Perfectionism and Anxiety Sensitivity:

The Relation between Etiological Factors of Social Anxiety

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Abstract

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Perfectionism and Anxiety Sensitivity: The Relation between Etiological Factors of Social Anxiety

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Social anxiety disorder (SAD) is characterized by maladaptive distress, anxiety, and avoidance in social situations. Perfectionistic self-presentation (PSP; the desire to present a perfect image to a social audience) and anxiety sensitivity (AS) social concerns (the fear of publicly observable anxiety symptoms) have been identified as potential risk factors of social anxiety. However, no studies have investigated the interplay between PSP, AS social concerns, and social anxiety. The current study examined potential ways that PSP and AS social concerns could confer risk for social anxiety by comparing a mediation and moderation model using structural equation modeling. Participants included 390 community adults recruited on Mturk that completed measures at baseline, month 3, and month 6 and responded correctly to validity items. Prior to comparing structural models, factorial invariance was established for all constructs. The planned mediation model evidenced suppression effects, and the moderation model failed to converge, suggesting poor model specification. Mediation and moderation models were then estimated using manifest variables, which provided a divergent pattern of results than the models using latent variables. The current findings are not consistent with either PSP or AS social concerns serving as mediators/moderators for the other construct. These

findings highlight a need for future research to elucidate mechanisms of risk for social anxiety.

Keywords: social anxiety, perfectionistic self-presentation, anxiety sensitivity

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Social Anxiety Disorder

Social anxiety disorder (SAD) is characterized by maladaptive distress, anxiety, and avoidance in social situations (American Psychiatric Association, 2013). Approximately 11% of the United States population will develop SAD in their lifetime, making SAD one of the most prevalent anxiety disorders (Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012). SAD, even at the subsyndromal level, is associated with significant impairment in occupational, social, and familial domains (Merikangas, Avenevoli, Acharyya, Zhang, & Angst, 2002; Olatunji, Cisler, & Tolin, 2007) and is, therefore, a substantial economic and public health burden (Greenberg et al., 1999; Kessler et al., 2009). Given these consequences, identifying factors contributing to the etiology of social anxiety is an important avenue for research.

One avenue to address this burden is through the identification of malleable risk factors. Risk factors are constructs that precede psychopathology and can be used to identify individuals at risk for developing some mental disorder (Kraemer et al., 1997). There are two types of risk factors: fixed risk factors (i.e., risk factors that cannot be altered), and malleable risk factors (i.e., risk factors that change over time or as a result of an intervention). Although fixed risk factors are important to identify individuals at risk for social anxiety (Kraemer et al., 1997), they do not assist in prevention or intervention efforts. Conversely, malleable risk factors can serve as viable targets for treatment and prevention efforts. Thus, the relation between malleable risk factors and symptoms of social anxiety is especially important to investigate.

Perfectionistic Self-Presentation

One potential malleable risk factor of social anxiety is perfectionistic self-presentation (PSP), or the belief that a perfect presentation (both outward appearance and behavior) is needed to avoid negative evaluation (Hewitt et al., 2003). PSP was initially conceptualized based on theories of social anxiety (e.g., Clark & Wells, 1995; Heimberg, Brozovich, & Rapee, 2010; Rapee & Heimberg, 1997) that present a process by which negative evaluation leads to the internalized belief that perfect presentation is needed to bypass negative social judgements (Hewitt et al., 2003). Heimberg and colleagues (2010) proposed a model of social anxiety in which socially anxious individuals form an internal mental self-representation that is compared with the individual's perceived performance standard as expected by their audience. These authors state that socially anxious individuals are likely to think they are unable to meet the standards their audience holds and form the belief that they must perform perfectly in social situations to avoid negative evaluation, which further increases social anxiety. Based on the theoretical description presented by Heimberg and colleagues, PSP is an important construct in the development of social anxiety.

As expected based on the theoretical account presented by Heimberg and colleagues (2010), empirical studies have demonstrated robust relations between PSP and social anxiety. Individuals diagnosed with SAD report higher levels of PSP compared to community participants (Jain & Sudhir, 2010; Teale Sapach, Carleton, Mulvogue, Weeks, & Heimberg, 2014). Further, PSP is positively related to social anxiety symptom severity (Hewitt, Habke, Lee-Baggley, Sherry, & Flett, 2008; Mackinnon, Battista,

Sherry, & Stewart, 2014; Newby et al., 2017). In one study, Hewitt and colleagues (2008) recruited a clinical sample to examine how PSP was related to distress when discussing past mistakes in a formal interview setting. They found that PSP was related to both self-reported distress and objective distress (i.e., physiological reactivity) following the interview, after controlling for depression and interaction anxiety (Hewitt et al., 2008). In another study, Newby and colleagues (2017) found that PSP explained unique variance (3.4% of the variance) in social interaction anxiety above the effects of neuroticism and trait perfectionism. However, PSP was not uniquely related to social evaluation anxiety after controlling for neuroticism and trait perfectionism (Newby et al., 2017). In the only study to investigate these constructs longitudinally, Mackinnon and colleagues (2014) used a daily diary study design over a 21-day period in an undergraduate sample. Participants in this study completed measures of PSP and social anxiety once a day over this 21-day period. Findings revealed that PSP predicted both within- and between-participant variance in social anxiety, even after controlling for other variables (i.e., perfectionistic cognitions, depression, baseline socially prescribed perfectionism; Mackinnon et al., 2014). Together, these findings suggest that PSP is robustly related to social anxiety concurrently, but there is only limited evidence that PSP is a risk factor for social anxiety longitudinally.

