Cogn Ther Res (2009) 33:375–389
DOI 10.1007/s10608-008-9203-0

ORIGINAL ARTICLE

"To Avoid Evaluation, Withdraw": Fears of Evaluation and Depressive Cognitions Lead to Social Anxiety and Submissive Withdrawal

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Published online: 8 August 2008

Abstract We propose a cognitive model of social anxiety-related submission based upon psycho-evolutionary accounts of social anxiety and depression and present results of two studies supporting this model. We tested a confirmatory factor model consisting of three latent lower-order factors (fear of negative evaluation, fear of positive evaluation, and depressive cognitions), all of which load onto a single latent higher-order *submissive cognitions* factor. In essence, we propose that the symptoms associated with social anxiety and depression (in part) served adaptive functions for coping with social threats in the ancestral environment and that the cognitive symptoms associated with these disorders may function collectively as integrated components of a social anxiety-related submission mechanism. Confirmatory factor analysis indicated that the hypothesized model fit well. A score derived from the submissive cognitions factor correlated strongly with social anxiety-related measures and less strongly with measures of generalized anxiety/worry in Studies 1 and 2. Furthermore, this submissive cognitions score correlated in the expected direction with self-report measures of social comparison, negative affect, and positive affect in Study 2, and mediational analyses indicated that submissive cognitions may mediate the relationship between social comparison and submissive behaviors. Findings from both studies provide support for the proposed model.

Keywords Social anxiety disorder · Depression · Submissive behavior · Psycho-evolutionary theory

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A high level of comorbidity exists between social anxiety disorder and depression (e.g., Kessler et al. 1999; Magee et al. 1996), with recent evidence showing that, relative to social anxiety disorder, generalized anxiety disorder is the only anxiety disorder to have a stronger relationship with unipolar mood disorders (Kessler et al. 2005). Furthermore, structural models have underscored dimensional similarities between social anxiety and depressive symptoms (e.g., see Brown et al. 1998). Psycho-evolutionary models, which describe ways that current human behavior is rooted in adaptations to previous environments (Krebs 2003), provide one way of examining the overlap between anxiety and depression. We review such models below; in short, they suggest that social anxiety and depression should overlap because their functions in ancestral environments were similar.

Ethological/Psychobiological Model of Social Anxiety Disorder

Gilbert (2001) and colleagues (e.g., Trower and Gilbert 1989; Trower et al. 1990) have proposed a comprehensive

psycho-evolutionary model of social anxiety disorder. According to this model, humans appraise internal and external cues during social interactions. When a discrepancy between social cues and internal standards arises, a coping system is activated, and behaviors selected to reduce the discrepancy are employed. The situation is then re-evaluated by an appraisal system via a continuous feedback loop. In other words, human beings are self-regulating in terms of their social behavior (e.g., Carver and Scheier 1998). According to this model, an important component of self-regulation is *social comparison*, which facilitates the formation of dominance hierarchies because evaluation of whether one is *relatively* strong or weak depends on the comparison of self to others (Allan and Gilbert 1995).

Gilbert (2001) and colleagues (Trower and Gilbert 1989) further suggest that self-regulation is driven by two separate psychobiological systems: the defense system, which responds to cues regarding dominance and competitiveness (in part via social comparison-based evaluations), and the safety system, which responds to cues indicating cooperation. Trower and Gilbert (1989) propose four goals of the defense system, which they hypothesize has a specific relationship to social anxiety. The primary goal is to achieve the dominant position in social interactions. However, because socially anxious individuals have low expectancies for achieving this goal, they substitute a second-level goal of avoiding harm/rejection by the dominant. This submissive strategy then leads to further re-evaluation of the situation. If, at this stage, the socially anxious individual perceives that submissive behavior is also unlikely to be successful, further adjustment is made to the third-level goal of avoiding perceived threat from the dominant by utilizing a strategy of escape or avoidance (e.g., through the responses of fight, flight, freeze, and avoidance of others).

If, however, all three higher-level strategies are unsuccessful, socially anxious individuals may adopt a fourth-level state of resignation or despair, in which depression is experienced and a stance of helplessness is adopted (Trower and Gilbert 1989). Trower and Gilbert (1989) propose that individuals who adopt this fourth-level option "give up altogether in a state of defeat and depression, and thereby give up the survival struggle" (p. 27). However, this option is also consistent with psycho-evolutionary models of depression, including *social competition* models (see Allen and Badcock 2003, for a review of psycho-evolutionary models of depression, including social competition models), which propose that depressive symptoms can serve an adaptive function within particular social contexts (e.g., Gardner 1982, 2001; Price et al. 1994). We turn to the potentially adaptive functions of depressive symptoms below; first, we briefly review findings regarding cognitive aspects of social anxiety.

Fear of Evaluation as a Core Feature of Social Anxiety

Cognitive-behavioral models of social anxiety disorder have described fear of evaluation as a core feature of the disorder, whether the evaluation is negative (e.g., Clark and Wells 1995; Rapee and Heimberg 1997) or positive (e.g., Weeks et al. 2008a, b) in nature. With respect to fear of negative evaluation (FNE), individuals with social anxiety disorder assume that others are inherently critical and therefore likely to evaluate them negatively (e.g., Leary et al. 1988). Socially anxious individuals form a biased image or mental representation of themselves as seen by others and focus their attentional resources in part on the aspects of the image that are potentially negative. They also continuously monitor the social environment for indicators of negative evaluation (Rapee and Heimberg 1997). In support of Rapee and Heimberg's model of social anxiety, individuals with social anxiety disorder report negative mental representations of their appearance and behavior, particularly in anxiety-evoking social situations (e.g., Coles et al. 2001; Hackman et al. 1998).

Recent findings suggest that fear of positive evaluation (FPE) is also an important cognitive feature of social anxiety (Weeks et al. 2008a, b). FPE correlates strongly with public scrutiny fear and social interaction anxiety (Weeks et al. 2008a, b) and relates more strongly to self-reported social anxiety than to self-reported symptoms of other anxiety disorders (i.e., generalized anxiety disorder, obsessive-compulsive disorder, panic disorder) in an undergraduate sample (Weeks et al. 2008b). In addition, confirmatory factor analyses suggest that FPE and FNE are independent constructs (Weeks et al. 2008a), and FPE has been shown to account for significant variance in social interaction anxiety and fear of public scrutiny beyond that already accounted for by FNE (Weeks et al. 2008a, b). Furthermore, FPE (but not FNE) predicts emotional and cognitive responses to receipt of positive social feedback (Weeks et al. 2008b).

Taken together, these findings suggest that fear of evaluation *in general* is important to social anxiety, regardless of the valence of the evaluation. In an early environment in which humans lived in a community with a relatively clear dominance hierarchy, avoiding negative evaluation would have been adaptive in avoiding conflict with people who ranked higher on the social hierarchy. However, people in such an environment would also be motivated to avoid giving such a positive impression that they would be viewed as a threat by other members of the group. We therefore propose that fears of negative and positive evaluation are cognitive mechanisms which facilitated the adaptive function of submission within competitive social contexts in the ancestral environment.

