equipped with a head tracker and facial recognition technology (Applied Science Laboratories [ASL], 2008). The D6 system records the three-dimensional coordinates of the participant’s head in real-time. Of primary interest in the present study were the elevation (i.e., vertical) and right/left (i.e., right/left tilt) coordinates of participants’ heads during the study. Elevation of the head refers to movement of the head up or down (i.e., head nodding), and right/left movement involves tilting of the head such that the ear (i.e., the side of the head) approaches the shoulder.

Subjective Units of Distress Scale (SUDS). The SUDS (Wolpe & Lazarus, 1966) is a self-report item of the level of anxiety/distress at any given moment. The scale ranges from 0 (no anxiety) to 100 (the worst anxiety ever experienced or imaginable). The experimenter provided participants with descriptions of various levels of the scale and followed administration recommendations outlined by Hope, Heimberg, Juster, and Turk (2006). SUDS scores were collected five times: prior to all experimental manipulations (T0; entered as a covariate in all study analyses), immediately before the getting acquainted task (T1; collected for exploratory purposes), during the middle of the getting acquainted task (T2), just before the getting acquainted task ended (T3), and immediately before they would allegedly meet the other “participants” in person (anticipatory anxiety; T4). Peak SUDS ratings during the getting acquainted task were obtained by selecting SUDS scores obtained either at T2 or T3, whichever score was higher for a given participant.
Avatar postures. Participants were asked to select avatars to represent themselves in the computer game that would ostensibly take place later in the experiment. Women had the option of selecting one of four female avatars and men had the option of selecting one of four male avatars. The potential avatars were displayed standing in four positions, with some positions appearing more dominant/powerful than others. Expansive, open postures project high power/dominant status, whereas contractive, closed postures project low power/subordinate status (e.g., see Carney, Hall, & Smith LeBeau, 2005). In the present study, an avatar standing with a dominant posture had its legs and arms further apart, chin up, and chest out. A more subordinate posture included legs and arms closer together, shoulders rolled in slightly and chin tilted down slightly. The avatar images were obtained with permission (from www.heromachine.com) and modified by the author to achieve differences in power posturing.

Procedures

As noted previously, participants were randomly assigned to an experimental condition (i.e., either inclusion or overinclusion) via a random number generator before arrival to the laboratory. Upon arrival, the study procedures were explained and participants were asked to provide informed consent. Participants were not informed about the study hypotheses, the measurement of head movements, or the fact that the other interaction partners in the study were simulated until all procedures were completed (post-study consent to analyze participants’ data was obtained upon debriefing). The order of the study procedures was counterbalanced to prevent ordering effects, with half of the participants completing the survey portion (i.e., the trait questionnaires) before the
experimental portion (i.e., introduce yourself task and the getting acquainted task) and the other half completing these in the reverse order.

**Experimental portion.** The experimenter obtained baseline SUDS ratings (T0; entered as a covariate in all study analyses). The experimenter then explained to participants that they would first get acquainted with other participants (via the introduce yourself and getting acquainted tasks) and then play a computer game. In actuality, the other participants were computer-simulated interaction partners and the computer game never occurred. The experimenter informed the participant that only three of the four “participants” would play the computer game as a team, and that one of the “participants” would play the computer game alone (i.e., as an individual player). The experimenter explained that the person who plays individually would be determined by the group’s preference after the getting acquainted task. In the present study, informing participants that one person must play alone on the basis of a group decision was used to create the threat of reprisal from other dominant group members in the form of social rejection (e.g., see Twenge, Baumeister, Tice, & Stucke, 2001). After describing the study procedures, the experimenter used a camera to take headshot and profile shots of the participant, ostensibly for use during the getting acquainted task. Leading participants to believe that their pictures would be used in the study was necessary to maintain credibility of the explained study procedures, in that participants viewed pictures of the other players during the getting acquainted task and were led to believe that the other players could see photographs of themselves.
**Social dominance and threat manipulations.** Participants were asked to meet the other participants by participating in an “introduce yourself” task on the computer. Consistent with research paradigms utilizing simulated players in an online ball tossing game (e.g., Wirth & Williams, 2004), participants were shown a prompt informing them that they were randomly assigned to be “player 3”. Next, participants typed brief answers to two “get to know you” questions and viewed the other players’ answers to the “get to know you” questions (see Appendix C). The answers were paired with the appropriate player’s headshot. The true purpose of this task was to establish players 1 and 4 as socially dominant and player 2 as subordinate. After the introduce yourself task, participants completed a manipulation check (i.e., see *Perceptions of Dominance* section above for details) to assess whether participants perceived players 1 and 4 as more dominant than player 2 (as intended).

Next, the participant indicated on a Likert-type scale the degree to which he/she would like to lead the group in the computer game that would allegedly take place after the getting acquainted task. Participants also cast a preliminary vote for who should lead the group in the computer game. When the participant advanced to the next screen, non-veridical feedback was presented showing that player 4 received the majority of votes to be the leader of the group, as a means of establishing player 4 as the dominant member of the group.

Next, the participant was told that only three group members could participate in the getting acquainted task and that player 4 (i.e., the player who was elected to lead the group in the computer game) was randomly selected to simply observe. Informing the
participant that a group leader would observe the getting acquainted task was intended to create a situation in which positive attention towards the participant could be interpreted as threatening by this dominant group member, within the context of the bivalent fear of evaluation model of social anxiety (Weeks & Howell, 2012).

**Getting acquainted task.** The experimenter explained to participants that their goal in the getting acquainted task was to get to know the other group members, and that they would take turns asking and answering questions chosen from the provided list. The two basic rules of the getting acquainted task were: (1) questions must be directed towards a specific interaction player, and (2) once someone answers a question, it is that person’s turn to ask a question. Participants were informed that they could give zero, one, or two “likes” to another player’s response to their questions. The task involved a total of 12-13 questions and lasted approximately 10 minutes.

During the getting acquainted task, participants were seated at a monitor equipped with the D6 optics housing/head tracker, which the experimenter used to surreptitiously record their head movements. As noted previously, verbal responses from the simulated interaction partners (in actuality, research assistants) were pre-recorded before any participants were run. Therefore, all male participants heard voices of the same two male research assistants, and all female participants heard voices of the same two female research assistants (under the pretense that these vocal responses were occurring in real time from live participants, in response to questions during the experiment). Participants were asked for a SUDS rating as the getting acquainted task began (T1), during the middle of the task (T2) and just before the task ended (T3).
After the getting acquainted task, participants completed the manipulation check (i.e., Perceptions of Positive Attention, Perceived Closeness) items, and selected an avatar posture. Finally, participants were told that they were about to meet the other group members face-to-face and were asked to provide a SUDS rating of how anxious they felt in anticipation to the meeting (T4).
Results

Preliminary Analyses

Perceptions of social dominance. A one-way within-subjects Analysis of Variance (ANOVA) was used to analyze perceived social dominance (i.e., social dominance scores; see Perceptions of Dominance section for details) of players 1, 2, and 4. The omnibus test was significant $F(2, 55)=83.30, p<.001$. Consistent with expectations, follow-up pairwise comparisons revealed that player 4 was rated as being significantly more dominant ($M=5.61, SD=0.78$) than either player 1 ($M=4.26, SD=0.82$) or player 2 ($M=3.82, SD=0.86$), both $ps<.001$. Also as expected, player 1 was rated as being significantly more dominant than player 2, $p=.007$.

Perceptions of positive attention. To confirm that the getting acquainted task was successful in manipulating perceived positive attention directed towards participants, participants’ estimated percentage of questions player 1 asked the participant and estimated percentage of questions player 2 asked the participant were averaged to create a perceived positive attention score. As expected, participants in the overinclusion condition reported receiving a greater percentage of questions ($M=54.31\%, SD=8.40$) than did those in the inclusion condition ($M=47.41\%, SD=5.29$), $t(55)=3.70, p=.001$. Also as expected, participants in the overinclusion condition reported receiving a greater number of likes on average ($M=1.89, SD=0.30$) than those in the inclusion condition ($M=1.06, SD=0.20$), $t(55)=12.14, p<.001$.

