SOCIAL ANXIETY IN CONTEXT: THE EFFECTS OF SOCIAL STRUCTURE

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ABSTRACT

Person-environment interactions are the rule, not only for development but also for moment-to-moment experience. Knowledge about environmental influences on the manifestation of psychological symptoms is an important area of research, particularly with regard to social anxiety where symptoms vary dramatically depending on the social context. Like other forms of anxiety, social anxiety is thought to have evolved to help us pay attention to, assess, and respond to potential (in this case, intra-species) threats. The current study was based on (1) the theoretical proposition that social anxiety represents an adaptation to hierarchical, or agonic, modes of social organization; (2) the observation that in the non-hierarchical hedonic systems seen in some of our closest primate relatives, submissiveness is not required for group functioning, and (3) more recent empirical data showing that social anxiety symptoms are dependent on contextual factors.

The current study integrated these three ideas and examined whether participating in a hedonic system, as compared to an agonic system, diminishes social anxiety, and whether social context moderates the relationship between trait social anxiety and activation of state anxiety. Participants of all different levels of trait social anxiety were randomly assigned to play a group game, the context and rules of which were consistent with either agonic or hedonic social structures. Self-reported anxiety and behaviors associated with social anxiety were then measured. Results from the experiment were mixed, sometimes seemingly conflicting, and therefore difficult to interpret. The more hierarchical, agonic social system was associated with higher anxious affect. However, the type of social system did not
appear to affect self-reported submissive behavior, social comparison, or social behavior. Additionally, experimental condition did not moderate the effect of trait social anxiety on these variables. Although our findings were mixed, they hint at the role of social structure in the activation of anxious affect.
For my husband, David.

Thank you for your patience, your humor,

and your unconditional support.
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CHAPTER 1

INTRODUCTION

Social anxiety is characterized by distress about social situations for fear of potential rejection or scrutiny by others. It is often examined as a personality trait, as research supports the existence of a continuum from an absence of social fear, to varying degrees of shyness and social anxiety, to more intense and clinically impairing social fears (Chavira, Stein, & Malcarne, 2002; Davidson, Hughes, George, & Blazer, 1994). Regardless of whether it is examined as a momentary emotional experience, personality trait, or disorder, it is important to recognize that social anxiety is wedded to social context.

Research suggests that social context is an important factor in understanding the physiological and behavioral reactions of individuals with high levels of social anxiety (e.g., Kashdan & Collins, 2010; Kashdan, Volkmann, Breen, & Han, 2007; Thompson & Rapee, 2002; S. Turner, Beidel, & Larkin, 1986). For example, data indicate that the degree to which an individual becomes socially anxious depends upon characteristics of the interaction partners (e.g., Leary & Kowalski, 1990; Leary et al., 1994; S. Turner et al., 1986), as well as the size and composition of a social audience (e.g. Carron, Estabrooks, Horton, Prapavssis, & Hausenblas, 1999). There is also evidence that socially anxious individuals report less anxiety when feelings of security and cohesion are more prominent (Carron et al., 1999). However, with the exception of the research mentioned above, social context as a source of variance in state-level social anxiety has received little attention. Contextual determinants of social anxiety are an important topic of study, as increased knowledge of social
context could inform treatment recommendations and have implications for the
types of academic and work environments that may be selected by socially anxious
individuals. Psycho-evolutionary models (Buss, 1999), which couch social anxiety
processes in terms of their adaptive value in responding to specific features of our
ancestral environment, represent an ideal backdrop for the investigation of
potential person by environment interactions.

Social Anxiety as an Evolutionary Adaptation

Like other forms of anxiety, social anxiety is thought to have evolved to help
us pay attention to, appraise, and cope with potentially threatening (social) stimuli.
In psychobiological terms, social anxiety is thought to arise from the activation of
evolved mechanisms for dealing with intra-species (i.e., conspecific) threat, which
served a vital role in the evolution of social groups (Trower & Gilbert, 1989). For
eyear humans, survival was ensured through the formation and maintenance of
cohesive social groups. These groups provided protection from the elements and
predators, as well as a community of individuals on which to depend in times of
hardship (J. Turner, 2000; Williams, Forgas, & von Hippel, 2005). However, there
were also significant challenges to group living. One of the largest early challenges
to group cohesion was unchecked competition among members. Banding together
meant that resources such as food, materials, and mates were visible to the whole
group simultaneously, and these resources had to be acquired by individuals
through direct competition. Theorists have speculated that in a number of social
mammals, including humans, social hierarchies organized around dominance and
submission—often called agonic social systems (Chance 1980, 1984)—evolved to
“solve” the problem of excessive competition without undermining group cohesion (Price & Sloman, 1987). Social anxiety is thought to be a key adaptation that allows agonistic social systems to work (Trower & Gilbert, 1989). As Bernstein (1980) noted, “a dominance relationship between two individuals is inferred not because both ‘assert their dominance,’ but because one readily submits. If and only if the subordinate recognizes the relationship or predicts the outcome of an agonistic encounter by immediately showing submission, can we assume that a dominance relationship exists” (pp. 80-81).

According to psycho-evolutionary theory, social anxiety is more than a simple tendency to submit; it manifests within the context of a biologically-prepared agonistic mentality (Gilbert, 1989) that involves the tendency to perceive social groups as structured in terms of dominance and submission hierarchies, to selectively perceive and interpret cues in ways that are consistent with that structure, to focus on the self under threat as perceived through the eyes of others, and to take action to defend the self against potentially catastrophic loss of status in the hierarchy (Trower & Gilbert, 1989). Several lines of evidence are consistent with this thesis. Animal research has connected socially stressful positions in the social hierarchy (i.e., the lowest and highest positions) with alterations in the neurochemistry of anxious behavior and social vigilance (Sapolsky, 2005). Research with shy and socially anxious student populations demonstrates that social anxiety is associated with the tendency to rate others as more critical (e.g., Jones & Briggs, 1984; Leary, Kowalski & Campbell, 1988). Finally, individuals with social anxiety disorder are more likely to endorse negative interpretations of ambiguous social situations.
(Stopa & Clark, 2000) and exhibit more submissive behavior (e.g., Alden, Bieling, & Meleshko, 1995). Thus, individuals with high trait social anxiety tend to perceive the social world as threatening instead of safe and automatically recruit emotions, thoughts, and behaviors which support submission (e.g., thoughts about one’s unworthiness, avoidance of eye contact, desire for escape, appeasement of dominant others, etc.).

Social anxiety is connected to several features of agonic social structures. In agonic systems, control over and access to resources such as food and mates are determined by one’s placement on the dominance hierarchy, and the hierarchy is maintained through patterns of threatening displays and submissive behaviors (e.g., Washburn & Moore, 1980). Individuals keep a respectful distance from one another and arrange themselves around a single, dominant member so that they can quickly recognize and anticipate threat-invoking actions. Psychologically, group members are said to exist in a state of braked readiness (Chance, 1980, 1984), in which stress levels are high (Sapolsky, 2005) and submissive behavioral repertoires remain primed for quick deployment. Additionally, after being threatened or hurt, subordinate individuals attempt to re-approach the dominant individual in a non-threatening manner (Trower & Gilbert, 1989). Researchers speculate that early humans could not afford to flee, and to retain the survival benefits of group membership, it was necessary to renegotiate one’s relationship with the dominant via submissive signals. This tendency to move back towards a source of threat (i.e., the dominant member) has been called reverted escape (Chance, 1988; Trower & Gilbert, 1989) and is consistent with appeasement behaviors commonly seen in
individuals with social anxiety (De Waal, 1989; Sapolsky, 2005; Trower, Gilbert, & Sherling, 1990). Thus, in the agonic systems of our evolutionary past, it is thought to be the subordinate’s anxiety in relation to the dominant that ensured that fighting did not continually break out and the subordinate’s reverted escape behavior that ensured that members maintained a close and cohesive group. In the modern era, these mechanisms are thought to be chronically and inappropriately triggered among persons with social anxiety disorder (Oakman, Gifford, & Chlebowsky, 2003; Trower & Gilbert, 1989).

*An Alternative Social Structure: The Hedonic System*

Although much of modern human life mimics the agonic mode of our earliest ancestors, in which dominant individuals maintain power through threats and by withholding reinforcement, there was a considerable period of human evolutionary history during which agonic systems became less viable (Knauf et al., 1991) and were abandoned in favor of cooperative, affiliative, and radically egalitarian systems of social organization known as *hedonic systems* (Chance, 1980, 1984). Within this phylogenetically more recent mode of social organization, ritual agonistic behavior is not inhibited by submissive gestures, but rather by reassurance signals that encourage approach behavior (e.g., smiles, physical contact, greetings). Whereas the agonic system utilizes punishment, the hedonic mode depends on positive reinforcement. In studies of primate groups and modern-day hunter-gatherer groups, it has been observed that when hedonic signals operate, defensive (social) anxiety remains low (e.g., Sapolsky, Alberts, & Altmann, 1997; Tanaka, 1987; Wilkinson, 2006).
Many evolutionary theorists agree that, at a certain point in human evolution, selection began to favor hedonic patterns of relating that did not require social anxiety to function properly (Erdal, Whitten, Boehm, & Knauft, 1994). The fossil record demonstrates that for early humans, shifting weather and migratory patterns led to a significant decrease in the amount of available resources and a significant increase in the risk of predation (Kerr, 2008). Due to the increasingly sparse and impoverished resource environment, early humans were forced to abandon the group formation and fan out individually or in small subgroups to find food. Our hominid ancestors were solitary creatures compared to early humans, and theorists believe that the transition from continuous patterns of troop formation to dispersive patterns occurred with relative psychological ease (Kerr, 2008). However, this tendency to disperse likely increased the risks of predation and created a strong selection pressure for traits that would help drive individuals back together (i.e., the propensity to experience negative affect when separated from group members and desire for closeness and bonding; Pierce & White, 2006).

Indeed, hedonic social systems are characterized by a pattern of periodic “fission and fusion,” with celebratory reunion rituals (Reynolds, 1965, p. 695).

Another important likely consequence of this dispersion was that resources became less contestable; when group members fan out to participate in resource acquisition activities, dominant individuals can no longer easily control access to these resources (Power, 1988, 1991). Under these environmental conditions, subordinate individuals have little use for the submissive behaviors that kept them safe within agonistic social structures. Thus, over the course of evolutionary history,
dominance hierarchies that initially developed to control excessive competition over resources were disarmed in environmental contexts in which resources were less contestable (e.g., Washburn & Moore, 1980). There are several other environmental pressures that likely contributed to the emergence of hedonic social structures and inhibited the cognitive, affective, and behavioral mechanisms associated with agonic systems (e.g., cooperation requirements associated with food sharing, hunting, defending against hostile conspecific groups, shared child rearing, etc.); however, an examination of all of these forces is beyond the scope of this paper. For now, it is sufficient to say that the groups with strong affiliative ties and little need for competition, who cooperated and punished non-cooperators, were the groups that flourished and continued (Washburn & Moore, 1980).

Despite this apparent species-wide shift towards hedonic patterns, the psychological potential to form dominance hierarchies was not replaced or undone. Along with the advent of sedentary living arrangements, agriculture, and herding, all of which made resources concentrated and contestable once more, came a concomitant increase in the use of coercion and violence as a systematic means of organizational constraint (Eisler, 1987; Erdal et al., 1994; Knauft et al., 1991). The result of these developments was a shift away from hedonic structures and back towards agonic systems, eventually bringing about a fundamental shift in the predominant patterns of human relating.

It appears that at different times in our evolutionary history, human ancestors may have needed to alternate between agonic and hedonic social structures. As a result, modern humans may retain the psychological machinery to
operate in both systems, and indeed most people appear to switch back and forth between agonic and hedonic modes of interaction as the situation dictates (Trower & Gilbert, 1989). Evidence suggests that humans are highly attuned to cues in the exogenous and social environment (e.g., resource contestability; spatial arrangement of individuals) signaling that an agonic system is operating, and they adjust their own mode of operation accordingly (Pierce & White, 2006; Saxenian, 1994). Theorists have speculated that our ability to detect agonic signals may be better developed than our ability to detect hedonic signals, given that failing to notice agonic cues could quickly invite threats or actual violence. High levels of trait social anxiety may represent a stronger or additional bias towards agonic interpretations. According to Trower and Gilbert (1989), socially anxious individuals fail to recruit the hedonic mentality and remain locked in phylogenetically older patterns of agonic relating in which social interaction represents an opportunity to dominate or be dominated. However, this dichotomous conceptualization of social anxiety may be too stringent. As discussed above, even individuals with high trait social anxiety do not become equally anxious in all social situations. Thus, it is worth considering whether hedonic cues signaling social safety are capable of diminishing social anxiety by balancing or inhibiting the perception of agonic cues.