The Social Competition Model of Depression

According to the social competition model of depression, depressed mood serves as a de-escalating strategy which enables the individual to exhibit and experience defeat in ritual agonistic encounters (which involve behavioral dominance/submissive displays) and to adapt to consequential loss in social status (Gardner 1982, 2001; Price et al. 1994). In other words, depression/depressed mood results in behaviors signifying withdrawal from a fight, which minimizes the risk of physical injury or death through effectively signaling to both the self and others that one has been defeated and should no longer be considered a threat (Price 1967). In essence, a submissive display communicates the message "I am no threat to you, I will not retaliate" (Price et al. 2004, p. 2); indeed, the depressed individual takes submission even further than anxious submissive displays by communicating the message "I am too depressed to even have the capacity to express submission" (Price et al. 2004, p. 4). Thus, the social competition model of depression can be taken as a theoretical extension of Gilbert's (2001; Trower and Gilbert 1989) model of social anxiety, in which depressive behaviors are essentially a more extreme form of submission, designed to avoid harm by minimizing motivation and active social behavior.

In support of social competition models of depression, several lines of study suggest that nonverbal behaviors associated with depression include strong and specific social signals, including changes in voice tone, eye contact (Gotlib and Robinson 1982), verbal response time (Youngren and Lewinsohn 1980), and facial expression (Ellgring 1989). Furthermore, people experiencing depression communicate self-devaluation and helplessness in interpersonal communications (Biglan et al. 1985; Hokanson et al. 1980), depression is associated with self-report of submissive behaviors and withdrawal from conflicts with more powerful others (Allan and Gilbert 1997), and depressed people are less assertive than non-depressed individuals (Arrindell et al. 1990). Thus, there is empirical support for the notion that depressive behavior may be successful in reducing social threat in humans (see Allen and Badcock 2003, for a more detailed review).

A Higher-Order Cognitive Model of Social Anxiety-Related Submission

Given that psycho-evolutionary models of social anxiety disorder and depression propose that the symptoms associated with these disorders (in part) served adaptive functions for coping with social threats in the ancestral environment, the cognitive symptoms of these disorders may have functioned collectively as integrated components of a social anxiety-related submission mechanism. Thus, we hypothesize a cognitive model of social anxiety-related submission consisting of three lower-order factors: FNE, FPE, and depressive cognitions, all of which load onto a higher-order submissive cognitions factor. In this paper, we review two studies evaluating the validity of this model and examining relationships between social anxiety, submissive cognitions, submissive behaviors, social comparison, and negative and positive affect.

Study 1

Confirmatory factor analysis (CFA) was utilized to evaluate the fit of the hypothesized model. In addition, a score was derived from the obtained submissive cognitions factor, and the convergent and discriminant validity of this Submissive Cognitions Scale (SCS) score were evaluated by examining relationships between the SCS and scores on measures of social interaction anxiety, generalized anxiety disorder symptoms, and worry. Specifically, it was hypothesized that the SCS would correlate more strongly with the social interaction anxiety measure than with the measures of generalized anxiety disorder symptoms and worry.

Method

Participants

Participants were undergraduates enrolled in introductory psychology courses at either Temple University (n = 392) or the University of Houston (n = 245). To obtain two samples of optimal size for cross-validation purposes, participants from both sites were merged into a single dataset which was then randomly split into two subsamples. The majority of participants in the first subsample (n = 322) were female (74.3%). In addition, 45.1% of participants were Caucasian, 19.5% were African American, 17.2% were Asian American, 9.1% were Hispanic, 0.7% were Middle Eastern, 0.7% were Native Hawaiian, 3.0% were of other ethnicity, and 4.7% were of mixed ethnicity. Participants had a mean age of 18.79 years (SD = 2.41).

Similarly, the majority of participants in the second subsample (n = 315) were female (73.8%). In addition, 50.4% of participants were Caucasian, 13.4% were African American, 19.4% were Asian American, 8.9% were Hispanic, 0.6% were Middle Eastern, 0.3% were Native Hawaiian, 3.5% were of other ethnicity, and 3.5% were of mixed ethnicity. These participants had a mean age of 18.67 years (SD = 1.85).

Measures of Fear of Evaluation

Brief Fear of Negative Evaluation-Straightforward Scale (BFNE-S: Rodebaugh et al. 2004; Weeks et al. 2005) The Brief Fear of Negative Evaluation Scale (BFNE; Leary 1983) is a 12-item self-report measure of fear and distress related to negative evaluation from others. Items are rated on a 5-point Likert-type scale, ranging from 1 (*Not at all characteristic of me*) to 5 (*Extremely characteristic of me*). Rodebaugh et al. (2004) and Weeks et al. (2005) have reported that the 8 straightforwardly worded items of the BFNE are more reliable and valid indicators of fear of negative evaluation than the reverse-scored items in both undergraduate and clinical samples, respectively. Consequently, Rodebaugh et al. and Weeks et al. suggested the scoring strategy of utilizing only the straightforward (-S) BFNE items to calculate the total score, thereby yielding an 8-item BFNE-S score. The BFNE-S has demonstrated excellent internal consistency (all αs $>$ .92), strong factorial validity, and strong construct validity in undergraduate (Rodebaugh et al. 2004) and clinical (Weeks et al. 2005) samples. The 12-item BFNE was administered; however, only the straightforward items (BFNE-S) were utilized in the present analyses. The BFNE-S demonstrated excellent internal consistency in both samples in this study (both αs $>$ .94). The items of the BFNE-S were included in the present study to serve as indicators for the lower-order FNE factor in the hypothesized cognitive model of social anxiety-related submission.

Fear of Positive Evaluation Scale (FPES; Weeks et al. 2008a) The 10-item FPES uses a 10-point Likert-type rating scale, ranging from 0 (*not at all true*) to 9 (*very true*). Two reverse-scored items are included but are not utilized in calculating the total score. The FPES has demonstrated strong internal consistency (all αs $>$ .80) and 5-week test-retest reliability (intraclass correlation coefficient = .70) in undergraduate samples. Furthermore, the FPES has demonstrated strong factorial and construct validity in several undergraduate samples (Weeks et al. 2008a, b). The FPES demonstrated good internal consistency in both subsamples in this study (both αs $>$ .80). The items of the FPES were included in the present study to serve as indicators for the lower-order FPE factor in the hypothesized higher-order cognitive model of social anxiety-related submission.

Measure of Depressive Cognitions

We sought to include items of a cognitive-specific depression scale as indicators for the third lower-order factor of depressive cognitions in the hypothesized cognitive model of social anxiety-related submission.

The Beck Depression Inventory-II (BDI-II; Beck et al. 1996) The BDI-II is a 21-item self-report measure of depression. Items pertain to depressive symptoms and attitudes that can be rated from 0 to 3 in terms of intensity. Arnau et al. (2001) have reported a cognitive factor comprised of 8 items from the BDI-II (henceforth referred to as the BDI-C). Although alternative cognitive-specific factors comprised of items from the BDI-II have been reported in samples of depressed patients (e.g., Beck et al. 1996; Steer et al. 1999), the factor proposed by Arnau and colleagues was deemed preferable for present purposes because their study sample was more similar to ours (e.g., a non-clinically depressed sample).[1] The BDI-C demonstrated good internal consistency in both subsamples in this study (both αs $>$ .80).