Perceptions of group dynamics. To determine how close participants felt to each of the simulated players, a within-subjects ANOVA was conducted, with simulated
player as the within-subjects variable. The omnibus test was significant, \( F(1, 56)=29.79, p<.001 \) Across the entire sample, participants felt closest to player 1 (\( M=3.37, SD=1.11 \)), moderately close to player 2 (\( M=3.07, SD=1.05 \)), and least close to player 4 (\( M=2.21, SD=1.32 \)) (all pairwise comparisons were significant: all \( ps<.03 \)).

Next, a between-subjects ANOVA was conducted to determine whether condition influenced how close participants felt toward the other players. As expected, participants in the overinclusion condition felt closer to the simulated players (\( M=3.13, SD=0.98 \)) than did participants in the inclusion condition (\( M=2.63, SD=0.86 \)), \( t(55)=2.03, p=.048 \). This finding appears to have been driven by differences in feelings of closeness to player 4. Specifically, feelings of closeness to players 1 and 2 did not differ across condition, \( ps>.05 \), but those in the overinclusion condition felt closer to player 4 (\( M=2.66, SD=1.40 \)) than did those in the inclusion condition (\( M=1.75, SD=1.08 \)), \( F(1, 56)=7.48, p=.008 \). Perceptions of how close the other players were to each other did not differ across conditions, \( t(55)=1.31, p=.20 \).

**State anxiety.** A relatively large percentage of participants reported zero state anxiety during the getting acquainted task (peak SUDS) and anticipatory anxiety about meeting the other players (17.5% and 12.3%, respectively), and the distributions of both state anxiety during the getting acquainted task and anticipatory anxiety about meeting the players face-to-face were positively skewed (skewness=1.31 and 1.08, kurtosis=1.24 and 0.80 respectively). Thus, square-root transformations were performed for both of these scores. Following transformation, state and anticipatory anxiety scores exhibited
tolerable levels of skewness (both values $<|0.17|$, both $SEs=0.32$) and kurtosis (both values $<|0.70|$, both $SEs=0.62$).

**Head orientation descriptive statistics.** For each individual participant, (a1) ° of head tilt (left head tilt values [-], right head tilt values [+]), (a2) absolute values of ° of head tilt (i.e., head tilt irrespective of left versus right), and (b) ° of elevation (recorded throughout the getting acquainted task) were averaged to obtain (a1) average head tilt, (a2) average absolute value of head tilt, and (b) average elevation during the task.

Average head tilt ($M=0.21$, $SD=4.70$) did not differ from zero in the overall sample, $t(52)=0.75, p=.75$, indicating no tendencies toward leftward or rightward tilt. However, average absolute value of head tilt ($M=4.54$, $SD=3.24$) revealed that participants tended to deviate significantly from the neutral upright position (reflected by 0.0° point of origin), $t(52)=10.27, p<.001$. Average head elevation ($M=13.93$, $SD=7.37$) revealed that participants tilted their heads upwards during the task (i.e., head elevation was significantly greater than 0.0°) $t(53)=13.76, p<.001$. Comparison of standard deviations suggests that average head elevation was more variable than was average head tilt. Height of the participants (relative to the screen, not relative to the D6 optics housing) and the degree to which the participants reclined in the chair may have influenced average head elevation for each participant, thus increasing variance in head elevation scores.

**Primary outcome measures.** The primary outcome measures (i.e., state anxiety during the getting acquainted task [peak SUDS], anticipatory anxiety about meeting the other players [SUDS T4], avatar selection, and head orientation) did not differ by race, all $ts <1.72$, all $ps>.09$, or (overall) by sex, all $ts<1.45$, all $ps>.16$, with one notable
exception; women reported more anticipatory anxiety about meeting the other players face-to-face ($M=17.14, SD=15.33$) than did men ($M=10.85, SD=7.04$), $t(55)=2.12, p=.04$.

Correlations between trait measures (i.e., SIAS-S, FPES, and BFNE-S) and primary outcome measures are displayed in Table 2. Consistent with prior literature (e.g., Rodebaugh, Weeks, Gordon, Langer, & Heimberg, 2012), FPE (i.e., FPE-S scores) and FNE (i.e., BFNE-S scores) were moderately correlated with one another and strongly correlated with trait social interaction anxiety (i.e., SIAS-S scores). Trait social anxiety, FPE, and FNE correlated significantly with: (1) state anxiety during the getting acquainted task (peak SUDS) (2) head tilt during the getting acquainted task, and (3) anticipatory anxiety about meeting the other players (SUDS T4). Two outcome measures, (4) head elevation during the getting acquainted task and (5) participants’ choice of dominance display during the alleged computer game (i.e., avatar posture selection), were not significantly correlated with any of the three trait social anxiety-related measures.

**Primary Analyses**

**Head orientation.** When analyzing head orientation, four individuals (7.02% of the overall study sample) were excluded due to equipment malfunction/experimenter error. Because head tilt, but not head elevation, correlated significantly with trait social anxiety and FPE (see Table 2), study analyses focused on head tilt as the primary variable of interest (but see Appendix G for analyses of head elevation, as well as of head bow [i.e., a composite of head tilt and head elevation \{non-significant predictor\}]). A hierarchical linear regression analysis was performed to test whether trait social anxiety interacted with experimental condition to predict head tilt. Baseline state anxiety (i.e.,
baseline SUDS [T0]) was entered as a covariate. Trait social anxiety symptoms (i.e., SIAS-S scores) and condition (i.e., *inclusion vs. overinclusion*) were entered into the first step and their interaction term was entered into the second step.

Social anxiety symptoms and experimental condition (with baseline anxiety scores included) did not account for significant variance in head tilt, $F(3, 49)=2.20$, $p=.10$, $R^2=.12$. However, when the interaction term was added to the model, the model accounted for significant variance in head tilt $F(4, 48)=3.30$, $p=.02$, $R^2=.22$. The interaction between social anxiety symptoms and experimental condition was the only significant predictor of head tilt, $t(51)=2.44$, $p=.02$. Highly socially anxious participants (i.e., participants scoring 1 SD above the mean SIAS-S score) exhibited more leftward head tilt in the overinclusion condition than in the inclusion condition. This effect was significantly different, $p=.02$, from participants with low social anxiety (i.e., participants scoring 1 SD below the mean SIAS-S score) who tended to tilt their heads more toward the right in the overinclusion condition than in the inclusion condition. See Figure 1.

Another hierarchical linear regression analysis was performed to test whether trait FPE (i.e., FPES scores) interacted with condition to predict head tilt. Baseline state anxiety (i.e., baseline SUDS [T0]) and FNE (i.e., BFNE-S scores) were entered as covariates. FPE (i.e., FPES scores) and condition (i.e., *inclusion vs. overinclusion*) were entered into the first step and their interaction term was entered into the second step. Head tilt was entered as the criterion variable.

FPE and experimental condition (with FNE and baseline anxiety included) accounted for significant variance in head tilt, $F(4, 48)=2.90$, $p=.03$, $R^2=.15$. The model
fit was improved in the second block when the interaction term between FPE and condition was added ($F_{\text{Change}} = 7.63$, $p = .008$, $R^2_{\text{change}} = .11$), and the overall model continued to account for significant variance in head tilt $F(5, 47) = 4.17$, $p = .003$, $R^2 = .31$. Experimental condition and FPE uniquely accounted for significant variance in head tilt, $t(51) = 2.35$, $p = .02$, and $t(51) = 2.07$, $p = .04$, respectively. The interaction between FPE and condition also accounted for significant variance in head tilt, above and beyond condition and FPE alone $t(51) = 2.76$, $p = .008$. Individuals who endorsed high levels of FPE (i.e., participants scoring 1 SD above the mean FPES score) tilted their heads more toward the left in the overinclusion condition than in the inclusion condition. This effect was significantly different, $p = .005$ from participants who endorsed low FPE (i.e., participants scoring 1 SD below the mean FPES score) who tended to tilt their heads more toward the right in the overinclusion condition than in the inclusion condition. See Figure 2.