Anxiety Sensitivity Social Concerns

Anxiety sensitivity (AS) is the fear of negative consequences associated with anxious arousal (Reiss, 1991). AS is composed of three lower-order dimensions: physical concerns (fear of physiological anxiety sensations), cognitive concerns (fear of cognitive

dyscontrol), and social concerns (fear of publicly observable anxiety symptoms; Taylor et al., 2007). Of the three AS lower-order dimensions, AS social concerns has demonstrated the strongest relations with social anxiety (Allan, Capron, Raines, & Schmidt, 2014; Naragon-Gainey, 2010). Thus, AS social concerns is another potential malleable risk factor of social anxiety. As with PSP, AS social concerns fits well in theoretical descriptions of social anxiety. A tenant of Heimberg and colleagues' (2010) proposed model of social anxiety is that publicly observable anxiety symptoms influence the extent to which socially anxious individuals believe they will be judged negatively in a social situation. In particular, publicly observable responses to anxiety negatively influence individuals' mental self-representation, which creates a positive feedback loop leading to increased awareness of anxious responses and more social anxiety (Heimberg et al., 2010). Thus, publicly observable symptoms of anxiety become feared as these symptoms are associated with social anxiety within and across social situations (Clark & Wells, 1995). Given the theoretical description presented by Heimberg and colleagues, AS social concerns is an important construct to investigate in the etiology of social anxiety.

As with PSP, AS social concerns has demonstrated robust relations to social anxiety. Individuals diagnosed with SAD report higher levels of AS social concerns than do community participants or participants diagnosed with other anxiety disorders (Naragon-Gainey, 2010; Zinbarg, Barlow, & Brown, 1997). Further, associations between AS social concerns and social anxiety symptom severity have consistently been found (Allan et al., 2014; Olthuis, Watt, & Stewart, 2014; Wheaton, Deacon, McGrath, Berman, & Abramowitz, 2012). Additionally, AS social concerns and social anxiety are

similarly reduced following therapeutic interventions (e.g., Courbasson & Nishikawa, 2010) and reductions in AS social concerns over the course of treatment mediates the relation between treatment condition and social anxiety in interventions targeting social anxiety (Nowakowski, Rowa, Antony, & McCabe, 2016). Although AS social concerns has demonstrated concurrent relations to social anxiety, and both AS social concerns and social anxiety are similarly reduced following therapeutic interventions, there are inconsistent findings regarding AS social concerns as a risk factor for social anxiety. In one longitudinal study, AS social concerns predicted increases in social anxiety over a 10 month span in a clinical sample (Rodriguez, Bruce, Pagano, Spencer, & Keller, 2004). However, in another longitudinal study, AS social concerns did not predicted changes in social anxiety over a one year span in an undergraduate sample (Grant, Beck, & Davila, 2007). Notably, both of these studies used older versions of the measure used to capture AS that had lower reliability and validity regarding the AS social concerns subscale (Taylor et al., 2007). Thus more research is needed to clarify the temporal relations between AS social concerns and social anxiety. Regardless, as a whole, findings suggest that AS social concerns is concurrently related to social anxiety, but there is mixed evidence that AS social concerns is a risk factor of social anxiety.

Perfectionistic Self-Presentation and Anxiety Sensitivity Social Concerns

Although both PSP and AS social concerns are related to social anxiety (Mackinnon et al., 2014; Naragon-Gainey, 2010), and are relevant to theoretical accounts of social anxiety, only one study, by Flett and colleagues (2004), has examined the relation between PSP and AS social concerns. They found that PSP was positively

correlated with AS social concerns after controlling for other perfectionism constructs (i.e., perfectionistic cognitions, trait perfectionism). However, these authors did not examine how PSP or AS social concerns related to social anxiety. Given both PSP and AS social concerns are implicated in theoretical accounts of social anxiety (Heimberg et al., 2010), research is needed to examine the interrelations between PSP, AS social concerns, and social anxiety.

Evidence for perfectionistic self-presentation and anxiety sensitivity social concerns interplay. Not all individuals with elevated PSP or AS social concerns develop SAD (Alden, Bieling, & Wallace, 1994; Naragon-Gainey, 2010). Considering it has been suggested that individuals with elevated PSP are reactive to indications that they are not presenting a perfect image to a social audience (including observable anxiety symptoms; Heimberg, Juster, Hope, & Mattia, 1995), these constructs may influence each other to confer risk for social anxiety. Further, extant research has found a positive association between PSP and AS social concerns (Hewitt et al., 2003), which allows for the possibility that the relation between PSP and social anxiety may be influenced by AS social concerns, and vice versa. Therefore, it is plausible that PSP and AS social concerns may be involved in a causal chain (e.g., mediation or moderation; Kraemer, Stice, Kazdin, Offord, & Kupfer, 2001). However, no studies have examined the different ways in which PSP, AS social concerns, and social anxiety could relate.

Perfectionistic self-presentation mediating the relations between anxiety sensitivity social concerns and social anxiety. Although no study has examined the relations among PSP, AS social concerns, and social anxiety, theoretical accounts and

results from similar studies can be used to advance hypotheses about how these constructs may relate. Specifically, given that individuals high in PSP feel driven to present a perfect image of themselves in social situations, it is reasonable to expect that they are more reactive to publicly observable symptoms of anxiety (Erozkan, 2016). As such, PSP could influence the relation between AS social concerns and social anxiety. However, it is unlikely that the fear of publicly observable anxiety symptoms precedes the belief that perfect appearance and behavior is needed in social situations. Thus, it is unlikely that PSP serves to mediate the relation between AS social concerns and social anxiety.

Anxiety sensitivity social concerns mediating the relations between perfectionistic self-presentation and social anxiety. Alternatively, AS social concerns could serve as a mediator of the PSP and social anxiety relation. Cross-sectional studies have found the higher-order AS construct to mediate the relation between trait perfectionism and panic disorder (Wood, Cano-Vindel, & Salguero, 2015) and between anxiety and depression symptoms (Pirbaglou et al., 2013). However, this is also not the most plausible way that PSP, AS social concerns, and social anxiety relate. Outward appearance is only one aspect of PSP, and the fear of publicly observable anxiety symptoms is unlikely to explain the relations between other aspects of PSP (e.g., avoiding verbal admissions of imperfection, verbally proclaiming perfection) and social anxiety.

