Social comparisons and social anxiety in daily life: An experience-sampling approach

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Abstract

Judgments about the self compared to internalized standards are central to theoretical frameworks of social anxiety. Yet, empirical research on social comparisons—how people view themselves relative to others—and social anxiety is sparse. This research program examines the nature of everyday social comparisons in the context of social anxiety across two experience-sampling studies containing 8,396 unique entries from 273 adults. Hypotheses and analyses were preregistered with the Open Science Foundation (OSF) prior to data analysis. Study 1 was a three-week daily diary study with undergraduates, and Study 2 was a two-week ecological momentary assessment (EMA) study with a clinical sample of adults diagnosed with social anxiety disorder (SAD) and a psychologically healthy comparison group. In both studies, social anxiety was associated with less favorable, more unstable social comparisons. In both studies, favorable social comparisons were associated with higher positive affect and lower negative affect and social anxiety. In both studies, social comparisons and momentary affect/social anxiety were more strongly linked in people with elevated trait social anxiety/SAD compared to less socially anxious participants. Participants in Study 2—even those with SAD—made more favorable social comparisons when they were with other people than when alone. Taken together, results suggest that social anxiety is associated with unfavorable, unstable self-views that are linked to compromised well-being.

General Scientific Summary

Social anxiety is characterized by persistent and excessive concerns about making an undesirable social impression. This study supports the notion that for people with social anxiety disorder, these concerns may be due to self-views of being inferior or deficient compared to others. These self-views, however, are relatively unstable, suggesting that they may be amenable to change with targeted interventions.

Keywords

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A core symptom of SAD is fear of social evaluation (DSM-5, 2013), so much so that fear of (negative) evaluation measures are sometimes used as proxies for the disorder itself (e.g., Brief Fear of Negative Evaluation Scale; Leary, 1983). People with SAD believe that when interacting with other people, they will be evaluated poorly and rejected (Hofmann & Barlow, 2002). Thus, they exert considerable effort to avoid opportunities for scrutiny (e.g., restricting self-disclosure). But what, specifically, do people with SAD fear exposing? That is—why is social evaluation so distressing?

Moscovitch (2009) proposed that the core fear for people with SAD is exposing self-attributes that they perceive as *inferior relative to other people*. He wrote:

> ...individuals with social phobia are uniquely and primarily concerned about characteristics of self that they perceive as being deficient or contrary to perceived societal expectations or norms (p. 125)

With this framework, people with SAD make unfavorable *social comparisons* (Festinger, 1954). Social comparisons involve making judgments about social information (*how is everyone else doing?*), gauging one's own standing (*how am I doing?*), and then calibrating one's own standing relative to other people's standing (*how do I compare relative to other people?*). The degree to which a person makes favorable self-evaluation depends on their judgments of other people on a given attribute.

Despite the central role of negative self-perceptions in cognitive models of social anxiety (Clark & Wells, 1995; Hofmann, 2007; Rapee & Heimberg, 1997), there is a surprising lack of empirical research on social comparisons. We know relatively little about how people with SAD compare themselves to other people, including how these judgments change over time and their links to daily emotional experiences. To this end, in our research, we examined the nature of everyday social comparisons in the context of social anxiety across two experience-sampling (ESM) studies.

An Evolutionary Framework of Social Comparisons in Social Anxiety

For most primates, group cohesion is maintained by members recognizing and acting in accordance with their role in a social hierarchy (see Tone et al., 2019 for an overview). Two psychological systems govern this social order: social rank (a focus on power and dominance) and affiliation (a focus on reciprocity and intimacy). The primary goal of the social rank system is to monitor the social hierarchy for potential dangers when trying to access finite resources (e.g., food, allies, romantic partners). The primary goal of the affiliation system is to facilitate social connectedness and intimacy. Effective social functioning depends on group members' ability to flexibly shift between social rank and affiliative modes in response to changing situational demands.

Gilbert and colleagues (Gilbert, 2001, 2014; Trower & Gilbert, 1989) suggest that social anxiety is an adaptive mechanism that maintains social order via the social rank system. Thousands of years ago, when humans lived within tight-knit social groups with limited access to information and healthcare, group membership was required for survival. Ostracism increased the probability of death. Accordingly, it behooves people to monitor

their status within the social hierarchy to ensure they are not violating norms that could lead to being ousted from their social group. Social anxiety protects against social rejection by increasing attention to signs of social threat (e.g., disapproval) and concern for social acceptance (e.g., rejection sensitivity), which facilitates behavioral modifications to avoid challenging more dominant group members (e.g., submissive behaviors) (Trower & Gilbert, 1989). When functioning as intended, social anxiety helps maintain social hierarchies and decrease stress among group members (Sapolsky, 2005).

People with elevated social anxiety over-utilize the social rank system and under-utilize the affiliation system (e.g., Aderka et al., 2013; Peschard et al., 2019). Social rank theory suggests that people with concerns about undesirable self-attributes perceive themselves as lower in social rank (Gilbert, 1992, 2000). When encountering more dominant group members, lower status individuals believe they are unlikely to achieve the social rank system's primary goal of maximizing resources because they cannot compete with higher status individuals who have more power and thus greater access to finite resources; therefore, they defer to a secondary goal of the social rank system: avoid social rejection, and ultimately, losing resources (Aderka et al., 2009). People with elevated social anxiety view interpersonal situations as more competitive than affiliative (Tone et al., 2019) and overestimate the likelihood of rejection (Leary & Jongman-Sereno, 2014). They vigilantly scan for signs of social threat and show elevations in threat detection of ambiguous stimuli (e.g., Gilboa-Schechtman et al., 1999). They engage in submissive social behaviors to avoid rejection because they perceive themselves as lower in social status ("involuntary subordinate self-perception" - Gilbert, 1992; Weeks et al., 2011). This is consistent with Moscovitch's (2009) framework, where social rejection is feared because of self-attributes perceived as deficient relative to others. In both models, the core assumption is that people high in social anxiety make unfavorable social comparisons about self-attributes.

A small body of research offers preliminary support. In two survey studies, trait social anxiety symptoms were associated with less favorable social comparisons (Aderka et al., 2009; Gilbert, 2000). These results were replicated in a survey study, where people diagnosed with SAD reported less favorable social comparisons than people with other anxiety disorders and psychologically healthy controls (Weisman et al., 2011). In an experimental study, college undergraduates were randomly assigned to read (bogus) accounts of either high achieving or "normative" achieving fellow students (Mitchell & Schmidt, 2014). Across both conditions, trait social anxiety symptoms were associated with a more negative appraisal of one's own personality compared to the study proxy. Taken together, people with elevated social anxiety are more likely to make less favorable social comparisons than those low in social anxiety.

Social Comparisons and Emotional Well-being

Beyond the favorability of social comparisons, there are important questions to answer about the emotional impact of social comparisons. Self-enhancement theories suggest that people compare themselves to lower status targets ("downward social comparisons") to feel better about their current situation (e.g., Wills, 1981; Wood et al., 1985). Downward social comparisons can be a form of coping with stressors, colloquially referred to as "at least"

statements (e.g., "at least I am not as impaired as those people"). One study found that breast cancer patients benefited when they made strategic downward comparisons, such as "There are days when I look in the mirror and I am upset with the scar under my arm and I think to myself, 'You are upset with that; how would you feel with a mastectomy scar?'" (Wood et al., 1985, p.1174). Indeed, downward social comparisons are associated with higher positive and lower negative affect (and greater life satisfaction and self-esteem; Dufner et al., 2019; Zell et al., 2020; see also Alicke & Govorun, 2005). The psychological benefits of perceived higher social status might explain the "better-than-average effect"—despite the mathematical fact that only half of a given population can be above average on any characteristic (assuming a normal distribution); a recent meta-analysis of nearly 1 million people found that people tend to rate self-attributes as above average (Zell et al., 2020).[1]

Social comparison favorability may also relate to social anxiety. Based on Moscovitch's (2009) and Gilbert's (Gilbert, 2001, 2014; Trower & Gilbert, 1989) models, fear of negative social evaluation is a consequence of perceived self-deficiency. As such, we would expect more unfavorable social comparisons to be related to greater social anxiety, even among those low in social anxiety (e.g., Hirsch et al., 2006). For people with elevated social anxiety, who are vigilant to loss of social standing (Gilboa-Schechtman et al., 1999), links between unfavorable social comparisons and negative emotional experiences might be especially strong. Although no study has tested this hypothesis with social comparisons, research on broader negative self-perceptions offers ancillary support. Negative self-perceptions are associated with greater negative emotionality in people with SAD than in healthy controls (e.g., Goldin et al., 2009), partially explain relationships between trait social anxiety with lower positive affect (Alden et al., 2008), and contribute to greater social anxiety for people with SAD than healthy controls (Hirsch et al., 2003). Taken together, this research suggests that social comparison favorability is positively associated with positive affect and negatively associated with negative affect and social anxiety, and this relationship is stronger for people with elevated social anxiety symptoms relative to those with lower social anxiety symptoms.

An Experience-Sampling Approach to Understanding Social Comparisons

One challenge to understanding the nature and impact of social comparisons is the time course in which they are typically studied. Most research has assessed social comparisons retrospectively using global self-report measures. Single time point questionnaires lack sensitivity to fluctuations (e.g., variability; situational differences) and potentially introduce recall bias (Shiffman et al., 2008). For social comparisons in particular, people are likely making comparisons throughout the day—consciously or not—and these comparisons may vary in favorability and influence. Indeed, one of the few ESM studies on social comparisons found that people varied considerably in favorability of social comparisons and influence of proximal emotional experiences (Wheeler & Miyake, 1992).

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[1]A smaller body of work suggests that rating oneself as relatively lower/worse at times may be beneficial (Suls et al., 2002). People may intentionally compare themselves to superior others as a form of motivation to improve. This self-improvement hypothesis suggests that upward comparisons can lead to hope and inspiration that one can attain a similar level of status (Collins, 1998; Wood, 1989).

To our knowledge, only one study has used ESM to study social comparisons and social anxiety. Antony and colleagues (2005) employed an event-contingent design, in which participants were instructed to initiate a survey response each time they drew a social comparison. Relative to healthy controls, people with SAD perceived proxies as faring better than themselves more often and to a greater degree. Following upward comparisons, people with and without SAD reported worse general affect (composite score of positive and negative affect), suggesting that rating oneself as lower in social status might adversely impact mood.

Our study builds off this work in four ways. First, we employed two types of signal-contingent designs, in which participants are prompted to make social comparisons at scheduled times each day. This approach might be advantageous over an event-contingent approach because it allows for tests of temporal relationships of social comparisons and emotional experiences (i.e., lagged analyses). Daily diary ratings (Study 1) allowed for tests of how a person's perceptions of their social status that day, as a whole, related to their affect/social anxiety, and if these perceptions predict spillover effects on mood the following day. Ecological momentary assessment (EMA) ratings (Study 2) allow for tests of how a person's social comparisons in the moment they are assessed relate to affect at the same and subsequent time points. Second, we included separate positive and negative affect ratings. Positive and negative affect are not on opposite ends of the same continuum and are best studied as separate (often inversely correlated) constructs (e.g., Tellegen et al., 1999; Watson & Tellegen, 1985). Positive affect is particularly important to distinguish from negative affect in research on social anxiety, as people with SAD display chronic and pervasive positivity deficits (Kashdan, 2007; Richey et al., 2019). Third, we included state measures of social anxiety. Social anxiety differs from general anxiety or negative affect in that it involves unique evaluative concerns and worries. Assessing state social anxiety in tandem with trait symptoms may offer greater precision into understanding relationships with social comparisons (e.g., Schulz et al., 2008). Fourth, we examined the stability of social comparisons. Research on temporal dynamics suggests that instability of emotional experiences might characterize psychological disorder (Trull et al., 2015; Wichers et al., 2015), where higher levels instability are associated with lower psychological well-being (Houben et al., 2015), mood disorders (e.g., depression—Thompson et al., 2012), and anxiety disorders (e.g., SAD—Farmer & Kashdan, 2014). In addition to stability of affect, it might be worthwhile to explore stability of people's social comparisons. Theoretical models suggest that people with SAD display unstable, uncertain self-concepts (Clark & Wells, 1995). Empirical research offers preliminary support—when describing their personality traits, people high in social anxiety reported less confidence and took longer to do so than those lower in social anxiety (Stopa et al., 2010). For research on social comparisons, it is important to examine stability by quantifying daily reports rather than global trait judgments, as self-concept ratings may be minimally related to measures indexed from repeated assessments (e.g., Kernis et al., 1992).