The Current Study

Three points from the above review served as the basis for the current study: (1) social anxiety represents an adaptation to agonic modes of social organization and is activated in response to agonic cues, (2) the more recently evolved hedonic
system is non-hierarchical and does not require submissiveness to function, and (3) the degree to which an individual will become anxious in a particular social situation depends on contextual factors. The current study aimed to integrate these findings and investigate whether interacting within a hedonic social system, as compared to an agonic system, diminishes activation of social anxiety. Although a great deal of descriptive research is consistent with the hypothesis that hedonic social systems do not beget social anxiety (e.g., Sapolsky et al., 1997; Tanaka, 1987; Wilkinson, 2006), these findings are inherently limited by an array of confounding factors (e.g., environmental self-selection, developmental and cultural factors, etc.), making it difficult to determine whether social structure meaningfully predicts the degree of state-level social anxiety. Thus, in the current study, we maintained a higher level of control by randomly assigning participants to play a group game within agonic or hedonic social structures.

**Primary Aims and Hypotheses.** As mentioned above, the primary aim of the current study was to investigate whether interacting within a hedonic social system, as compared to an agonic system, diminishes activation of social anxiety. First, we hypothesized a main effect in which the stable tendency to become socially anxious (trait social anxiety) would predict several state-level manifestations of social anxiety as a result of study participation: (1) anxious affect, (2) submissiveness, (3) ratings of social comparison, and (4) interpretations about the attractiveness of one's social behavior to others. Specifically, we hypothesized that as trait social anxiety increased, state-level anxious affect would increase, submissiveness would increase, ratings of oneself in comparison to others would decrease, and
interpretations about the attractiveness of one’s own social behavior would
decrease. We also predicted a main effect of experimental condition on the four
dependent variables listed above. Specifically, we hypothesized that the agonic
condition would be associated with higher levels of anxious affect, higher
submissiveness, low social comparison ratings relative to others, and less attractive
self-reported social behavior.

We also hypothesized an interaction between trait social anxiety and social
structure, which if demonstrated, would qualify the main effects described above.
We expected that experimental condition would moderate the degree to which trait
social anxiety predicted state-level manifestations of social anxiety within the
experiment—specifically, that agonic social structure would intensify the effect of
trait social anxiety on the dependent variables (state-level anxiety, submissiveness,
social comparison, and self-reported social behavior) and hedonic social structure
would blunt this effect.

**Exploratory Aims and Hypotheses.** Of secondary interest was whether
gender moderates the main effect of experimental condition on the four dependent
variables described above. There is some indication from the literature that female
patterns of interaction tend to be more hedonic than male patterns (e.g., Maner,
Miller, Schmidt, & Eckel, 2008). We speculated that the hedonic manipulation would
be less powerful among females if hedonic patterns of relating were considered
normative. Likewise, the effect of the agonic manipulation would be blunted among
females if the contextual cues were not powerful enough to disarm normative
patterns of relating. Hence, we examined whether experimentally manipulated
social structure had a smaller effect on the dependent variables (i.e., state-level social anxiety, submissiveness, social comparison, and social behavior) for females than males.
CHAPTER 2

METHODS

Participants

Undergraduate students in psychology and business classes were invited to complete the study as one option to fulfill their course requirements. Students participated in groups of three. In reality, data were collected from only one group member—the other members of each group were undergraduate confederates trained to behave in a manner consistent with the specific environmental manipulation. The decision to use confederates instead of multi-participant groups was made to prevent attendance problems from interfering with study recruitment and to protect against unintended inter-group differences (e.g., a group solely comprised of highly dominant individuals). To minimize the chance that confederate characteristics could exert an unmeasured effect, every effort was made to balance confederate participation across the two conditions.

Additionally, given the age of participants and the short amount of time available for study participation, there was a concern that mixed-sex groups may introduce the potential for dyadic mating-directed behaviors (see Buss, 1999, for a review of the evolutionary foundations of mating behavior). Because the intent of our study was to observe the effects of social structure and not the effects of sex or mating behavior, groups were comprised of all heterosexual males or all heterosexual females. To ensure that sex was not confounded with experimental condition, an equivalent proportion of male and female participants was balanced across conditions and levels of social anxiety (for a description of how we
operationalized levels of social anxiety, see the description of the Social Interaction Anxiety Scale in the Materials section).

To participate, students were required to be fluent in English. Additionally, students who reported severe symptoms of depression were excluded (see the description of the Beck Depression Inventory II in the Materials section for a discussion of the rationale behind this decision). Participants who completed the study received course credit and were entered into a drawing for a $100 Visa® gift card.

Materials

Screening and Measurement of Predictor Variables.

Social Interaction Anxiety Scale (SIAS). The SIAS (Mattick & Clarke, 1998) is a scale designed to measure anxiety regarding dyadic and group social interactions. This measure was chosen over other measures of social anxiety (i.e., measures assessing performance fears or fears of negative evaluation) because its focus on patterns of interpersonal relating is particularly relevant to the construct of agonic and hedonic systems. The SIAS contains 20 Likert-type items rated from 0 (not at all characteristic of me) to 4 (extremely characteristic of me). An example item is “I become tense if I have to talk about myself or my feelings.” The SIAS has been widely used in the assessment of social anxiety and shows good reliability (e.g., αs > .87, re-test coefficients > .90; Mattick & Clarke, 1998) and validity in a number of studies (e.g., Brown et al., 1997; Rodebaugh, Woods, Heimberg, Liebowitz, & Schneier, 2006; Safren, Turk, & Heimberg, 1998). The SIAS was administered as part of an online screener prior to study participation to ensure that trait social anxiety
was balanced across experimental conditions. Responses obtained through previous administrations of the SIAS in a large sample of Temple undergraduates were used to approximate quintiles (20th percentile) representative of our target population. Twenty participants with SIAS scores in each of these pre-established quintile ranges were recruited to participate in the study, for a total of 100 participants. Because priming participants to think about their social anxiety may have influenced the emergence of agonic and hedonic social structures, the SIAS was not re-administered on the day of the study. Reliability in the current sample was good (α = .89).

*Beck Depression Inventory, 2nd edition (BDI-II).* The BDI-II (Beck, Steer, & Brown, 1996) is a 21-item scale designed to measure the cognitive, affective, and somatic symptoms of depression. For each item, respondents choose from four statements the one that best describes how they have been feeling during the past two weeks; for example, the item measuring pessimism contains the following statements: “1) I am not discouraged about my future, 2) I feel more discouraged about my future than I used to be, 3) I do not expect things to work out for me, and 4) I feel my future is hopeless and will only get worse.” The scale demonstrates high internal consistency among college students and outpatients (e.g., αs > .92), as well as good convergent and discriminant validity (Beck, Steer, Ball, & Ranieri, 1996). The BDI-II was administered online prior to study participation, and inclusion in the study was contingent upon receiving a BDI-II score ≤ 27 (Sloan et al., 2002). This allowed participants who were highly socially anxious to have moderate symptoms of depression, while increasing the probability that our findings were a function of
social anxiety rather than depression. The BDI-II was administered again after study completion to ensure that participants still met inclusion criteria. Data from participants who scored ≥27 on the day of the study were excluded from analyses. Reliability in the current sample was excellent (α = .91).

**Measurement of Dependent Variables.**

**Brief State Anxiety Measure (BSAM).** The BSAM (Berg, Shapiro, Chambless & Ahrens, 1998) is a 6-item version of the State-Trait Anxiety Inventory (Spielberger et al., 1983) and was used in the current study as an index of state-level activation of social anxiety. Respondents were asked to rate each item on a four-point, Likert-type scale ranging from 1 (Not at all) to 4 (Very much so). An example item is “I feel strained.” The BSAM is highly correlated with the full measure (r = .93) and displays good internal consistency (αs = .83-.87; Berg et al., 1998; Rodebaugh, Jakatdar, Rosenberg, & Heimberg, 2009). In order to obtain a reliable and valid estimation (Iida, Shrout, Laurenceau, & Bolger, 2012) of participants’ overall state-level anxiety, the BSAM was administered 5 times over the course of the study. Excluding the first administration (which took place prior to the experimental procedure), BSAM scores were then averaged to create a variable representing each participant’s average anxiety outcome. Other dependent measures, which focused explicitly on social processes, were not administered until the end of the study in order to avoid affecting participants’ perceptions and behavior via conceptual priming (Jacoby, 1983).

The BSAM was chosen over the full measure in order to minimize disruption to study procedures. Although the BSAM does not comprehensively capture the
evolutionary construct of social anxiety (i.e., does not measure agonic cognitions or submissive behavior), we were concerned that drawing specific attention to these phenomena might affect emergent social structures in an unintended manner. To further mask our interest in anxiety, the BSAM was accompanied by several distracter items (see Appendix A for a complete list of distracter items appended to the BSAM). Reliability in the current sample was good (α ranged from .73 to .87).

**Social Comparison Scale (SCS).** The SCS (Allan & Gilbert, 1995) is an 11-item self-report measure that assesses social comparison tendencies (i.e., tendencies to compare oneself to others), with lower SCS scores reflecting lower social self-rankings. The SCS total score has demonstrated excellent internal consistency in both undergraduate and clinical samples (both αs > .88; Allan & Gilbert, 1995). Consistent with theoretical models of social comparison, negative correlations have been reported between scores on the SCS and various self-report indices of psychopathology (indicating that lower social self-rankings are associated with increased psychopathological symptoms), and clinical samples obtain lower social comparison scores than undergraduates (Allan & Gilbert, 1995). The instructions were modified for the purposes of the current study, specifying that respondents rate how they compared to other group members from the study. Reliability in the current sample was good (α = .89).

**Submissive Behavior Scale - Adapted (SBS).** The SBS (Allan & Gilbert, 1997) is a 16-item self-report measure that assesses involuntary submissive behaviors. Participants rate each item on a 5-point Likert-type scale to indicate whether the statement is *Never, Rarely, Sometimes, Mostly,* or *Always* true for them. Derived from
an earlier list developed by Buss and Craik (1986), the SBS is designed to explore
the relationship of evolved mental mechanisms of social rank to psychopathology
and psychobiological features. The SBS has demonstrated adequate internal
consistency in clinical and non-anxious samples and correlates highly with clinician-
administered (Schneier, Heimberg, Belzer, & Liebowitz, 2007) and self-report
measures (Zimmerman, Morrison & Heimberg, 2015) of social anxiety. For the
purposes of this study, the instructions and items were modified to measure
submissive behavior specific to the experimental context. Additionally, because
several items on the SBS refer to situations that may or may not have occurred
within the context of the study, the instructions and items were modified to ask
participants to imagine how much each statement might have been true for them
during the study, regardless of whether or not the situation actually arose (e.g., the
item I say ‘thank you’ enthusiastically and repeatedly when someone does a small
favor for me became I would have said ‘thank you’ enthusiastically and repeatedly if
someone did a small favor for me). Reliability in the current sample was good (α = .79).

Behavior Checklist. The Behavior Checklist (Stopa & Clark, 1993) is a 23-
item checklist for assessing social behavior, designed for use as both a self-report
and other-report instrument. The checklist, which was originally developed by
Lewinsohn, Mischel, Chaplin, and Barton (1980) to measure positive self-illusions in
relation to depression, was adapted by social anxiety researchers studying self-
versus other-perceptions of social behavior (e.g., Stopa & Clark, 1993; Hirsch,
Matthews, Clark, Williams, & Morrison, 2006; Mansell & Clark, 1999). One of the
central concerns among persons experiencing social anxiety is that they are exhibiting negative social behavior that will elicit negative judgments from others. In the current study, participants completed the self-report version of the behavior checklist and rated their social behavior on 16 positive dimensions (friendly, confident, relaxed, assertive, attractive, liked, warm, answered questions easily, humorous, self-assured, understandable, asked interesting questions, pleasant, socially skilled, fluent, and competent) and 7 negative dimensions (nervous, blushing, hands shaking, embarrassed, left long gaps in the conversation, awkward, and uncomfortable) on a scale from 0-8 (“not characteristic at all” to “extremely characteristic”). Positive items are reverse scored, and total scores are computed by summing the items; hence, lower scores indicate better self-perceived performance. In previous studies, the behavior checklist has demonstrated high internal consistency (Hirsch et al., 2006; Mansell & Clark, 1999). Reliability in the current sample was good (α = .77).