Perfectionistic self-presentation moderating the relations between anxiety sensitivity social concerns and social anxiety. Rather, it is more likely that a high drive to appear perfect in social situations amplifies the fear of publicly observable anxiety

symptoms, as the strength of the relation between publicly observable anxiety symptoms and social anxiety is likely dependent on PSP. Specifically, it is expected that the relation between the fear of publicly observable anxiety symptoms and social anxiety is stronger if an individual has a high drive to appear perfect in social situations. Thus, PSP may moderate relations between AS social concerns and social anxiety.

Current Study

The current study was designed to elucidate how PSP and AS social concerns confer risk for social anxiety. Although PSP and AS social concerns are related (Flett et al., 2004), theories of social anxiety are agnostic in terms of the structure of this relation. AS social concerns could mediate the relation between PSP and social anxiety as other AS dimensions have mediated the link between perfectionism and psychopathology (Pirbaglou et al., 2013; Wood et al., 2015). Alternatively, PSP could exacerbate the relation between AS social concerns and social anxiety. Given the gap in the existing literature, the current study examined the structure of the relation among PSP, AS social concerns, and social anxiety by comparing two structural equation modeling (SEM) models in a longitudinal sample of community adults recruited online. Based on the theory described above, it was hypothesized that PSP would moderate the relation between AS social concerns and social anxiety.

Method

Participants and Procedure

Participants (N = 500) were recruited for an online longitudinal study through Amazon Mechanical Turk (Mturk). Mturk is an online crowdsourcing marketplace that

allows researchers to easily investigate psychopathology (Shapiro, Chandler, & Mueller, 2013). Self-report data gathered using Mturk is high quality and captures a wide range of variation in clinical traits (Buhrmester, Kwang, & Gosling, 2011). Participants on Mturk report social anxiety symptoms at a greater degree than in the general population (Arditte, Çek, Shaw, & Timpano, 2016), suggesting Mturk is a useful tool to investigate risk factors of social anxiety.

Participants were recruited for this study as a part of a larger online longitudinal study (Principle Investigator: Allan). All study procedures were approved by the Ohio University Institutional Review Board prior to the onset of data collection. Access to this study was restricted to participants over 18 years of age who reside in the United States or Canada. On Mturk, individuals are rated on an approved/not approved basis after completing each assignment they are given. For this study, only those that had 95% approval rate for their prior work on Mturk were eligible to participate. This was done to ensure high quality data. Participants were informed that the study was investigating emotional response patterns, personality, and behavior, but were not told that the study was examining psychopathology. In the larger study, participants completed measures at baseline and three-, six-, and nine-month follow-up. At each wave participants completed questionnaires asking about current symptoms of psychopathology and relevant risk factors. Consistent with compensation on Mturk, participants were paid $1.25-$2.00 each time they completed the questionnaires. Additionally, there were two drawings for $25.00 at each wave (with the exception of the first wave) to encourage continued participation.

Participants that provided complete data at each wave were also entered in a drawing for $100.00.

For the current study, data were used from the baseline, three- and six-month follow-up time-points. There were two validity check items added to the questionnaires for the baseline and three-month time-points (e.g., "*If you are reading this questionnaire, select 4*."). If a participant did not respond correctly to all validity items they were not included in the data analysis. This resulted in the removal of 110 participants, for a final sample of 390 participants (*M* age = 39.9 years, *SD* = 12.8, 66.4% female). Within this sample, 84.4% identified as White, 9.0% Black, 3.8% Asian, 1.8% Native American, and 2.6% other or mixed race.

Measures

The Perfectionistic Self-Presentation Scale (PSPS; Hewitt et al., 2003). The PSPS is a 27-item self-report questionnaire designed to assess an individual's need to appear perfect to others and not display or disclose imperfections in public (Hewitt et al., 2003). Participants indicate how much they agree with each item on a 7-point Likert-type scale (1 = *Disagree Strongly* through 7 = *Agree Strongly*). The PSPS contains three subscales corresponding to different aspect of PSP: perfectionistic self-promotion (e.g., "*If I seem perfect, others will see me more positively*."), nondisplay of imperfection (e.g., "*I will do almost anything to cover up a mistake*."), and nondisclosure of imperfection (e.g., "*I should always keep my problems to myself*."). Higher scores on the PSPS indicate higher levels of PSP. The PSPS has demonstrated good psychometric properties across several samples (Hewitt et al., 2003). The PSPS is scored by summing the scores of the

items for each subscale and for the total score. In the current study, the reverse-coded items were excluded from the sum scores and all analyses. Reliability, calculated as coefficient rho (ρ; e.g., Raykov, 2009) for the perfectionistic self-promotion subscale was excellent at all time points (ρ's = .93). Reliability at baseline (ρ = .91), month 3 (ρ = .91), and month 6 (ρ = .92) was excellent for the nondisplay of imperfection subscale and was good across time for the nondisclosure of imperfection subscale (ρ = .83; ρ = .80; ρ = .81).

The Anxiety Sensitivity Index-3 (ASI-3; Taylor et al., 2007). The ASI-3 is an 18-item self-report measure designed to assess the fear of anxiety-related sensations and their consequences (Taylor et al., 2007). The ASI-3 was developed based on the original Anxiety Sensitivity Index (Reiss, Peterson, Gursky, & McNally, 1986). Participants indicate how much each item concerns them on a 5-point Likert-type scale (0 = *Very Little* through 4 = *Very Much*). The ASI-3 contains three subscales corresponding to the three lower-order facets of AS: AS physical concerns (e.g., "*It scares me when my heart beats rapidly*."), AS cognitive concerns (e.g., "*It scares me when I am unable to keep my mind on a task*."), and AS social concerns (e.g., "*I worry that other people will notice my anxiety*."). Only the AS social concerns subscale was included in these analyses. Higher scores on the ASI-3 indicate higher levels of AS. The AS social concerns subscale has demonstrated good reliability and validity (Taylor et al., 2007). The ASI-3 is scored by computing a sum score for each subscale and for the total score. Reliability for the AS social concerns subscale in the current study was good at baseline (ρ = .86), month 3 (ρ = .83), and month 6 (ρ = .87) measurements.