The Present Research

Addressing knowledge gaps in social comparisons is important for understanding social anxiety. First, experience-sampling studies can clarify if, how (e.g., concurrently vs.

prospectively), and for whom (e.g., people with SAD vs. healthy controls) unfavorable social comparisons are associated with greater social anxiety. In this way, the current studies offer an empirical test of one mechanism of cognitive (Moscovitch, 2009) and evolutionary (Trower & Gilbert, 1989) theories that suggest self-perceptions underlie social anxiety. Second, unfavorable social comparisons may perpetuate low positive emotionality, a characteristic feature of SAD (Brown et al., 1998; Watson et al., 1988) even after controlling for depression (Kashdan, 2007; Kashdan et al., 2013). Positive emotions are critical for social bonding and connectedness (Ramsey & Gentzler, 2015) and deficits may perpetuate relationship difficulties for people with elevated social anxiety (Kashdan & Roberts, 2004; Taylor et al., 2017). Findings from our research can extend social anxiety research suggesting that social rank concerns are linked with diminished positive affectivity (e.g., Weeks & Howell, 2012). Third, psychotherapeutic treatment research has shown that reductions in negative self-perceptions are correlated with changes in social anxiety symptoms (Hofmann, 2000; Hofmann et al., 2004). A stronger understanding of the nature of social comparisons (e.g., favorable to the self, stability) throughout the daily lives of people with SAD can increase precision by which negative self-perceptions are targeted in psychotherapy.

Across two studies, we examined the nature of social comparisons made in daily life and relationships with momentary affect and social anxiety. In Study 1, college undergraduates (*N*=186) completed daily diary surveys for 21 days measuring social comparisons and affect (3,837). We compared effects for people high versus low in social anxiety. In Study 2, we employed a two-week ecological momentary assessment (EMA) to examine finer-grained changes by measuring social comparison ratings and affect at five randomly selected time points throughout the day. Participants were a clinical sample of community adults diagnosed with SAD (*N*=42) and a comparison group of psychologically healthy adults (*N*=45) who completed 4,559 reports. Multilevel power simulation studies suggest that designs with at least 80 Level 2 units (e.g., participants) and 14 Level 1 units (e.g., observations) are sufficient to detect effect sizes greater than .20 (Nezlek, 2011, 2012; Raudenbusch & Liu, 2000). We preregistered our study hypotheses and analytical plan with the Open Science Foundation (OSF) prior to data analysis for this manuscript (https://osf.io/f8xw5/) and after data for both studies were collected; all analytical code is available on this project page.[2]

Study 1

Hypotheses

We hypothesized that daily social comparison favorability would be positively associated with daily positive affect and negatively associated with daily negative affect and social anxiety (Hypothesis 1); trait social anxiety would moderate within-person relationships between social comparison favorability and positive affect, negative affect, and social

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[2]Preregistration of research plans includes two broad types: preregistration of study design and preregistration of data analysis plan. We preregistered our data analysis plan (i.e., hypotheses, confirmatory analyses, exploratory analyses) after data were collected but before analyses were conducted for this manuscript. We did not preregister our study design prior to data collection. See Nosek et al. (2015) and (2018) for detailed discussions of transparent research practices.

anxiety, such that social comparison favorability would be more strongly associated with affect and social anxiety for people high compared to low in social anxiety (Hypothesis 2); and trait social anxiety symptoms would be inversely associated with social comparison stability (Hypothesis 3).

Method

Participants and Procedure

Undergraduate students were recruited from a northeastern university through an online portal. They were compensated with course credit and raffle tickets for $25 gift cards. The final sample included 186 participants (133 female) with a mean age of 24.04 years (SD = 9.14; range 18–63). Racial/ethnic composition was 57.8% White, 12.7% Latino/Hispanic, 12.1% Asian, 7.5% African American, 1.7% Middle Eastern, 1.2% Native American, and 6.9% reported "other."

Participants had to be at least 18 years of age and proficient in English. During a 1.5-hour laboratory session, participants provided informed consent and completed baseline questionnaires. Research assistants trained participants to complete daily surveys on social anxiety, affect, and social comparisons using a secure website. For at least 21 days, participants completed daily surveys each night before bed; some participants completed over 21 days to ensure three weekends of daily surveys were gathered. They received weekly reminders encouraging compliance and emphasizing confidentiality of their data.

Measures

Trait Measures.

Social Anxiety.: The 20-item Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998) measures fear and avoidance of social interactions (e.g., "I have difficulty talking with other people" and "I worry about expressing myself in case I appear awkward). Items were rated from 0=*not at all characteristic of m*e to 4=*extremely characteristic of me*. Scale validity has been established in clinical, undergraduate, and community samples (Heimberg et al., 1992; Mattick & Clarke, 1998; Rodebaugh et al., 2006). Per Rodebaugh and colleagues' (2007) recommendation, the 17 non-reverse-coded items (straightforward SIAS or SIAS-S) were retained for scoring. SIAS scores reliably discriminate between people with and without SAD (cutoff score for 17-item SIAS is 28; Rodebaugh et al., 2011).

Daily Measures.

Affect.: Affect was measured with 10 emotion adjectives from the Positive and Negative Affect Schedule—Expanded Form (PANAS-X; Watson & Clark, 1994). The PANAS-X scales exhibit good internal consistency and strong correlations with other measures of mood states. Emotions were selected to reflect the four quadrants of the emotion circumplex (i.e., high-low arousal x positive-negative valence; Russell et al., 1989). Five items measure positive affect (*enthusiastic*, *calm*, *happy*, *satisfied*, *excited*), and five items measure negative affect (*embarrassed*, *disappointed*, *bored*, *anxious/nervou*s, *sad*). Items were rated from 1=*not at all* to 7=*very much*. Averages of each subscale were computed.

Social Anxiety.: Social anxiety was assessed with a three-item state measure of social anxiety (Kashdan & Steger, 2006). The three items are drawn from validated social anxiety scales (e.g., brief fear of negative evaluation scale [BFNE]; Leary, 1983); the items are: "I am worried that I will say or do the wrong things" "I am worried about what other people think of me," and "I am afraid that others don't approve of me." This measure has demonstrated acceptable reliability in prior ESM studies with clinical (Kashdan et al., 2014) and non-clinical (Goodman et al., 2018) samples, and convergent validity via positive associations with trait social anxiety and discriminant validity via associations with experiential avoidance (Kashdan & Steger, 2006; Kashdan et al., 2014). Items were rated from 1=*not at all* to 7=*very much* and averaged together.

Social Comparisons.: The social comparison scale (SCS) measures self-perceptions of social rank on various dimensions (Allan & Gilbert, 1995). Participants are prompted to compare themselves to other people using 10-point bipolar scales. The SCS exhibits good internal consistency and demonstrates moderate to large correlations with measures of psychopathology. Four dimensions from the original SCS were chosen that are most relevant to social anxiety: *inferior-superior, incompetent-competent, left out-accepted*, and *unlikeable-likeable*.[3] At the end of each day, participants rated how they felt on each dimension relative to other people that day (e.g., "In comparison to others, today I felt [Inferior] … [Superior]). Items were presented via dimensional bipolar scales, where 1 indicated an unfavorable rating on each dimension (i.e., *inferior*; *incompetent*; *unlikeable*; *left out*) and 10 indicated a favorable rating on each dimension (i.e., *superior*, *competent*, *likeable*; *accepted*). Scores for each dimension were averaged to create one social comparison score. We chose the more parsimonious total score rather than using single-item scores for each dimension to reduce the number of tests and remain consistent with prior use of the SCS. Items demonstrated strong positive bivariate within- and between-person correlations (*r*s between persons = .82–.94; *r*s within person = .48–.68). Adequate multilevel reliability (R_{CN} = .79) suggests these dimensions can be combined into one total score.

Analyses

Variable scaling.—To aid in interpretability and comparability of regression coefficients across measures and studies with varying response scales, we POMP-scored (percent of maximum possible; Cohen et al., 1999) all continuous variables. POMP scores range from 0 (minimum possible value on the response scale) to 100 (maximum possible value on the response scale); unstandardized regression coefficients for POMP scores can be interpreted as the expected percentage increase on the criterion response scale for a 1% increase on the predictor response scale. POMP scores have interpretational advantages over standardized scores for multilevel models because it is unclear which standard deviation (i.e., between-person, within-person, overall) should be used to standardize (Nezlek, 2011, 2012).

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[3]To prevent data quality issues resulting from lengthy experience-sampling surveys (e.g., careless responding, lower compliance; see Eisele et al. 2020), we selected a subset of dimensions from the original SCS questionnaire that are most relevant to social anxiety. We selected items that reflected broader cognitive judgements rather than those seemingly focused on physicality (*unattractive-more attractive*; *weaker-stronger*; *undesirable-more desirable*) or potentially better suited for specific domains rather than daily assessment (*untalented-talented*). We also excluded dimensions that were redundant with chosen dimensions (*outsider-insider*; *different-same*).

Descriptive statistics.—All analyses were conducted in *R* (version 4.0.2; *R* Core Team, 2020). We present within- and between-person components for all bivariate correlations between daily measures. We estimated reliability for multi-item daily measures using R_{CN}, an index of the reliability of within-person variations in scale total scores (averaged across items) over time (i.e., time nested within persons; see Shrout & Lane, 2012). We also present values for between-person reliability (R_{KR}), which is an index of the reliability of average time points across all items. We computed these reliability indices using the mlr()function in the *psych* package (version 1.9.12.31; Revelle, 2019) in *R*.

Multilevel models.—To test Hypotheses 1 and 2, we fit multilevel linear models to accommodate hierarchical nesting, with days (Level 1) nested within persons (Level 2). Continuous Level 1 predictors were group-mean centered (centered within persons), continuous Level 2 predictors were grand-mean centered, and categorical variables were uncentered. We estimated models using restricted maximum likelihood (REML) in the *lme4* package (version 1.1–23; Bates et al., 2015) in *R*. For each model, we report unstandardized fixed effects coefficients and random effects variance components, along with profile likelihood confidence intervals. We also computed marginal R^2_m (proportion of the total variance explained by fixed effects) and conditional R^2_c (proportion of the total variance explained by both fixed and random effects, i.e., the variance explained by the entire model; Nakagawa & Schielzeth, 2013; Nakagawa et al., 2017) along with empirical parametric bootstrap confidence intervals. The statistics can be interpreted similarly to adjusted R^2 in single-level models (as the proportion of the variance in the response variable accounted for by modeled predictors; Johnson, 2014). In the present analyses, the random effects include only random intercepts (i.e., accounting for individual differences in response means). These individual differences likely account for a large proportion of variance in the response variable across occasions, but variation accounted for by measured person- and state-level features (i.e., the fixed effects parts of the model) are likely to be more theoretically relevant. Thus, evaluating overall predictive power of predictors should likely focus on the marginal (fixed-effects only) R^2_m. The appropriate denominator degrees of freedom for multilevel models with unbalanced clusters is unclear, so we rely on profile likelihood confidence intervals (CI) for inference (Bates, 2006); effects are statistically significant at the traditional $p < .05$ threshold if the CI excludes zero (cf. Amrhein et al., 2019).