Procedure

Screening and Randomization. Undergraduate students enrolled in psychology and business courses were invited to complete an online screener comprised of a demographic questionnaire, the SIAS, and the BDI-II. Participants meeting the eligibility criteria (i.e., heterosexual orientation, BDI-II scores < 27, SIAS scores in one of the pre-established quintiles) were invited by email to participate in the study.

Study Procedure. Upon arriving in the lab, students were told that the study required them to participate “as a group” with two other student participants. The
confederates serving as the other two group members were already present and “in character.” The experimenter then reviewed the consent form and explained the study requirements.

The experimental procedure for group members in both conditions (agonic and hedonic) was a quiz game. The rules and incentive structure of the game were designed to be consistent with universal human goals related to maximizing personal resources while maintaining inclusion within important social groups. In the current study, “personal resources” took the form of raffle tickets, which were entered into a drawing for a $100 gift card. Group members were told that their performance would determine how many raffle tickets they earned. We assert that participants had adequate motivation to remain within the group structure, as any opportunity to win the raffle would be lost if they discontinued. Indeed, there was no evidence to suggest that participants were under-motivated to perform well during the quiz game. To eliminate the possibility that participants’ knowledge and skill playing trivia games might artificially influence the development of the group’s social structure (i.e., they would direct it from a position of expert power), the game was designed in such a way that it was impossible to know with certainty how one was performing. The “stories” surrounding the game and rules of play were manipulated to make them consistent with agonic and hedonic social structures. For example, in the agonic condition, resources were concentrated and contestable, whereas in the hedonic condition, group members “foraged” for their own resources. Additionally, the game included “surprise attack rounds,” which required group members to defend against an external threat in a manner consistent with the
social and environmental context of their social system. For example, in the agonic condition, rules of the game dictated that group members look to a dominant group leader for protection, whereas in the hedonic condition, group members cooperated and flexibly adopted multiple situational leaders. For a comprehensive description of study procedures, and a script for the experimenter and confederates, please refer to Appendix B.

**Creating Agonic and Hedonic Social Structures.** To our knowledge, only one study (Pierce & White, 2006) has attempted to experimentally manipulate human agonic/hedonic social structures in groups of human participants. Although their study focused on the ability of different resource contexts (i.e., contestable or non-contestable) to trigger agonic versus hedonic social systems and did not examine social anxiety, their results demonstrate that agonic- or hedonic-type social systems can be reliably elicited in the laboratory. Additionally, whereas agonic- and hedonic-type structures arise spontaneously in response to the surrounding resource context, the authors acknowledged that structural and cultural elements are also important in forming and maintaining these structures. In other words, agonic and hedonic social structures can be considered both emergent and designed; the patterns of agonic and hedonic relating are not dependent upon criteria imposed by a central authority, but they can be affected and consciously considered through the creation of institutionalized rules or codes (Pierce & White, 2006). Thus, the current study sought to elicit agonic and hedonic social structures by manipulating a more comprehensive set of design features (i.e. environmental, interpersonal, and institutional). The design features we manipulated were those
originally described by Chance (1980, p. 90) as the central differences between agonic and hedonic systems. These features include: (1) social cohesion, (2) arrangement of individuals, (3) individual attention, (4) presence of a central figure, (5) response to external threat, (6) social interaction, (7) relationships, and (8) arousal due to social stressors. Each design feature and its operationalization within the study will be described in turn. Because any one aspect of the study may be integral to the operationalization of more than one design feature, some features are described jointly in order to ease reader burden and reduce redundancy. For an abbreviated description of how each design feature was operationalized in the current study, please refer to Table 1.

**Social Cohesion and Arrangement of Individuals.** In naturally occurring agonic systems, group members are spatially separated (respectful distance) but maintain a clustered, single troop formation. In hedonic systems, members do not need to be in constant view of each other; they split off as individuals or in small groups to forage for resources but demonstrate an affinity for closeness and affiliation when they return together (i.e., fission/fusion). Within the current study, agonic group members remained close together but spatially separated (i.e., maintaining respectful distance) as they competed for a single supply of raffle tickets. Hedonic group members turned their backs to one another while playing individual games (i.e., foraging for their own resources) but came close together when cooperation was required (i.e., surprise attack rounds) or to socialize during breaks. In both agonic and hedonic conditions, the spatial position of each group
member was controlled by chair placement within the experimental space and by experimenter instruction.

**Individual Attention.** In the agonic systems, group members’ attention is focused upon the dominant members. In hedonic systems, group members direct their attention more flexibly and typically focus on the physical environment. Within the current study, participants in the agonic condition competed directly for resources, which required facing and attending to the actions of other group members. Participants in the hedonic condition did not directly compete for resources and directed their attention to individual games.

**Presence of a Central Figure and Response to External Threat.** Regarding the presence of a central figure, in agonic systems there is a singular dominant leader, whereas in hedonic systems, leadership is not permanent and is determined according to the situation. Regarding response to external threat, in agonic systems, the group clusters and looks to the dominant member for protection, whereas in hedonic systems, a dynamic of encouragement and “group bolstering” is observed, and individuals respond as needed.

In the current study, agonic groups had an established leader. Leadership was ostensibly determined based on who demonstrated the best performance during two practice rounds. In reality, the game was rigged so that one of the confederates was always the leader. In addition to being recognized as superior, the leader derived power from two institutionalized procedures. First, as part of his or her role during surprise attacks, the leader was asked to defend group resources by answering a series of quickly presented questions and trying to beat a threshold
score. We operationalized success as beating a threshold score in an effort to mimic the types of non-organized, non-human (predatory) threats encountered by agonic groups. If the leader was successful at beating the threshold score, the group members retained their raffle tickets and the leader received bonus tickets; if the leader was not successful, all group members lost tickets and another group member was required to “step up” and try to beat the score. Although participants were told that they might be required to step up and become the new leader, the game was rigged so that the confederate leader always won and remained “in power.” Additionally, group members were told that, at the end of the game, the leader had the power to distribute extra raffle tickets to the person he or she judged to be most “deserving.” The purpose of this extra power was to motivate members in the agonic condition to make a good impression on the leader.

In the hedonic condition, there was no mention of leaders. During surprise attack rounds, members competed in the same fast-question round; however, the nature of the threat and the group response was manipulated to be consistent with hedonic systems. Here, group members were required to defend their resources from an organized human threat (another group of students participating in the same study) and endorse situational “leaders” to do so. These hedonic leaders did not enjoy any permanent status but were chosen on a question-by-question basis depending on the level of domain-specific expertise and confidence. Hedonic groups won or lost as a team; that is, the raffle ticket “stakes” were equivalent for all members. To heighten hedonic group members’ sense that they were competing
against another group of cooperating individuals, groups chose a team name and were told the name of the group they were competing against.

**Social Interaction.** In agonic systems, the pattern of social interaction is “fight or submit.” In hedonic systems, the pattern is “tend and befriend,” in which approach behavior is reinforced by sending reassurance signals. In the current study, agonic group members were in direct competition for resources (i.e., fight). When two members arrived at the answer submission box at the same time, one person had to allow the other to give their answer first (i.e., submit) as the boxes were only large enough to accept one form at a time. Confederates in the agonic condition were instructed to approach the box at the same time as the participant, but were not instructed whether to “fight” or “submit;” confederates were encouraged to “act the way [they] normally would in a competitive situation.” Another opportunity in the agonic condition for a “fight or submit” interaction was introduced during break-time—participants were provided with a basket containing three different snacks (e.g., a bag of cookies, a bag of crackers, and a bag of chips), which could be selected on a “first come, first served” basis. In the hedonic condition, resources were foraged for individually and all snacks in the snack basket were the same; thus, there was no need for fighting or submitting.

**Relationships.** Relationships in agonic social systems are hierarchical and take the form of a pecking order. Hedonic systems are egalitarian (i.e., networks of individuals); sharing is expected and vigilantly policed, and those who try to exert dominance over others are reprimanded. In the current study, we attempted to achieve these relationship dynamics by manipulating the game’s incentive structure.
In agonic groups, members received raffle tickets commensurate with their performance-based ranking. Furthermore, the leader held additional power to give a “bonus” to the member he or she saw as being more deserving, thus creating an implicit rank-order among all three members. In the hedonic condition, members did not enjoy any special status aside from situational prominence (e.g., the ability demonstrated to others in the form of social skills, performance during surprise attacks, etc.). During surprise attacks, hedonic members were explicitly instructed to cooperate. Additionally, we attempted to support a “culture of counter-dominance” by informing hedonic participants that they would have an opportunity at the end of the study to indicate whether any individual acted too bossy or domineering and that anyone “tagged” by two group members would lose a portion of their raffle tickets.

**Arousal/Social Stressors.** Because of the ever-present possibility of aggression from within, members of agonic groups remain in a state of high arousal (“braked readiness”). In hedonic systems, there is little conflict within the group, and arousal fluctuates more normally because members are not in a constant state of anxiety. The study was designed to elicit higher states of arousal among agonic group members, who were required to continually compete for raffle tickets and navigate the social hierarchy (anticipate shifts in leadership and try to keep in the “good graces” of all potential leaders) and lower states of arousal among hedonic group members, who were engaged in a non-competitive, cooperative, and reassurance-based social structure.
Table 1

Operationalization of Agonic and Hedonic Social Structures

<table>
<thead>
<tr>
<th>Feature</th>
<th>Agonic</th>
<th>Hedonic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social cohesion</td>
<td>Continuous (single troop)</td>
<td>Periodic (fission/fusion)</td>
</tr>
<tr>
<td></td>
<td>Members stay together to compete for a single supply of raffle tickets</td>
<td>Members &quot;forage&quot; separately for raffle tickets, but breaks are taken together</td>
</tr>
<tr>
<td>Arrangement of individuals when</td>
<td>Spatially separated (respectful distance)</td>
<td>Close contact</td>
</tr>
<tr>
<td>together</td>
<td>Members sit in seats arranged 3 feet apart at all times</td>
<td>During breaks members sit together on a sofa; during surprise attack rounds, they cluster together in a central location</td>
</tr>
<tr>
<td>Individual attention</td>
<td>Directed to others within group</td>
<td>Directed at physical environment</td>
</tr>
<tr>
<td></td>
<td>Members face each other and must respond to others’ behavior in order to compete</td>
<td>Members do not compete for raffle tickets, and attend to individual games</td>
</tr>
<tr>
<td>Presence of a central figure</td>
<td>Single dominant leader</td>
<td>Multiple situational leaders</td>
</tr>
<tr>
<td></td>
<td>Leadership is institutionalized; members must count on the leader to defend group resources against surprise attacks; members attempt to impress the leader in order to receive an end-of-study bonus</td>
<td>No formal leaders are recognized; situational &quot;leaders&quot; may emerge based on ability and expertise during surprise attacks.</td>
</tr>
<tr>
<td>Response to external threat</td>
<td>Group clusters; looks to dominant individual for protection</td>
<td>Group bolstering; individual response as needed</td>
</tr>
<tr>
<td></td>
<td>During surprise attacks, the leader defends the group's supply of raffle tickets alone</td>
<td>During surprise attacks, members brainstorm and select the individual with the best answer</td>
</tr>
<tr>
<td>Social interaction</td>
<td>Fight or submit</td>
<td>Tend and befriend</td>
</tr>
<tr>
<td></td>
<td>Direct competition for raffle tickets; if two members wish to answer at the same time, one will be forced to submit</td>
<td>No direct competition; members are free to share tips and strategies</td>
</tr>
<tr>
<td>Relationships</td>
<td>Hierarchical (pecking order)</td>
<td>Egalitarian (network of individuals)</td>
</tr>
<tr>
<td></td>
<td>Members receive a quantity of raffle tickets commensurate with their ranking within the group; during surprise attacks all losses are shared equally, but only the leader is eligible for a bonus</td>
<td>Members receive raffle tickets commensurate with their individual performance; during surprise attacks, all group members are affected equally</td>
</tr>
<tr>
<td></td>
<td>In order increase the chance of earning the leader's 3-ticket bonus, members are motivated to appear &quot;more deserving&quot; (higher ranking) than the other group subordinate member</td>
<td>Members are punished (lose 3 raffle tickets) if they attempt to establish dominance over other members during surprise attacks</td>
</tr>
<tr>
<td>Arousal due to social stressors</td>
<td>Frequent (medium-high)</td>
<td>Infrequent (low-medium)</td>
</tr>
<tr>
<td></td>
<td>Continuous competition</td>
<td>No direct competition, except for prominence during surprise attacks</td>
</tr>
</tbody>
</table>
**Debriefing.** After participants completed the last set of questionnaires, the experimenter provided a debriefing about some aspects of the study. To prevent potential future participants from learning sensitive information about the study’s true structure and aims (e.g., use of confederates, examination of social anxiety, and examination of hierarchical versus egalitarian structures), study participants were told that the purpose of the study was to examine how people reach their goals within a social context. Once recruitment for the proposed study was complete, an email was sent to each participant containing a full disclosure about the methods and purpose of the study.