The Social Phobia Scale-6 (SPS-6; Peters, Sunderland, Andrews, Rapee, & Mattick, 2012). The SPS-6 is a 6-item self-report measure to assess an individual's fear of public scrutiny, recognized as one of the core features of SAD (Peters et al., 2012). The SPS-6 was developed from the original Social Phobia Scale (SPS; Mattick & Clarke, 1998). To complete the SPS-6, participants rate how characteristic six statements are of them (e.g., "*I get nervous that people are staring at me as I walk down the street*.") on a 5-point Likert-type scale (0 = *Not at all characteristic or true of me* through 4 = *Extremely characteristic or true of me*). Higher scores on the SPS-6 indicate higher levels of social anxiety. The SPS-6 has demonstrated good reliability and validity (Peters et al., 2012). The SPS-6 is scored by computing a sum score. Reliability in the current study was excellent across baseline (ρ = .93), month 3 (ρ = .93), and month 6 (ρ = .94).

Demographic Questionnaire. An 11-item investigator-designed questionnaire was used to collect basic demographic information. All participants indicated their age, sex, race, ethnicity, sexual orientation, marital status, number of children, education background, employment status, and yearly family income.

Data Analytic Plan

Descriptive statistics were computed using the Statistical Package for the Social Science (SPSS) version 23. All other analyses were performed using Mplus version 8.0 (Muthén & Muthén, 1998-2017). All constructs were modeled as latent variables to reduce measurement error and increase power to detect interaction effects (Jaccard & Wan, 1995). As the three subscales of the PSPS have been found to correlate highly (r = .79 to .83; Cockell et al., 2002), PSP was modeled as a higher order latent variable rather

than using each individual PSP facet. Given SEM was used for all analyses, a measurement model with all factors was used to provide correlations among the factors (i.e., the correlations were calculated using the latent variables).

At each time point a confirmatory factor analysis (CFA) model of PSP as a higher-order factor was computed. The reverse-coded items were excluded from these analyses. This was done in light of findings that reverse-coded items can confound factor structure (Deemer & Minke, 1999; Fombrun, Gardberg, & Sever, 2000; Magazine, Williams, & Williams, 1996), and that reverse-coded and forward-coded questions may not measure the same underlying construct (Hughes, 2009; Weems & Onwuegbuzie, 2001). Given the identified limitations of using both reverse- and forward-coded questions in the same model, only the forward-coding questions on the PSPS were used in these analyses.

Next, CFAs were computed at each time point for the AS Social Concerns and Social Anxiety factors. CFAs were modeled using robust maximum likelihood (MLR) to account for skew and kurtosis in the data and to handle missing data. Model fit was assessed using the likelihood ratio test (LRT), by examining the chi-square (χ^2) test statistic, in which a nonsignificant χ^2 value indicates good model fit. However, the LRT can suggest poor model fit when models contain many items per factor (Kenny & McCoach, 2003; Moshagen, 2012). Additionally, given the LRT is a test of exact fit, it is an overly conservative estimate of model fit (Browne, MacCallum, Kim, Andersen, & Glaser, 2002; Moshagen, 2012; Mulaik, 2007). Therefore, additional model fit indices were examined to provide a comprehensive examination of model fit. Specifically, the

comparative fit index (CFI), standardized root mean square residual (SRMR), and root mean square error of approximation (RMSEA) were reported. CFI values greater than .95 and SRMR values less than .08 indicate good fit. Further, RMSEA values less than .05 indicate good fit (Hu & Bentler, 1999; Kline, 2015). RMSEA confidence intervals (CIs) were also reported, with a 90% lower bound CI value less than .05 suggesting good model fit cannot be ruled out, and an upper bound CI value greater than .10 suggesting poor model fit cannot be ruled out (Bentler, 1990; Hu & Bentler, 1999; MacCallum, Browne, & Sugawara, 1996).

Prior to analyzing structural models, factorial invariance (i.e., measurement equivalence across groups) for all constructs was assessed across the three time points by comparing several CFA models. There are four levels of measurement invariance; configural invariance, loading invariance, indicator invariance, and strict invariance (Little, 2013). Configural invariance is held when items load on similar factors and model fit is similar across groups. Loading invariance is held when corresponding factor loadings are equivalent across groups. Indicator invariance is held when corresponding item intercepts are equivalent across groups. Finally, strict invariance is held when item residuals are equivalent across groups. To test invariance, models are statistically compared in this order, requiring at least partial invariance at one level to test the next level of invariance (e.g., comparing a model with the loadings fixed to equality to a model with loadings and intercepts fixed to equality to establish indicator invariance). In the current study, all levels up to indicator invariance were tested, as these are necessary to test longitudinal mediation (Little, 2013).

Once factorial invariance was established, mediation and moderation SEMs examining relations between the Perfectionism, AS Social Concerns, and Social Anxiety factors were conducted and compared. In Mplus, interactions between latent variables are analyzed through a quasi-maximum likelihood design, which does not provide standard fit indices as the interaction is considered to be a nonlinear adaptation of typical SEM, and no adequate fit indices have been developed for this approach (Klein & Muthén, 2007). Thus, the moderation model was compared to the mediation model by examining the significance of the interaction term. If the interaction term was nonsignificant, the mediation model was accepted as the most parsimonious solution. Following the comparison of the mediation and moderation models, follow-up analyses were conducted to provide final parameter estimates and model fit statistics. The mediation models were conducted using maximum likelihood (ML) estimation with bootstrapped (5000 samples) asymmetric CIs for indirect effects to provide stable and replicable estimates. The bootstrapped CIs were used to determine the significance of indirect effects. ML estimation was used as opposed to MLR because MLR estimation does not allow for asymmetric CIs, which are provided by ML estimation. If the moderation term was significant, the interaction would be probed by comparing the relation of AS social concerns and social anxiety at high and low levels of PSP (i.e., ± 1 *SD* ; Aiken & West, 1991).