Single-level models.—For Hypothesis 3, all variables were at the person level (Level 2), so we fit a single-level linear model predicting social comparison stability using the SIAS total score. We indexed social comparison stability using the root mean squared successive difference (RMSSD) in uncentered social comparison POMP scores (von Neumann et al., 1941).[4] RMSSD can be interpreted as a person's average difference in social comparison scores from one day to the next. Larger RMSSD indicates greater instability. For this model, we report regression coefficients and noncentral-*t* confidence intervals, along with the Pearson correlation (with Fisher *z* confidence interval) and R^2 (with empirical bootstrap confidence interval).

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[4]A typo in the analysis preregistration indicated we would use the mean squared successive difference (omitting the word "root"). The root mean squared difference is preferred because it is on the same scale as the scale scores, whereas the mean squared difference is on a squared unit scale (cf. standard deviation versus variance).

Results

Descriptive Statistics

Participants reported 3,837 daily entries that included social comparison items with an average of 20.63 entries (SD= 4.88) per participant. Only eight participants reported fewer than 10 surveys. The average SIAS score was 16.02 (SD = 10.93; POMP mean = 23.56; POMP SD = 16.08). Means, SDs, ICCs, and bivariate correlations of Study 1 daily variables are presented in Table 1.

Contemporaneous Analyses: Social Comparisons, Affect, and Social Anxiety

As predicted (Hypothesis 1), daily social comparison favorability was associated with much higher daily positive affect (b = .52 [95% CI .48, .56, t = 25.42], R^2_m = .083 [95% CI .069, .097]), much lower daily negative affect (b = −.43 [95% CI −.46, −.40, t = −25.26], R^2_m = .092 [95% CI .077, .107]), and somewhat lower daily social anxiety (b = −.28 [95% CI −.32, −.24, t = −13.10], R^2_m = .022 [95% CI .015, .028]); see Table 2.

Consistent with prior research, people with higher trait social anxiety reported somewhat less favorable social comparisons (b = −.24 [95% CI −.38, −.11, t = −3.48], R^2_m = .040 [95% CI .017, .073]); see Table 3. As predicted (Hypothesis 2), trait social anxiety moderated the relationship between daily social comparison favorability and daily social anxiety (b_{Int} = −.0033 [95% CI −.0060, −.0006, t = −2.37]; simple slopes b = −.23 at −1 SD SIAS, b = −.28 at mean SIAS, b = −.33 at +1 SD SIAS), though this effect was somewhat small. Contrary to prediction (Hypothesis 2), trait social anxiety did not substantially moderate the relationships between daily social comparison favorability and daily positive affect (b_{Int} = .0018 [95% CI −.0008, .0044, t = −1.38]; simple slopes b = .48 at −1 SD SIAS, b = .51 at mean SIAS, b = .54 at +1 SD SIAS) or daily negative affect (b_{Int} = −.0014 [95% CI −.0035, .0007, t = −1.29]; simple slopes b = −.40 at −1 SD SIAS, b = −.42 at mean SIAS, b = −.45 at +1 SD SIAS); see Table 4. Therefore, although daily social comparison favorability predicted daily positive affect and negative affect, the strength of these relationships did not differ meaningfully across levels of trait social anxiety.

Lagged Analyses: Social comparisons, Social Anxiety, and Affect

As a robustness check of the same-day contemporaneous relationships reported above, we also estimated lagged models predicting daily positive affect, daily negative affect, and daily social anxiety using previous-day social comparison favorability and criterion values. These models estimate the degree to which social comparison favorability predicts change in affect or social anxiety, while accounting for criterion autocorrelation and stable person random effects (Zyphur et al., 2020). We additionally estimated models with daily social comparison favorability as the criterion variable and previous-day social comparison favorability and affect/anxiety as predictors.[5]

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[5]We inadvertently omitted the lagged analyses from the preregistered analysis plan. This was an oversight. They are included here for consistency with Study 2 (for which the analyses *were* included in the preregistration).

Daily social comparison favorability did not predict next-day positive affect ($b = .013$ [95% CI −.038, .063, $t = 0.49$]) or social anxiety ($b = −.010$ [95% CI −.058, .038, $t = −0.41$]); see Table 5. The coefficient for social comparison favorability predicting next-day negative affect was statistically significant though small in size ($b = −.047$ [95% CI −.090, −.005, $t = −2.17$]). Next-day social comparison favorability was not substantially predicted by positive affect ($b = −.0013$ [95% CI −.030, .027, $t = −0.09$]), negative affect ($b = −.012$ [95% CI −.046, .022, $t = −0.67$]), or social anxiety ($b = −0.009$ [95% CI −.035, .018, $t = −.63$]).

Social Comparison Instability

Contrary to prediction (Hypothesis 3), trait social anxiety was not substantially related to social comparison instability ($b = .050$ [95% CI −.023, .123, $t = 1.342$]). The estimated correlation was weak with a wide confidence interval ($r = .10$ [95% CI −.05, .25]).[6]

Study 1 Discussion

Study 1 results partially supported our preregistered hypotheses. As expected, on days when participants made more favorable social comparisons, they reported higher positive affect and lower negative affect and social anxiety. Social comparison favorability also predicted lower next-day negative affect but was unrelated to next-day positive affect and social anxiety. Prospective findings are somewhat consistent with previous research demonstrating social comparisons impact how a person later feels (Wheeler & Miyake, 1992). Lagged analyses in the opposite direction showed that affect did not predict next day social comparison favorability.

Consistent with our prediction, trait social anxiety moderated the relationship between daily social comparison favorability and daily social anxiety. Relative to people with low levels of trait social anxiety, for people high in trait social anxiety, the relationship between daily social comparison favorability and daily social anxiety was slightly stronger. This finding is consistent with research demonstrating that people with elevated social anxiety feel more anxious around unfavorable social comparisons (Antony et al., 2005). Conversely, trait social anxiety did not moderate relationships between daily social comparison favorability and positive or negative affect. Participants in this sample reported relatively mild social anxiety symptoms (SIAS-S $M = 16.02$, $SD = 10.93$), with approximately 15% scoring at or above the cutoff for clinically elevated social anxiety (Rodebaugh et al., 2011). Although this is higher than what we might expect based on prevalence rates (12-month prevalence rate: 6.8%; Kessler et al. 2005), social anxiety symptoms may have not been severe enough to capture the emotional disturbances observed in people with SAD, and consequently, not alter the impact of social comparisons on positive and negative affect. Study 2 aimed to

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[6]A reviewer raised an important point that low between-person variance in social anxiety might limit the ability to detect effects. The SIAS is designed to measure symptoms indicative of SAD and reliably discriminates between people with and without SAD. An alternative way to index trait social anxiety is to average a person's daily social anxiety; this is congruent with Fleeson's (2001) model that suggests individual differences can be conceptualized as density distributions of states. Our daily social anxiety index may be better calibrated to this sample, and an ICC of .48 suggests sizable between-person variance. Thus, we conducted an exploratory follow-up analysis to examine how social comparison instability predicted average (daily) social anxiety. Consistent with our conceptual hypotheses about instability, participants who reported more unstable social comparisons reported higher social anxiety throughout the study ($b = .46$ [95% CI 0.14, 0.77, $t = 2.81$], $R^2_m = .021$).

address this limitation by assessing social comparisons in adults diagnosed with SAD and a healthy comparison group.

People with higher average daily social anxiety made more unstable social comparisons than those with lower average daily social anxiety, but this was not true of people with higher versus lower trait social anxiety symptoms. Participants in Study 1 summarized their evaluations at the end of each day, which prohibits examination of proximal predictors and consequences of momentary social comparisons. Study 2 addresses this limitation by using an EMA design where participants provide reports about their current state during the moment they receive the prompt. Because participants responded to prompts several times each day, we examined predictors and consequences of social comparisons within a single day. We also examined the stability of social comparisons within a single day to identify fine-grained fluctuations and their links with emotional well-being.

Study 2

Adults were recruited from the community and completed diagnostic interviews to identify a clinical sample of people diagnosed with SAD and a psychologically healthy control group. Participants completed five surveys each day across a two-week sampling period that assessed social comparison favorability, positive and negative affect, and social anxiety. They were also asked if they were with other people at the time of the survey, which allowed us to examine how social comparison ratings differed between social versus non-social settings.

We hypothesized that people with SAD would make less favorable (Hypothesis 4a) and less stable social comparisons (Hypothesis 4b) than healthy controls; social comparison favorability would be associated with concurrent affect (Hypothesis 5); social comparison favorability would be associated with next time point increases in positive affect and decrease in negative affect and social anxiety (Hypothesis 6a), but the reverse direction would not be significant (i.e., affect/social anxiety would be unrelated to next time point social comparison stability) (Hypotheses 6b); social comparison stability would be associated with same-day affect (Hypothesis 7); and the relationships between affect and social comparison favorability (Hypothesis 8a), and affect and stability (Hypothesis 8b) would be stronger for people with SAD than controls (i.e., moderation by diagnostic group). We preregistered exploratory analyses examining how the presence of other people when a social comparison is made (i.e., measured at the same time point) predicts social comparison favorability, and how relationships between social comparison favorability and affect/social anxiety differ when made alone versus with other people. Given the limited literature on social comparisons and social anxiety—and no prior research on the influence of other people when social comparison judgments are made—we have no a priori hypotheses and consider these analyses exploratory.

Method

Participants and Procedure

Participants were recruited from a large northeastern city and surrounding suburbs through flyers, online forums (e.g., Craigslist), and social media (Facebook, Instagram). Trained research assistants at the post-baccalaureate level conducted phone screens with potential participants. Following informed verbal consent, research assistants administered a semi-structured interview to assess for symptoms of social anxiety, generalized anxiety, depression, panic, and psychosis. Participants with evidence of social fears or the absence of mental illness symptoms were invited to a laboratory session. At this stage, inclusion criteria were daily access to the Internet on personal mobile phone, age 18 years or older, and proficiency in English; exclusion criteria were prior participation in a research study in our lab and current pregnancy (as our study included several questions about alcohol use).

After completing an initial phone screen, 111 participants attended a baseline session. In the laboratory, participants provided informed consent, completed a baseline questionnaire containing self-report surveys, and participated in a negative life events interview with a trained research assistant. Clinical psychology doctoral students administered the Structured Clinical Interview for DSM-V (SCID-5) to assess for anxiety, mood, substance, obsessive-compulsive and related, trauma and stressor-related, and psychotic disorders (personality disorders were not assessed—see DeYoung et al., 2020; Wright & Kaurin, 2020). Eligibility for the SAD group required SAD as a primary diagnosis and the absence of a psychotic disorder; eligibility for the healthy control group required absence of any current or past mental disorder. Half (N=56) of all SCIDs were randomly selected and coded; inter-rater reliability was excellent for all diagnoses (κs = .81–1.00).