**Avatar postures.** A hierarchical linear regression analysis was performed to test whether trait social anxiety (i.e., SIAS-S scores) interacted with experimental condition to predict participants’ choice of dominance display during a computer game (i.e., avatar posture selection). Baseline state anxiety (i.e., baseline SUDS [T0]) was entered as a covariate. SIAS-S scores and condition (i.e., *inclusion* vs. *overinclusion*) were entered into the first step and their interaction term was entered into the second step. Participants’ selected avatar posture was entered as the criterion variable. The first block did not predict avatar posture, $F(3, 53) = 0.86$, $p = .47$, $R^2 = .05$. The model remained non-significant when the interaction term was added, $F(4, 52) = 1.30$, $p = .28$, $R^2 = .09$. None of the individual predictors accounted for significant variance in avatar posture, all $ps > .05$. 


Because the avatar items differed based on sex, the regression analysis conducted in the overall sample was performed with men and women separately as an exploratory analysis. The results for men were similar to those of the overall sample. The first block did not predict avatar posture selection $F(3, 16)=0.36, p=.79, R^2=.06$, and the model remained non-significant when the interaction term was added $F(4, 15)=0.71, p=.60, R^2=.12$. None of the individuals predictors accounted for significant variance in avatar posture all $ps>.05$.

For women, the first block did not predict avatar posture selection $F(3, 33)=0.76, p=.53, R^2=.04$. The model was, however, significantly improved upon adding the interaction term ($F$ change$=5.31, p=.03$) although the overall model remained non-significant $F(4, 32)=1.97, p=.12, R^2=.20$. Experimental condition accounted for significant variance in avatar selection, $p=.03$, and trait social anxiety trended towards significance, $p=.056$. The interaction term also accounted for significant variance in women’s avatar selection, $p=.03$, above and beyond trait social anxiety and condition alone. Although these effects must be interpreted with caution given that the overall regression model was not significant (see above), women with higher social anxiety (i.e., SIAS-S scores) chose less dominant avatars after experiencing overinclusion than inclusion. This effect was significantly different, $p=.009$, from women with lower social anxiety, who tended to select more dominant avatars after experiencing overincusion than inclusion. See Figure 3.

**State anxiety during the getting acquainted task.** A hierarchical linear regression analysis was performed to test whether trait social anxiety interacted with
experimental condition to predict state anxiety during the getting acquainted task. Baseline state anxiety ratings (i.e., baseline SUDS [T0]) were entered as a covariate. Social anxiety symptoms (i.e., SIAS-S scores) and experimental condition (i.e., inclusion vs. overinclusion) were entered into the first step and their interaction term was entered into the second step. Peak SUDS ratings were obtained by selecting SUDS scores obtained *either* during the middle of the getting acquainted task (i.e., T2) or just before the task ended (i.e. T3), whichever score was higher for a given participant. This measure of state anxiety was entered as the criterion variable.

The first block significantly predicted peak state anxiety, \( F(3, 53)=10.32, p<.001, R^2=.37 \). Trait social anxiety accounted for significant variance in peak state anxiety, \( t(55)=3.02, p=.004 \). Inconsistent with hypothesis, experimental condition did not account for unique variance in peak state anxiety above and beyond trait social anxiety and baseline state anxiety, \( t(55)=0.96, p=.34 \). Adding the interaction term to the model in the second block did not significantly improve model fit (\( F \) change=0.49, \( p=.49 \)) and the interaction term did not account for significant variance in peak state anxiety, \( t(55)=0.70, p=.49 \).

**Anticipatory anxiety about meeting the simulated players.** A hierarchical linear regression analysis was performed to test whether trait social anxiety (i.e., SIAS-S scores) interacted with experimental condition to predict anticipatory state anxiety (i.e., anxiety about meeting the other “players”, including player 4, “face to face”). Because, as noted previously, anticipatory anxiety varied by participants’ sex (see **Preliminary Analyses [Primary outcome measures]** section above for details), participants’ sex was
entered as a covariate, in addition to baseline state anxiety (i.e., baseline SUDS [T0]).

Trait social anxiety symptoms and condition (i.e., inclusion vs. overinclusion) were
entered into the first step, and their interaction term was entered into the second step.
Anticipatory anxiety about meeting the simulated players (i.e., SUDS T4) was entered as
the criterion variable.

The first block significantly predicted anticipatory anxiety $F(4, 52)=9.59, p<.001,$
$R^2=.44.$ Trait social anxiety accounted for significant variance in anticipatory anxiety,
t$(55)=4.12, p<.001.$ Inconsistent with hypothesis, experimental condition did not account
for unique variance in anticipatory anxiety above and beyond SIAS-S scores and baseline
SUDS scores $t(55)=0.12, p=.90.$ Adding the interaction term to the model in the second
block did not significantly improve model fit, $F$ change$=0.91, p=.35$ and the interaction
term did not account for significant variance in anticipatory anxiety $t(55)=0.95, p=.35.$
Discussion

The purpose of the present study was to investigate how social anxiety affects responses to excessive positive attention. It was hypothesized that social anxiety would be positively associated with interpretations of positive attention as potentially threatening to dominant group members, leading to feelings and displays of discomfort. To evaluate this, the present study evaluated whether the interaction between (1) trait social anxiety and related features, and (2) the level of positive social attention received (i.e., overinclusion versus inclusion) predicted a variety of state outcome measures: (1) state anxiety during a social interaction task, (2) submissive head orientation during a social interaction task, (3) anxiety about meeting others face to face (i.e., anticipatory anxiety), and (4) choices of dominance displays. Results of the study revealed overall that both social anxiety symptoms and FPE interacted with amount of positive attention received to predict one dimension of submissive head orientation (i.e., head tilt), but not self-reported levels of state anxiety or choices of dominance displays in the overall sample. Exploratory analyses revealed that social anxiety symptoms interacted with amount of positive attention received to predict women’s choice of dominance displays (although the latter findings must be interpreted with caution given the non-significant effect for the overall model).

Partially inconsistent with hypothesis, head elevation during the social interaction was unrelated to trait social anxiety or fears of evaluation. However, consistent with hypothesis, head tilt, which involves lowering of the head along a different spatial dimension, was associated with both trait and state social anxiety and trait fears of
evaluation (see Table 2). More specifically, recalling that moving one’s head down and to the left has been established previously as a behavioral sign of embarrassment (Keltner, 1995), together with preliminary results indicating that lowering of the head in general may be a behavioral indicator specific to social anxiety (Weeks, Neczypor, & Srivastav, 2015), higher levels of both trait and state anxiety were associated with a greater tendency to tilt one’s head down towards the left in the present study. Moreover, hierarchical regression results revealed an interaction between trait social anxiety and receipt of positive attention. Specifically, social anxiety was not associated with head tilt upon receipt of reasonably expected levels of positive attention (i.e., inclusion); however, more highly socially anxious individuals tilted their heads more to the left than did less socially anxious individuals upon receipt of excessive positive attention (i.e., overinclusion; see Figure 1).

Head tilt was also associated with FPE. FPE and positive attention received (i.e., manipulated via experimental condition) interacted to predict head tilt, even upon including FNE as a covariate. Specifically, individuals with higher FPE tilted their heads more to the left, whereas individuals with lower FPE tilted their heads more to the right upon receipt of excessive positive attention, and these effects did not emerge upon receipt of reasonably expected levels of positive attention (see Figure 2).

Contrary to expectation, choice of avatars that varied in dominance did not correlate with any variables in the overall sample. Moreover, choice of dominance display was not associated with trait social anxiety symptoms, level of positive attention received, or the interaction of these two variables in the hierarchical regression analyses.
performed in the overall sample. However, it is worth noting that sex-specific follow-up analyses revealed interaction effects in women that were largely consistent with hypothesis. Specifically, when compared to low socially anxious women, more highly socially anxious women opted for less dominant representations (i.e., avatars) specifically when under social threat (i.e., overinclusion) (see Figure 3). See below for additional discussion of results pertaining to avatar selection.