**Aims and Analyses**

**Hypotheses**

The primary aim of the current study was to investigate whether interacting within a hedonic social system, as compared to an agonic system, diminished activation of social anxiety. There were three corresponding hypotheses, summarized below.

1. *Trait social anxiety would predict several state-level manifestations of social anxiety (i.e. higher anxious affect, higher submissiveness, lower social behavior ratings, and lower ratings of social comparison) as a result of study participation.*

2. *Participants in the agonic condition would display higher anxious affect, higher submissiveness, lower social behavior ratings, and lower ratings of social comparison as a result of study participation.*
3. The two effects hypothesized above would be qualified by an interaction between trait social anxiety and experimental condition. Specifically, experimental condition would moderate the degree to which social anxiety predicts state-level manifestations of social anxiety. Agonic social structure was expected to intensify the effect of trait social anxiety on the dependent variables (anxious affect, submissiveness, social behavior ratings, and social comparison) and hedonic social structure was expected to blunt this effect.

Of secondary interest was whether gender moderated the main effect of experimental condition on the four dependent variables described above. Our fourth (exploratory) hypothesis was that:

4. Experimental condition (i.e., social structure) would have a reduced effect on anxious arousal, submissiveness, social behavior, and social comparison among females (i.e. there would be a smaller cross-condition difference among females compared to males).

Data Management and Statistical Analyses

Data Management. Prior to data analysis, data were inspected to ensure satisfaction of statistical assumptions for multiple linear regression.

Statistical Analyses. Preliminarily, bivariate correlational and chi square analyses were conducted to check for the potential confounds of age, sex, and race with any of the predictor or outcome variables. Hierarchical linear regression was used to analyze the primary and exploratory aims. Predictors were entered in Step 1, and the hypothesized two-way interaction terms were entered in Step 2. The sole continuous predictor variable, SIAS score, was centered on its grand mean. No
three-way interactions were probed as none were hypothesized. Because each
dependent variable represents a unique construct within the larger domain of social
anxiety, the effects of various predictors on state-level social anxiety,
submissiveness, social comparison, and social behavior were evaluated within
separate regression analyses.

Predictors in the primary linear regression analyses consisted of trait social
anxiety (i.e., SIAS score) and experimental condition (i.e., agonic or hedonic
randomization), and dependent variables were state-level social anxiety (i.e.,
average of post-baseline BSAM scores), submissiveness (i.e., SBS score), social
comparison (i.e., SCS score), and social behavior (i.e., behavior checklist score).
Predictors in the exploratory analyses, examining whether manipulated social
structure exerts weaker effects among females, consisted of dichotomous variables
representing experimental condition (i.e., agonic, hedonic) and sex (i.e., male,
female), and dependent variables were state-level social anxiety, submissiveness,
social comparison, and social behavior.

Missing data for the primary outcome variables were imputed based on the
average score given on the other items of that measure, or the appropriate subscale.
In the current study, only nine missing values were imputed this way, with no more
than two imputations per participant.

**Power Analysis and Sample Size**

If predictors were measured without error, then the sample sizes required to
detect interactions at $\alpha = .05$ and .80 power would be 36 for a large effect size, 77 for
a moderate effect size, and 550 for a small effect size (Cohen et al., 2003). Although
no studies to date have examined the interaction of trait social anxiety and social structure on the prediction of state-level anxiety, submissiveness, social comparison, and social behavior, studies examining environmental determinants of self-presentational anxiety within athletic contexts typically show moderate effects (e.g. Carron et al., 1999; Spink, 1992). For the current study, a sample size of 100 was selected in an attempt to balance the chances of Type II error with available time and resources. Twenty participants were recruited from each SIAS quintile, but data from only 97 participants were retained for analyses. Two participants were excluded because their BDI scores on the day of the study were 28 or above. A third participant was excluded because she exhibited bizarre, paranoid behavior on the day of the experiment. Additionally, the validity of her self-report data is questionable as she was observed circling items quickly without reading the instructions or prompts.
CHAPTER 3

RESULTS

Preliminary Analyses

The assumptions for multiple linear regression were upheld. According to Kolmogorov-Smirnov and Shapiro-Wilk tests and visual inspection of variable histograms, continuous variables were normally distributed. The assumptions of linear relationships between independent and dependent variables, and homoscedasticity for all variables, were confirmed by examining scatter plots and partial regression plots; thus, no transformations were performed. Additionally, Cook’s D, Leverage, and DFBETA analyses identified a few potentially influential cases; however, there was no “procedural integrity” rationale for excluding these participants from analyses. Finally, there were no significant relationships between predictors tested in the same regression analysis, confirming the assumption of no multicollinearity.

Bivariate correlational analyses indicated that age was not significantly correlated with any continuous predictor or outcome variable at the $p < .05$ level ($r$ ranged from -.195 to .056). Chi square analyses revealed that sex, white race, and black race were all unrelated to predictor and outcome variables, and that study condition was not related to trait social anxiety ($ps$ ranged from .180 to .963). Racial and ethnic groups other than black and white were not analyzed because of the low frequency of occurrence in the sample (cell size < 10). Table 2 summarizes participant demographic and baseline characteristics.
Primary Findings

The relationships between each predictor (level of trait social anxiety and experimental condition) and each social anxiety-related outcome variable (anxious affect, submissiveness, social comparison, and self-reported social behavior ratings) were analyzed using linear regression. Recall our three hypotheses: that as a result of study participation (1) trait social anxiety would predict higher anxious affect, higher submissiveness, lower social behavior ratings, and lower ratings of social comparison, (2) participants in the agonic condition would display higher anxious affect, higher submissiveness, lower social behavior ratings, and lower ratings of social comparison, and (3) the first two hypotheses would be qualified by an interaction between trait social anxiety and experimental condition in which agonic social structures intensify the effect of trait anxiety on the outcome variables and hedonic social structure blunts this effect. Results pertaining to each outcome variable are summarized in Tables 3-6, and each will be discussed in turn.

Anxious Affect. Counter to expectations, trait social anxiety did not significantly predict level of anxious affect, as indexed by the average of four BSAM
scores collected at various time points throughout the study. Consistent with the predicted effects of social structure, participants in the agonic condition showed significantly higher levels of anxious affect. The interaction between trait social anxiety and experimental condition was non-significant, suggesting that social structure did not moderate the relationship between trait social anxiety and state-level anxious affect.

Table 3

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trait social anxiety (centered)</td>
<td>0.026</td>
<td>0.033</td>
<td>0.112</td>
<td>0.430</td>
</tr>
<tr>
<td>Social structure</td>
<td>-1.492</td>
<td>0.568</td>
<td>-0.253</td>
<td>0.010</td>
</tr>
<tr>
<td>Trait social anxiety x social structure</td>
<td>0.055</td>
<td>0.045</td>
<td>0.173</td>
<td>0.224</td>
</tr>
</tbody>
</table>

Behavioral Submissiveness. As expected, participants with higher levels of trait social anxiety reported significantly higher levels of behavioral submissiveness as indexed by their scores on the SBS. However, neither condition nor the interaction between condition and trait social anxiety predicted submissive behavior during the study.

Table 4

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trait social anxiety (centered)</td>
<td>0.356</td>
<td>0.085</td>
<td>0.578</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Social structure</td>
<td>-0.833</td>
<td>1.437</td>
<td>-0.054</td>
<td>0.564</td>
</tr>
<tr>
<td>Trait social anxiety x social structure</td>
<td>-0.146</td>
<td>.115</td>
<td>-0.175</td>
<td>0.207</td>
</tr>
</tbody>
</table>
Social Comparison. Counter to expectations, neither trait social anxiety nor experimental condition significantly predicted participants’ tendency to view themselves more positively or negatively than other group members, as indexed by the SCS. The interaction between trait social anxiety and experimental condition also failed to predict social comparison scores.

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trait social anxiety</td>
<td>-0.050</td>
<td>0.153</td>
<td>-0.049</td>
<td>0.747</td>
</tr>
<tr>
<td>Social structure</td>
<td>0.171</td>
<td>2.667</td>
<td>0.007</td>
<td>0.949</td>
</tr>
<tr>
<td>Trait social anxiety x social structure</td>
<td>-0.175</td>
<td>0.210</td>
<td>-0.127</td>
<td>0.406</td>
</tr>
</tbody>
</table>

Social Behavior. Counter to expectations, trait social anxiety did not significantly predict participants’ estimations of their social behavior. Additionally, neither experimental condition nor the interaction between trait social anxiety and condition predicted self-reported social behavior during the study.

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trait social anxiety</td>
<td>-0.417</td>
<td>0.267</td>
<td>-0.224</td>
<td>0.121</td>
</tr>
<tr>
<td>Social structure</td>
<td>1.478</td>
<td>4.609</td>
<td>0.031</td>
<td>0.749</td>
</tr>
<tr>
<td>Trait social anxiety x social structure</td>
<td>-0.367</td>
<td>0.366</td>
<td>-0.144</td>
<td>0.318</td>
</tr>
</tbody>
</table>
Exploratory Findings

Because there is some suggestion in the literature that females naturally display more hedonic patterns of relating, exploratory analyses were conducted to determine whether sex moderated the effect of experimental condition on the various social anxiety-related outcomes. Sex did not moderate the relationship between experimental condition and any of the social-anxiety outcome variables (anxious affect, behavioral submissiveness, social comparison, or social behavior). Results of the exploratory analyses are summarized in Table 7.

Table 7

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxious affect</td>
<td>.077</td>
<td>1.337</td>
<td>.013</td>
<td>.954</td>
</tr>
<tr>
<td>Behavioral Submissiveness</td>
<td>3.439</td>
<td>3.793</td>
<td>.217</td>
<td>.367</td>
</tr>
<tr>
<td>Social Comparison</td>
<td>-6.543</td>
<td>6.114</td>
<td>-2.47</td>
<td>.287</td>
</tr>
<tr>
<td>Social Behavior</td>
<td>-8.568</td>
<td>11.020</td>
<td>-.177</td>
<td>.439</td>
</tr>
</tbody>
</table>
CHAPTER 4
DISCUSSION

Like other forms of anxiety, social anxiety is thought to have evolved to help us pay attention to, assess, and respond to potential (in this case, intra-species) threats. The current study was based on (1) the theoretical proposition that social anxiety represents an adaptation to hierarchical, or agonic, modes of social organization; (2) the observation that in the non-hierarchical hedonic systems seen in some of our closest primate relatives, submissiveness is not required for group functioning, and (3) more recent empirical data showing that social anxiety symptoms are dependent on contextual factors. The current study integrated these three ideas and examined whether participating in a hedonic system, as compared to an agonic system, diminishes social anxiety, particularly in those with higher levels of trait anxiety. To do so, we randomly assigned participants to play a group game, the context and rules of which were consistent with either agonic or hedonic social structures; we then measured self-reported anxiety and behaviors associated with social anxiety. Results from the experiment were mixed, sometimes seemingly conflicting, and therefore difficult to interpret.