Based on SCID-5 diagnoses, 45 participants qualified for the SAD group, 49 qualified for the healthy control group, and 17 were excluded. Seven eligible participants declined to participate in the ESM portion. Due to a technological glitch, baseline survey data for one participant in the SAD group was completed but never recorded and stored; however, this participant still completed the SCID and ESM portion. Given that the research questions outlined in this manuscript do not include baseline survey data, this participant was retained in analyses. Our final sample contained 42 participants with SAD and 45 healthy controls. In terms of diagnoses in the SAD group, 11 had major depressive disorder, 2 persistent depressive disorder, 9 generalized anxiety disorder, 7 alcohol use disorder, 6 post-traumatic stress disorder, 3 panic disorder, and 2 agoraphobia. Self-reported race/ethnicity was 48.3% white, 19.5% black/African American, 13.8% Asian/Pacific Islander, 6.9% Latino/Hispanic, 2.3% Arab/Middle Eastern, and 9.2% other. Average participant age was 30.3 years ($SD =$ 9.63), and 62% were female.

Doctoral students in clinical psychology trained eligible and interested participants on completing the daily surveys. Participants completed two types of surveys each day: morning and EMA survey. The morning survey was sent once per day at 9:00am. The afternoon surveys were sent 5 times per day between the hours of 12:00pm and 8:00pm. They were sent at random intervals each day, with all surveys sent at least 30 minutes apart. The morning survey contains questions about the prior day, and the EMA surveys

contain questions about the current moment. The morning surveys were not analyzed for this manuscript.

Participants were contacted four times during the study (beginning and end of the first and second weeks) to provide compliance updates including the number of surveys completed and current study earnings. Participants could earn up to $75 for their participation: $40 for the baseline session and up to $35 for the experience-sampling portion. Participants earned $0.25 for each afternoon survey, $0.50 for each morning survey, and compliance bonuses. For answering 80% or more surveys in a week, they received bonus payments of $5 bonus and $5.50 for first and second week, respectively.

Measures

Affect.—Affect was measured with 12 emotion adjectives to reflect the four quadrants of the emotion circumplex, as in Study 1. Six adjective items measured positive affect (*enthusiastic*, *content*, *joyful*, *proud*, *interested*, *relaxed*), and six items measured negative affect (*angry*, *sluggish*, *anxious*, *sad*, *irritable*, *guilty*).[7] Items were rated on a 5-point Likert scale from 1=*not at all* to 5=*extremely.* Averages of each subscale were computed. Instructions were adapted to the EMA design, such that participants were instructed to indicate how they felt "right now, in the present moment" rather than for "today."

Social anxiety.—This measure is identical to Study 1, except with similar adjustments to instructions (i.e., "Today" changed to "Right now, in the present moment"), and items were rated on a 5-point Likert scale from 1=*not at all* to 5=*extremely*.

Social comparisons.—This measure is identical to that in Study 1, except that participants were instructed with the prompt: "Right now, compared to other people, I feel…" and then provided a rating for each dimension. Again, these items were combined in a single social comparison favorability score. As with Study 1, items demonstrated strong positive bivariate within- and between-person correlations (rs between persons = .80–.97; rs within persons = .49–.69) and adequate multilevel reliability (R_{cn} = .73).

Presence of other people.—Participants responded to a single item to indicate (*yes* or *no*) if they were with another person or persons at the moment they received the prompt.

Analyses

We conducted variable scaling, descriptive statistics computation, and results interpretation as in Study 1, and the general analysis plan was similar to Study 1.

For hypotheses involving momentary social comparison *favorability* (Hypotheses 4a, 5, and 6, and corresponding components of Hypotheses 8 and 9), we fit 3-level models,

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[7]Affect items differ slightly across studies. We aimed to refine our affect measures in Study 2 by replacing highly abstract terms with more straightforward, conceptually similar albeit distinct terms. For positive affect, we used *joyful* instead of *happy*; *relaxed* instead of *calm*; and *content* instead of *satisfied*. We also wanted to capture a wider breadth of positive affect by replacing *excited* (which is conceptually similar to *joyful*) with *interested* and adding *pride*. For negative affect, we replaced *bored*, *embarrassed*, and *disappointed* with *sluggish*, *irritable*, and *angry*. Although affect measures across studies are conceptually similar, reflect the four quadrants of the emotion circumplex (i.e., high-low arousal x positive-negative valence; Russel et al., 1989), and demonstrate adequate psychometric properties, they do not include identical discrete emotions and should be interpreted accordingly.

with measurement occasions nested within days nested within persons. Lagged analyses (Hypothesis 6) predicted social comparison favorability, positive affect, negative affect, and social anxiety variable at measurement occasion t using previous occasion ($t-1$) values for social comparison favorability and affect/anxiety.

For hypotheses involving social comparison *instability* (Hypotheses 4b and 7, and corresponding components of Hypothesis 8), we fit 2-level models, with days nested within persons. We indexed social comparison instability using the within-day RMSSD of measurements taken on the same day. We included person-level mean within-day social comparison instability as a covariate to effectively person-mean-center the instability variable. For comparison with Study 1, we also computed an across-day index of social comparison instability as the RMSSD of a person's day-level mean social comparison favorability, which we examined using a single-level regression model.

For interaction models (Hypotheses 8 and 9), we included interaction terms of the proposed moderators (SAD diagnosis, presence of people) with the focal variable and each covariate in the model.

Results

Descriptive Statistics

Participants provided 4,559 reports, with an average of 52.40 reports per person ($SD = 15.24$). Participants submitted at least 1 entry on average during 13.07 of 14 study days ($SD = 2.16$). The modal number of active study days was all 14 days; 66 (75.86%) participants completed surveys on all 14 days, and only 6 participants completed surveys on fewer than 10 days (minimum 4 days). Participants completed all five EMA prompts on nearly half (44%) of the study days and at least four of five surveys 73% of study days. Means, *SD*s, ICCs, and bivariate correlations of Study 2 within-day variables are shown in Table 6.

Participants reported that they were with other people at the time of the prompt approximately half of the time (47.2%; 2152 prompts), providing sufficient data to compare prompts during social and non-social interactions.

Group Differences in Social Comparison Favorability and Instability

Hypothesis 4 predicted that people diagnosed with SAD would show lower average social comparison favorability and greater social comparison instability. As predicted (Table 7), people with SAD made much less favorable social comparisons than healthy controls ($b = -17.69$ [95% CI -23.77, -11.60, $t = -5.69$], $R^2_m = .193$ [95% CI .073, .299]). As predicted, people with SAD made less stable social comparisons than healthy controls within-day ($b = 3.03$ [95% CI 0.72, 5.43, $t = 2.57$], $R^2_m = .029$ [95% CI $-.024$, .057]) and, to a lesser degree, across-days ($b = 2.85$ [95% CI 0.17, 5.52, $t = 2.12$], $R^2_m = .039$ [95% CI .000, .159]).

Most (85.7%) participants with SAD reported at least one shift in favorability of their social comparison rating (i.e., from relatively better to worse off than others, or vice versa) from one time point to the next on a given day (compared to 53.3% of controls). Similarly, examining day-level averages, half (50%) of participants with SAD reported at least one

shift in favorability of their social comparison rating from one day to the next day (compared to 27% of controls).

Contemporaneous Analyses: Social Comparison Favorability and Instability Predicting Affect and Social Anxiety

Social comparison favorability.—Hypothesis 5 predicted that momentary social comparison favorability would predict momentary affect and social anxiety. As predicted (Table 8), social comparison favorability was strongly related to higher positive affect (b = 0.56 [95% CI 0.52, 0.60, t = 30.48], R^2_m = .059 [95% CI .045, .072]), lower negative affect (b = −0.37 [95% CI −0.39, −0.34, t = −28.13], R^2_m = .078 [95% CI .061, .092]), and lower social anxiety (b = −0.39 [95% CI −0.43, −0.36, t = −21.13], R^2_m = .037 [95% CI .026, .045]).

Social comparison instability.—Hypothesis 7 predicted that greater within-day social comparison instability would predict daily affect and social anxiety. As predicted (Table 9), on days when people were more unstable in their social comparisons, they tended to experience more social anxiety (b = 0.20 [95% CI 0.11, 0.28, t = 4.53], R^2_m = .041 [95% CI −.053, .076]). The size of this effect was small when considering how much people tended to vary in their social comparison instability across days. In a random-intercepts model predicting within-day social comparison RMSSD, the residual within-person standard deviation of RMSSD was σ_{res} = 7.06 [95% CI 6.77, 7.39]. Accordingly, on days when a person was 2 standard deviations above their mean in terms of social comparison instability (indicating an atypically tumultuous day), they tended to be 2.8 POMP points [95% CI 1.54, 3.92] higher on social anxiety. As predicted (Table 9), on days when people were more unstable in their social comparisons, they tended to experience somewhat more negative affect (b = 0.09 [95% CI 0.03, 0.15, t = 2.86], R^2_m = .064 [95% CI −.036, .116]); the magnitude of effect was approximately half the size of social comparison instability effects on social anxiety. The relationship between social comparison instability and positive affect was negligible (b = −0.09 [95% CI −0.19, 0.01, t = −1.77], R^2_m = .060 [95% CI −.040, .113]). Estimated effects of social comparison instability were smaller if we controlled for day-level mean social comparison instability, indicating that overall social comparison level and instability overlap in their contributions to predicting daily affect and social anxiety.

Moderation by SAD diagnosis.—Hypothesis 8 predicted that within-person relationships of social comparison favorability and instability would be stronger among people diagnosed with SAD than controls. As predicted (Table 10), the relationship of social comparison favorability with social anxiety was much larger among people with SAD (b_{Int} = −0.34 [95% CI −0.42, −0.27, t = −9.24]; simple slope −0.55 [95% CI −0.60, −0.50, t = −22.04]) than among healthy controls (simple slope −0.21 [95% CI −0.26, −0.15, t = −7.51]). Moderating effects were also present, though smaller, for predicting negative affect (b_{Int} = −0.12 [95% CI −0.17, −0.07, t = −4.67]; b_{SAD} = −0.42 [95% CI −0.45, −0.39, t = −24.05]; b_{NoSAD} = −0.30 [95% CI −0.34, −0.26, t = −15.49]) and positive affect (b_{Int} = 0.08 [95% CI 0.01, 0.15, t = 2.14]; b_{SAD} = 0.60 [95% CI 0.55, 0.64, t = 24.02]; b_{NoSAD} = 0.52 [95% CI 0.46, 0.57, t = 18.90]).

Contrary to predictions, SAD moderation of within-day social comparison instability relationships were smaller and had wide confidence intervals (positive affect: $b_{Int} = 0.03$ [95% CI −0.16, 0.23, $t = 0.32$]; negative affect: $b_{Int} = -0.08$ [95% CI −0.21, 0.04, $t = -1.35$]; social anxiety: $b_{Int} = 0.11$ [95% CI −0.06, 0.28, $t = 1.26$]). Moderation effects were similarly small if day-level mean social comparison favorability was controlled (Table S3). Thus, relationships between social comparison instability on affect and social anxiety tended to be similar for people with and without SAD.

Lagged Analyses: Social Comparisons, Social Anxiety, and Affect

Hypothesis 6a predicted that momentary social comparison favorability would predict affect and social anxiety later the same day. Social comparison favorability predicted slight decreases in negative affect ($b = -0.04$ [95% CI −0.08, −0.01, $t = -2.45$]); see Table 11. Contrary to predictions, lagged relationships were negligible for positive affect ($b = 0.04$ [95% CI −0.01, 0.09, $t = 1.67$]) and social anxiety ($b = -0.04$ [95% CI −0.08, 0.005, $t = -1.76$]).