Measures Used to Examine the Construct Validity of the Submissive Cognitions Scale

Social Interaction Anxiety Scale-Straightforward Score (SIAS-S; Rodebaugh et al. 2007) The Social Interaction Anxiety Scale (SIAS; Mattick and Clarke 1998) is a measure of anxiety in dyads and groups and consists of 20 items which are scored on a five-point Likert-type scale ranging from 0 (*Not at all characteristic or true of me*) to 4 (*Extremely characteristic or true of me*). Rodebaugh and colleagues have reported that the 17 straightforwardly worded items of the SIAS are more valid indicators of social interaction anxiety than the reverse-scored items in both undergraduate and clinical samples. Consequently, Rodebaugh et al. suggested the scoring strategy of utilizing only the straightforward SIAS items to calculate the total score, thereby yielding a 17-item score, hereafter referred to as the SIAS-Straightforward (SIAS-S) score. The SIAS-S has demonstrated excellent internal consistency (α = .93) and factorial validity in undergraduate samples and construct validity in both undergraduate and clinical samples (Rodebaugh et al. 2007). The 20-item SIAS was administered to the overall sample. However, only the straightforward items (SIAS-S) were utilized in the present analyses,[2] which demonstrated excellent internal consistency in both subsamples in this study (both αs $>$ .93). The

[1] The factor analysis of the BDI-II by Ward (2006) appears definitive in establishing the structure of the instrument. However, the best-fitting model has the function of partialling a general depressive mood from the cognitive items. Although Ward is correct that the so-called cognitive items also include responses related to affect, the BFNE and FPES also include affect-related information. Use of Ward's model in our analyses would thus not only result in a model that might be too complex to be adequately estimated in our sample but also would involve treating the BDI-II items very differently than the items from the other measures.

[2] Results using the SIAS total score are available upon request and are substantively identical to the current results.

items of the SIAS-S were included in the present study to examine the relationship between submissive cognitions and social interaction anxiety.

Generalized Anxiety Disorder Questionnaire for DSM-IV (GAD-Q-IV; Newman et al. 2002) The GAD-Q-IV is a self-report measure for the diagnosis of generalized anxiety disorder (GAD) based on DSM-IV (American Psychiatric Association 1994) criteria. In a study by Newman et al. (2002), the GAD-Q-IV demonstrated adequate two-week retest reliability in an undergraduate sample, $\kappa = .64$, and 92% of the sample showed stability of diagnosis over time. Furthermore, there was adequate agreement between diagnosis on the GAD-Q-IV and diagnosis on the Anxiety Disorders Interview Schedule for DSM-IV-Lifetime Version (ADIS-IV-L; DiNardo et al. 1994), $\kappa = .67$. Support for the convergent and discriminant validity of the GAD-Q-IV is provided by the finding that the GAD-Q-IV correlates more strongly ($r = .66$) with a measure of excessive and uncontrollable worry than with a measure of PTSD symptoms ($r = .45$) or the SIAS ($r = .34$) (Newman et al. 2002). The GAD-Q-IV demonstrated good internal consistency in both subsamples in this study (both Guttman split-half coefficients $> .82$).[3] The GAD-Q-IV was utilized to examine the discriminant validity of the SCS.

Penn State Worry Questionnaire (PSWQ; Meyer et al. 1990) The PSWQ is a self-report assessment of the frequency, excessiveness, and uncontrollability of worry. Its 16 items are scored on a 5-point Likert-type scale ranging from 1 (*Not at all typical*) to 5 (*Very typical*). The PSWQ demonstrates good internal consistency in clinical and undergraduate samples (all αs $> .86$) and excellent 1-month retest reliability in undergraduate samples ($r = .93$) (Brown et al. 1992; Meyer et al. 1990). Furthermore, patients with GAD obtain higher PSWQ scores than control participants and patients with other anxiety disorders, including social anxiety disorder (Brown et al. 1992). The PSWQ demonstrated excellent internal consistency in both subsamples in this study (both αs $> .90$). The PSWQ was utilized to examine the discriminant validity of the SCS.

Procedure

In partial fulfillment of research requirements for their Introductory Psychology courses, all participants completed a battery of questionnaires which included the above measures.

[3] The Guttman split-half coefficient was utilized to calculate the internal consistency of the GAD-Q-IV due to the structure of the GAD-Q-IV response scales (see Newman et al. 2002).

Results

Means and standard deviations for participants' responses to all Study 1 questionnaires are displayed in Table 1.

Confirmatory Factor Analysis

Analytic Strategy CFA models were tested using the robust weighted least squares estimator (referred to as WLSMV) implemented in the Mplus program (version 4, Muthén and Muthén 1998–2006). The WLSMV estimator is suitable for use with categorical variables. The BDI items are clearly categorical given that the response options are presented as ordered categories, with unknown distance between categories. The BFNE items have often been treated as continuous, but it has also been argued that, due to their constrained response scale, they should be treated categorically (e.g., Rodebaugh et al. 2004). Accordingly, the BDI-C and BFNE items were treated categorically, and the FPES items were treated as continuous. In determining factor structure, global model fit was evaluated using the: (a) Tucker–Lewis incremental fit index (TLI; Tucker and Lewis 1973), (b) comparative fit index (CFI, Bentler 1990), and (c) root mean square error of approximation (RMSEA, Steiger and Lind 1980). These indices were evaluated with the aid of recommendations by Hu and Bentler (1999).

Model Results The model tested specified that the BFNE-S items loaded onto a single latent factor (i.e., *fear of negative evaluation*), FPES items loaded onto a single latent factor (i.e., *fear of positive evaluation*), and BDI-C items loaded onto a single latent factor (i.e., *depressive cognitions*); these three factors in turn all loaded onto a higher order factor (i.e., *social anxiety-related submissive cognitions*). The model is displayed in Fig. 1. In the first subsample, this model displayed good fit (CFI = .95, TLI = .98, RMSEA = .07), with all indices indicating acceptable to good fit and all factor loadings statistically significant. The model was then tested in the second subsample, in which it successfully cross-validated, showing similar fit (CFI = .95, TLI = .98, RMSEA = .08). All factor loadings were again statistically significant.