Results

Descriptive Statistics, Correlations, and Missing Data

Descriptive statistics and correlations between all study variables are provided in Table 1. There was no problematic skew or kurtosis at any time point, based on values that have been shown to be problematic in simulation studies (skew exceeding 2.0 or kurtosis more than 7.0; Curran, West, & Finch, 1996). Regarding attrition, 353 participants completed the measures at month 3, and 334 participants completed the measures at month 6. Participants with missing data at month 3 reported higher levels of social anxiety (M = 6.36, SD = 6.45) than participants that responded at month 3 (M = 4.54, SD = 5.99; t = 2.75, p = .006), with no differences in PSP (t = .32, p = .75; M = 83.32, SD = 27.78; M = 82.37, SD = 27.86, respectively) or AS social concerns (t = 1.41, p = .16; M = 8.76, SD = 5.84; M = 7.86, SD = 5.88, respectively). Similarly, participants with missing data at month 6 reported higher levels of social anxiety (M = 6.44, SD = 6.64) than participants that responded at month 6 (M = 4.45, SD = 5.85; t = 3.04, p = .003), with no difference in PSP (t = -.22, p = .82; M = 82.24, SD = 28.36; M = 82.90, SD = 27.56, respectively) or AS social concerns (t = 1.82, p = .07; M = 8.90, SD = 5.74; M = 7.77, SD = 5.91, respectively). Little's Missing Completely at Random test was nonsignificant (χ^2 = 116.225, df = 102, p = .159), suggesting that the assumption of data missing completely at random was met (Little, 1988). Participants were excluded from data analysis if they did not respond correctly to the baseline or month three validity items. A total of 110 participants were excluded using this method, for a final sample of 390 participants. On average, participants endorsed lower levels of social anxiety (M =

5.43, *SD* = 6.38) than seen in clinical samples (*Ms* = 6.32 – 10.51, *SDs* = 6.36 – 6.50) but endorsed higher levels of social anxiety than seen in nonclinical samples (*Ms* = 3.58 – 4.14, *SDs* = 3.28 – 3.67; Fergus, Valentiner, McGrath, Gier-Lonsway, & Kim, 2012; Peters et al., 2012).

Table 1.
Descriptive Statistics and Correlations for Social Anxiety, Anxiety Sensitivity Social Concerns, and Perfectionistic Self-Presentation

	1	2	3	4	5	6	7	8	9
1. BL Social Anxiety	1								
2. M3 Social Anxiety	.81	1							
3. M6 Social Anxiety	.82	.85	1						
4. BL AS Social Concerns	.69	.64	.62	1					
5. M3 AS Social Concerns	.67	.79	.67	.77	1				
6. M6 AS Social Concerns	.67	.75	.81	.70	.81	1			
7. BL PSP	.59	.48	.51	.67	.56	.57	1		
8. M3 PSP	.50	.53	.54	.52	.58	.57	.78	1	
9. M6 PSP	.40	.48	.53	.48	.54	.64	.69	.79	1
Mean	5.13	4.67	5.08	8.15	7.33	7.60	82.68	82.33	82.74
SD	6.19	5.75	6.24	5.86	5.31	5.79	27.77	28.01	27.40

Note. Latent variables were used for the correlation coefficients and manifest variables were used for the means and standard deviations. $N = 390$. BL = Baseline measurement. M3 = Month 3 measurement. M6 = Month 6 measurement. AS = Anxiety Sensitivity. PSP = Perfectionistic Self-Presentation.
All p's $< .001$.

Confirmatory Factor Analysis Models and Factor Invariance Testing

Social Anxiety. The one-factor CFA for Social Anxiety symptoms at baseline provided excellent fit to the data ($\chi^2 = 15.15$, $df = 9$, $p = .09$, CFI = .99, SRMR = .02, RMSEA = .04, 90% CI [.00, .08]) with all items loading significantly on the Social Anxiety factor ($\lambda s \geq .75$). Further, the one-factor CFA for Social Anxiety symptoms at month three provided excellent fit to the data ($\chi^2 = 9.31$, $df = 9$, $p = .41$, CFI = .99, SRMR = .02, RMSEA = .01, 90% CI [.00, .07]) with all items loading significantly on the Social Anxiety factor ($\lambda s \geq .72$). Finally, the one-factor CFA for Social Anxiety symptoms at month six provided excellent fit to the data ($\chi^2 = 3.84$, $df = 9$, $p = .92$, CFI = 1, SRMR = .01, RMSEA = 0, 90% CI [.00, .02]) with all items loading significantly on the Social Anxiety factor ($\lambda s \geq .80$). Because the χ^2 values for the CFAs at each time point were nonsignificant, no modifications were made. Results of the longitudinal factor invariance testing for all constructs can be found in Table 2. Loading invariance held for the Social Anxiety factors, as evidenced by the nonsignificant χ^2 differences when comparing freely estimated models to models with factor loadings held to equality. Additionally, indicator invariance held for the Social Anxiety factors, as evidenced by the nonsignificant χ^2 differences when comparing a model with factor loadings held to equality to a model with factor loadings and intercepts held to equality. Thus, the factor loadings and intercepts were set to equality for the Social Anxiety factors across time.

Table 2.