Hypothesis 6b predicted that momentary experiences of affect and social anxiety would not predict same-day changes in social comparison favorability. Consistent with this hypothesis (Table 11), estimated lagged relationships of positive affect ($b = 0.009$ [95% CI −0.02, 0.03, $t = 0.70$]) and social anxiety ($b = -0.02$ [95% CI −0.05, 0.002, $t = -1.85$]) were negligible. Contrary to predictions, negative affect predicted slight subsequent changes in social comparison favorability ($b = -0.05$ [95% CI −0.09, −0.02, $t = -2.84$]), though the size of the effect was small (see Tryon, 2001, for a discussion of equivalence testing using confidence intervals).

Contrary to Hypothesis 8 (Table S4), SAD diagnosis did not moderate relationships of social comparison favorability on subsequent changes in positive affect, negative affect, or social anxiety. Lagged social comparison favorability–affect/anxiety relationships were uniformly small regardless of diagnosis. Similarly, SAD diagnosis did not appreciably moderate affect/anxiety relationships with changes in social comparison favorability; the predictive validity of affect and social anxiety for later social comparisons was small regardless of SAD diagnosis.

Exploratory Analyses: Presence of Other People

On an exploratory basis, as specified in our preregistered analysis plan, we examined how the presence of other people during the moment a social comparison was made (i.e., measured at the same time point) predicted the social comparison favorability. We found that the presence of other people was associated with slightly higher social comparison favorability (Table 12; $b = 1.35$ [95% CI 0.64, 2.07, $t = 3.70$], $R^2_m = .001$ [95% CI −.0005, .002]), meaning that people made slightly more favorable social comparisons when they were with another person or persons than when they were alone. This effect appeared to be somewhat larger among people without SAD, but the confidence interval for this interaction term was wide and included zero ($b_{Int} = -1.26$ [95% CI −2.70, 0.18, $t = -1.72$]). We also examined if the relationships between social comparison favorability and momentary affect/social anxiety differed between social versus non-social contexts. These effects were

negligible to small (positive affect: $b_{\text{Int}} = 0.07$ [95% CI 0.00, 0.14, $t = 1.99$]; negative affect: $b_{\text{Int}} = -0.04$ [95% CI -0.09, 0.01, $t = -1.51$]; social anxiety: $b_{\text{Int}} = -0.03$ [95% CI -0.10, 0.04, $t = -0.87$]); see Table 13. Three-way interactions of people presence with SAD diagnosis on these relationships were all negligible (Table S5).

Study 2 Discussion

We examined how people with SAD and psychologically healthy adults made social comparisons in real-time and links to daily well-being. Across groups, social comparison favorability was associated with higher positive affect and lower negative affect and social anxiety at the time the social comparisons were rated. Our EMA design allowed us to examine how social comparisons and affect/social anxiety prospectively relate to each other throughout the day. Using lagged analyses, we found that social comparison favorability predicted later decreases in negative affect, and negative affect predicted later decreases in social comparison favorability, although these effects were small. No prospective relationships (in either direction) were found between social comparisons and positive affect or social anxiety. In addition to within-person effects, we identified differences between people with and without SAD. People with SAD made less favorable, more unstable social comparisons throughout the day and across days. Moderation analyses found that relationships between social comparison favorability and affect/social anxiety were stronger for people with SAD than controls.

On an exploratory basis, we examined how being around other people influenced how people evaluate themselves. When participants were with another person or persons, they made more favorable social comparisons than when they were alone. This was true for people with and without SAD. In addition, the positive relationship between social comparison favorability and positive affect was slightly stronger when people were with other people than when alone, although this effect was small. Nonetheless, these are exploratory analyses and should be interpreted as such.

General Discussion

The purpose of this research program was to integrate rich social psychological research on social comparisons to understand links with social anxiety in daily life. Results from two experience-sampling studies suggest that social comparisons are relevant to the phenomenology of social anxiety. Study 1 was a daily diary study with a nonclinical sample of college undergraduates, and Study 2 was an EMA study with a clinical sample of community adults diagnosed with SAD and a psychologically healthy comparison group. In both studies, social anxiety was associated with less favorable and more unstable social comparisons. In both studies, social comparison favorability was associated with higher state positive affect and lower negative affect. Moderation analyses suggest that relationships between social comparison favorability and state affect/social anxiety differ as a function of trait social anxiety—for people higher in social anxiety symptoms (Study 1) and with SAD (Study 2), more favorable social comparisons were more strongly linked to lower social anxiety. Similar relationships were found for positive affect and negative affect in Study 2.

These results suggest that social comparisons and affect are more closely tied to each other in people with elevated social anxiety.

To determine the direction of these effects (i.e., does social comparison favorability lead to changes in affect/social anxiety, or does affect/social anxiety lead to changes in social comparison favorability?), we conducted between-day lagged analyses in Study 1 and within-day lagged analyses in Study 2. Social comparison favorability predicted slight decreases in next-day negative affect in both studies. In Study 2, we found a small bidirectional effect for negative affect, such that social comparison favorability predicted slight decreases in negative affect, and negative affect predicted slight decreases in social comparison favorability. As in Study 1, there was no evidence of influence or relationships over time between social comparisons and positive affect or social anxiety. In Study 2, we found that across people with and without SAD, social comparisons made around others were more favorable than those made alone.

Unstable Self-concepts in Social Anxiety

Cognitive models of social anxiety suggest that mental self-concepts are formed from negative beliefs about one's capabilities, personal attributes, and potential (Clark & Wells, 1995; Rapee & Heimberg, 1997). Consistent with this body of work and our a priori hypotheses, people with higher social anxiety/SAD made less favorable social comparisons. Nonetheless, negative self-concepts do not necessarily imply rigid or stable concepts. Indeed, experimental studies have successfully manipulated self-images, and these changes in self-images altered participants' levels of social anxiety (e.g., Hirsch et al., 2006; Hirsch et al., 2003). In both of the present studies, social anxiety was associated with greater social comparison instability. These results are consistent with research suggesting that people with elevated social anxiety demonstrate less self-concept clarity (Stopa et al., 2010). These findings are also consistent with experience-sampling research suggesting that people with SAD report (relatively) unstable daily cognitive and affective experiences (Farmer & Kashdan, 2014). One way to understand social comparison instability is to examine the places on the bipolar scale at which a given person deviates. For example, a person may draw unstable social comparisons at one end of the scale (e.g., always rating themselves as worse off than others, but to varying degrees) or draw unstable comparisons that fluctuate between relatively favorable and relatively unfavorable. In this study, healthy controls (and to a lesser degree in Study 1, those with lower social anxiety) reported consistently favorable social comparisons. In contrast, those with SAD (and to a lesser degree in Study 1, those with higher social anxiety), reported social comparisons that were less favorable on average. Further, those with SAD more frequently shifted between favorable (i.e., better off than others) and unfavorable (i.e., worse off than others) ratings than healthy controls.

Still, one's level of social comparison stability is not inherently good or bad. On one extreme, unstable social comparisons might indicate emotional volatility, identity disturbance, or hyperreactivity. On the other extreme, albeit less convincing, unstable social comparisons might indicate receptivity to feedback, realistic self-evaluations, or psychological flexibility. As a first step, we explored links between social comparison stability and affect. The EMA methodology in Study 2 allowed us to examine stability

of social comparison judgments each day and examine correlations with average affect and social anxiety that day. Across people with and without SAD, on days when people made more unstable social comparisons, they experienced greater social anxiety and, to a lesser degree, greater negative affect; social comparison stability was unrelated to positive affect. These findings suggest that at the daily level, relatively unstable social comparisons are linked with higher negative emotionality. These findings are consistent with research demonstrating that across days, self-esteem instability is associated with greater social anxiety, more social avoidance, and fewer social interactions (Kernis et al., 1992; Oosterwegel et al., 2001). They also fit with research suggesting that affective instability is elevated in people with SAD and other emotional disorders (Trull et al., 2015). To date, most research on instability of daily experiences has focused on affect; our research extends this work and suggests that people with SAD may also demonstrate unstable cognitive experiences and self-judgments that are linked with distress.

Social Comparisons and Affective Experiences

If social comparisons demonstrate sensitivity to change, and this sensitivity differs as a function of psychopathological symptoms, then the logical next line of inquiry is to determine how daily affective experiences are associated with those changes. In both studies, social comparison favorability was associated with higher positive affect, lower negative affect, and lower social anxiety (measured at the same time point), which is consistent with prior research (e.g., Gibbons, 1986; Marsh & Parker, 1984; Tesser et al., 1988). Similar to previous research (Antony et al., 2005), social comparisons were more strongly linked to greater social anxiety in people with elevated trait social anxiety or a SAD diagnosis. Thus, people with SAD were more fearful of others' social evaluations when they made less favorable evaluations of themselves. These findings are consistent with Moscovitch's (2009) central hypothesis that people with SAD fear social evaluation because they perceive their self-attributes as deficient and likely to cause social rejection. They are also consistent with Gilbert's (2001) social rank theory that suggests social anxiety occurs when people perceive their self-attributes as inferior and lower in social status, which leads to a hyper-focus on avoiding social rejection. Taken together, while judging oneself as relatively worse off is social anxiety provoking for most people, for those with SAD, these judgments may represent a confirmation of their core fear—that they are, in one or more ways, inferior to others—and thus exacerbate social anxiety.

These experience-sampling studies are observational, not experimental, and therefore no claims about causality can be made. Nevertheless, intensive repeated measurements allow for lagged analyses that offer insight into directionality. Across both studies, less favorable social comparisons predicted slight increases in negative affect, but not social anxiety or positive affect. Specifically, using daily diary ratings in Study 1, relatively unfavorable judgments of one's social status on a given day, as a whole, predicted slight increases in next-day negative affect. Using momentary ratings in Study 2, relatively unfavorable judgments of one's social status predicted slight increases negative affect later that day. Although these effects were relatively small, they are consistent with hypotheses and replicated across both studies and thus warrant discussion. It is possible that less favorable social comparisons have stronger emotional consequences than more favorable ones. An

unfavorable social comparison may serve as a reminder or reinforce a person's low social status. Although not a measure of rejection, it is possible that this type of social comparison signals ostracism (e.g., "I am inferior to others and therefore not worthy of group membership"), the emotional costs of which have been well documented (Williams, 2007). More broadly, our findings may be more simply explained by a negativity bias, where humans attend to and are more influenced by negative stimuli relative to positive stimuli (Cacioppo & Bernston, 1994). Despite burgeoning research on positive emotions and other "positive" experiences, many have argued that a negativity bias is evolutionarily adaptive because it draws attention to potentially threatening stimuli (e.g., Vaish et al., 2008). Although positive and negative emotions tend to be inversely correlated, they operate on separate continuums rather than opposite ends of a single continuum (e.g., Tellegen et al., 1999). Drawing a relatively unfavorable social comparison may lead to increases in negative emotions, but drawing a relatively favorable social comparison may not do the same for positive emotions. Nonetheless, despite replication in two studies, we caution against over-interpreting null effects for positive emotions and encourage future investigations.

Social Comparisons in the Presence and Absence of Others

Participants in Study 2 made more favorable social comparisons when they were with other people than when alone. In the absence of contextual information about these social interactions, we offer a parsimonious explanation: increases in social connectedness. Social scientists have long documented the fundamental need to belong and the myriad benefits of social connectedness (e.g., Baumeister & Leary, 1995). Perhaps merely being around other people leads to more favorable self-concepts, an effect similar to social facilitation findings where, under certain conditions, task performance on simple tasks is improved when around others (Uziel, 2007). It is noteworthy that this effect was true even for people with SAD. While in social interactions—the very nature of their pathology—people with SAD had more positive self-concepts than when they were alone. These findings suggest that there appears to be at least some cognitive benefit from socializing. Although people with SAD have considerable social evaluation concerns, this does not preclude them from the opportunity to derive benefits when socializing. People with SAD strive to develop and maintain intimate interpersonal relationships to the same degree as healthy adults (Goodman et al., 2019). Social situations may be both anxiety-provoking and rewarding. Moreover, a diagnosis of SAD does not mean that every social situation will be anxiety-provoking; there is considerable heterogeneity in the type and severity of feared social situations (e.g., public speaking versus interactional situations—Stein & Deutsch, 2003; structured vs. unstructured interactions—Glenn et al., 2019). It is plausible that social comparison favorability differs between and within different types of social interactions. Nonetheless, this analysis was exploratory from the outset and these explanations are only speculations. Replication across samples is necessary before drawing conclusions, including tests of specific mechanisms (e.g., social connectedness) that explain these relationships.