Deriving a Submissive Cognitions Scale (SCS) Score

A score was derived from the SCS factor by estimating the factor score, utilizing the obtained factor loadings for all 24 SCS items. Specifically, we first used Mplus to output a submissive cognitions factor score. This factor score could not be replicated by other researchers, however, because Mplus uses an iterative procedure to produce factor scores when variables are categorical. Therefore, to provide an approximate method of creating factor scores, we used

Table 1 Means and standard deviations of all measures in Study 1

Measure	Subsample 1		Subsample 2	
	M	SD	*M*	SD
Brief Fear of Negative Evaluation Scale-Straightforward items only	19.76	8.03	19.73	8.16
Fear of Positive Evaluation Scale	22.26	13.52	23.81	13.22
Beck Depression Inventory-Cognitive	3.71	4.05	3.57	3.72
Social Interaction Anxiety Scale-Straightforward items only	18.47	12.77	18.41	12.71
Generalized Anxiety Disorder Questionnaire for DSM-IV	5.95	3.88	5.55	3.72
Penn State Worry Questionnaire	48.87	12.60	50.55	13.78

Note: *N*s vary from 321 to 322 in subsample 1 and from 301 to 304 in subsample 2 due to missing data

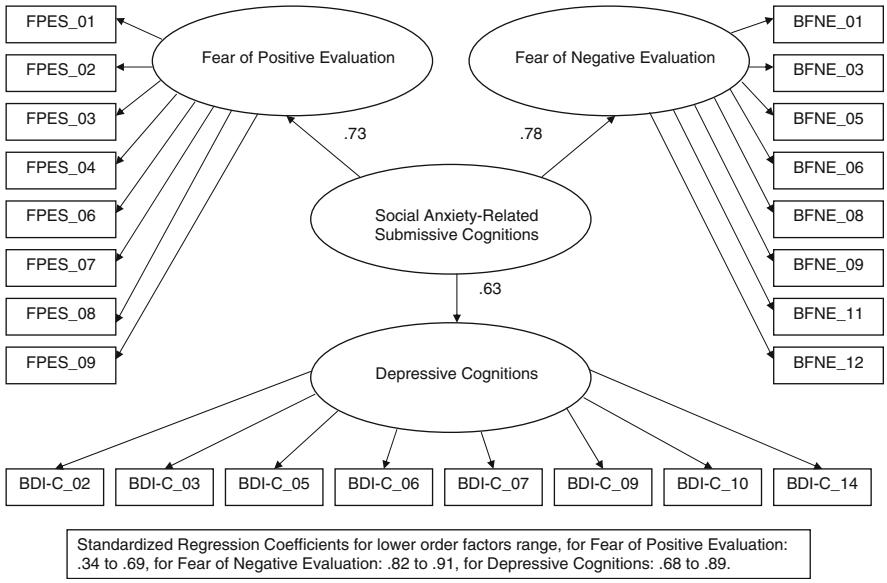

Fig. 1 Factor diagram of hypothesized higher-order model of social anxiety-related submission with standardized regression coefficients for higher-order factor loadings. BFNE = Brief Fear of Negative Evaluation Scale, FPES = Fear of Positive Evaluation Scale, BDI-C = Beck Depression Inventory-Cognitive subscale. *Note*: Residual variance terms and lower order factor loadings are not displayed for the sake of clarity; available upon request

multiple regression with the entire sample, and each item used in the CFA was entered as a predictor for the factor score. The items accounted for virtually all the variance in the factor score (R^2 = .99). Subsequent analyses used the estimated factor score,[4] calculated by weighting each item with its unstandardized regression coefficient. Coefficients are available on request and can be used to replicate our analyses in other samples without estimating CFA models.

SCS scores (subsample 1: M = 2.57, SD = 0.85; subsample 2: M = 2.56, SD = 1.15) were normally distributed (subsample 1: skewness = 0.05, SE = .30, and kurtosis = −0.46, SE = 0.59; subsample 2: skewness = 0.47, SE = .14, and kurtosis = −.38, SE = 0.28) in both subsamples, and participant responses to the SCS exhibited good internal consistency (both αs > .87).

Convergent and Discriminant Validity of the Social Anxiety-Related Submissive Cognitions Scale

The convergent and discriminant validity of the obtained SCS score was evaluated by examining relationships between the SCS and scores on the SIAS-S, GAD-Q-IV, and the PSWQ. The SCS was significantly correlated with all three of these measures in both subsamples (see Table 2). Significance tests were next conducted to determine whether SCS scores correlated more strongly with the measure of social interaction anxiety (the SIAS-S) than with the measures of generalized anxiety disorder symptoms (GAD-Q-IV) and worry (PSWQ) (Meng et al. 1992). Consistent with hypothesis, the SCS related more strongly to the SIAS-S than to either the GAD-Q-IV or the PSWQ in both samples (all zs > 2.86, all ps < .001).

[4] We also calculated z-scores of the three SCS subscales (i.e., BFNE-S, FPES, and BDI-C scores) and summed these standardized subscale scores to derive a *standardized SCS* total score. This score is less complicated to calculate; it would therefore be useful to know whether it is essentially isomorphic with the estimated SCS factor score. Indeed, it was; in both samples, the standardized SCS score significantly predicted the estimated SCS factor score, accounting for more than 96% of the variance in the estimated SCS factor scores (both overall adjusted R^2s > .96). We used the SCS factor score because of its (theoretical) greater precision, but other researchers could use the standardized score with confidence.

Table 2 Zero-order correlations of the submissive cognitions scale with convergent and discriminant measures across studies

Measure	*r*		
	Study 1, subsample 1	Study 1, subsample 2	Study 2
Social Interaction Anxiety Scale-Straightforward items only	.70*	.65*	.73*
Social Phobia Scale	–	–	.65*
Submissive Behavior Scale	–	–	.67*
Social Comparison Rating Scale	–	–	−.47*
Generalized Anxiety Disorder-Questionnaire for DSM-IV	.42*	.43*	.54*
Penn State Worry Questionnaire	.54*	.52*	–

Note: * $P < .001$; "–" measure not administered in study; *N*s vary from 321 to 322 in subsample 1 and from 301 to 304 in subsample 2 for Study 1 and from 271 to 272 in Study 2 due to missing data

Furthermore, the relationship between submissive cognitions (SCS scores) and social interaction anxiety (SIAS-S) remained large in both subsamples on controlling for GAD-Q-IV scores (both partial *r*s > .59, both *p*s < .001) and PSWQ scores (both partial *r*s > .55, both *p*s < .001); partial correlations of the SCS and GAD-Q-IV (both partial *r*s < .24, both *p*s < .001) and PSWQ (both partial *r*s < .35, both *p*s < .001) controlling for the SIAS-S are best described as small to medium-sized effects (see Cohen 1988).

Finally, in the interest of comprehensively exploring our proposed higher-order construct of submissive cognitions, we also examined the relationships between the estimated scores on the SCS lower-order factors (i.e., FNE, FPE, and depressive cognitions)[5] and each of the convergent/discriminant measures utilized in the present study. Each of the SCS sub-dimensions related positively to social interaction anxiety and exhibited more modest relationships to generalized anxiety and worry (see Table 3). Moreover, for most correlations, the relationships between the lower-order factors and the comparison measures were weaker than the relationships between the SCS scores and these measures, indicating that the findings presented in Table 2 are not due to any single sub-dimension of the SCS factor.

Study 2

Study 1 established that the SCS model fit the data well, and an SCS score derived from that model had expected properties in preliminary tests. A second study was conducted in a separate sample with the goal of further explicating relationships between social anxiety, submissive cognitions, submissive behaviors, social comparison, and positive and negative affect. Gilbert (2001) and colleagues (Trower and Gilbert 1989) propose that socially anxious individuals engage the defense system in response to social threats, detected via social comparison (Allan and Gilbert 1995), which prompts submissive behaviors as an adaptive coping response in competitive social environments. Thus, we expected that social anxiety and related submissive cognitions would be associated with social comparison tendencies and submissive behaviors. We further expected that lower social self-rankings would be associated with greater endorsement of submissive cognitions as well as the triggering of submissive behaviors, with submissive cognitions leading to a still further exacerbation of submissive behaviors.