Based on the fact that the experimental procedure involved interacting with a group of strangers, we first hypothesized that higher trait social anxiety would be associated with higher self-reported state-level anxiety, higher self-reported submissiveness, lower self-reported social comparison, and less attractive self-reported social behavior during the study. In other words, we believed both conditions would, to differing degrees, activate patterns of affect and behavior related to trait social anxiety. This hypothesis was mostly unsupported by the data; although trait social anxiety was
related to self-reported submissive behavior, it was not related to anxious affect, social comparison, or self-perceived social behavior, across both conditions. Based on this pattern of mostly negative findings, we must consider the possibility that the social situations within the current study were not stressful enough to produce marked anxiety responses of the sort that would be captured by our measures.

Another potential explanation stems from the fact that the main effects of trait social anxiety on state-level anxious affect, submissive behavior, social comparison, and social behavior were actually conditional effects, as our regression analyses included an interaction term (trait social anxiety x condition). If the current study was underpowered or the experimental effect was relatively weak—a possibility explored below, the presence of an interaction term in the model may have interfered with our ability to see the true effect of trait social anxiety on the dependent variables (Jaccard & Turrisi, 2003). And indeed, in step one of the regression analysis when the interaction term was not present, the effect of trait social anxiety on all dependent variables except social comparison rose to the level of significance.

The second and most novel hypothesis in the current study was that state-level anxiety and other social anxiety-related behaviors would be intensified in the agonic social condition and blunted in the hedonic condition. And indeed, anxious affect was higher among participants immersed in the agonic social system than those in the hedonic system. This finding is consistent with the evolutionary view of state-level social anxiety as an adaptation (albeit uncomfortable) to hierarchical social systems, activated by cues that an agonic system is functioning.
However, according to psycho-evolutionary theory, anxious affect should accompany thoughts and behaviors that encourage and communicate submissiveness and inhibit competition. Thus, it is notable that the other three variables of interest—self-reported submissive behavior, self-reported social comparison, and self-reported social behavior—did not show differences based on the experimental condition. We can see two ways to explain this discrepancy—the first assumes that agonic and hedonic systems were successfully constructed in the current study, whereas the second questions this assumption. Two pieces of evidence support the assumption that the study produced agonic and hedonic social conditions. First are the findings from Pierce and White (2006) indicating that agonic- and hedonic-like systems can be elicited in groups of human participants by manipulating resource context. Second is our own finding that state anxiety was higher in the agonic condition compared to the hedonic condition, which is consistent with the state of braked readiness observed in agonic systems. However, our methods do not precisely replicate those of Pierce and White (2006), and our groups included confederates; therefore, we must also consider the possibility that agonic and hedonic systems did not emerge in the current study. We will consider both interpretations in turn.

Assuming the experimental manipulation successfully created agonic and hedonic social systems.

If we assume that agonic and hedonic social structures were legitimately produced in the current study, why were self-reported social comparison, submissive behavior, and social behavior not significantly different in the agonic and hedonic groups? One possible explanation is that the theory is flawed and that agonic and hedonic social systems may
have no significant bearing on activation of state social anxiety. However, this interpretation fails to explain why anxiety affect scores were higher in the agonic condition, and in fact, there are several reasons to believe our affective findings may hold more significance. First, the Brief State Anxiety Measure (BSAM) was the only well-validated measure used in this study without modifications; other measures were modified in ways that may have undermined their validity. Additionally, confidence in the validity of our affective findings is bolstered by the fact that the BSAM was collected in real time, at multiple time points, and in several different contexts during the course of the study. Measures of all other dependent variables were administered retrospectively at the end of the study.

Yet another reason to acknowledge our affective results, despite the negative cognitive and behavioral findings, comes from the literature on defensive flight or fight reactions (Blanchard et al., 2001). Psychobiological conceptions of defensive processes such as social anxiety generally regard affective responses as the most sensitive and immediate form of response to a dangerous situation (de Gelder et al., 1999; Phelps, 2006). The cognitive processes required to judge and report social comparisons are arguably slower and less automatic (Phelps, 2006), and submissive social behaviors may require a certain level of stress to emerge (D’Aquilla et al., 1994). Thus, one possible explanation for the discrepancy between our findings for anxious affect and for the other dependent variables is that the effect of social structure was relatively mild and only strong enough to produce an effect at the more sensitive and immediate affective level.

Another potential explanation for the negative findings comes from the measures we used to assess social comparison, submissive behavior, and social behavior. With
regard to the Social Comparison Scale (SCS), we hypothesized that participants in the agonic condition would rate themselves as inferior to other group members on a number of dimensions. This was related to the evolutionary theory that agonic cues activate patterns of thought that decrease confidence in one’s ability to win social competitions (Gilbert, 2001), and thereby decrease the chances of getting hurt or expelled from the group. It was assumed that the SCS would tap changes in the tendency to engage in these upward social comparisons. However, the SCS may not have adequately measured specific comparisons to other group members in the current study. First, our version of the SCS specified that participants should rate how they compared to other group members from the current study, rather than how they compare themselves to others in general. It is possible that the SCS is more sensitive to generalized social comparison tendencies—how one thinks about oneself in relation to their social peers or those with similar demographic characteristics—and that these generalized comparisons are more highly correlated with social anxiety than are specific comparisons to particular people. This interpretation is consistent with our finding that the SCS was not significantly predicted by trait social anxiety in the current sample. It is also possible that the experimental condition did not affect the magnitude and direction of social comparisons but did affect the frequency of such comparisons. The SCS, which only measures the strength and direction of self-rankings, would not have detected such changes had they been present.

Similarly, it is possible that the measures we used to assess submissive behavior and social behavior during the study were inadequate for measuring true differences across conditions. The Submissive Behavior Scale (SBS) and Behavior Checklist
measured the frequency with which participants perceived and reported their engagement in submissive and other social behaviors during the study. These instruments more directly assess, and likely more accurately gauge, how participants thought they behaved, than how they actually behaved. If, as hypothesized above, the experimental manipulation did not produce powerful enough changes in actual submissive behavior to be evident to the participants, they may have fallen back on self-estimations consistent with their overall sense of identity. This regression to trait-estimations may have been further encouraged by the fact that many items on our modified SBS asked about hypothetical behavior (recall that the SBS instructions were changed so that submissive tendencies could be assessed regardless of whether situations described in the measure actually arose during the study). Additionally, the SBS and Behavior Checklist asked participants to reflect on their behavior “during today’s study,” which may have been interpreted as referring to the game procedure rather than the entire experience, including conversations before the procedure and during breaks. In retrospect, it may have been better to ask participants to reflect on their behavior during the past two hours, and explicitly say that this includes time spent conversing and taking breaks in addition to playing the game. Finally, many of the items on the SBS and Behavior Checklist refer to events or processes that arise in conversational contexts, and in the current study, opportunities for conversation were often limited (due to time constraints or group members’ personalities or other state-level effects such as being tired for an early morning study).

Our third hypothesis, that social structure would moderate the relationship between trait social anxiety and each of the dependent variables, was not supported by
the data. This hypothesis was rooted in the idea that individuals who tend to become socially anxious (with high trait social anxiety) might represent a subset of people who are particularly sensitive to hierarchical social systems; perhaps these individuals would be especially unnerved in agonic contexts and find a proportional degree of relief within hedonic social environments. However, if social anxiety evolved as a mechanism for responding to intra-species threats, under the right conditions it should be a relatively universal experience. Although contrary to Hypothesis 3, from an evolutionary standpoint it makes sense that all participants, not just those high in social anxiety, showed higher levels of anxious affect in the agonic compared to the hedonic context.

Finally, an exploratory aim of the current study was to determine whether our environmental manipulation had less effect on the anxious affect, social comparison, submissive behavior, and social behavior of females compared to males. We speculated that if female patterns of interaction are naturally more hedonic (e.g., Maner et al., 2008), the effect of our hedonic manipulation might be blunted among female participants. Similarly, the effect of the agonic system could also be blunted among females if those environmental cues were not sufficiently powerful to disarm normative patterns of relating. Assuming that the experimental manipulation was effective in creating agonic and hedonic conditions, our results suggest that females and males did not differ in their response to these environments; both males and females were likely to become more anxious in the agonic condition.

*Assuming the experimental manipulation failed to generate true agonic and hedonic systems.*
We must next consider the possibility that the manipulated design features failed to produce true agonic and hedonic systems and interpret our findings in this light. The significant differences in anxious affect are consistent with the hypothesis that such systems did in fact emerge; however, the submissiveness, social comparison, and social behavior findings would seem to suggest otherwise. We must consider the possibility that some spurious variable explains the differences in BSAM scores and that flaws in the study design interfered with the emergence of agonic and hedonic systems. It is possible, for example, that some feature present in the agonic system, such as hurrying from one’s seat to submit answers during the game, led to greater sympathetic nervous system activation and that physical activity was responsible for higher BSAM scores and social anxiety processes were not.

Speculatively, there are several reasons why agonic and hedonic systems may not have emerged or been sufficiently robust in the current study. One possibility is that the brief laboratory interaction designed for this experiment did not provide enough time to generate true social structures in which the encouraged patterns of interaction were internalized and/or available in awareness to permit self-report. Participants spent the majority of time playing the study game, which provided strong cues about resource context, the role of competition, and leadership; however, there was not much unstructured time and at no time was social interaction mandated. Additionally, because participants in the hedonic condition “foraged alone,” this comparative lack of interaction may have been a barrier to cultivating a strong hedonic system defined by fission and fusion. In naturalistic hedonic groups, reunited individuals cluster together in close proximity and engage in warm, celebratory rituals. Perhaps in the cultural climate
inhabited by the student participants, such interactions tend to be reserved for close family and friends, in which case the students may have needed much more time to adopt hedonic patterns than was provided for in this very circumscribed context.

Another potential problem relates to the agonic condition. In the agonic systems that Chance first described (1980, p.90), individuals spent much of their time watching those at the top in a state of *braked readiness*. In the current study, it is possible that participants’ cognitive resources were so devoted to the game that the students were not “scanning for threat,” and thus, did not reach a state of braked readiness. Relatedly, it is possible that the agonic game had all of the appropriate design features, but was not sufficiently competitive to encourage the deployment of submissive behaviors.

Finally, it is also possible that the presence of an experimenter had unintended consequences on the emergent social systems. One of the central design features for agonic systems is the presence of a central leader (Chance, 1980). Although we attempted to remove any leadership role from the hedonic condition, the experimenter may have inadvertently become a type of leader, thus decreasing the validity of the hedonic system. Future research might allow the experimenter to dole out rewards and punishment, thus becoming a recognized member of the group and a source of social competition.

The lack of a manipulation check independent of the dependent variables is a major weakness of the current study. Future research might correct this weakness by following the lead of Pierce and White (2006), who asked participants to identify agonic- and hedonic-like thoughts and behaviors, using items taken from the Organizational Culture Inventory (Cooke & Szumal, 1993). We believe that, overall, it is more likely that our experimental manipulation did produce two different types of social systems—
one more agonic and one more hedonic. However, it is possible that these systems were not as robust as they would have been with more time, a less hypothetical reward structure, social threats that were truly present, or in more naturalistic hedonic and agonic environments that would remove the need for an ever-present experimenter. Future research could tweak our study procedure to address some of these potential weaknesses, for example by including experimenter ratings of submissive and social behavior and by increasing the amount of time group members are given to interact with one another. Future research could also study the design principles in isolation and examine their individual effects on social anxiety activation.

Although the evolutionary theory being tested should apply to all humans, another potential limitation of the current study is the use of a student sample. A larger and more diverse sample would increase confidence in our findings. Additionally, naturalistic, ethnographic research that examines the presence of social anxiety in naturally occurring agonic- and hedonic-leaning human groups might provide greater insight about the effects of social structure, and hold implications for the types of jobs and communities selected by socially anxious individuals.