Clinical Considerations

While these findings offer additional support that socially anxious people have uncertain self-concepts, they also demonstrate sensitivity to change, offering potential promise as

intervention targets. Negative self-concepts depend on the availability and accessibility of relevant stimuli (Mussweiler, 2003). For someone with SAD, negative self-concepts might be more readily accessible based on how they are processing their social environment. A host of information-biases have been linked to social anxiety, including overinterpreting ambiguous stimuli as threatening (Bantin et al., 2016) and autobiographical memory biases (Morgan, 2010). Clinicians can help socially anxious clients identify the sources of information that they typically draw from when making less favorable social comparisons and determine if/how they are distorted. If these information sources appear distorted, clinicians can help clients restructure biases (cognitive-behavioral framework) and/or detach from the emotional and social implications of particular biases (acceptance and commitment framework).

Another potential intervention target could be modifying social and performance expectations. People often construct social comparisons in ways that are consistent with their expectations (Suls et al., 2002). People with elevated social anxiety overestimate the likelihood of being evaluated unfavorably and rejected (Harb et al., 2002), expectations that may be consistent with their social comparisons. Prior to entering a social situation, if they anticipate they will not be liked, they may be more likely to view themselves as relatively unlikeable; if they anticipate they will not appear competent, they may be more likely to view themselves as relatively incompetent. It is plausible that altering expectations, particularly social expectations, can alter social comparisons—or the reverse, such that altering social comparisons can alter social expectations. Cognitive-behavioral psychotherapeutic approaches for anxiety assess the validity of anxious anticipation and replace overestimations of harm with more realistic reasoning. Clinicians can help socially anxious clients modify expectations of poor social performance, which may lead to the downstream consequences of modifying social comparisons.

Limitations and Future Directions

Several study limitations warrant mention. First, participants were asked to make social comparisons at each prompt (in the moment or at the end of the day). This methodology forces participants to draw a social evaluation, which prohibits measurement of how often people spontaneously draw social comparisons. Frequency of social comparisons may provide information about a person's emotional well-being. For instance, someone with elevated social anxiety will be overly concerned about other people's evaluations, which may lead to excessive monitoring of their social behavior and attempts to decipher their standing with other people (Leary & Jongman-Sereno, 2014). A more negative self-view may increase the salience of one's social standing and lead to more frequent social comparisons. The reverse direction may also be true, where the more often a person compares themselves to other people, the less favorable they view themselves as they accumulate multiple data points of other people's superiority. Nonetheless, social comparisons likely occur rapidly and often outside of a person's conscious awareness. To best assess social comparisons in real-time, researchers must weigh the tradeoffs of methodologies that offer stable assessment of social comparison versus relying on participants to initiate prompts when they make a comparison (i.e., event-contingent responding). Second, our measure of social comparisons did not specify comparison targets.

Although a specific person or group in mind is not necessary to make a social comparison (Wheeler et al., 1997), people may evaluate themselves differently across proxies. In the broadest sense, social comparisons are people's representation of their relative social worth (Goethals et al., 1991), and specifying different targets can answer interesting questions about the information people use to make these determinations. The mechanisms underlying differences in social comparison across proxies are unclear and might depend on features of proxy (e.g., nature of relationship with proxy, importance of relationship with proxy) (Suls et al., 2002). Future investigations that differentiate between proxies should compute separate favorability and stability ratings for each proxy to understand if and how ratings differ across proxies. Third, in Study 2, we only assessed if participants were with other people and did not ask questions about the nature of the social interaction. Future research can answer numerous questions about why, under which conditions, and for whom socializing leads to more favorable social comparisons by assessing variables such as who is present, how long the interactions last, whether interactions are obligatory or freely chosen (e.g., work meeting vs. social), and who initiates the interaction. Fourth, we chose social comparison dimensions most relevant to social anxiety, but there are likely other relevant dimensions. These may be specific to a life domain (e.g., physical health), career (e.g., achievement), or general social standing (e.g., wealth, privilege). Future research can assess social comparisons across different domains, including those included in Allan and Gilbert's (1995) original work that were not assessed in this study (e.g., unattractive-attractive), by establishing a predetermined set of dimensions or asking participants to identify specific dimensions on which they compare themselves to others. Fifth, we examined social comparison favorability on a continuum, and it is possible that differences between scale points are not uniform. The extremity of social comparisons may relate to affect above and beyond the level of social comparison (Gerber et al., 2018). For example, downward comparisons about a person who is much worse off may improve mood because the rater recognizes their level of superiority; conversely, if the rater perceives themselves as only slightly better than the proxy, they might feel worse because they recognize they are not as advanced or superior as they previously thought. When a person makes a comparison with a similar other, they may feel differently about themselves than when drawing a comparison with an extreme other. Sixth, although we found some support for bidirectional effects between social comparison and negative affect, bidirectionality can be influenced by time-based designs, especially if the sampling frequency is much higher than to dynamics of interest. Given the limited number of EMA studies on social comparisons, we know little about within-day and between-day dynamics in ratings. Seventh, in Study 2, we compared people with SAD to a healthy control group, not a clinical control group. Our goal was to better understand the phenomenology of SAD and determine whether the effects in Study 1 replicated. Following these two studies, researchers can move to additional questions such as whether any effects uncovered are relevant to other emotional disorders. Although social evaluation concerns are a defining feature of SAD, other internalizing disorders may share common features relevant to social comparisons (e.g., rejection sensitivity—Marston et al., 2010). Future research can compare individuals with different mental health diagnoses to determine the degree of specificity for people with SAD. Eighth, while we chose to run and transparently report on numerous analyses to strengthen the empirical base of the theories discussed in this manuscript, one tradeoff is potential inflation of Type I error rates.

Replication is needed prior to extensive interpretation. To aid in this effort, our analytical code is freely available on OSF.

Conclusion

In his seminal theory of social comparisons, Festinger (1954) proposed that "there exists, in the human organism, a drive to evaluate his opinions and abilities" (p. 117). Nearly 70 years later, psychological scientists have produced a corpus of important insights about social cognition. These two experience-sampling studies extend this work by examining individual differences in social comparisons and their links with emotional well-being. We demonstrated that people with SAD draw potentially problematic social comparisons throughout their daily lives, characterized by relatively unfavorable and unstable self-views that are strongly linked with negative emotions. We also demonstrated that when people with SAD make less favorable social comparisons, they are especially fearful of others' social evaluations—suggesting that unfavorable social comparisons may be one contributor of daily experiences of social anxiety. These findings offer support for central assumptions of prevailing cognitive-behavioral (Moscovitch, 2009) and evolutionary (Gilbert, 2001) frameworks that suggest unfavorable self-evaluations are an important marker for social anxiety symptoms. Together, our results generate a number of intriguing questions about how social comparisons vary across individual differences in social anxiety and other emotional disturbances.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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Table 1

Study 1: Descriptive Statistics and Correlations

Variable	SC	PA	NA	SA
Social comparison favorability (SC)	—	0.39	−0.39	−0.21
Positive affect (PA)	0.45	—	−0.40	−0.06
Negative affect (NA)	−0.37	−0.33	—	0.30
Social anxiety (SA)	−0.31	−0.25	0.60	—
Mean n	20.64	20.65	20.62	21.04
$SD\ n$	4.88	4.82	4.84	4.54
Grand mean	61.64	51.78	24.65	19.80
SD of means	14.87	14.95	10.84	16.81
Pooled within-person SD	11.51	16.24	13.63	14.71
ICC	0.57	0.42	0.36	0.48
Between-person reliability (R_{KR})	0.99	0.98	0.97	0.99
Within-person reliability (R_C)	0.79	0.63	0.34	0.76

Note: ICC = intraclass correlation; between-person correlations below the diagonal; within-person correlations above the diagonal; 95% confidence intervals for between-person correlations ≈ ± .12 (all p .001), for within-person correlations ≈ ± .03 (all $p < $ .001); full confidence intervals for correlation in the online supplement.

Table 2

Study 1: Daily Social Comparison Favorability Predicting Affect and Social Anxiety

Term	Positive affect				Negative affect				Social anxiety			
	b	95% conf. int.		t	b	95% conf. int.		t	b	95% conf. int.		t
(Intercept)	51.74	49.59	53.90	47.18	24.64	23.07	26.21	30.80	19.79	17.34	22.24	15.89
SC favorability	0.52	0.48	0.56	25.42	−0.43	−0.46	−0.40	−25.26	−0.28	−0.32	−0.24	−13.10
$\tau_{00\,Person}$	14.48	13.00	16.14		10.47	9.38	11.68		16.52	14.84	18.39	
σ_{res}	15.54	15.18	15.90		12.94	12.65	13.25		16.37	16.00	16.75	
Marginal R^2	0.083	0.069	0.097		0.092	0.077	0.107		0.022	0.015	0.028	
Conditional R^2	0.510	0.463	0.559		0.451	0.408	0.500		0.515	0.467	0.571	
N people	185				185				185			
N days	3801				3796				3819			

Note. Focal parameter estimates shaded in gray; SC = social comparison; b = unstandardized regression coefficient; conf. int. = confidence (compatibility) intervals constructed using profile likelihood for b, τ, and σ and empirical parametric bootstrap for R^2; for single-level models, R^2 is adjusted R^2 and confidence intervals constructed using pivots for b and σ and bias-corrected accelerated nonparametric bootstrap; SC favorability scaled as POMP scores; τ_{00} = random effects standard deviation, σ = residual standard deviation.

Table 3

Study 1: Trait Social Anxiety Predicting Daily Social Comparison Favorability and Instability

Term	Social comparison favorability				Across-days social comparison instability			
	b	95% conf. int.		t	b	95% conf. int.		t
(Intercept)	61.20	59.05	63.34	55.90	14.20	13.04	15.35	24.22
SIAS	−0.24	−0.38	−0.11	−3.48	0.05	−0.02	0.12	1.34
$\tau_{00\,Person}$	14.01	12.51	15.61					
σ_{res}	12.74	12.44	13.05		7.64	6.87	8.50	
Marginal R^2	0.040	−0.017	0.073		0.011	0.000	0.070	
Conditional R^2	0.566	0.509	0.619					
N people	171				170			
N days	3538							

Note. Focal parameter estimates shaded in gray; SIAS = Social Interaction Anxiety Scale; b = unstandardized regression coefficient; conf. int. = confidence (compatibility) intervals constructed using profile likelihood for b, τ, and σ and empirical parametric bootstrap for R^2; for single-level model, R^2 is adjusted R^2 and confidence intervals constructed using pivots for b and σ and bias-corrected accelerated nonparametric bootstrap [zero-order $r = .10$, 95% CI = −.05, .25]; SC favorability scaled as POMP scores; τ_{00} = random effects standard deviation, σ = residual standard deviation.