As expected, individuals with higher trait social anxiety felt significantly more anxious when interacting with other “participants” (i.e., state interaction anxiety; e.g., see Table 2). However, contrary to hypotheses, the amount of positive attention received (i.e., manipulated via experimental condition) did not predict self-reported state anxiety and did not interact with social anxiety symptoms to predict state anxiety. Similar results were found when examining anticipatory anxiety about meeting the other participants as the outcome variable. Upon controlling for sex (see Preliminary Analyses [Primary outcome measures] section for details), as expected, individuals with higher trait social anxiety felt significantly more anxious in anticipation of a face-to-face meeting with other “participants”. Contrary to hypotheses, however, amount of positive attention received did not predict anticipatory anxiety and did not interact with social anxiety symptoms to predict anticipatory anxiety.

An issue that warrants additional discussion is the non-significant findings pertaining to avatar selection. Responses to the avatar measure did not correlate significantly with any variables in the present study (see Table 2), suggesting that the avatar measure may have been psychometrically flawed. Choice of dominance display
was measured by a single item created for the express purposes of the present study, and as a result, this measure had not been psychometrically evaluated previously. In addition, participants were given only four choices of avatars that varied in stature, which appears to have resulted in restricted range; to illustrate, 82.5% of the overall study sample chose one of the middle two avatars (i.e., the two least extreme avatars in terms of dominance versus submissiveness, respectively). The scale could potentially be improved for future use by: increasing the number of response options available (e.g., see Preston & Colman, 2000), increasing the variability in avatar response options (i.e., even more extreme visual differences in dominance), or both.

Null results pertaining to avatar selection in the overall sample may be a direct result of men’s avatar selections. Although the regression model was nearly significant in women, this effect was likely obscured in the overall sample by the low amount of variance (12%) it accounted for in the avatar selections of men. Of note, women (whose avatar choices were associated with hypothesized predictors [see Figure 3]) evidenced greater variability in avatar selection than did men (whose avatar selections were not associated with any predictors). Women also more frequently selected the most submissive avatar than did men (18.9% versus 5.0%, respectively). Although speculative, it is possible that socio-cultural factors make it is less socially acceptable for men than women to deliberately choose to display overt signs of submission. If true, the sex-specific differences in effects obtained from the avatar selection analyses highlight the importance of using implicit measures to evaluate submissive gestures, particularly in men.
Regarding the null findings pertaining to state anxiety during the getting acquainted task and anticipatory anxiety about meeting the other “players”, it is possible that floor effects could have precluded detection of significant effects of condition upon both measures of state anxiety. To illustrate, sizable percentages of the participants who received excessive positive attention (i.e., overinclusion) reported zero peak and anticipatory state anxiety (17.2% and 10.3%, respectively). The most straightforward interpretation of these findings is that the manipulation was simply not perceived as threatening by these individuals. More speculatively, it is interesting to consider that response biases could have led to reports of no anxiety even if the manipulation was perceived to be threatening, similar to findings for men pertaining to avatar selections.

The null state anxiety regression findings may also be attributable to the nature of the social interaction task that was utilized. First, a lack of dynamic visual social cues could have buffered against sizable increases in state anxiety in the present study. Although participants did engage in an interactive task, the images that they viewed were static. However, this was deemed a necessary aspect of the design, in that the simulations were highly standardized, and as such, only still images of the simulated players were available to display – to inform the participants that the other players could “see” them live would have necessitated showing live videos of the other simulated players, which were not available. Recent research has demonstrated that static facial stimuli evoke less self-reported emotional arousal than do dynamic stimuli (e.g., see Sato & Yoshikawa, 2007). Second, speaking over an intercom system may have removed several important (potentially anxiety-provoking) aspects of positive attention, such as real-time eye
contact, facial cues (e.g., smiling), and other behavioral signs of engagement. Thus, employing alternative research paradigms to increase ecological validity (e.g., designs involving dynamic visual stimuli, and in which participants believe that they are visible to others in real-time) is an important direction of future research into the relationship between positive attention and social anxiety.

It is noteworthy that statistically significant differences in submissive head orientation were detected under relatively low conditions of social threat in the present study. To illustrate, participants exhibited submissive head orientation (see Keltner, 1995) despite the fact that they were aware that their interaction partners could not observe them as they engaged in the display. Across species, the primary function of submissive behavior is to appear less threatening (de Waal, 1998), and it is reasonable to expect that the presence and magnitude of these behaviors are typically moderated by the presence or absence of observers. Although it is unclear why head elevation was not related to social anxiety in the present study (see Table 2; see also Appendix G), it seems reasonable to conclude that submissive displays exhibited by participants would have been exacerbated if the participants believed that the (simulated) interaction partners could see them as they took part in the interaction tasks. In addition, it bears noting that head tilt was significantly associated with state anxiety at experimental timepoints (see Table 2), that head tilt was influenced by experimental condition, and that this latter relationship was consistent with hypothesis (see Figures 1 and 2).

Findings regarding head tilt were consistent with the bivalent fear of evaluation model in suggesting that FPE is an important component of social anxiety (Weeks &
Howell, 2012). In the context of the present study, FPE appeared to be a more robust predictor of submissive displays than was social anxiety. At the bivariate level, FPE was more strongly associated with head tilt than was social anxiety (see Table 2). Additionally, regression models suggested that FPE was a particularly strong predictor of head tilt. Trait social anxiety, amount of positive attention received, and their interaction accounted for 22% of the variance in head tilt. When this model was analyzed with FPE in place of trait social anxiety, it accounted for a greater percentage of variance (31%), even when controlling for FNE. These findings indicate that the effects were related to social anxiety overall, but were more specifically and directly relevant to FPE.

As noted above, findings regarding the direction of head tilt were consistent with previous findings that people tend to turn their head to the left when embarrassed (Keltner, 1995). Considering these findings within the context of psycho-evolutionary theories of social anxiety (e.g., Gilbert, 2001), it appears that receipt of positive attention is associated with increased self-conscious emotions, which in turn are associated with leftward motion of the head. If true, this suggests that leftward tilt of the head may be an implicit appeasement strategy. Submissive head orienting gestures can be considered implicit in that they are activated automatically, without conscious awareness (De Houwer & Moors, 2012; Greenwald & Banaji, 1995). Individuals may respond to threats in the environment non-consciously even in the absence of conscious or well-articulated feelings of discomfort. For example, Lakin, Chartrand, and Arkin (2008) demonstrated that social exclusion prompted greater non-conscious mimicry of an interaction partner, but did not result in expected mood decrements. Furthermore, accumulating evidence
suggests that a variety of goals (e.g., affiliation, food consumption, task performance, etc.) can be evoked in humans and pursued in the absence of conscious awareness, and indeed, even without awareness of changes in motivation (Custers & Aarts, 2010).

Discrepant findings regarding submissive behavior and state/anticipatory anxiety in the present study may be explained by their measurement as implicit and explicit constructs, respectively. Because head orientation was measured without participants’ knowledge, it was less subject to potential response biases and demand characteristics than were the self-report measures used in the present study. In addition, relationships between implicit and explicit measures of the same construct, as well as their relationship to other variables, can vary widely and may be context-dependent (Nosek, 2005). Of relevance to the present study, Teachman and Allen (2007) found minimal to no relationship between implicit and explicit measures of FNE. They also found that implicitly measured FNE and explicitly measured FNE related differentially to psychosocial variables. In addition, Asendorpf, Banse, and Mücke (2002) found that implicit ratings of shyness uniquely predicted spontaneous (but not deliberate) shy behavior (e.g., body tension), whereas self-reported shyness uniquely predicted deliberate (but not spontaneous) shy behavior (e.g., speech). These findings, along with findings from the present study, suggest that implicit, uncontrolled anxious or submissive behaviors may provide information that is unique from self-reported anxiety.

**Conclusions**

The present study suggests that positive social attention is threatening to socially anxious individuals, at least on an implicit level. However, due to the failure of excessive
positive attention to predict exacerbated reports of state anxiety, conclusions regarding the effect of positive attention on state social anxiety are less clear. As discussed previously, statistical (e.g., floor effects) and/or methodological issues (e.g., ecological validity) could reasonably have obscured effects which would otherwise have been detected. It is also possible that positive social attention received in the present study was not threatening or anxiety provoking to socially anxious individuals. However, the latter explanation is deemed unlikely for several reasons. First, positive attention was meaningfully associated with submissive head orientation, an implicit indicator of social anxiety, and submissive head orientation was in turn positively associated with state anxiety (see Table 2). Second, positive evaluation, which has been established as threatening to socially anxious individuals (e.g., see Weeks, Howell, & Goldin, 2013), is closely related to positive attention (1) in terms of implications regarding dynamics of social hierarchical groups (Gilbert, 2001), and (2) in that positive evaluation and positive attention would be expected to inherently co-occur.