Factor Invariance Testing of Social Anxiety, Anxiety Sensitivity Social Concerns, and Perfectionistic Self-Presentation

Models	χ^2	*df*	CFI	SRMR	RMSEA	90% CI		$\Delta\chi^2$	Δ df
						LL	UL		
Social Anxiety									
Configural	264.97*	114	.99	.04	.03	.01	.04	--	--
Loading	277.87*	124	.99	.04	.03	.01	.04	10.36	10
Indicator	283.76*	134	.99	.04	.03	.01	.04	5.95	10
AS Social Concerns									
Configural	202.30***	114	.98	.05	.04	.03	.05	--	--
Loading	206.62***	124	.98	.05	.03	.02	.05	4.17	10
Indicator	216.50***	134	.98	.05	.03	.02	.04	10.23	10
PSP – Self Promotion[a]									
Configural	599.81***	222	.94	.05	.06	.05	.06	--	--
Loading	609.22***	236	.94	.05	.05	.05	.06	10.57	14
Indicator	627.13***	250	.94	.05	.05	.05	.06	18.14	14
PSP – Nondisplay									
Configural	599.63***	294	.95	.05	.04	.04	.05	--	--
Loading	628.08***	310	.95	.06	.04	.04	.05	33.02*	16
Partial Loading	620.59***	309	.95	.06	.04	.04	.05	24.36	15
Indicator	629.70***	324	.95	.06	.04	.03	.05	9.17	15
PSP – Nondisclosure[b]									
Configural	147.26***	69	.97	.05	.04	.03	.06	--	--
Loading	153.68***	77	.97	.05	.04	.03	.05	6.26	8
Indicator	158.77***	85	.97	.05	.04	.02	.05	5.13	8

Table 2: continued

PSP – Second Order[c]									
Configural	4204.31***	2060	.88	.07	.05	.04	.05	--	--
Loading	4204.35***	2064	.88	.07	.05	.04	.05	2.10	4
Indicator	4211.88***	2068	.88	.07	.05	.04	.05	8.68	4
PSP – Scale Scores									
Configural	24.74	15	.99	.03	.04	0	.07	--	--
Loading	28.49	19	.99	.03	.04	0	.06	3.07	4
Indicator	40.63*	23	.99	.03	.04	0	.07	13.20*	4
Partial Indicator	31.96	22	.99	.03	.03	0	.06	.03	3

Note. CFI = Comparative fit index. SRMR = Standardized root mean square residual. RMSEA = Root mean square error of approximation. CI = Confidence interval. LL = Lower limit. UL = Upper limit. AS = Anxiety Sensitivity. PSP = Perfectionistic Self-Presentation. [a]Factor invariance was tested while allowing for residual correlations between item 26 and 27 on the PSPS. [b]Factor invariance was tested while allowing for residual correlations between item 13 and 14 on the PSPS. [c]Factor invariance was tested while allowing for residual correlations between item 13 and 14, and item 26 and 27 on the PSPS.

*$p < .05$, **$p < .01$, ***$p < .001$

Anxiety Sensitivity Social Concerns. The one-factor CFA for AS Social Concerns at baseline provided excellent fit to the data ($\chi^2 = 6.73$, $df = 9$, $p = .67$, CFI = 1, SRMR = .02, RMSEA = 0, 90% CI [.00, .05]) with all items loading significantly on the AS Social Concerns factor ($\lambda s \geq .57$). Further, the one-factor CFA for AS Social Concerns at month three provided good fit to the data ($\chi^2 = 23.68$, $df = 9$, $p = .005$, CFI = .97, SRMR = .04, RMSEA = .08, 90% CI [.04, .12]) with all items loading significantly on the AS Social Concerns factor ($\lambda s > .46$). Finally, the one-factor CFA for AS Social Concerns at month six provided adequate fit to the data ($\chi^2 = 36.29$, $df = 9$, $p < .001$, CFI = .95, SRMR = .04, RMSEA = .11, 90% CI [.07, .15]) with all items loading significantly on the AS Social Concerns factor ($\lambda s \geq .57$). Although the χ^2 values for the AS Social Concerns factors were significant at month three and month six, there were no substantive bases for allowing residual correlations, so no modifications were made. Loading invariance held for the AS Social Concerns factors, as evidenced by the nonsignificant χ^2 differences when comparing freely estimated models to models with factor loadings held to equality. Further, indicator invariance held for the AS Social Concerns factors, as evidenced by the nonsignificant χ^2 differences when comparing a model with factor loadings held to equality to a model with factor loadings and intercepts held to equality. Thus, the factor loadings and intercepts were set to equality for the AS Social Concerns factors across time.

Perfectionistic Self-Presentation. Modeling PSP as a higher-order factor provided poor fit to the data at baseline ($\chi^2 = 813.03$, $df = 206$, $p < .001$, CFI = .86, SRMR = .08, RMSEA = .09, 90% CI [.08, .09]), month three ($\chi^2 = 546.79$, $df = 206$, $p < .001$, CFI = .88, SRMR = .07, RMSEA = .08, 90% CI [.07, .09]), and month six ($\chi^2 =$

609.02, *df* = 206, *p* < .001, CFI = .85, SRMR = .08, RMSEA = .09, 90% CI [.08, .10]). Because these models fit the data poorly, several modifications were made to improve model fit. Residual correlations between items 13 ("*I should always keep my problems to myself*.") and 14 ("*I should solve my own problems rather than admit them to others*.") were allowed. Additionally, residual correlations were allowed between items 26 ("*I must always appear to be perfect*.") and 27 ("*I strive to look perfect to others*."). Making these changes resulted in significant improvements in model fit for the baseline (χ^2 = 615.21, *df* = 204, *p* < .001, CFI = .91, SRMR = .05, RMSEA = .07, 90% CI [.07, .08]), month three (χ^2 = 457.17, *df* = 204, *p* < .001, CFI = .91, SRMR = .05, RMSEA = .07, 90% CI [.06, .08]), and month six (χ^2 = 490.42, *df* = 204, *p* < .001, CFI = .89, SRMR = .06, RMSEA = .07, 90% CI [.07, .08]) models. For all PSP CFA models all items loaded significantly on their respective factor (λs ≥ .45), and all lower-order factors loaded significantly on the higher order factor (λs ≥ .86).