Table 4

Study 1: Trait Social Anxiety Moderating Daily Social Comparison Favorability Relationships with Affect and Social Anxiety

Term	Positive affect				Negative affect				Social anxiety			
	b	95% conf. int.		t	b	95% conf. int.		t	b	95% conf. int.		t
(Intercept)	51.55	49.25	53.84	44.03	24.71	23.10	26.32	30.10	20.14	17.65	22.62	15.88
SC favorability	0.51	0.47	0.55	24.17	−0.42	−0.46	−0.39	−24.15	−0.28	−0.32	−0.24	−12.60
SIAS	−0.02	−0.17	0.12	−0.32	0.21	0.10	0.31	3.99	0.32	0.16	0.47	3.95
SC favorability × SIAS	0.002	−0.001	0.004	1.38	−0.001	−0.004	0.001	−1.29	−0.003	−0.006	−0.001	−2.37
Simple slopes for SC favorability across SIAS levels												
−1 *SD* SIAS	0.48	0.42	0.54	15.58	−0.40	−0.45	−0.35	−15.63	−0.23	−0.29	−0.16	−7.00
Mean SIAS	0.51	0.47	0.55	24.17	−0.42	−0.46	−0.39	−24.15	−0.28	−0.32	−0.24	−12.60
+1 *SD* SIAS	0.54	0.48	0.59	18.77	−0.45	−0.49	−0.40	−18.69	−0.33	−0.39	−0.27	−10.97
τ_{00} Person	14.88	13.26	16.60		10.31	9.17	11.53		16.14	14.39	18.00	
σ_{res}	15.43	15.07	15.81		12.91	12.60	13.22		16.43	16.0	16.83	
Marginal R^2	0.081	0.058	0.094		0.125	0.087	0.154		0.068	0.017	0.103	
Conditional R^2	0.524	0.473	0.574		0.466	0.418	0.518		0.526	0.474	0.583	
N people	171				171				171			
N days	3520				3515				3538			

Note. Focal parameter estimates shaded in gray; SC = social comparison; SIAS = Social Interaction Anxiety Scale; b = unstandardized regression coefficient; conf. int. = confidence (compatibility) intervals constructed using profile likelihood for b, τ, and σ and empirical parametric bootstrap for R^2; for single-level models, R^2 is adjusted R^2 and confidence intervals constructed using pivots for b and σ and bias-corrected accelerated nonparametric bootstrap; SC favorability scaled as POMP scores; τ_{00} = random effects standard deviation, σ = residual standard deviation.

Table 5

Study 1: Lagged Analysis: Predicting Next-Day Affect, Social Anxiety, and Social Comparison Favorability

Term	Positive affect				Negative affect				Social anxiety			
	b	95% conf. int.		t	b	95% conf. int.		t	b	95% conf. int.		t
Predicting next-day affect/anxiety												
(Intercept)	51.89	49.71	54.06	46.87	24.32	22.71	25.93	29.70	19.55	17.06	22.04	15.43
Lagged SC favorability	0.01	−0.04	0.06	0.49	−0.05	−0.09	−0.005	−2.17	−0.01	−0.06	0.04	−0.41
Lagged affect/anxiety	0.14	0.10	0.18	6.94	0.10	0.06	0.14	5.08	0.10	0.06	0.14	5.32
τ_{00} Person	14.36	12.84	16.06		10.49	9.34	11.76		16.62	14.89	18.56	
σ_{res}	16.40	15.98	16.82		13.79	13.44	14.15		16.48	16.06	16.90	
Marginal R^2	0.011	0.004	0.016		0.010	0.003	0.014		0.005	0.001	0.008	
Conditional R^2	0.440	0.386	0.495		0.372	0.320	0.423		0.507	0.451	0.564	
N people	184				184				184			
N days	3133				3127				3168			
Predicting next-day social comparison favorability												
(Intercept)	61.99	59.82	64.16	56.08	61.98	59.81	64.15	56.12	61.99	59.82	64.16	56.08
Lagged SC favorability	0.15	0.12	0.19	8.18	0.15	0.11	0.19	7.86	0.15	0.12	0.19	8.53
Lagged affect/anxiety	−0.001	−0.03	0.03	−0.09	−0.01	−0.04	0.02	−0.67	−0.009	−0.04	0.02	−0.63
τ_{00} Person	14.63	13.15	16.29		14.62	13.14	16.28		14.63	13.15	16.29	
σ_{res}	12.06	11.76	12.38		12.07	11.78	12.38		12.06	11.76	12.38	
Marginal R^2	0.010	0.004	0.014		0.010	0.005	0.014		0.010	0.004	0.014	
Conditional R^2	0.599	0.549	0.652		0.599	0.548	0.656		0.599	0.549	0.652	
N people	184				184				184			
N days	3135				3131				3135			

Note. Focal parameter estimates shaded in gray; SC = social comparison; b = unstandardized regression coefficient; conf. int. = confidence (compatibility) intervals constructed using profile likelihood for b, τ, and σ and empirical parametric bootstrap for R^2; SC favorability scaled as POMP scores; τ_{00} = random effects standard deviation; τ_{00} = random effects standard deviation, σ = residual standard deviation.

Table 6

Study 2: Descriptive Statistics and Correlations

Variable	SC	PA	NA	SA
Social comparison favorability (SC)	—	0.42	−0.40	−0.32
Positive affect (PA)	0.73	—	−0.46	−0.17
Negative affect (NA)	−0.48	−0.42	—	0.36
Social anxiety (SA)	−0.47	−0.26	0.69	—
Mean *n*	52.40	52.40	52.40	52.40
SD n	15.24	15.24	15.24	15.24
Grand mean	61.68	39.52	12.31	15.44
SD of means	16.88	19.88	9.82	17.04
Pooled within-person *SD*	9.77	13.81	9.20	11.61
ICC	0.71	0.64	0.48	0.57
Between-person reliability (R_{KR})	1.00	1.00	1.00	1.00
Within-person reliability (R_C)	0.73	0.72	0.51	0.84

Note: ICC = intraclass correlation; between-person correlations below the diagonal; within-person correlations above the diagonal; 95% confidence intervals for between-person correlations ≈ ±.15 (all $p <$ .001), for within-person correlations ≈ ±.03 (all $p <$ .001); full confidence intervals for correlation in the online supplement.

Table 7

Study 2: SAD Diagnosis Differences on Within-Day Social Comparison Favorability and Instability

Term	Social comparison favorability			Within-day social comparison instability[a]			Across-days social comparison instability		
	b	95% conf. int.	t	b	95% conf. int.	t	b	95% conf. int.	t
(Intercept)	70.18	65.95 74.41	32.51	7.65	6.05 9.25	9.35	7.15	5.30 9.01	7.66
SAD diagnosis	−17.69	−23.77 −11.60	−5.69	3.03	0.72 5.34	2.57	2.85	0.17 5.52	2.12
$\tau_{00\ Person}$	5.79	5.365 6.224		5.07	4.23 5.98				
$\tau_{00\ Day}$	14.31	12.229 16.586							
σ_{res}	9.39	9.172 9.616		7.06	6.77 7.39		6.26	5.39 7.27	
Marginal R^2	0.193	0.073 0.299		0.029	−0.024 0.057		0.039	0.000 0.159	
Conditional R^2	0.782	0.741 0.833		0.360	0.269 0.443				
N people	87			87			87		
N days	1137			1088					
N observations	4559								

Note. Focal parameter estimates shaded in gray; SAD = social anxiety disorder; SC = social comparison; b = unstandardized regression coefficient; conf. int. = confidence (compatibility) intervals constructed using profile likelihood for b, τ, and σ and empirical parametric bootstrap for R^2; for single-level models, R^2 is adjusted R^2 and confidence intervals constructed using pivots for b and σ and bias-corrected accelerated nonparametric bootstrap; SC favorability scaled as POMP scores; SC instability scaled as the RMSSD between successive within-day observations; τ_{00} = random effects standard deviation; σ = residual standard deviation; see Table S3 for results controlling for person-mean SC favorability.

Table 8

Study 2: Social Comparison Favorability Predicting Affect and Social Anxiety

Term	Positive affect				Negative affect				Social anxiety			
	b	95% conf. int.		t	b	95% conf. int.		t	b	95% conf. int.		t
(Intercept)	39.63	35.42	43.84	18.56	12.36	10.27	14.46	11.63	15.48	11.86	19.09	8.43
SC favorability	0.56	0.52	0.60	30.48	−0.37	−0.39	−0.34	−28.13	−0.39	−0.43	−0.36	−21.13
$\tau_{00\,\text{Person}}$	8.19	7.67	8.74		4.83	4.46	5.21		7.20	6.68	7.74	
$\tau_{00\,\text{Day}}$	19.71	16.95	22.97		9.74	8.35	11.37		16.90	14.52	19.71	
σ_{res}	11.27	11.01	11.54		8.20	8.01	8.40		11.69	11.41	11.97	
Marginal R^2	0.059	0.045	0.072		0.078	0.061	0.092		0.037	0.026	0.045	
Conditional R^2	0.795	0.760	0.840		0.666	0.619	0.718		0.723	0.678	0.777	
N people	87				87				87			
N days	1137				1137				1137			
N observations	4559				4559				4559			

Note. Focal parameter estimates shaded in gray; SC = social comparison; b = unstandardized regression coefficient; conf. int. = confidence (compatibility) intervals constructed using profile likelihood for b, τ, and σ and empirical parametric bootstrap for R^2; SC favorability scaled as POMP scores; τ_{00} = random effects standard deviation; τ = random effects standard deviation, σ = residual standard deviation.

Table 9

Study 2: Within-Day Social Comparison Instability Predicting Average Within-Day Affect and Social Anxiety

Term	Positive affect				Negative affect				Social anxiety			
	b	95% conf. int.		t	b	95% conf. int.		t	b	95% conf. int.		t
(Intercept)	48.55	40.77	56.32	12.23	7.44	3.68	11.19	3.88	9.28	2.55	16.00	2.70
Within-day SC instability	−0.09	−0.19	0.01	−1.77	0.09	0.03	0.15	2.86	0.20	0.11	0.28	4.53
Person-level mean within-day SC instability	−0.89	−1.62	−0.16	−2.38	0.43	0.07	0.79	2.37	0.46	−0.17	1.09	1.42
$\tau_{00\,Person}$	19.06	16.27	22.11		9.11	7.75	10.60		16.48	14.05	19.12	
σ_{res}	11.12	10.65	11.62		6.99	6.69	7.30		9.78	9.36	10.22	
Marginal R^2	0.060	−0.040	0.113		0.064	−0.036	0.116		0.041	−0.053	0.076	
Conditional R^2	0.761	0.704	0.831		0.653	0.582	0.730		0.750	0.695	0.815	
Controlling for day-level mean SC favorability												
(Intercept)	48.62	40.90	56.34	12.33	7.39	3.64	11.14	3.86	9.22	2.50	15.95	2.69
Within-day SC instability	0.02	−0.07	0.11	0.48	0.02	−0.04	0.08	0.70	0.12	0.03	0.20	2.80
Person-level mean within-day SC instability	−1.01	−1.74	−0.28	−2.73	0.51	0.15	0.86	2.80	0.55	−0.08	1.18	1.71
Within-day mean SC favorability	0.64	0.55	0.72	14.71	−0.40	−0.45	−0.35	−14.69	−0.47	−0.55	−0.40	−12.11
$\tau_{00\,Person}$	18.98	16.21	22.00		9.15	7.79	10.63		16.50	14.08	19.13	
σ_{res}	10.10	9.66	10.54		6.34	6.07	6.62		9.14	8.74	9.54	
Marginal R^2	0.101	0.004	0.155		0.122	0.026	0.175		0.071	−0.021	0.109	
Conditional R^2	0.802	0.755	0.860		0.715	0.656	0.778		0.782	0.733	0.839	
N people	87				87				87			
N days	1088				1088				1088			

Note. Focal parameter estimates shaded in gray; SC = social comparison; b = unstandardized regression coefficient; conf. int. = confidence (compatibility) intervals constructed using profile likelihood for b, t, and σ and empirical parametric bootstrap for R^2; SC favorability scaled as POMP scores; SC instability scaled as the RMSSD between successive within-day observations; τ_{00} = random effects standard deviation, σ = residual standard deviation.