A major contribution of this research has been the experimental testing of a theoretical perspective developed using an evolutionary lens and the development of a new paradigm for examining the effects of resource context and social structure on any number of theoretically relevant variables. As noted by Laland and Brown (2002), it is essential to test hypotheses as well as to theorize to avoid the problem of creating justifiably criticized “just so stories” and engaging in what they call “irresponsible
biologizing” (p. 6). The findings from this experiment suggest that anxious affect can be elicited by social structure as predicted by evolutionary theories of social anxiety.

If social anxiety affect is part of a competitive mentality activated in agonistic contexts, arises within a competitive, agonic mentality, this research holds some clinical implications for the treatment of socially anxious persons. First, if individuals with social anxiety are automatically recruiting a defense strategy aimed at preventing aggression or rejection, therapists might use interventions aimed at switching the person out of the agonic mentality and into a hedonic mentality emphasizing egalitarian relationships. This outcome might be achieved in several ways. Therapists might employ cognitive-behavioral interventions to help change a client’s underlying philosophy to one of acceptance of the self and others. Therapists might also help design in-session or out-of-session exposure exercises in which clients interact with others who are likely to be friendly and non-competitive. Additionally, therapists could encourage clients to strengthen existing social connections with those who are less likely to appear as social competitors (e.g., family, different-aged peers) or encourage participation in a team in which intra-group (rather than inter-group) competition is the norm.

Although this study did not find overwhelming support for the effect of social structure on social anxiety activation, our finding that agonic social systems are associated with higher levels of anxious affect, together with the methodological shortcomings of the current study, support the case for further research. Such efforts could enrich therapeutic conceptualization and treatment of socially anxious persons.
REFERENCES CITED


*Behaviour Research and Therapy, 38*, 273-283.


Screening Questionnaire

1. What is your age? _____

2. What is your sex?
   a. Male
   b. Female
   c. Other

3. What race do most closely identify with?
   a. American Indian or Alaska Native
   b. Asian
   c. Black or African-American
   d. Native Hawaiian or Other Pacific Islander
   e. White
   f. More than one race
   g. Unknown

4. What ethnicity do you most closely identify with?
   a. Hispanic or Latino
   b. Not Hispanic or Latino
   c. Unknown

5. What is your sexual orientation?
   a. Heterosexual
   b. Homosexual
   c. Bisexual
   d. Other

6. What year are you in college (e.g. first, second, etc.)?
   a. First (freshman)
   b. Second (sophomore)
   c. Third (junior)
   d. Fourth or higher (senior or non 4-year student)

7. Do you have any difficulties reading, speaking, or understanding English?
   a. Yes
   b. No
SAMPLE GAME QUESTIONS

1. Name something you’d find on a person’s arm.

2. Name a sport that does not use a ball.

3. Name something people use water for every day.

4. Name another word for “little.”

5. Name an occupation someone with a fear of heights should never consider.

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1 Questions were projected on the wall (from a laptop) during regular rounds and read out loud by the experimenter during surprise attack rounds.
APPENDIX B

SCRIPT FOR AGONIC AND HEDONIC CONDITIONS

Script for Agonic Condition

To Determine Eligibility

- Download survey responses from SONA screener
- Determine whether any respondents meet eligibility criteria (SIAS-S score within a quintile that is not yet filled, English speaking, normal/corrected vision) and do not meet any exclusion criteria (homosexual, BDI > 27)
- Email eligible respondents inviting them to participate in the study and providing information about how to sign up for time slots through SONA

Before the Participant Arrives:

Experimenter:

- Confirm the participant’s randomization condition is *Agonic* (contained on Google calendar and in the excel “Participant Sheet” on the S: drive)
- Unlock and set up Room 462:
  - Laptop and projector turned on, power-point presentation (containing game slides) open to the first slide
  - Put 1 submission box on the table on 462 (the one in front of the projector) and 3 stacks of differently colored paper at the appropriate seats
  - Prepare 3 consents on clipboards and 3 pens in 462
Unlock Room 447 put 3 different snacks in 462 (e.g. chips/pretzels/fruit snacks and 3 bottles of water) *Email Laura if snacks are running low!

Number BSAMs A,B & C 1-4 (and administer in that order)

Wait in 447 for participant to arrive

Confederates A & B: 2 Minutes Prior to Study Start Time – Take stairs down to first floor and return to 4th floor on elevator “in character” (pretending to be a participant). Come to room 462 and wait if participant has not yet arrived.

When the Participant Arrives:

Experimenter enters 462, and once everyone is there say:

Hi! Thanks for coming today. Has everyone met each other?

(Ask for each of their names and repeat the names out loud as if you’re trying to memorize them)

I’ll be running the experiment today, and most of the time I will be reading from this paper. I may sound robotic at times, but we want to make sure we say the exact same thing to all groups. The study will take over two hours. Please do not eat, drink, or take out your cell phones during today’s study. About midway through, we will provide you a short break with snacks and water. Before we get started, does anyone need to get water or use the bathroom?

Experimenter: Pass out copies of the consent form to all group members and do the following:

• ask them to read carefully and initial/date on all three pages (and sign on page 2)
• inform them that although the consent says the study will take 2 ½ hours, it will actually be finished in 2 hours
• answer any questions

Thank you. I need to go get some materials out of the other room before we start the study. Hang tight and I'll be right back.

(Leave, sign consent of the participant, and return after 2 minutes with ticket tracking sheet in hand)

Experimenter announces study start and administers 1st BSAM. Say:

Now we will begin today's study. First we will begin with a questionnaire, which you will be asked to fill out multiple times throughout the study.

(Give everyone the correct #1 BSAM form)

Confederate A – Form A
Confederate B – Form B
Participant – Form C

Think about how you are feeling right now at this very moment and fill it out accordingly.

(Wait for them to finish)

Thank you. Now I will explain what you’ll be doing during today's study.

Experimenter explains how study task works:

This experiment is going on in several buildings across campus, and always involves three students who participate as a group. We are studying how individual skill and competition interact. Specifically, we are interested in seeing how people go after resources they want, and how they feel while doing so.
(Talk very slowly and clearly while displaying “raffle ticket tracking” sheet)

_In order to motivate you to perform at your highest ability, we have included a prize of a 100-dollar Visa gift card. The winner of the gift card will be determined by raffle, and your performance today will determine how many raffle tickets you earn. Each group member will begin with 10 raffle tickets in exchange for participating in the study, but you may gain some or lose some along the way._

_Experimenter: direct everyone to their assigned seat. Say:_

_Now please come take your seats at the table. Bring your pen with you._

confederate A - middle  
participant - left  
confederate B – right

(Wait until everyone is seated, and move to the front of the table (facing projector) to give the next instructions)

_The study task is a type of trivia quiz. Questions will be projected on this wall. Instead of answering the questions based on facts, you will be guessing the 5 answers most commonly given by Temple Students (the format is similar to the popular game show “Family Feud,” if you are familiar with that). The “5 most popular answers” were determined by surveying 1000 Temple students last year. You must guess the most common answers, and record your 5 responses on these sheets of paper (point to colored answer sheets). You will use one sheet of paper for each question that flashes on the wall._

_So for example, if the question is: “Which foods are you most likely to grab for a late night snack?” – you would have to think about how other Temple students are likely to answer that question. You might write down ice cream, cereal, chips, fruit, and soft pretzel._
For each question, you will have 1 minute to record your responses on a sheet of colored paper and put them in this box (motion towards the box in the middle of the room). If you cannot think of 5 answers, write as many as you can. You can cross out and change your answers as many times as you’d like before you submit your paper, but once the paper goes into the box, you may not take it back out. You must stay in your designated spot while you’re writing your answers, but as soon as you put the pencil down you may run to the box.

The amount of time remaining for each question will be displayed below each question (motion to place on wall where timer counts down). Make sure you submit your answers in time. When time is up, you will no longer be able to submit an answer for that question. I will be watching through this window (motion to observation window) to make sure everybody submits before time is up. Go back to your designated spot immediately, because once time runs out for one question, the next will automatically appear on the wall and you must begin working on that question using a new sheet of colored paper.

(talk slowly and clearly while explaining next part)

Now, here is how you score points. Answers are considered correct if they are one of the top 5 answers (given by the 1000 Temple students). For each question, the first person to submit their answers to in the box will receive 3 raffle tickets for every correct answer. The second person to submit their answers in the box will receive 2 raffle tickets for every correct answer. The third person to submit their answers will receive 1 raffle ticket for each correct answer. As I watch from the window, I will record who is first, second, and third to submit after each question.
To summarize, you get more tickets for correct answers, but you also must try to be the fastest because submitting 2nd decreases your earning power and submitting 3rd decreases your earning power even more. If you do not turn in your paper before the time is up, you automatically receive 0 tickets for that question.

Any questions so far?

There will be 5 questions in each round, and we ask that you not speak to each other during these rounds, even if everyone has answered and you are waiting for the next question. When the study begins, I will go into the other room to observe through the window. But first we are going to do a couple of practice questions and I will stay here to help make sure you understand. No tickets can be earned on the practice questions, but it is important that you still try your hardest for reasons I’ll explain later. We will do two practice questions, but keep in mind the real game will have 5 questions per round. Remember to hurry and submit your answers in this box (point to box) as soon as you’ve finished writing.

Ready for the first practice question? Write your 5 answers and then put them in the submission box and return to your spots. You will have one minute. Ready? Go!

**Experimenter:** Click to slide for practice question 1.

*Here are the top 5 answers given by Temple students.*

(read answers on slide out loud)

- Answer any questions
  - If participant asks any questions, confederate B should ask the pre-prepared question
Conf. B: "What if we can’t think of 5 answers, should we just turn in our piece of paper with less than 5?

Experimenter: “Yes, you can, but I would encourage you to try to come up with five because you only earn points for each answer you give.

• Correct any mistakes
  o If participant does not submit before time is up, give general reminder to everyone that you will be watching to make sure they submit before the clock hits zero, and they will not receive points for the question if they submit after it hits zero.
  o If participant needs a correction, make sure to give confederate B the pre-prepared correction (below)
    ▪ “each answer goes on its own line”

• Collect answers out of box and pretend to compare to something on the clipboard

Good. Now we’re going to do one more practice question.

Experimenter: Click to slide for practice question 2.

Here are the top 5 answers given by Temple students.

(read answers on slide out loud)

• Answer any questions

• Correct any mistakes

• Collect answers out of the box and pretend to compare to something on the clipboard.
• LOOK THROUGH ALL ANSWER SHEETS AS IF YOU’RE SCORING, AND

WRITE SOMETHING ON CLIPBOARD

Good, it seems like you all understand the process. Now I want to explain another part of today’s study.

Experimenter explains leadership role and surprise attack rounds:

(If questions arise, ask them to wait until you’re done explaining)

As I mentioned, there are other groups taking part in this study. At any time during the study, I may come in and announce that the next round will be a surprise attack round. During these “surprise attacks,” you will count on a group leader to defend your resources (i.e. your raffle tickets) against another group of study participants. The leader is the only person responsible for responding to such attacks. I have already selected your group leader based on who performed the best during the practice rounds, and that leader is __(confederate A name)__.

The group whose leader goes up against your leader is located in Gladfelter Hall. Therefore, that leader will not be physically present during surprise attack rounds. I will compare your score against theirs by calling over to the other experimenter.

Now I will tell you how the surprise attacks work. Everyone needs to listen to these instructions because there’s a chance one of you (gesture towards confederate B and participant) may need to step up as the leader at a later point. At any time, I may come in and announce that the next round will be a surprise attack. A surprise attack will never happen while you are actively engaged in a regular round (never while the clock is counting down).
At this point, the leader must step up to try and defend all of your (gesture towards entire group) tickets by coming to the middle of the room and quickly answering a series of questions. The question format is similar to the other rounds – to answer correctly, the leader will have to guess the most common response given by Temple students. However, instead of providing the 5 responses the leader will have 8 seconds to provide one response.

If that response is in the top 5 most common responses, it gets points. The top answer is worth 5 points, the second most common answer is worth 4 points, and so on. For these rounds, I will read the questions out loud instead of using the computer. The leader will respond, saying their answers out loud instead of writing them down. I will keep score.