Given that social anxiety disorder and depression are both associated with high levels of negative affect (as well as with low levels of positive affect) (Brown et al. 1998) and that the SCS represents a higher-order unifying factor for evaluative (i.e., social anxiety-related) fears and depressive cognitions, we examined relationships between the SCS, social anxiety, and negative affect to rule out the possibility that the higher-order factor identified in our confirmatory factor model from Study 1 simply reflects negative affect, as opposed to social anxiety-related submissive cognitions. Based on previously reported relationships between social anxiety, depression, and affect (Brown et al. 1998), we expected that the SCS would be positively related to negative affect and negatively related to positive affect.

Thus, hypotheses tested in Study 2 were as follows: a) SCS scores would correlate positively with self-report measures of social anxiety and a self-report measure of submissive behaviors and negatively with self-reported social self-rankings (obtained from a measure of social comparison); b) SCS scores, submissive behaviors, and social self-rankings would

[5] Estimated factor scores for the SCS lower-order factors were derived using the same general procedure utilized to derive SCS scores (see the *Deriving a Submissive Cognitions Scale (SCS) Score* section); we based our calculations on multiple regression analyses in which all items used to estimate the lower-order factor were used to predict the lower-order factor score. In each case, most of the variance of the lower-order factor score (all R^2s > .91) was predicted by the items. Subsequent analyses involving the SCS sub-dimensions used the estimated lower-order factor scores, calculated by weighting each item with its unstandardized regression coefficient obtained from the respective multiple regression analysis above.

Table 3 Zero-order correlations of estimated factor scores of the Submissive Cognitions Scale (SCS) lower-order factors with convergent and discriminant measures across studies

Measure	*r*		
	Fear of negative evaluation	Fear of positive evaluation	Depressive cognitions
Social Interaction Anxiety Scale-Straightforward items only[a]	.57*–.63*	.53*–.56*	.41*–.53*
Social Phobia Scale[b]	.50*	.57*	.49*
Submissive Behavior Scale[b]	.53*	.61*	.46*
Social Comparison Rating Scale[b]	−.39*	−.33*	−.41*
Generalized Anxiety Disorder-Questionnaire for DSM-IV[a]	.35*–.46*	.28*–.29*	.36*–.60*
Penn State Worry Questionnaire[c]	.49*–.50*	.36*–.37*	.35*–.42*
Positive and Negative Affect Schedule—Negative Affect scale[b]	.54*	.37*	.55*
Positive and Negative Affect Schedule—Positive Affect scale[b]	−.30*	−.24*	−.40*

Note: * $P < .001$; *N*s vary from 301 to 322 across subsamples for Study 1 and from 271 to 272 in Study 2 due to missing data. When ranges of correlations are presented, these represent the correlations obtained in Study 1 and Study 2

[a] Measure administered in Studies 1 and 2

[b] Measure administered in Study 2 only

[c] Measure administered in Study 1 only

account for *unique* variance in social anxiety; c) SCS scores would (at least partially) mediate the relationship between social comparison and self-reported submissive behaviors; d) SCS scores would be positively correlated with negative affect and negatively correlated with positive affect; and e) the relationship between SCS scores and measures of social anxiety would remain robust upon controlling for negative and positive affect.

Method

Participants

Participants were undergraduates enrolled in introductory psychology courses at Temple University (n = 275). The majority of the sample was female (70.6%); in addition, 55.7% of participants were Caucasian, 19.6% were African American, 9.1% were Asian American, 3.6% were Hispanic, 0.4% were Native Hawaiian or Pacific Islander, and 11.6% were of other ethnicity. Participants had a mean age of 19.63 years (SD = 2.89).

Measures

All participants in the second study completed the FPES, BFNE-S, BDI-C, SIAS-S, and the GAD-Q-IV. All measures demonstrated good internal consistency in the present sample (all αs > .84). In addition, several other measures were administered to further assess the construct validity of the SCS (see below).

The *Social Phobia Scale* (SPS; Mattick and Clarke 1998) measures fear of public scrutiny. The scale consists of 20 items, which are scored on a 5-point Likert-type rating scale ranging from 0 (*Not at all characteristic or true of me*) to 4 (*Extremely characteristic or true of me*). The SPS has demonstrated strong internal consistency in clinical, community and undergraduate samples (αs range from .89 to .94) (Mattick and Clarke 1998), and adequate retest correlations have been reported (r = .66) in a sample of undergraduates (Heimberg et al. 1992). Furthermore, Mattick and Clarke (1998) demonstrated that scores on the SPS adequately discriminate among patients with anxiety disorders (social anxiety disorder, agoraphobia, simple phobia), and between individuals with social anxiety disorder and various control groups. The SPS was utilized in Study 2 to examine the convergent validity of the SCS. The SPS demonstrated excellent internal consistency in the present sample (α = .93).

The *Submissive Behavior Scale* (SBS; Gilbert and Allan 1994) is a 16-item self-report measure that assesses involuntary submissive behaviors. The SBS was designed to explore the relationship of evolved mental mechanisms of social rank to psychopathology and psychobiological features and is derived from an earlier list developed by Buss and Craik (1986). The SBS has demonstrated adequate internal consistency in both clinical (α = .82) and nonanxious control (α = .74) samples (Schneier et al. 2007). Furthermore, a strong correlation has been demonstrated between SBS scores and scores obtained on a clinician-administered measure of social anxiety, and patients with generalized social anxiety disorder obtained higher SBS scores than nonanxious controls (Schneier et al. 2007). The SBS demonstrated good internal consistency in the present sample (α = .86).

The *Social Comparison Rating Scale* (SCRS; Allan and Gilbert 1995) is an 11-item self-report measure that assesses social comparison (i.e., comparing oneself to others) tendencies, with lower SCRS scores reflecting lower social self-rankings. In addition to a total score, the SCRS yields three subscale scores assessing: social rank (e.g., *inferior* vs. *superior*), social group fit (e.g., *outsider* vs. *insider*), and social attractiveness (e.g., *unattractive* vs. *more attractive*). However, because no hypotheses of the present study pertained to the distinction between the various dimensions of social comparison assessed by the SCRS subscales, only the SCRS total score was utilized. The SCRS has demonstrated adequate internal consistency in both undergraduate (α = .91) and clinical (α = .88) samples (Allan and Gilbert 1995). Consistent with theoretical models of social comparison, negative correlations have been reported between scores on the SCRS and various self-report indices of psychopathology (indicating that lower social self-rankings are associated with increased psychopathological symptoms); furthermore, clinical participants obtain lower social comparison scores than undergraduates (Allan and Gilbert 1995). The instructions of the SCRS were modified for the purposes of the present study, specifying that respondents rate how they generally compare themselves to *others of the same gender* (as opposed to *others*), as we expected that social comparison tendencies would vary systematically by gender (e.g., we expected that males would be more concerned about their strength relative to *other males* rather than *others in general*). The modified SCRS demonstrated excellent internal consistency in the present sample (α = .94).