Table 10

Study 2: SAD Diagnosis Moderation of Social Comparison Favorability and Instability Effects

Term	Positive affect			Negative affect			Social anxiety		
	b	95% conf. int.	t	b	95% conf. int.	t	b	95% conf. int.	t
(Intercept)	48.01	42.74 53.27	17.87	7.36	4.88 9.84	5.81	6.51	2.29 10.72	3.03
SC favorability	0.52	0.46 0.57	18.90	−0.30	−0.34 −0.26	−15.49	−0.21	−0.26 −0.15	−7.51
SAD diagnosis	−17.35	−24.92 −9.77	−4.49	10.35	6.78 13.92	5.68	18.56	12.50 24.62	6.00
SC favorability × SAD diagnosis	0.08	0.01 0.15	2.14	−0.12	−0.17 −0.07	−4.67	−0.34	−0.42 −0.27	−9.24
Simple slopes for SC favorability									
SAD diagnosis = No	0.52	0.46 0.57	18.90	−0.30	−0.34 −0.26	−15.49	−0.21	−0.26 −0.15	−7.51
SAD diagnosis = Yes	0.60	0.55 0.64	24.02	−0.42	−0.45 −0.39	−24.05	−0.55	−0.60 −0.50	−22.04
$\tau_{00\ Person}$	8.19	7.66 8.74		4.72	4.35 5.10		6.92	6.40 7.46	
$\tau_{00\ Day}$	17.78	15.18 20.61		8.29	7.05 9.63		14.18	12.08 16.46	
σ_{res}	11.27	11.00 11.54		8.21	8.01 8.40		11.63	11.36 11.91	
Marginal R^2	0.180	0.078 0.260		0.213	0.126 0.284		0.219	0.116 0.309	
Conditional R^2	0.796	0.759 0.838		0.665	0.616 0.713		0.725	0.679 0.772	
N people	87			87			87		
N days	1137			1137			1137		
N observations	4559			4559			4559		
(Intercept)	53.96	44.95 62.98	11.59	3.94	−0.22 8.10	1.83	3.77	−3.52 11.05	1.00
Within-day SC instability	−0.10	−0.25 0.04	−1.45	0.13	0.04 0.22	2.95	0.14	0.02 0.26	2.20
SAD diagnosis	−19.00	−33.97 −4.03	−2.46	11.88	4.96 18.79	3.33	19.88	7.78 31.98	3.18
Person-level mean within-day SC instability	−0.67	−1.64 0.30	−1.33	0.32	−0.14 0.77	1.35	0.21	−0.58 1.00	0.52
Within-day SC instability × SAD diagnosis	0.03	−0.16 0.23	0.32	−0.08	−0.21 0.04	−1.35	0.11	−0.06 0.28	1.26
Person-level mean within-day SC instability × SAD diagnosis	0.33	−1.07 1.73	0.46	−0.22	−0.87 0.43	−0.66	−0.36	−1.49 0.78	−0.61
Simple slopes for within-day SC instability									
SAD diagnosis = No	−0.10	−0.25 0.04	−1.45	0.13	0.04 0.22	2.95	0.14	0.02 0.26	2.20
SAD diagnosis = Yes	−0.07	−0.21 0.06	−1.07	0.05	−0.04 0.13	1.15	0.25	0.13 0.37	4.16
$\tau_{00\ Person}$	17.66	14.87 20.25		8.04	6.74 9.25		14.23	11.97 16.34	
σ_{res}	11.13	10.65 11.62		6.98	6.68 7.29		9.78	9.35 10.21	

Term	Positive affect			Negative affect			Social anxiety		
	b	95% conf. int.	t	b	95% conf. int.	t	b	95% conf. int.	t
Marginal R^2	0.169	0.040 0.254		0.202	0.089 0.294		0.228	0.104 0.328	
Conditional R^2	0.764	0.708 0.822		0.657	0.587 0.723		0.752	0.698 0.808	
N people	87			87			87		
N days	1088			1088			1088		

Note. Focal parameter estimates shaded in gray; SAD = social anxiety disorder; SC = social comparison; b = unstandardized regression coefficient; conf. int. = confidence (compatibility) intervals constructed using profile likelihood for b, τ, and σ and empirical parametric bootstrap for R^2; SC favorability scaled as POMP scores; SC instability scaled as the RMSSD between successive within-day observations; τ_{00} = random effects standard deviation, σ = residual standard deviation.

Table 11

Study 2: Lagged Analysis: Predicting Later Within-Day Affect, Social Anxiety, and Social Comparison Favorability

Term	Positive affect				Negative affect				Social anxiety			
	b	95% conf. int.		t	b	95% conf. int.		t	b	95% conf. int.		t
Predicting later within-day affect/anxiety												
(Intercept)	39.66	35.44	43.87	18.54	12.00	9.91	14.08	11.32	14.76	11.20	18.32	8.16
Lagged SC favorability	0.04	−0.01	0.09	1.67	−0.04	−0.08	−0.01	−2.45	−0.04	−0.08	0.005	−1.76
Lagged affect/anxiety	0.38	0.35	0.42	22.10	0.29	0.23	0.34	15.92	0.29	0.24	0.34	16.42
$\tau_{00\ \text{Person}}$	0.00	0.00	3.08		2.16	0.00	3.13		4.35	3.05	5.42	
$\tau_{00\ \text{Day}}$	19.79	17.04	23.05		9.71	8.33	11.34		16.64	14.29	19.42	
σ_{res}	13.81	13.48	14.15		9.35	9.04	9.67		12.52	12.11	12.94	
Marginal R^2	0.057	0.042	0.070		0.050	0.036	0.061		0.037	0.026	0.046	
Conditional R^2	0.691	0.642	0.761		0.554	0.490	0.630		0.667	0.611	0.742	
Predicting later within-day social comparison favorability												
(Intercept)	61.83	58.24	65.41	34.02	61.82	58.24	65.40	34.00	61.82	58.24	65.40	34.02
Lagged SC favorability	0.32	0.27	0.37	17.50	0.31	0.25	0.35	16.67	0.32	0.26	0.36	17.94
Lagged affect/anxiety	0.009	−0.02	0.03	0.70	−0.05	−0.09	−0.02	−2.84	−0.02	−0.05	0.002	−1.85
$\tau_{00\ \text{Person}}$	1.12	0.00	2.67		1.13	0.00	2.68		1.13	0.00	2.68	
$\tau_{00\ \text{Day}}$	16.84	14.50	19.61		16.84	14.50	19.62		16.84	14.50	19.61	
σ_{res}	10.36	10.01	10.66		10.34	10.00	10.64		10.35	10.00	10.65	
Marginal R^2	0.030	0.020	0.038		0.031	0.020	0.039		0.031	0.020	0.038	
Conditional R^2	0.735	0.685	0.801		0.736	0.685	0.802		0.735	0.684	0.801	
N people	87				87				87			
N days	1088				1088				1088			
N observations	3422				3422				3422			

Note. Focal parameter estimates shaded in gray; SC = social comparison; b = unstandardized regression coefficient; conf. int. = confidence (compatibility) intervals constructed using profile likelihood for b, τ, and σ and empirical parametric bootstrap for R^2; SC favorability scaled as POMP scores; τ_{00} = random effects standard deviation; τ_{00} = random effects standard deviation, σ = residual standard deviation.

Table 12

Study 2: Presence of People and People Presence-SAD Diagnosis Interaction Predicting Within-Day Social Comparison Favorability

Term	b	95% conf. int.		t	b	95% conf. int.		t
(Intercept)	61.04	57.48	64.59	33.82	69.26	65.03	73.46	32.20
People present	1.35	0.64	2.07	3.70	1.94	0.97	2.91	3.91
SAD diagnosis					−17.01	−23.06	−10.95	−5.50
SAD diagnosis × People present					−1.26	−2.70	0.18	−1.72
Simple slopes for People present								
SAD diagnosis = No					1.94	0.97	2.91	3.91
SAD diagnosis = Yes					0.68	−0.39	1.74	1.25
Simple slopes for SAD diagnosis								
People present = No					−17.01	−23.07	−10.95	−5.50
People present = Yes					−18.27	−24.34	−12.19	−5.89
$\tau_{00\ \text{Person}}$	5.77	5.35	6.21		5.76	5.34	6.20	
$\tau_{00\ \text{Day}}$	16.62	14.30	19.36		14.17	12.10	16.42	
τ_{res}	9.38	9.16	9.60		9.38	9.16	9.60	
Marginal R^2	0.001	−0.0005	0.002		0.120	0.078	0.302	
Conditional R^2	0.779	0.736	0.834		0.780	0.739	0.831	
N people	87				87			
N days	1137				1137			
N observations	4551				4551			

Note. Focal parameter estimates shaded in gray; SAD = social anxiety disorder; b = unstandardized regression coefficient; conf. int. = confidence (compatibility) intervals constructed using profile likelihood for b, τ, and σ and empirical parametric bootstrap for R^2; SC favorability scaled as POMP scores; τ_{00} = random effects standard deviation; σ = residual standard deviation.

Table 13

Study 2: Presence of People Moderating Social Comparison Favorability Relationships with Affect and Social Anxiety

Term	Positive affect				Negative affect				Social anxiety			
	b	95% conf. int.		t	b	95% conf. int.		t	b	95% conf. int.		t
(Intercept)	38.53	34.35	42.71	18.17	12.65	10.55	14.76	11.83	13.79	10.12	17.46	7.40
SC favorability	0.52	0.47	0.57	21.10	−0.35	−0.38	−0.31	−19.48	−0.38	−0.43	−0.34	−15.22
People present	2.37	1.50	3.25	5.32	−0.62	−1.25	0.00	−1.96	3.73	2.84	4.62	8.24
SC favorability × People present	0.07	0.00	0.14	1.99	−0.04	−0.09	0.01	−1.51	−0.03	−0.10	0.04	−0.87
Simple slopes for SC favorability												
People present = No	0.52	0.47	0.57	21.10	−0.35	−0.38	−0.31	−19.48	−0.38	−0.43	−0.34	−15.22
People present = Yes	0.59	0.54	0.65	22.74	−0.38	−0.42	−0.35	−20.57	−0.42	−0.47	−0.36	−15.65
$\tau_{00\ Person}$	8.25	7.72	8.80		4.84	4.47	5.23		7.14	6.61	7.68	
$\tau_{00\ Day}$	19.48	16.75	22.70		9.70	8.32	11.33		17.06	14.65	19.89	
σ_{res}	11.16	10.90	11.43		8.18	7.99	8.38		11.60	11.32	11.87	
Marginal R^2	0.063	0.048	0.076		0.079	0.062	0.092		0.043	0.031	0.052	
Conditional R^2	0.796	0.760	0.840		0.666	0.617	0.719		0.730	0.684	0.784	
N people	87				87				87			
N days	1137				1137				1137			
N observations	4551				4551				4551			

Note. Focal parameter estimates shaded in gray; SC = social comparison; b = unstandardized regression coefficient; conf. int. = confidence (compatibility) intervals constructed using profile likelihood for b, τ, and σ and empirical parametric bootstrap for R^2; SC favorability scaled as POMP scores; τ_{00} = random effects standard deviation; τ_{00} = random effects standard deviation; σ = residual standard deviation.