I will write down the leader’s responses to each question. When the surprise attack is over, I will leave the room briefly and make a phone call to compare your leader’s responses to those given by the other leader. If your leader successfully protects the group by beating the other team’s leader, your leader gets 3 extra raffle tickets for him/herself. Group members do not get any extra tickets if their leader is successful. If your leader fails to protect the group, each group member including the leader loses 2 tickets.

Additionally, if your leader loses, a new leader must step up and volunteer to answer the same questions again, hopefully with a better outcome. If this new leader also fails to score better than the other team’s leader, each team member loses another 2 tickets and the group member who has not yet volunteered must step up and try. If that person fails, everyone loses another 2 tickets and the surprise attack is over.
Does anyone have questions or need clarification?

One more point about the leader. The leader who most successfully defends the group (by winning the most surprise attacks), will choose one other group member to receive 3 extra raffle tickets. (Turning to confederate B and participant) So respect your leader, because he/she has the power to give those bonus tickets to one of you but not the other.

Any questions about the surprise attacks? I can remind you of the rules if you forget.

Now it’s time to begin the first real round. It will be just like the practice rounds, except for this time, when time runs out the next question will automatically appear on the wall. Make sure you go back to your seats after submitting your answers so that you can be ready to respond to the next question. After I begin the timer, I will leave and watch from the other room until the round is over. Please remember not to talk during these rounds. Five questions will be presented during Round 1. Is everybody ready?

**Experimenter: Start Round 1 on Computer and Bring Ticket Tracking Sheet**

**Back to 447.**

(Watch from other room and return when final question is over)

**Experimenter: Collect the answer sheets from the submission box and say:**

Good. I will tally and record your points while you begin the second round.

(Talk slowly and clearly here)
I cannot give you any feedback about your performance until the end of the study. After we're finished today, I will privately let each of you know how many raffle tickets you've earned.


**Experimenter: Start Round 2 on Computer and Leave the Room.**

(Watch from other room and return when final question is over)

(Collect answer sheets)

**Experimenter: Administer 2nd BSAM. Say:**

*Here is the second questionnaire. Please reflect on how you're feeling at this very moment and fill it out accordingly.*

(Give everyone the correct #2 BSAM form and wait for them to finish)

  Confederate A – Form A  
  Confederate B – Form B  
  Participant – Form C

**Experimenter: Inform the group that they are experiencing a surprise attack.**

**Say:**

*Now I need to inform you that the next round will be a surprise attack. This means the leader (gesture to confederate A) is going to compete against another group’s leader in a surprise attack round.*

(Bring confederate A to center of the room and sit down in the pink chair)

*Leader, answer the following questions as well as you can. Remember, you are not trying to guess the correct answer; you are trying to guess the most common response given by a group of 1,000 Temple students. You will have 8 seconds to respond to each*
question. If you run out of time, I will ask you for a final answer, at which point you must provide an answer or you will get 0 points for that question.

Ready? Let’s begin.

Experimenter: Read surprise attack questions and give 8 seconds before requesting that someone give a final answer.

(Write down answers on paper)

Now I will call over to the other experimenter to see which leader scored the most points during the surprise attack round. I will be back in a few minutes to report the winner. In the meantime, please take a short break. There are some snacks and water on the table in the corner. Help yourself to a snack and bottle of water, but please return to your seat while eating and drinking. If you need to, you may also use the bathroom at this time.

(Leave room, walk to 447, record if participant uses the bathroom, return in 4 minutes)

(Do NOT read the following statement straight off the paper)

Very nicely done, Leader! You beat the other team’s leader, thus protecting your group’s raffle tickets and earning yourself 3 bonus tickets. Don’t forget that if you maintain your position as leader, you will get to assign a bonus to one of your other group members. You should pay attention to who you think deserves that bonus as you continue through the study.

Experimenter: Return and administer 3rd BSAM. Say:
Before we resume another regular round, please fill out this questionnaire again. Reflect on how you’re feeling at this very moment.

(Give everyone the correct #3 BSAM form and wait for them to finish)

Confederate A – Form A
Confederate B – Form B
Participant – Form C

Now we will begin round 3. Just like before, each of you will be providing your top 5 answers on your colored paper and competing to answer correctly and submit quickly. I will be watching from the other room.

**Experimenter: Start Round 3 on the Computer and Leave**

(Watch from other room and return when final question is over)

(Collect answer sheets)

Okay, now let’s begin round 4. Ready? Go.

**Experimenter: Start Round 4 on the Computer and Leave**

(Watch from other room and return when final question is over)

(Collect answer sheets)

**Experimenter: Inform the group that they are experiencing another surprise attack and administer 4th BSAM. Say:**

Now I need to inform you that the next round will be a surprise attack. This means the leader (gesture to confederate A) is going to compete in another surprise attack round. If he/she loses, one of you (gesture to confederate B and participant) must step up and compete as the new leader, so be ready.

However, before we do that, I would like each of you to fill out another one of these questionnaires according to how you feel RIGHT NOW.
(Give everyone the correct #4 BSAM form and wait for them to finish)

Confederate A – Form A
Confederate B – Form B
Participant – Form C

Thank you. Now let’s continue with the surprise attack round. Leader, come to the center of the room and answer the following questions as well as you can. You will have 8 seconds to answer each question, and you’ll need to beat the other team’s leader maintain leadership status. Ready? Let’s begin.

**Experimenter:** Read surprise attack questions and give 8 seconds before requesting that someone give a final answer.

(Record answers on the clip board)

Now I will call over to the other experimenter to see which leader scored the most points during the surprise attack round. I will be back in a minute to report the winner. Leader, please return to your seat.

(Leave room, walk to 447, return in 1 minute)

(To Leader) Great job, you have maintained your leadership status! You beat the other team’s leader again, thus protecting your group’s raffle tickets and earning yourself 3 more bonus tickets. Don’t forget that if you remain the most successful leader, you will get to assign a bonus to one of your other group members. Continue paying attention to who you think deserves that bonus as we move forward.

Now we will resume another regular round – round 5. Just like before, each of you will be providing your top 5 answers on your colored paper and competing to answer correctly and submit quickly. I will be watching from the other room.

**Experimenter:** Start Round 5 on the Computer and Leave
(Watch from other room and return when final question is over)

(Collect answer sheets)

**Experimenter: Wrap-Up and Final Questionnaires. Say:**

Now it is time for all of you to fill out your last set of questionnaires. One will be the same form you’ve filled out multiple times – just fill it out according to how you feel in the moment. The other questionnaires are new. You still have plenty of time left before the study is scheduled to end, so please take your time reading the instructions and answering the questions. Try not to over-think your answers. Go with your gut.

Leader, while you fill out the forms, please consider which other group member you think should receive the 3-ticket bonus.

Make sure you write your name on the front of the packet. For the sake of privacy, I will ask two of you to follow me to different rooms to complete the final questionnaires. Since you two are closest to the door (motion to 2 confederates), come with me and I will find you a place to sit in nearby rooms.

You can find me __(right outside in the hallway/in room # __)___. Feel free to come ask me if you have questions. When you’re done, please bring me your completed questionnaires. While you’re filling these out, I will calculate the total number of raffle tickets each of you earned today.

**Experimenter: Collect Participant Questionnaires and Debrief. Say:**

You’re finished with the study! Please follow me so that I can debrief you about the purpose of the study.

• Points to emphasize:
• We were interested in how anxiety is related to how people feel in cooperative or competitive environments

• Participants do have a chance of winning the $100 gift card, but chances are NOT actually related to how they performed today. Everyone has the same chance.

• Please do not share information with your friends or classmates about this study (except for to tell them it’s fun and they should participate!).

• They can contact Laura Bruce with any questions

• Do NOT say:
  o Anything about the confederates

**Experimenter: Make sure data entered into database**

• Give participant packet to a confederate to enter into the database, or if both confederates had to leave right after the study, enter it yourself.

  o Find Subject Number and SIAS score in the participant sheet

  o Remainder of data comes from BSAMs and post-packet

  o Paperclip consent to front of packet and BSAMs, and write subject number on the top of the consent.

  o File paperwork in “completed packets” in drawer in 426.
Script for Hedonic Condition

To Determine Eligibility

- Download survey responses from SONA screener
- Determine whether any respondents meet eligibility criteria (SIAS score within a quintile that is not yet filled, English speaking, normal/corrected vision) and do not meet any exclusion criteria (homosexual, BDI > 27)
- Email eligible respondents inviting them to participate in the study and providing information about how to sign up for time slots through SONA

Before the Participant Arrives:

Experimenter:

- Confirm the participant’s randomization condition is Hedonic (contained on google calendar and in the excel “Participant Sheet” on the M: drive)
- Unlock and set up Room 462:
  - Laptop and projector turned on, power-point presentation (containing game slides) open to the first slide
  - Put dividers on table
  - Prepare 3 consents on clipboards and 3 pens in 462
  - Prepare 3 submission boxes, and 3 stacks of differently colored paper at the appropriate seats
  - Unlock Room 447 and put snacks in 462 (3 bag of pretzels and 3 bottles of water) *Email Laura if snacks are running low!
  - Number BSAMs A,B & C 1-4 (and administer in that order)
Confederates A & B: 2 Minutes Prior to Study Start Time – Take stairs down to first floor and return to 4th floor on elevator “in character” (pretending to be a participant). Come to room 462 and wait if participant has not yet arrived.

When the Participant Arrives:

Experimenter enters 462, and once everyone is there say:

Hi! Thanks for coming today. Has everyone met each other?

(Ask for each of their names and repeat the names out loud as if you’re trying to memorize them)

I’ll be running the experiment today, and most of the time I will be reading from this paper. I may sound robotic at times, but we want to make sure we say the exact same thing to all groups. The study will take over two hours. Please do not eat, drink, or take out your cell phones during today’s study. About midway through, we will provide you a short break with snacks and water. Before we get started, does anyone need to get water or use the bathroom?

Experimenter: Pass out copies of the consent form to all group members and do the following:

• ask them to read carefully and initial/date on all three pages (and sign on page 2)

• inform them that although the consent says the study will take 2 ½ hours, it will actually be finished in 2 hours

• answer any questions
Thank you. I need to go get some materials out of the other room before we start the study. Hang tight and I’ll be right back.

(Leave, sign the consent of the participant, and return after 2 minutes with ticket tracking sheet in hand)

**Experimenter announces study start and administers 1st BSAM. Say:**

Now we will begin today’s study. First we will begin with a questionnaire, which you will be asked to fill out multiple times throughout the study.

(Give everyone the correct #1 BSAM form)

Confederate A – Form A  
Confederate B – Form B  
Participant – Form C

Think about how you are feeling right now at this very moment and fill it out accordingly.

(Wait for them to finish)

Thank you. Now I will explain what you’ll be doing during this study.

**Experimenter explains how study task works:**

This experiment is going on in several buildings across campus, and always involves three students who participate as a group. To distinguish between groups, we have assigned each group a different color. You guys are “Team Gold.” We are studying two main things—how group members work individually and cooperatively. We want to know how people go after resources they want and how they feel while doing so. Today you will mostly work on your own, but in some instances, you will also be asked to cooperate as a group.

(Talk very slowly and clearly while displaying “raffle ticket tracking” sheet)
In order to motivate you to perform at your highest ability, we have included a prize of a 100-dollar Visa gift card. The winner of the gift card will be determined by raffle, and your performance today will determine how many raffle tickets you earn. Each group member will begin with 10 raffle tickets in exchange for participating in the study, but you may gain some or lose some along the way.

**Experimenter: direct everyone to their assigned seat. Say:**

*Now please come take your seats at the table. Bring your pen with you.*

confederate A - middle  
participant - left  
confederate B – right

(Wait until everyone is seated, and move to the front of the table (facing projector) to give the next instructions)

*The study task is a trivia quiz, but you will not be competing against each other. Each person will work individually. Questions will be projected on this wall. Instead of answering the questions based on facts, you will be guessing the 5 answers most commonly given by Temple Students (the format is similar to the popular game show “Family Feud,” if you are familiar with that). The “5 most popular answers” were determined by surveying 1000 Temple students last year. You must guess the most common answers, and record your 5 responses on these sheets of paper (point to colored answer sheets). You will use one sheet of paper for each question that flashes on the wall.  