Automatic (implicit) behavioral markers of social anxiety, such as avoidance of eye contact, have long been recognized by theoreticians and clinicians alike (e.g., Rapee & Heimberg, 1997). Recently, technology has allowed researchers to objectively measure social anxiety-related submissive behaviors, such as increased vocal pitch (Weeks et al., 2012) and gaze avoidance (Weeks et al., 2013), which appear analogous to submissive response patterns in non-human primates and other animals (e.g., see de Waal, 1998). Despite the high prevalence of head bow in submissive displays in mammalian species, patterns of head movements have received little attention in human/social anxiety
research, and are less well recognized as behavioral features of social anxiety. The current study extends upon the previous literature, demonstrating that lowering of the head to the left is associated with social anxiety and social threat. These results suggest that leftward head tilt is part of a behavioral signature that may be specific to social anxiety and which is non-consciously employed to appease others in social situations.

The present study has implications for individuals suffering from SAD. Although subtle submissive responses are presumed to be automatic responses exercised to avoid potential conflict, they can be problematic when employed inappropriately. Such behaviors performed by socially anxious individuals often paradoxically elicit negative evaluations from others, which ultimately result in difficulties bonding effectively with others (Alden & Taylor, 2004). Psychotherapeutic techniques that assist socially anxious individuals in coping more effectively with positive attention would likely improve social interactions with others. Moreover, directly targeting head orientation and posture could also be helpful. Carney, Cuddy, and Yap (2010) demonstrated that briefly adopting more expansive (as opposed to contractive) poses increased risk tolerance and decreased cortisol levels. It is possible that therapeutic interventions designed to increase expansive posture for socially anxious individuals could lead to reduced social anxiety symptoms (e.g., see Weeks, Heimberg, & Heuer, 2011) – although speculative, this intriguing possibility warrants empirical attention.

**Limitations and Future Directions**

The present study highlights the utility of implicit behavioral measurements in the evaluation of social threat. However, it was limited in that it analyzed the effects of
positive attention on only one objective form of submissive behavior: head orientation. An important next step is to evaluate the generalizability of these effects to related submissive behaviors (e.g., increased vocal pitch and gaze avoidance). Theoretically, these submissive cues occur together in response to the same underlying automatic process (see Gilbert, 2001). The present study was also limited in that it assessed average head orientation over a relatively long period of time (approximately 10 minutes). It is unclear whether significant differences in head orientation are due to prominent, acute, movements of the head, or sustained head orientation at a subtler angle. Future research would benefit from repeated measures designs examining submissive gestures in response to acute positive attention.

It is also important to consider the consequences of these subtle submissive behaviors. It would be useful, for example, to examine whether such displays divert observers’ attention, elicit negative reactions from others, or disrupt relationship formation. Previous research suggests that anxiety-related behaviors are related to disengagement of conversation partners (Alden & Taylor, 2004). However, other lines of research suggest that displays of submission can be beneficial in certain contexts. For example, submissive postures displayed in a complementary fashion to an interaction partner’s dominant postures resulted in greater liking and comfort reported by the dominant partner (Tiedens & Fragale, 2003). It is possible that some degree of submissive behaviors could reflect humility upon receipt of excessive positive attention, but too much submission may portray lack of confidence and social skills.
Another important future direction is to further distinguish the relationship between self-conscious emotions and leftward head tilt. In the present study, excessive positive attention was conceptualized as a social threat, potentially increasing fears of reprisal/rejection from others (in the context of psycho-evolutionary models of social anxiety; Gilbert, 2001). In addition to triggering anxiety regarding future reactions, positive evaluation/attention may be perceived to be a negative outcome in itself, triggering embarrassment. Therefore, future studies should evaluate feelings of embarrassment as well as anxiety. Keltner (1995) identified leftward head motion as a behavioral response to an embarrassing situation. It is important that future research clarify the specific nature of leftward head tilt as a general display of self-conscious emotions, versus one that may be more specifically related to social anxiety/embarrassment. It would also be informative to further clarify the nature of rightward head tilt. In the present study, there was an unanticipated trend for individuals with low levels of trait social anxiety to tilt their heads to the right during when receiving greater amounts of positive attention. Given these findings, it is possible that rightward tilt of the head reflects dominance, confidence, or comfort.

Another future direction to consider is the generalizability of the findings to other settings and forms of communication. The present study evaluated reactions to positive attention with relative strangers over an intercom system, which was relatively artificial. As discussed previously, it is possible that lack of certain contextual factors limited state anxiety responses. It is not yet known whether positive attention received in-person would elicit different (perhaps more intense) emotional and behavioral reactions. The
nature of the interaction partners is another important contextual factor that can be varied in future research. For example, it would be interesting to evaluate whether socially anxious individuals appear more comfortable receiving positive attention from known peers (or even close others). The present study created a social dominance hierarchy, such that participants were exposed to both dominant and subordinate interaction partners. Manipulation of positive attention from exclusively dominant and exclusively subordinate interaction partners would further evaluate SAHP in the context of psycho-evolutionary models of social anxiety (Gilbert, 2001).

The present study was the first to experimentally manipulate positive attention and evaluate its effects within the context of the bivalent fear of evaluation model of social anxiety (Weeks & Howell, 2012). Weeks and Howell (2014) highlighted that FPE continues to be the “neglected fear domain” in the social anxiety literature and called for further research on this topic. To this aim, the present study focused on FPE and manipulated a theoretically related construct—positive attention. A natural extension of this research would involve comparing positive attention to other well-established forms of social threat, such as negative attention or social exclusion (Baumeister & Leary, 1995). One would expect individuals to react similarly to different forms of social threat (e.g., submissive gestures; e.g., see Weeks et al., 2013), but there may be important differences in reactions to positive attention than other forms of social threat. For example, one might expect socially anxious individuals to feel deserving of negative, but not positive attention.
The present study evaluated social anxiety as a trait that is distributed relatively continuously throughout the population. Implications for SAD should be considered tentative given that the study sample was somewhat limited in the percentage of highly socially anxious participants (26.3% of the sample qualified for probable SAD; see Participants section for details). In order to draw firm conclusions regarding SAD, future research should manipulate positive social attention in samples of individuals diagnosed with SAD.
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Manuscript in preparation.


Endnotes

1 Only participants who identified as either White/Caucasian or Black/African-American were eligible to participate in the present study, for a number of reasons. First, it was deemed necessary to match photographs of “the other players” (displayed to participants in the present study) to each individual participant’s race, to reduce possible confounding effects that the race of the simulated players would have upon participants’ perceptions of inclusion/overinclusion (see next section for details). Second, although the database from which the photographs were obtained (i.e., the Center for Vital Longevity's Face Database; Minear & Park, 2004) does include pictures of young people of racial/ethnic backgrounds other than White/Caucasian and Black/African American, there was either: (a) too little variability for the race (and sex) distributions required for the present study (i.e., less than 3 pictures of men or women for a given ethnic/racial group), or, (b) a lack of variability in perceived social dominance ratings of the relevant images on the basis of results obtained from a pilot study (see Appendix B).