For the PSP factors, factor invariance was tested for each first-order factor and was then tested for the second-order PSP factors. Both loading and indicator factor invariance held for the Self Promotion and Nondisclosure factors. However, loading invariance did not hold for the Nondisplay factor. Modification indices indicated that freeing the factor loading of item 3 improved model fit, and freeing this loading resulted in a model that had partial loading invariance. The Nondisplay factor also demonstrated indicator invariance (after freeing the factor loading and intercept of item 3). The second-order PSP factors also demonstrated loading and indicator invariance, thus the loadings and intercepts of the first-order factors were set to equality across time.

Although a second-order factor of PSP demonstrated partial indicator invariance, entering the second-order PSP factor into structural models resulted in model nonconvergence. Therefore, longitudinal factor invariance was tested for PSP using summed scale scores as indicators. Loading invariance held for PSP when estimated using summed scale scores. Intercept invariance held for this model. However, fixing the item intercepts significantly degraded model fit. Modification indices suggested that freeing the intercept for baseline nondisplay of imperfection would improve model fit. The resulting model demonstrated partial indicator invariance. Thus, in the final SEM model all item loadings were set to equality across time, and all item intercepts were set to equality across time with the exception of baseline nondisplay of imperfection.

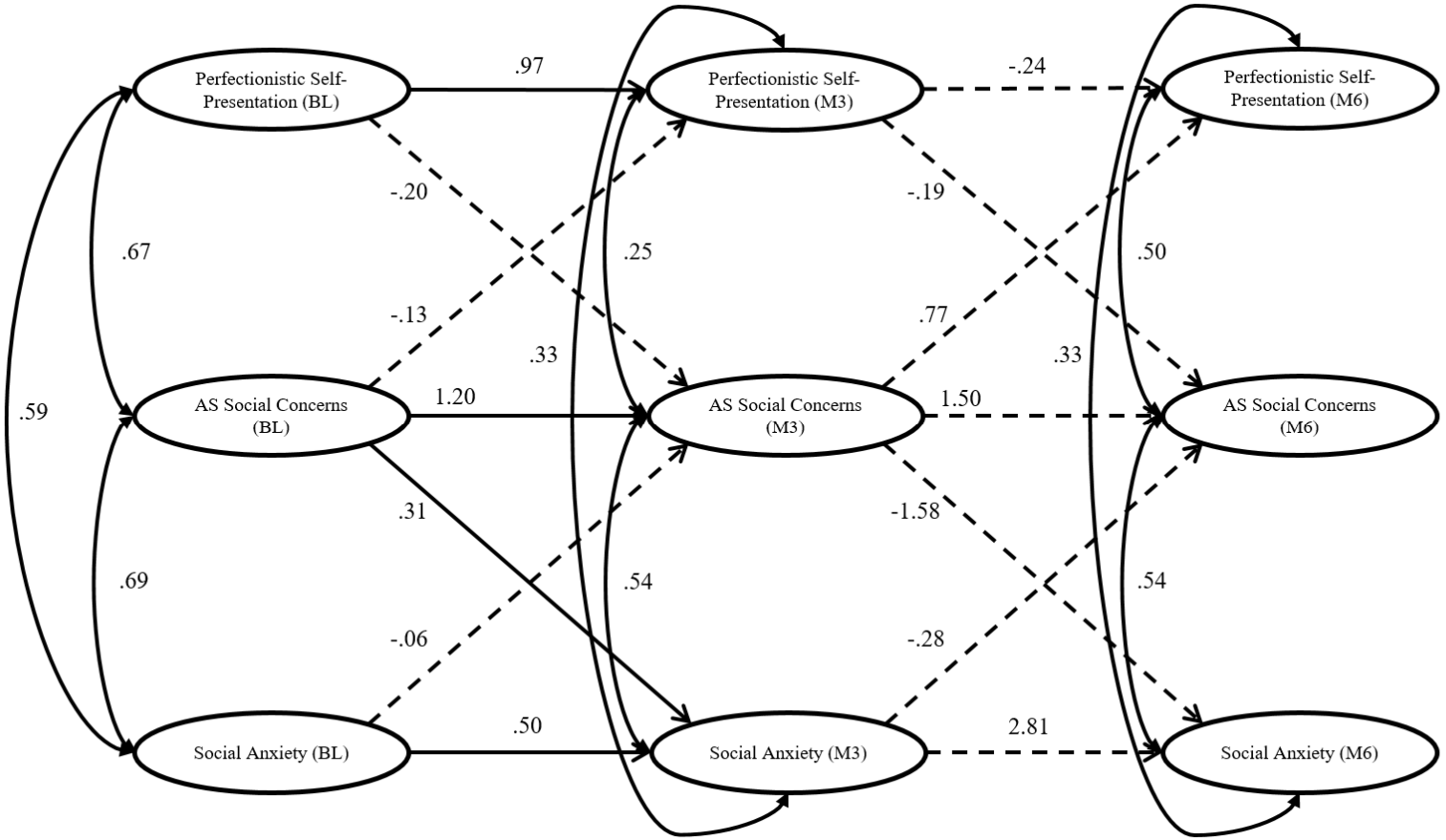
Direct Effects Model of Perfectionistic Self-Presentation, Anxiety Sensitivity Social Concerns, and Social Anxiety

Prior to examining a mediation model a direct effects model was estimated looking at the effects of month 3 PSP and AS Social Concerns on month 6 Social Anxiety after controlling for the effects of baseline Social Anxiety. The resulting model provided adequate fit to the data ($\chi^2 = 419.30$, $df = 189$, $p < .001$, CFI = .93, SRMR = .10, RMSEA = .06, 90% CI [.05, .06]). Baseline Social Anxiety predicted increased month 6 Social Anxiety ($\beta = .52$, $p < .001$) above the effects of month 3 PSP and AS Social Concerns. Month 3 PSP predicted increases in month 6 Social Anxiety ($\beta = .12$, $p < .01$) after controlling for baseline Social Anxiety and month 3 AS Social Concerns. Month 3 AS Social Concerns did not predict changes in month 6 Social Anxiety ($\beta = .11$, $p = .08$) after controlling for baseline Social Anxiety and month 3 PSP.