So for example, if the question is: “Which foods are you most likely to grab for a late night snack?” – you would have to think about how other Temple students are likely to answer that question. You might write down **ice cream, cereal, chips, fruit,** and **soft pretzel.***
For each question, you will have 1 minute to record your responses on a sheet of green paper and put them in the box sitting in front of you (place an answer box in front of each participant). If you cannot think of 5 answers, write as many as you can. You can cross out and change your answers as many times as you’d like before you submit your paper, but once the paper goes into the box, you may not take it back out. The amount of time remaining for each question will be displayed below each question (motion to place on wall where timer counts down). Make sure you submit your answers in these boxes before time is up. When time is up, the next question will automatically appear on the wall and you must begin working on that question, using a new sheet of paper.

(talk slowly and clearly while explaining next part)

Now, here is how you score points. Answers are considered correct if they are one of the top 5 answers (given by the 1000 Temple students). You will receive 1 raffle ticket for each correct answer, so each question can be worth up to 5 raffle tickets (if you guess all 5 top answers). Incorrect answers are 0 points. If you do not submit your answer sheet before time is up, you automatically receive 0 points for that question.

Any questions so far?

There will be 5 questions in each round, and we ask that you not speak to each other during these rounds, even if everyone has answered and you are waiting for the next question. You should be working completely independently. When the study begins, I will go into the other room to observe through the window. But first we are going to do a couple of practice questions and I will stay here to help make sure you understand. No tickets are earned or lost on the practice questions, but it is important
that you still try your hardest. We will do two practice questions, but keep in mind the real game will have 5 questions per round.

Ready for the first practice question? Write your 5 answers and then put them in the submission box before time runs out. You will have one minute. Ready? Go!

**Experimenter:** Click to slide for practice question1.

*Here are the top 5 answers given by Temple students.*

(read answers on slide out loud)

- Answer any questions
  - If participant asks any questions, confederate B should ask the pre-prepared question (below)
    - Conf. B: “So, if we finish writing 5 answers before time’s up, what do we do?
    - Experimenter: “Sit quietly and wait for time to run out, because the next question will pop up immediately after.”
  - Correct any mistakes
    - If participant does not submit before time is up, give general reminder to everyone that you will be watching to make sure they submit before the clock hits zero, and they will not receive points for the question if they submit after it hits zero.
    - If participant makes mistake, confederate B should voice confusion over the same point as the participant)
- Collect answers out of box and review, addressing any problems or apparent confusion.
- If participant needs a correction, make sure to give confederate B the pre-prepared correction (below)
  - “each answer goes on its own line”

Good job! Now we’re going to do one more practice question.

**Experimenter**: Click to slide for practice question 2.

*Here are the top 5 answers given by Temple students.*

(read answers on slide out loud)

- Answer any questions
- Correct any mistakes
- Collect answers out of box and review, addressing any problems or apparent confusion.

- **LOOK THROUGH ALL ANSWER SHEETS AS IF YOU’RE SCORING, AND WRITE SOMETHING ON CLIPBOARD**

Good, it seems like you all understand the process. Now I want to explain another part of today’s study.

**Experimenter explains cooperation during surprise attack rounds:**

(If questions arise, ask them to wait until you’re done explaining)

Recall that another part of today’s experiment is to see how you all cooperate to defend yourselves against a common threat. As I mentioned, there are other groups taking part in this study. These other groups may challenge you in the form of “surprise attack rounds.” During these surprise attacks, you guys will have to band together and cooperate in order to protect your raffle tickets from the challenging team.
Today, the challenging team is “Team Red.” Team Red is participating in Gladfelter Hall, and therefore will not be physically present during surprise attacks. I will compare your team’s score against theirs by calling over to the other experimenter.

Now I will tell you how the surprise attacks work. At any time, I may come in and announce that the next round will be a surprise attack. A surprise attack will never happen while you are actively engaged in a regular round (never while the clock is counting down).

If I call a surprise attack, you will all come to the center of the room. I will then present a series of questions. The question format is similar to the other rounds – to answer correctly, you will have to guess the most common response given by Temple students. However, instead of providing the “top 5 answers,” you will work together to produce only one response. If that response is in the top 5 most common responses, it gets points. The top answer is worth 5 points, the second most common answer is worth 4 points, and so on. During these rounds, I will read the questions out loud instead of using the computer. Then, you will have 30 seconds to brainstorm together and decide upon a final answer. Once you decide, the person who originally suggested the response chosen as your final answer will relay the answer to me.

I will write down your responses to each question. When the surprise attack is over, I will contact the experimenter working with Team Red and compare your scores. If your group defeats Team Red, you will each receive 5 extra raffle tickets. If your group loses, you will each lose 5 raffle tickets.
Does anyone have questions or need clarification?

One more point. An important aspect of the surprise attack is your ability to work cooperatively as a team. When we've run this study before, groups that did not take everyone's ideas into consideration usually got lower scores. At the end of today's study, you will fill out a questionnaire that asks about the surprise attack experience. It includes a spot to write the name of any team member who acted in an overly dominant or bossy way. Anyone who is identified this way by the two other members of Team Gold will lose 3 raffle tickets at the end of the study.

Any questions about that, or about any other aspect of the surprise attacks? I can remind you of the rules if you forget.

Now it's time to begin the first real round. It will be just like the practice round, except for this time, when time runs out the next question will automatically appear on the wall. After I begin the timer, I will leave and return when the round is over. Five questions will be presented during Round 1. Is everybody ready?

**Experimenter: Start Round 1 on Computer and Bring Ticket Tracking Sheet**

Back to 447.

(Watch from other room and return when final question is over)

**Experimenter: Collect the answer sheets from submission boxes and say:**

Good. I will tally and record your points while you begin the second round.

(Talk slowly and clearly here)

I cannot give you any feedback about your performance until the end of the study. After we're finished today, I will privately let each of you know how many raffle tickets you've earned.

**Experimenter: Start Round 2 on Computer and Leave the Room.**

(Watch from other room and return when final question is over)

(Collect answer sheets)

**Experimenter: Administer 2nd BSAM. Say:**

Here is the second questionnaire. Please reflect on how you’re feeling at this very moment and fill it out accordingly.

(Give everyone the correct #2 BSAM form and wait for them to finish)

Confederate A – Form A
Confederate B – Form B
Participant – Form C

**Experimenter: Inform the group that they are experiencing a surprise attack.**

Say:

Now I need to inform you that the next round will be a surprise attack. If Team Red beats Team Gold in this surprise attack round, each of you will be forced to hand over 5 of your raffle tickets. If you win, you will each get 5 raffle tickets from the members of Team Red.

Please come stand together in the center of the room.

(Bring group to center of the room and sit down in the pink chair)

I will read each question out loud, and you will have 30 seconds to brainstorm responses. Remember, you are not trying to guess the correct answer; you are trying to guess the most common response given by a group of 1,000 Temple students. Once you’ve decided on your team’s final answer, the person who originally suggested that response must say “final answer” out loud, and then give me the answer. That way I
will know which response to enter as your final answer. If you run out of time, I will stop deliberations and ask you for a final answer, at which point someone must provide an answer or your team will get 0 points for that question.

Remember to respect each other during the surprise attack round. Anyone who is identified by both team members as being “too bossy or dominating” will lose 3 raffle tickets.

Ready? Let’s begin.

**Experimenter:** Read surprise attack questions and give 30 seconds before requesting that someone give a final answer.

(Write down final answers on paper)

Now I will call over to the other experimenter to see which team scored the most points during the surprise attack round. I will be back in a few minutes to report the winner. There are some snacks and water on the table in the corner. Help yourself to a snack and bottle of water. We ask that you take your break in the couch area and don’t return to your stations until I come in to start the next round. If you need to, you may also use the bathroom at this time.

(Leave room, walk to 447, record if participant uses the bathroom, return in 4 minutes)

(Do NOT read the following statement straight off the paper)

Nicely done Team Gold! You beat Team Red, and that means that you each will receive 5 raffle tickets and they will each lose 5 raffle tickets.

**Experimenter:** Return and administer 3rd BSAM. Say:
Before we resume another regular round, please fill out this questionnaire again. Reflect on how you're feeling at this very moment.

(Give everyone the correct #3 BSAM form and wait for them to finish)

Confederate A – Form A
Confederate B – Form B
Participant – Form C

Now we will begin round 3. Just like before, each of you will be working on your own and writing your “top 5” responses on the sheets of green paper. I will be watching from the other room.

Experimenter: Start Round 3 on the Computer and Leave

(Watch from other room and return when final question is over)

(Collect answer sheets)

Okay, now let’s begin round 4. Ready? Go.

Experimenter: Start Round 4 on the Computer and Leave

(Watch from other room and return when final question is over)

(Collect answer sheets)

Experimenter: Inform the group that they are experiencing another surprise attack and administer 4th BSAM. Say:

Now I need to inform you that the next round will be a surprise attack. This means that your team will compete against Team Red in another surprise attack round. Remember to respect each other during the surprise attack round. Anyone who is identified by both team members as being “too bossy or dominating” will lose 3 raffle tickets.
However, before we begin the surprise attack, I would like each of you to fill out another one of these questionnaires according to how you feel RIGHT NOW.

(Give everyone the correct #4 BSAM form and wait for them to finish)

Confederate A – Form A
Confederate B – Form B
Participant – Form C

Thank you. Now let’s continue with the surprise attack round. Please come stand together in the center of the room. Just like before, you will have 30 seconds to brainstorm responses before I need a final answer. Remember, the person who originally thought of your team’s final answer must be the one to report it to me.

Ready? Let’s begin.

**Experimenter:** Read surprise attack questions and give 30 seconds before requesting that someone give a final answer.

(Record answers on the clip board)

Now I will call over to the other experimenter to see which team scored the most points during the surprise attack round. I will be back in a minute to report the winner.

(Leave room, walk to 447, return in 1 minute)

Nicely done! You beat Team Red again, and each of you will receive 5 more raffle tickets.

Now we will resume another regular round – round 5. Just like before, each of you will be working on your own and writing your “top 5” responses on the sheets of green paper. Everybody please go back to your seats. I will be watching from the other room.

**Experimenter:** Start Round 5 on the Computer and Leave
(Watch from other room and return when final question is over)

(Collect answer sheets)

**Experimenter: Wrap-Up and Final Questionnaires. Say:**

Now it is time for all of you to fill out your last set of questionnaires. One will be the same form you’ve filled out multiple times – just fill it out according to how you feel in the moment. The other questionnaires are new. You still have plenty of time left before the study is scheduled to end, so please take your time reading the instructions and answering the questions. Try not to over-think your answers. Go with your gut.

On the form that asks about the surprise attack rounds, please remember to indicate whether any of your team members were unnecessarily bossy or dominating.

Make sure you write your name on the front of the packet. We have found that some people take longer than others to finish this packet, and that when one person finishes quickly, the other group members also speed up. We want everyone to take the time they need, so we will give you each a private room. So, since you are closest to the door, can you two (motion to 2 confederates) come with me and I will give you a place to sit in nearby rooms.

You can find me _(right outside in the hallway/in room #_)__. Feel free to come ask me if you have questions. When you’re done, please bring me your completed questionnaires. While you’re filling these out, I will calculate the total number of raffle tickets each of you earned today.

**Confederates A and B:** Go hide in a research room until the participant has left the 4th floor

**Experimenter: Collect Participant Questionnaires and Debrief. Say:**
You’re finished with the study! Please follow me so that I can debrief you about the purpose of the study.

• Points to emphasize:
  o We were interested in how anxiety is related to how people feel in cooperative or competitive environments
  o Participants do have a chance of winning the $100 gift card, but chances are NOT actually related to how they performed today. Everyone has the same chance.
  o Please do not share information with your friends or classmates about this study (except for to tell them it’s fun and they should participate!).
  o They can contact Laura Bruce with any questions

• Do NOT say:
  o Anything about the confederates

**Experimenter: Make sure data entered into database**

• Give participant packet to a confederate to enter into the database, or if both confederates had to leave right after the study, enter it yourself.
  o Find Subject Number and SIAS score in the participant sheet
  o Remainder of data comes from BSAMs and post-packet
  o Paperclip consent to front of packet and BSAMs, and write subject number on the top of the consent.
  o File paperwork in “completed packets” in drawer in 426.