2 The cutoff score used for probable SAD (on the SIAS-S) was 28, as suggested by Rodebaugh et al. (2011).

3 Introductory psychology students at Ohio University complete an online prescreen via a SONA system website. When the study was initiated, participants were eligible only if their prescreen responses to a measure of social anxiety symptoms (Social Interaction Anxiety Scale [SIAS]; see Social Interaction Anxiety Scale section for details) were either (1) in the bottom tertile of the distribution of scores obtained or (2) exceeded an empirically replicated cutoff of 34 indicating a probable diagnosis of SAD.
(Heimberg, Mueller, Hold, Hope, & Liebowitz, 1992). The goal of this recruitment method was to create a low socially anxious group and a high socially anxious group, respectively, based on in-study measures. However, in response to slow recruitment of high socially anxious individuals for the study, the distribution of social anxiety symptoms was examined after 45 participants (80.4% of targeted study sample) had completed all study procedures; contrary to expectation, the scores were normally distributed, with a skewness of 0.66 \((SE=\cdot35)\) and a kurtosis of -0.63 \((SE=\cdot70)\). Thus, social anxiety was deemed most appropriately analyzed as a continuous (rather than categorical) variable, and the remaining 10 participants were recruited regardless of their prescreen SIAS scores.
Table 1.

*Distributions of standardized positive social attention that the participants received per experimental condition.*

<table>
<thead>
<tr>
<th>Condition</th>
<th>Inclusion</th>
<th>Overinclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of questions the simulated players directed to the participant</td>
<td>50</td>
<td>80</td>
</tr>
<tr>
<td>Percentage of questions the simulated players “asked each other”</td>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>Number of likes displayed to the participant per question</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Number of likes simulated players “gave each other” per question</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note.* Possible number of “likes” delivered by the simulated players per turn ranged from 0-2.
Table 2.

*Correlations among trait measures and primary outcome measures.*

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. SIAS-S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. FPES</td>
<td></td>
<td>.76**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. BFNE-S</td>
<td>.83**</td>
<td>.63**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Peak SUDS</td>
<td>.53**</td>
<td>.31*</td>
<td>.50**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. SUDS T4</td>
<td>.63**</td>
<td>.34**</td>
<td>.51**</td>
<td>.70**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Head tilt</td>
<td>-.34*</td>
<td>-.38**</td>
<td>-.41**</td>
<td>-.38**</td>
<td>-.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Avatar selection</td>
<td>.02</td>
<td>.16</td>
<td>.03</td>
<td>-.06</td>
<td>.12</td>
<td>-.11</td>
<td>.13</td>
</tr>
</tbody>
</table>

*Notes.* SIAS-S=Social Interaction Anxiety Scale-Straightforward items; FPES=Fear of Positive Evaluation Scale; BFNE-S=Brief Fear of Negative Evaluation Scale-Straightforward items; Peak SUDS=peak state anxiety during the getting acquainted task (highest value obtained at either T2 or T3); SUDS T4=anticipatory anxiety about allegedly meeting the other players in person; head tilt=head tilt during the getting acquainted task (with: more extreme values representing more extreme head tilt; negative values representing leftward tilt; and positive values representing rightward tilt); head elevation=head elevation during the getting acquainted task; and avatar selection=selection of avatars varying in stature (with higher values representing greater displays of submissiveness).

*p<.05, **p<.01
Figure 1. *Head tilt as a function of condition and trait social anxiety.*

*Notes:* For head tilt, positive values indicate degrees to the right, negative values indicate degrees to the left, and “0” indicates a neutral, upright position. The lines represent different levels of trait social anxiety symptoms: low social anxiety (i.e., 1 SD below the mean SIAS-S score), mean social anxiety (i.e., mean SIAS-S score), and high social anxiety (i.e., 1 SD above the mean SIAS-S score). The slopes are based on values predicted by the regression model. *p<.05, †p<.10; * pertains to whether slopes differed significantly from zero, † pertains to whether slopes differed significantly from one another.
Figure 2. *Head tilt as a function of condition and FPE.*

**Notes:** For head tilt, positive values indicate degrees to the right, negative values indicate degrees to the left, and “0” indicates a neutral, upright position. The lines represent different levels of symptoms: low FPE (i.e., 1 SD below the mean FPES score), mean FPE (i.e., mean FPES score), and high FPE (i.e., 1SD above the mean FPES score). The slopes are based on values predicted by the regression model. *p<.05, †p<.10; a pertains to whether slopes differed significantly from zero, b pertains to whether slopes differed significantly from one another.
Figure 3. Women’s choices of dominance display as a function of condition and trait social anxiety.

Notes: For explicit dominance display, higher values indicate more subordinate avatars and lower values indicate more dominant avatars. The lines represent different levels of trait social anxiety symptoms: low social anxiety (i.e., 1 SD below the mean SIAS-S score), mean social anxiety (i.e., mean SIAS-S score), and high social anxiety (i.e., 1 SD above the mean SIAS-S score). The slopes are based on values predicted by the regression model. Although the interaction significantly predicted dominance display, the overall regression model was not significant, so values must be interpreted with caution. *p<.05, †p<.10; a pertains to whether slopes differed significantly from zero, b pertains to whether slopes differed significantly from one another.
Appendix A: Photographs of the Simulated Players

<table>
<thead>
<tr>
<th>Player 1</th>
<th>Player 2</th>
<th>Player 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>White Men</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image1" alt="Image" /></td>
<td><img src="image2" alt="Image" /></td>
<td><img src="image3" alt="Image" /></td>
</tr>
<tr>
<td><strong>White Women</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image4" alt="Image" /></td>
<td><img src="image5" alt="Image" /></td>
<td><img src="image6" alt="Image" /></td>
</tr>
<tr>
<td><strong>Black Men</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image7" alt="Image" /></td>
<td><img src="image8" alt="Image" /></td>
<td><img src="image9" alt="Image" /></td>
</tr>
<tr>
<td><strong>Black Women</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image10" alt="Image" /></td>
<td><img src="image11" alt="Image" /></td>
<td><img src="image12" alt="Image" /></td>
</tr>
</tbody>
</table>
Appendix B: Pilot Study

A pilot study was conducted with the goal of preparing stimuli that could be used to induce social dominance hierarchy dynamics in the context of the present study. Specifically, the pilot study investigated the perceived social dominance of photographs and statements. These stimuli were used in the present study to create three characters (i.e., group members; “Players 1, 2, and 4”) that varied in terms social dominance.

Stimuli

Statements. The statements evaluated in the pilot study were 20 responses to “get to know you” questions (e.g., What is your favorite vacation you have taken?) and were developed by the author of the present study. Specifically, the author wrote five “get to know you” questions and developed two sets of responses for each question. Each set of responses included one statement intended to display high social dominance, and a “yoked” statement that was intended to portray relatively low social dominance, resulting in a total of four responses per question. For example, the dominant response to the question, “What is your favorite vacation you have taken or what is your favorite vacation activity?” was “Last year I organized a skiing trip with some friends. I like trying to beat everyone down the hill and people tell me I’m good at it.” The yoked non-dominant response to this question was “Last year I went on a skiing trip with some friends. I like flying down the hills with them and people tell me I’m okay at it”. These statements were designed so that their writer would be ambiguous with regard to sex and race, given that the present study was designed to match participants to simulated interaction partners on the basis of sex and racial background.
Faces. Photographs (headshots) of individuals aged 19-24 years were obtained from the Center for Vital Longevity's Face Database (Minear & Park, 2004). Due to the large number of photographs available on the database, the author conducted a preliminary (i.e., “pre-pilot”) survey to guide selection of photographs to be used in the pilot study. Sixteen individuals known to the author volunteered their participation and rated 66 faces on social dominance (i.e., dominance, popularity, leadership, competitiveness, and submissiveness [the latter item was reverse-scored]; these items were used to create a social dominance score).

On the basis of results from the preliminary survey, eight faces were selected for use in the pilot study. Specifically, the two faces rated highest in social dominance per sex and racial/ethnic background on social dominance, and the two faces rated lowest in social dominance per sex and racial/ethnic were selected for each of the following four groups: (1) White/Caucasian men, (2) White/Caucasian women, (3) Black/African American men, and (4) Black/African American women. Although the Center for Vital Longevity’s Face Database does include some pictures of young people of racial/ethnic backgrounds other than White/Caucasian and Black/African American, there were either too few pictures for a specific race and sex, or a lack of variability in social dominance in the pictures that were available. Therefore, only faces of White/Caucasian individuals and Black/African American individuals were selected for further examination in the pilot study.
Pilot Study Procedures

A total of 159 participants who identified as either White/Caucasian or Black/African-American were recruited through Amazon’s Mechanical Turk (MTurk; https://www.mturk.com/mturk/) and were compensated with 50 cents for their participation. Approximately half of the sample (50.31%) was female. The mean age of the sample was 25.38 years. In addition, approximately half of the participants identified as White/Caucasian (50.94%) and the remainder of the participants identified as Black/African-American.