The *Positive and Negative Affect Schedule* (PANAS; Watson et al. 1988) is comprised of two 10-item scales designed to assess positive affect and negative affect, respectively. The PANAS scales may be administered with different temporal instructions, including "right now" and "today." Using these administration instructions, the scales have demonstrated excellent internal consistency (all αs > .85) and are largely uncorrelated (both *r*s < −.15). Furthermore, the positive affect scale has demonstrated positive correlations with items assessing pleasant states (e.g., joyful, pleasant, self-confident), whereas the negative affect scale has demonstrated positive correlations with measures of depression, general distress, and general dysfunction (Watson et al. 1988), providing support for convergent validity. The PANAS instructions were modified for the present study, specifying that respondents rate the extent to which they tend to experience each of the feelings in question *while interacting with others in general*. Thus, social interaction-specific affect ratings were obtained. Each of the modified PANAS subscales demonstrated good internal consistency in the present sample (both αs > .87).

Procedure

In partial fulfillment of research requirements for their Introductory Psychology course, all participants in the second study completed the above measures.

Results

Means and standard deviations for participants' responses to all Study 2 questionnaires are displayed in Table 4.

Preliminary Analyses

SCS scores (*M* = 2.61, SD = 1.02) were normally distributed (skewness = 0.42, SE = .15; kurtosis = −.20, SE = 0.30) in this sample, and participant responses to the SCS exhibited good internal consistency (α = .88).

Convergent Validity

The convergent validity of the SCS was evaluated in this sample by examining relationships between the SCS and scores on the SPS, SIAS-S, SBS, and SCRS. Consistent with hypothesis, the SCS was significantly and positively correlated with both social anxiety measures and the SBS

Table 4 Means and standard deviations of all measures in Study 2

Measure	*M*	SD
Brief Fear of Negative Evaluation Scale-Straightforward items only	19.36	7.05
Fear of Positive Evaluation Scale	24.68	13.28
Beck Depression Inventory-Cognitive	3.66	4.28
Social Interaction Anxiety Scale-Straightforward items only	20.67	12.21
Social Phobia Scale	18.78	13.57
Submissive Behavior Scale	25.60	9.03
Generalized Anxiety Disorder-Questionnaire for DSM-IV	3.53	2.87
Social Comparison Rating Scale	62.15	18.32
Positive and Negative Affect Schedule—Negative Affect scale	21.90	7.18
Positive and Negative Affect Schedule—Positive Affect scale	34.22	6.87

Note: *N*s vary from 271 to 272 due to missing data

and negatively correlated with the SCRS (see Table 2). Furthermore, we examined the relationships between the estimated scores of the SCS lower-order factors (i.e., FNE, FPE, depressive cognitions) and each of the convergent measures. As in Study 1, each of the SCS sub-dimensions related as expected to all convergent measures, albeit generally more weakly than the SCS (higher-order) factor score (see Table 3).

Discriminant Validity

The SCS correlated significantly with the GAD-Q-IV (see Table 2). However, a significance test was conducted to determine whether the SCS correlated more strongly with measures of fear of public scrutiny (the SPS) and social interaction anxiety (the SIAS-S) than with the GAD-Q-IV (Meng et al. 1992). Consistent with hypothesis and with findings from Study 1, the SCS related more strongly to both social anxiety measures (both zs > 2.24, both ps $<$ .001) than to the GAD-Q-IV. In addition, consistent with findings from Study 1, relationships between submissive cognitions (SCS) and social anxiety (SIAS-S, SPS) remained large when controlling for GAD-Q-IV scores (both partial rs $> .57$, both ps $< .001$); partial correlations of the SCS and GAD-Q-IV controlling for the SIAS-S and SPS were medium-sized effects (both partial rs $< .42$, both ps $< .001$) (see Cohen 1988).

Furthermore, each of the estimated scores of the SCS lower-order factors (i.e., FNE, FPE, and depressive cognitions) exhibited lesser overall relationships to generalized anxiety (GAD-Q-IV) than to social anxiety (SIAS-S, SPS); providing additional support for construct validity of the SCS. Again, the relationships between the lower-order factors and the comparison measures were generally smaller than those between the SCS score and comparison measures, indicating that the results presented here are not due to one of the lower-order factors alone. These relationships are displayed in Table 3.

Examining Relationships Among Social Anxiety, Social Comparison, and Submissiveness

Two standard regression equations were conducted to examine whether (a) fear of public scrutiny and (b) social interaction anxiety were positively predicted by submissive cognitions and submissive behaviors and negatively predicted by social comparison ratings. As hypothesized, all three independent variables were significant predictors of fear of public scrutiny, $F(3, 252) = 134.63$, $P < .001$, and social interaction anxiety, $F(3, 252) = 78.78$, $P < .001$ (see Table 5). These effects were very large (both f^2s > 0.92) (Cohen 1988).

Mediational Analysis

We next tested a mediational model with SCRS scores as the predictor variable, SCS scores as the mediator, and SBS scores as the outcome variable.[6] This model is displayed in Fig. 2. The mediational model was evaluated using two methods. First, we utilized procedures outlined by Baron and Kenny (1986), who recommend testing three separate regression equations for evaluating mediational models: 1) regressing the mediator on the predictor variable; 2) regressing the outcome variable on the predictor variable; and 3) regressing the outcome variable on both the predictor variable and the mediator. Accordingly, mediation is established if: a) the predictor variable is related to the mediator in the first equation and the outcome variable in the second equation, b) the mediator is related to the outcome variable in the third equation, and c) the magnitude of the relationship of the predictor variable to the outcome variable is less in the third equation than in the second equation. Moreover, complete mediation is demonstrated if the predictor variable is unrelated to the outcome variable when the mediator is controlled, whereas partial mediation is demonstrated if the magnitude of this relationship is reduced when the mediator is controlled. Second, the strength of the indirect effect was assessed using Sobel's (1982) test.

Consistent with hypothesis, upon entering SCRS scores into the first regression equation predicting SBS (path c), the regression coefficient indicated that perception of one's social ranking in comparison to others within a social context was significantly and negatively related to submissive behaviors (i.e., lower social self-rankings predicted an increase in submissive behaviors) ($B = -.20$, SE $= .03$, $pr = -.41$, $P < .001$).[7] When SCRS scores were entered into the second regression equation predicting SCS (path a), the regression coefficient indicated that perception of one's social ranking in comparison to others within a social context was also significantly and negatively related to submissive cognitions (i.e., lower social self-rankings predicted an increase in submissive cognitions) ($B = -.03$, SE $= .003$, $pr = -47$, $P < .001$). Upon controlling for submissive cognitions, the predictive effect of social comparison for submissive behaviors was no longer significant (path c': $B = -.04$, SE $= .03$, $pr = -.11$, $P = .08$), whereas the predictive power of submissive cognitions was strong

[6] It should be noted that mediation cannot be truly demonstrated in cross-sectional (as opposed to longitudinal) designs, as such designs preclude the testing of temporal/causal patterns (e.g., see Kraemer et al. 2001). We include these analyses because mediational analyses conducted within cross-sectional samples can provide preliminary support for putative mediational relationships.