First, participants were randomly presented with one of the four responses to each of the five “get to know you” questions. They were asked to indicate how certain they were of each writer’s race on a scale from 1 (Not at all certain) to 4 (Very certain). They were also asked how certain they were of each writer’s sex on a scale from 1 to 7 where 1 is “Very certain he’s male,” 4 is “Uncertain,” and 7 is “Very certain she’s female”. Finally, they were asked to rate the writers of the statements on five characteristics using a 7-point Likert-type scale. Specifically, they rated the individuals on: dominance, submissiveness, popularity, leadership, and competitiveness. The submissiveness scores were reverse coded, and all ratings were subsequently averaged to achieve a social dominance composite score for each statement (α=.79). Participants rated only one statement for each question, and the levels of social dominance of the four statements for each question were compared using between-subjects one-way analyses of variance (ANOVA). The omnibus tests were followed up with all pairwise comparisons using Tukey’s Honestly Significant Difference Test (Tukey’s HSD test).
After rating the statements, participants were then presented with the photographs and were asked to rate the individuals in the photographs on the same characteristics (i.e., dominance, submissiveness, popularity, leadership, and competitiveness). Participants rated all four photographs of individuals who matched their self-identified race and sex. Again, a composite social dominance score was created for each photograph (α=.75). For each racial and sex group (i.e., White/Caucasian men, White/Caucasian women, Black/African-American men, and Black/African-American women), a one-way within-subjects ANOVA was conducted and followed up with all pairwise comparisons using Tukey’s HSD test.

**Pilot Study Results**

Responses to one of the five initial “get to know you” questions did not differ in social dominance (i.e., all four responses to one question were rated as having equivalent levels of social dominance), \( F(3, 154)=1.16, p=.33 \), and were not used in the present study. However, ratings differed as expected for the four responses to each of the other four questions (all \( F \) values >24.00, all \( p \) values<.001). Specifically, the statements designed to portray high levels of social dominance were rated significantly higher on the social dominance composite score than were the yoked statements designed to portray lower levels of social dominance (all \( p \) values <.001). Participants also indicated that they were relatively uncertain of the writer’s race (\( M= 1.84, SD=0.74 \); “2” on a 4 point scale reflected “slightly certain”) or sex (\( M= 3.58, SD=0.65 \); “4” on a 7-point scale reflected “uncertain”) suggesting that these statements would represent a credible manipulation of
social dominance for participants in the present study, regardless of the group members’ races and sex.

Ratings differed as expected for the photographs. Within each of the four groups (i.e., White/Caucasian men, White/Caucasian women, Black/African-American men, and Black/African-American women), there were significant differences in social dominance (all $F$ values $>5.80$, all $p$ values $<.001$). The omnibus tests were followed up with all pairwise comparisons. As expected, the photographs that scored relatively high on dominance in the preliminary survey were rated as significantly more socially dominant than the photographs of individuals of the same race and sex that scored lower on dominance in the preliminary survey (all $p$ values $<.05$). The results of the pilot study suggested that the statements and faces could be used to induce social hierarchy dynamics in the context of the present study.
Appendix C: “Introduce Yourself” Questions and Responses

Participants provided answers to the following two questions:

1. What is your major area of study? What made you choose that area?

2. Describe your personality. Are you generally laid back or competitive? A leader? Spontaneous? Outgoing?

Participants viewed six responses (two per simulated player). Responses were randomized such that participants viewed either set 1 or set 2 responses.

What is your favorite vacation you have taken or what is your favorite vacation activity?

Player 1

Q1: What is your major area of study? What made you choose that area?

R1 (Set 1 and 2): I’m a biology major because I want to go to school to be a physical therapist. I want to run my own practice one day, helping people rehab from injuries.

Q2: What is your favorite vacation you have taken or what is your favorite vacation activity?

R1 Set 1: Last year I organized a skiing trip with some friends. I liked trying to beat everyone down the big hills there!

R1 Set 2: I actually like going fishing with my friends. I always compete with them to see who can catch the biggest fish.

Player 2

R1 Set 1: *In my free time I like doing whatever my group of friends want to over the weekend like hiking or seeing a movie. As for clubs, I’m involved in SDAA, which is a group that does volunteer work with disabled kids.*

R1 Set 2: *I’m on an intermural softball team, so I go to practices and games. I also like just doing whatever my friends are doing, which is usually going to their houses for parties and to just chill.*

Q2: *What is your favorite vacation you have taken or what is your favorite vacation activity?*

R2 Set 1: *I actually like going fishing with my friends. We have fun seeing what kind of fish we can catch.*

R2 Set 2: *Last year I went on a skiing trip with some friends. I liked the big hills there and just tried to keep up with everyone!* 

Player 4


R1 Set 1: *I’m the captain of the intermural softball team, so I lead practices and games. I also like just getting friends together, having them over for parties and to just chill.*

R1 Set 2: *I’m on an intermural softball team, so I go to practices and games. I also like just doing whatever my friends are doing, which is usually going to their houses for parties and to just chill.*
Q2: Describe your personality. Are you generally laid back or competitive? A leader? Spontaneous? Outgoing?

R2 (Set 1 and 2): I’ve always been more of a competitive person. I also like being a leader and taking control of situations when I can. I’d say I’m pretty outgoing in general and like to socialize. Sometimes I like being spontaneous too.
Appendix D: Additional Study Measures

Overall, supplementary study measures demonstrated adequate to excellent internal consistency (as ranged from .76 to .94), with two exceptions (see Threat to Others and Personal Sense of Uniqueness-State Scale [PSU-S] sections below for details).

Liebowitz Social Anxiety Scale (LSAS)

The LSAS (Liebowitz, 1987) is a 24-item clinician-administered measure designed to assess fear and avoidance in social interaction (11 items) and performance (13 items) situations. The LSAS was included in the present study to estimate SAD prevalence for descriptive purposes. However, LSAS responses were not examined in any study analyses.

Anxiety Disorders Interview Schedule for DSM-IV, Social Phobia Subsection (ADIS-IV-SP)

The ADIS-IV (DiNardo, Brown & Barlow, 1994) is a semi-structured diagnostic interview designed to assess a subset of psychiatric disorders including anxiety, mood, and substance abuse disorders. For the purposes of the proposed study, the social phobia section of the ADIS-IV was administered to assess current severity of symptoms of social anxiety disorder. Training criteria outlined by Brown, DiNardo, Lehman, and Campbell (2001) were satisfied by the interviewer. The ADIS-IV-SP was included, in conjunction with the LSAS, to estimate SAD prevalence for descriptive purposes. However, ADIS-IV-SP responses were not examined in any study analyses.
Disqualification of Positive Social Outcomes Scale (DPSOS)

The DPSOS (Weeks, 2010) is a 13-item self-report measure of cognitive tendencies to disqualify (i.e., reject) positive social experiences. The items include other-oriented attributions (i.e., attributions of positive social experiences to the characteristics/experiences of others rather than to one’s own abilities or effort) and self-oriented items (i.e., self-targeted statements which directly reflect disqualification of positive social outcomes). The items are rated on a scale ranging from 0 to 9, with higher values reflecting greater tendencies to disqualify positive social outcomes. Two reverse-coded items are included with the intention of reducing response biases, but are not used when calculating the total score. The DPSOS was included for exploratory cross-sectional meditational analyses, with DPSOS scores as a potential mediator of the relationship between social anxiety and affect. However, the planned meditational analyses did not satisfy temporal ordering requirements suggested by Maxwell and Cole (2007), and were therefore not evaluated.