[7] Because the regression equations recommended by Baron and Kenny (1986) do not produce standardized regression coefficients, partial correlation (pc) coefficients were provided for comparison on a common metric.

Table 5 Regression weights from regression analyses examining the prediction of fear of public scrutiny and social interaction anxiety by submissive cognitions, submissive behaviors, and social comparison ratings in Study 2

Variable	Social Phobia Scale			Social Interaction Anxiety Scale		
	B	SE *B*	Beta	*B*	SE *B*	Beta
Submissive cognitions	5.18	.85	.39	5.21	.66	.44
Submissive behaviors	.38	.09	.25	.41	.07	.30
Social comparison	−.14	.04	−.19	−.13	.03	−.19

Note: Adjusted R^2 = .48 for fear of public scrutiny (Social Phobia Scale) and .61 for social interaction anxiety (Social Interaction Anxiety Scale). All predictors were significant in both equations, all *p*s < .001

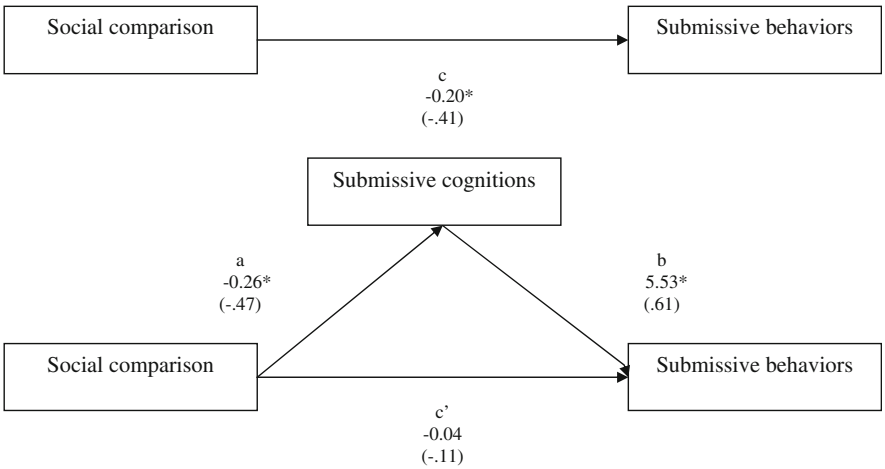

Fig. 2 Results for the hypothesized mediational model in which submissive cognitions mediate the relationship between social comparison and submissive behaviors (unstandardized regression coefficients presented with partial regression coefficients in parentheses; * $P < .01$)

(path b: $B = 5.53$, SE = 0.46, $pr = .61$; $P < .001$). The reduction in the regression coefficient for social comparison when the SCS was included in the regression equation ($B = -.20$ reduced to $B = -.04$) provides evidence of complete mediation of the relationship between social comparison and submissive behaviors by submissive cognitions. Sobel's test of the indirect effect of SCRS scores on SBS scores was also significant, $z = -6.87$, $P < .001$. Moreover, upon reversing the roles of the predictor and mediator variables, the indirect effect of this alternative model was not significant, $z = 1.69$, $P = .09$, ruling out an alternative hypothesis that social comparison mediates the relationship between submissive cognitions and submissive behaviors.[8]

Examining Relationships Between Submissive Cognitions, Social Anxiety, and Affect

As hypothesized, the SCS correlated positively with the PANAS-Negative affect subscale ($r = .60$, $P < .001$) and negatively with the PANAS-Positive affect subscale ($r = -.38$, $P < .001$). Moreover, the relationships between the SCS and fear of public scrutiny (SPS) and social interaction anxiety (SIAS-S) remained robust upon controlling for both negative (both *r*s > .47, both *p*s < .001) and positive (both *r*s > .61, both *p*s < .001) affect.[9]

[8] To examine whether the effect obtained in testing our hypothesized mediational model could be specific to certain sub-dimensions of submissive cognitions (FNE, FPE, or depressive cognitions), we tested three additional mediational models in which the estimated lower-order factor scores for (1) FNE, (2) FPE, and (3) depressive cognitions were included as separate mediator variables. The Social Comparison Rating Scale total score served as the predictor variable, and the Submissive Behavior Scale score served as the outcome variable in each of these models. Results from these additional mediational models were substantively identical to the results obtained from our hypothesized model (all Sobel's *z*s > −4.68, all *p*s < .001), with all obtained effects in the expected directions. The fact that all models are consistent with the SCS model, but not as strong, indicates that the mediation effect is not due to only one of the lower-order factors. The results from these additional models are available upon request.

[9] If our model of social anxiety-related submission is to apply to participants with clinical levels of anxiety and depression, a significant number of participants displaying such symptoms must be present in the samples utilized in the present studies. We therefore examined our samples in light of cut score guidelines provided by Heimberg et al. (1992) and Beck et al. (1996). Heimberg et al. (1992) reported that a cutoff score of 34 on the SIAS correctly classified 82% of participants with social anxiety disorder and control participants, and this cutoff score was cross-validated by Brown et al. (1997). Across our samples, 25.4% (Study 1) to 32.4% (Study 2) scored at or above this cutoff. Moreover, 12.4% (Study 1) to 12.5% (Study 2) of participants obtained BDI-II scores indicating moderate depression, and 9.4% (Study 1) to 9.9% (Study 2) obtained scores indicating severe depression. These findings provide some support for the generalizability of our findings to clinical samples of socially anxious and depressed patients.

Discussion

The primary purpose of the present studies was to propose and empirically validate a cognitive model of social anxiety-related submission. Based on psycho-evolutionary models of social anxiety (Gilbert 2001; Trower and Gilbert 1989) and depression (Allen and Badcock 2003; Gardner 1982, 2001; Price et al. 1994), a confirmatory factor model was proposed consisting of three lower-order factors (Fear of Negative Evaluation, Fear of Positive Evaluation, and Depressive Cognitions), all of which loaded onto a single higher-order (Submissive Cognitions) factor. The model demonstrated good fit and was successfully cross-validated.

The SCS correlated positively with a measure of social interaction anxiety but less strongly with measures of generalized anxiety symptoms and worry in both subsamples in Study 1. In Study 2, the SCS correlated positively with measures of social anxiety and submissive behaviors and correlated significantly more strongly with two measures of social anxiety than with the measure of generalized anxiety symptoms, providing further evidence of construct validity. Moreover, the SCS correlated significantly and in the expected direction with measures of social comparison, negative affect, and positive affect. Also, the relationships between the SCS and both social anxiety measures in Study 2 remained robust upon controlling for negative affect; this latter finding suggests that the higher-order factor identified in our hypothesized confirmatory factor model in Study 1 is not merely identical to negative affect (i.e., an alternative explanation of our CFA findings that does not involve social anxiety-related submissive cognitions). In addition, the estimated scores of the SCS lower-order factors (i.e., FNE, FPE, and depressive cognitions) related overall as expected with all convergent/discriminant measures utilized in the present studies, providing additional support for construct validity of the SCS. In addition, the relationships between the lower-order factors and these measures were somewhat weaker than the relationships between the SCS scores and the comparison measures, indicating that the findings regarding the SCS scores were not due to any single SCS sub-dimension.

Social anxiety was significantly predicted by the SCS, submissive behaviors, and lower social self-rankings in Study 2, with each of these predictors accounting for unique variance. Furthermore, we obtained preliminary support for our hypothesized mediational model in a cross-sectional sample. Specifically, the relationship between social comparison and report of submissive behaviors was mediated by submissive cognitions. These findings serve to explicate in part the mechanism(s) by which perception of one's social ranking as being *lower* relative to others in a social context may lead to an increase in both submissive cognitions and submissive behaviors and further suggest that submissive cognitions lead to increased submissive behaviors. Thus, our mediational findings are consistent with Gilbert's model of social anxiety: Believing oneself to be inferior, or lower on the hierarchy, triggers both submissive thoughts and behaviors, and the extent to which participants tend to display submissive behaviors is mediated by the degree to which they tend to experience submissive thoughts. Behaving submissively, at least in past environments, would then decrease the risk that participants would trigger the attention and possible reprisals of dominant others.

Given that measures of GAD and worry were included in the present studies as discriminant measures, the moderate-to-strong relationships between SCS scores and GAD/worry were somewhat larger than expected. Relationships between the SCS and social anxiety remained large upon controlling for GAD/worry, whereas the relationships between the SCS and GAD/worry upon controlling for social anxiety were small-to-medium effects; thus, the strength of the relationships between the SCS and GAD/worry appears attributable in part to the overlap between social anxiety and generalized anxiety symptoms. Indeed, given that the sub-dimensions of the SCS represent cognitive symptoms of social anxiety and depression, and that, of all the anxiety disorders, social anxiety disorder and generalized anxiety disorder exhibit the strongest relationships with unipolar mood disorders (Kessler et al. 2005), it seems reasonable to conclude that the moderate-to-strong relationships detected between the SCS and GAD/worry in the present studies may simply reflect symptomological/dimensional overlap across these disorders. Furthermore, our partial correlation findings also argue against the possibility that shared method variance (i.e., utilization of only self-report measures) could account exclusively for the relationships between submissive cognitions and social anxiety in the present studies.

Our findings carry implications for models of social anxiety. In the present studies, support was obtained for all psycho-evolutionary hypotheses, suggesting that social anxiety is (at least in part) associated with a psycho-evolutionary mechanism(s). Thus, as hypothesized by Gilbert (2001), social anxiety may have developed as an *adaptive* means of maximizing group affiliation during a time period when exclusion from the group would have minimized the likelihood of survival and reproductive success. In contrast, models of social anxiety disorder tend to focus on the *maladaptive* nature of social anxiety (e.g., Rapee and Heimberg 1997). This emphasis is understandable given the distress of people with higher social anxiety and the clinical focus on alleviating distress. However, support for psycho-evolutionary models suggests that researchers and clinicians may find it illuminating to approach social

anxiety disorder as a collection of symptoms of potentially *adaptive* processes that are *maladaptively* applied.

In addition, the present findings may explain, in part, the symptomological overlap and dimensional similarities previously reported between social anxiety disorder and depression (e.g., see Brown et al. 1998; Kessler et al. 1999). Namely, our findings suggest that the high rate of comorbidity between the symptoms of social anxiety disorder and depression may be due to overlap in the adaptive functions that these symptoms served in the ancestral environment. Although considerable attention has been paid to the possible precipitating events for the onset of depression and social anxiety disorder, support for psycho-evolutionary models may indicate that the onset of related disorders is triggered by the perception of threats to survival. Thus, we would suggest that researchers attend to the possibility that the events that trigger socially anxious and depressive symptoms may be related to the perception (whether conscious or not) that an event or situation has threatened survival (e.g., agonistic encounters, social exclusion).

The social competition model of depression, which is consistent with both our model of social anxiety-related submissive cognitions and the present findings, can be seen as a theoretical extension of Gilbert's (2001; Trower and Gilbert 1989) model of social anxiety. In other words, the evolved first line of defense against social threat is to submit anxiously, with complete (i.e., depressive) social withdrawal reflecting a follow-up/last-resort defensive strategy. This interpretation suggests, with respect to comorbid cases of social anxiety and depression that social anxiety would be likely to develop before depression. In support of this assertion, social anxiety disorder has an earlier average age of onset than depression in the majority of persons with both disorders (Kessler et al. 1999; Schneier et al. 1996; Wittchen et al. 1999). Further, change in social anxiety across treatment accounts for much of the change in depression, whereas change in depression has been found to account for little of the change in social anxiety (Moscovitch et al. 2005). An alternative explanation of these findings is that individuals develop major depression (and/or dysthymia) as a consequence of their social anxiety (Heimberg and Becker 2002). However, in as much as social anxiety disorder involves excessive fear of negative evaluation, persistent social anxiety should lead to increased perception of social threat, leading, in turn, to tendencies toward social withdrawal. Thus, although it is possible to construe the psycho-evolutionary explanation as an alternative to the standard implication that social anxiety disorder is depressing to live with, we believe that these points of view are entirely consistent with one another. The psycho-evolutionary viewpoint may simply detail one process through which social anxiety disorder can lead to depression.

Several limitations to the present study exist. First, the data were obtained in undergraduate samples. Although our findings provide support for our hypotheses, and cut scores on self-report measures administered here suggest that sizable percentages of our samples may have experienced clinically severe levels of social anxiety and depressive symptoms, examining the generalizability of these findings to clinical samples is an important next step. Second, it is important to extend the validation of our cognitive model through the inclusion of additional multimethod data sources, including clinician-administered measures and behavioral indicators (i.e., coding of submissive behaviors) of social anxiety and depression. Third, our measurement of positive and negative affect was specific to social situations; it is possible that measurement of general trait positive and negative affect might have yielded different results. On a related point, our intention in assessing negative affect was to rule out an alternative hypothesis regarding the nature of our Submissive Cognitions Scale (e.g., by ruling out the possibility that it could merely represent negative affect). Although our description and label of the SCS factor is consistent with the theory and the results which we present, it is also possible that there is a better way to explain the construct we examined in these studies. Thus, further tests in which general trait positive and negative affect, in addition to related traits (e.g., neuroticism and extraversion) are examined, would also be helpful in clarifying our findings. Fourth, although the mediational analyses in Study 2 provide initial support for the hypothesis that submissive cognitions mediate the relationship between social comparison and submissive behaviors, longitudinal designs are necessary to conclusively test this relationship. Fifth, further research is needed to more comprehensively evaluate the discriminant validity of our model of social anxiety-related submission. For example, future studies could examine whether SCS scores relate more strongly to measures of social anxiety disorder than to measures of anxiety disorders other than GAD, including panic disorder, obsessive-compulsive disorder, and post-traumatic stress disorder.

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