The Concerns of Social Reprisal Scale (CSRS)

The CSRS (Weeks & Menatti, 2015) is a 12-item self-report questionnaire designed to assess social anxiety-related concerns of reprisal due to forming positive impressions on others. The items are rated on a 10-point Likert-type scale, with higher values reflecting greater tendencies to fear social reprisal due to positive impressions. Two reverse-scored items are included for detecting response biases, but are not used in calculating the CSRS total score. The CSRS was included for exploratory analyses involving the threat to others measure (see Threat to Others section below).
Specifically, it was hypothesized that the CSRS would interact with perceived threat to others to predict state anxiety. However, because of low internal consistency of the threat to others measure ($\alpha = .39$), this analysis was not performed.

**The Self-Attributed Need for Uniqueness Scale (SANU)**

The SANU (Lynn & Harris, 1997) is a 4-item self-report measure of the respondent’s need to feel differentiated from others. Each item includes a blank in the sentence (e.g., *Being distinctive is ____ important to me.*), which is completed by choosing one of five multiple-choice items (e.g., *not at all to extremely*).

The SANU was included for exploratory analyses involving the Personal Sense of Uniqueness (PSU-S) measure (see below), to examine the relationships between trait social anxiety, positive attention, and psychological need for differentiation from others. However, because of low internal consistency of the PSU-S measure ($\alpha = .51$), this analysis was not performed.

**Positive and Negative Affect Scale (PANAS)**

The PANAS (Watson, Clark, & Tellegem, 1988) is a self-report measure comprised of two 10-item scales, one of which was designed to assess positive affect and the other designed to assess negative affect. The scales may be administered using different temporal instructions (e.g., *right now*). The PANAS was included for exploratory cross-sectional meditational analyses, with DPSOS scores as a potential mediator of the relationship between social anxiety and affect (i.e., PANAS scores). However, the planned meditational analyses did not satisfy temporal ordering requirements suggested by Maxwell and Cole (2007), and were therefore not performed.
Social Needs Inventory

The social needs inventory (i.e., basic needs scale; adapted from Zadro et al., 2004) is a 17-item self-report measure that assesses current feelings of belonging, control, self-esteem, and meaningful presence. Items are rated on a scale from 1 to 7. This scale, and other similar scales, are commonly used in studies of social exclusion, which have repeatedly demonstrated that social exclusion lowers these four basic social needs (e.g., Bernstein, Young, Brown, Sacco, & Claypool, 2008).

The SNI was included for analyses exploring the effects of positive attention and social anxiety on fundamental psychological needs. This exploratory analysis was proposed in conjunction with a conceptually related analysis investigating the effects of positive attention and social anxiety on psychological needs for differentiation from others. However, these analyses were not performed due to low internal consistency of a covariate measure ($\alpha=.51$) (see Personal Sense of Uniqueness-State Scale [PSU-S] section below).

Personal Sense of Uniqueness-State Scale (PSU-S)

The PSU (Simsek & Yalincetin, 2010) is a five-item self-report questionnaire that measures individuals’ sense of uniqueness. Items are rated on a 5-point Likert-type scale from 1 (strongly disagree) to 5 (strongly agree). The PSU has demonstrated acceptable to strong internal consistency and construct validity in undergraduate samples (Demir, Simsek, & Proscal, 2012; Simesek & Yalincetin, 2010). The PSU is positively associated with life-satisfaction and negatively associated with anxiety and depression (Simesek & Yalincetin, 2010). Although the PSU was developed to be a trait measure, it was adapted
for the proposed study to measure current feelings of uniqueness. This state measure included seven items assessing participants’ sense of uniqueness in relation to the other interaction partners. The PSU-S measure was included to explore the relationships between trait social anxiety, positive attention, and psychological need for uniqueness. However, because of low internal consistency of the measure ($\alpha=.51$), these analyses were not performed.

**Living Up to Expectations**

Participants were asked to rate the following four statements, developed by the author, on a scale from 1 (not at all true) to 9 (extremely true): (1) “I fear that I will not live up to the group’s impression of me,” (2) “I don’t think the group’s opinion of me will change,” (3) “I fear that once they meet me face to face, they will not like me as much,” (4) “I fear that the group will be disappointed when they meet me.” The straightforward items (i.e., items 1, 3, and 4) were averaged to create a living up to expectations score. The reverse-scored item (i.e., item 2) was included to reduce potential response biases (e.g., see Marsh, 1996).

The living up to expectations measure was included for exploratory analyses regarding the psychological mechanisms underlying anxiety in response to positive social outcomes. Specifically, exploratory stepwise regression analyses were proposed to determine the relative contribution of several possible contributing components (i.e., perceptions that one is viewed as a threat [see Threat To Others section below], perceptions that one will not be able to live up to expectations [see Living Up to Expectations section {Appendix D}], perceptions that one was misjudged [see
Inconsistent Treatment section below], and threats to one’s need for distinctiveness/uniqueness (see Personal Sense of Uniqueness-State Scale section {Appendix D}) to state social anxiety. However, due to low internal consistency of the threat to others measure ($\alpha = .39$), the analysis was not conducted.

Inconsistent Treatment

After completion of the “getting acquainted” task, participants were asked to rate the following statements on a scale from 1 (not at all true) to 9 (extremely true): (1) I feel that the other group members did not form the right impression of me, (2) The other group members would have treated me differently if they had known me a little better, and (3) I expected to be treated differently during the getting acquainted task. The ratings on these items were averaged to create an inconsistent treatment (from “other group members”) score.

The inconsistent treatment measure was included for exploratory analyses regarding the psychological mechanisms underlying anxiety in response to positive attention (see Living Up To Expectations section for details). However, due to low internal consistency ($\alpha = .39$) of one of the measures (i.e., Threat to Others, see below) the analysis was not conducted.

Threat to Others

Participants indicated on a scale from 1 (not at all) to 9 (extremely) the extent to which they believed each player (i.e., “players 1, 2 and 4”) perceived him/herself to be: (1) an ally (reverse-scored), (2) a threat, (3) a nuisance, and (4) a competitor. The scores to these four questions were averaged to create an index of threat to others.
The threat to others measure was included as an integrity check and also included for two exploratory analyses, one involving concerns of social reprisal due to positive impressions (see Concerns of Social Reprisal Scale [Appendix D]) and the other exploring psychological mechanisms underlying anxiety in response to positive social attention (see Living Up to Expectations [Appendix D]). However, because of low internal consistency of the measure (\(\alpha=.31\) [\(\alpha=.39\) with the exclusion of the reverse-scored item]), these analyses were not conducted.
Appendix E: Perceived Closeness Items
Appendix F: Trait Questionnaires

Social Interaction Anxiety Scale

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**

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

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>True</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>Very</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all True</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>Very</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.
Appendix G: Analyses of Head Elevation and Head Bow

A constant was added to the head tilt (right-left) and head elevation (up/down) variables such that all values were positive. These linearly transformed variables were then multiplied to create an index of head bow. A hierarchical linear regression analysis was performed to test whether trait social anxiety interacted with experimental condition to predict head bow. Baseline state anxiety (i.e., T0 SUDS scores) was entered as a covariate. Social anxiety symptoms (i.e., SIAS-S scores) and condition (i.e., inclusion vs. overinclusion) were entered into the first step and their interaction term was entered into the second step. The composite head bow index was entered as the criterion variable.

Head bow was not significantly predicted by social anxiety symptoms and experimental condition, $F(3, 49)=1.33$, $p=.28$, $R^2=.08$. When the interaction term was added to the model, the model accounted for significant variance in head bow, $F(4, 48)=2.70$, $p=.04$, $R^2=.18$. The interaction term was the only significant predictor of head bow, $t(51)=2.53$, $p=.015$. Specifically, there was a negative relationship between social anxiety and head bow, which was stronger in the overinclusion condition than the inclusion condition.

When examined further, this interaction effect appeared driven mainly by the model’s ability to predict head tilt, not head elevation. The model was predictive of head tilt (see Primary Analyses), but not predictive of head elevation. Specifically, predictors in the first block (i.e., SIAS-S scores and experimental condition) did not account for significant variance in head elevation $F(3, 49)=.67$, $p=.58$, $R^2=.04$. The second block (with the addition of the interaction term) also did not account for significant variance in
head elevation $F(4, 48)=.61, p=.66, R^2=.05$. Indeed, none of the individual predictors, including the interaction term, significantly predicted head elevation, all $ps>.05$. 