Comparison of Mediation and Moderation Models of Perfectionistic Self-Presentation, Anxiety Sensitivity Social Concerns, and Social Anxiety

A mediation model was estimated examining the indirect relations from baseline PSP to month 6 Social Anxiety through month 3 AS Social Concerns. The resulting mediation model provided good fit to the data ($\chi^2 = 1314.82$, $df = 915$, $p < .001$, CFI = .96, SRMR = .06, RMSEA = .03, 90% CI [.03, .04]). The standardized point estimates for this mediation model can be found in Figure 1. Although the mediation model provided good fit to the data, there was evidence suggesting suppression effects (Bentler & Chou, 1987; Johnson, 2000; MacKinnon, Krull, & Lockwood, 2000). Specifically, predictors with positive zero order correlations were negatively correlated after being entered in a statistical model. For example, the zero order correlation between month 3 PSP and month 6 PSP was .79, but the standardized SEM path estimate from month 3 PSP and month 6 PSP was -.24. Further, there was evidence of standardized path estimates that would be unlikely in the absence of suppression effects. An example of this is the standardized path estimate from month 3 social anxiety to month 6 social anxiety is 2.81, which is likely inaccurate, because the zero order correlation between those variables was .85. In addition to suppression effects, the high degree of multicollinearity also resulted in model nonconvergence for the moderation model, making it impossible to compare the mediation and moderation models.

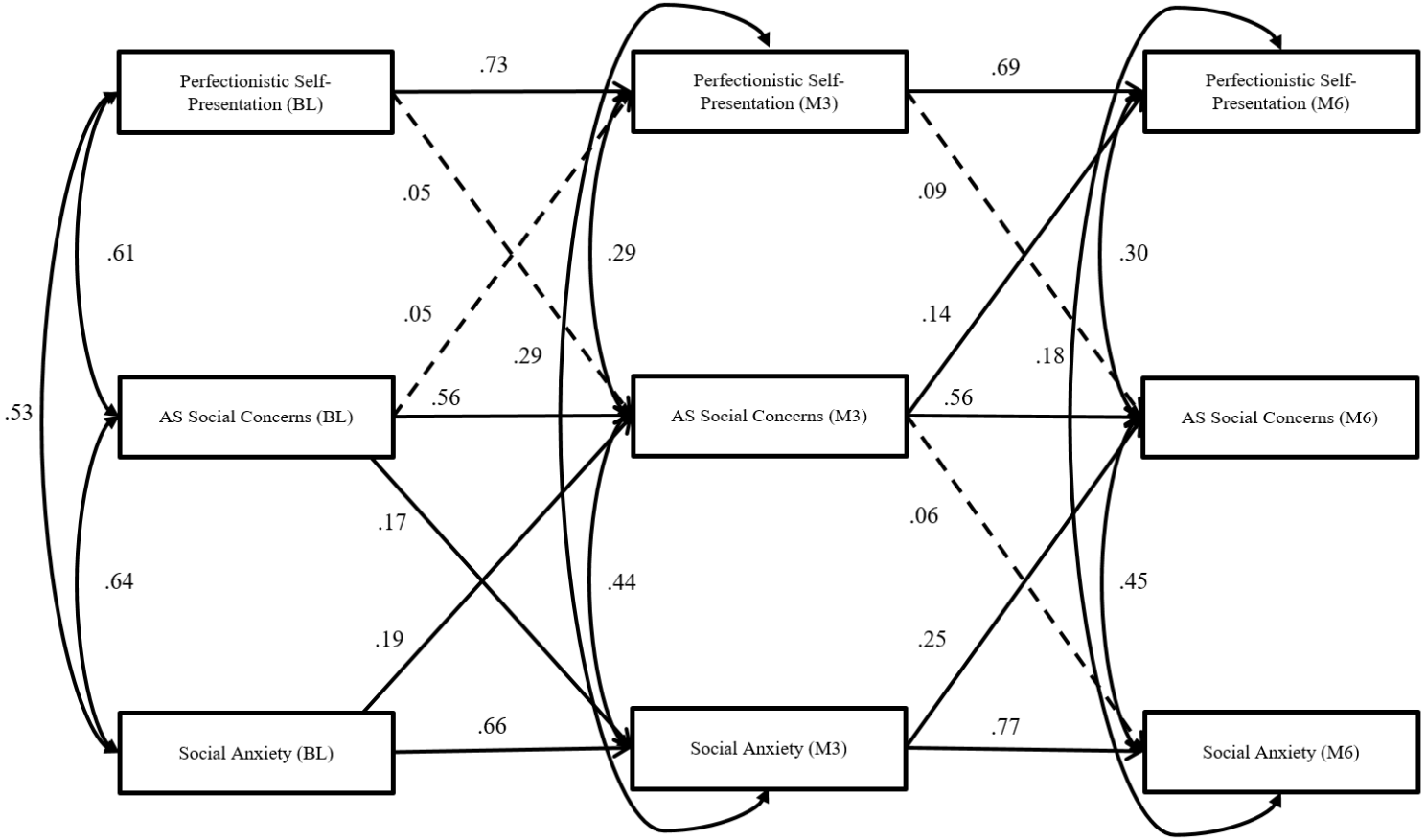
Figure 1.
Latent Variable Mediation Model



Note. Residual variances and factor correlations are omitted for clarity. Solid lines indicate significant paths. Dashed lines indicate nonsignificant paths. BL= Baseline measurement. M3 = Month 3 measurement. M6 = Month 6 measurement. AS = Anxiety Sensitivity.

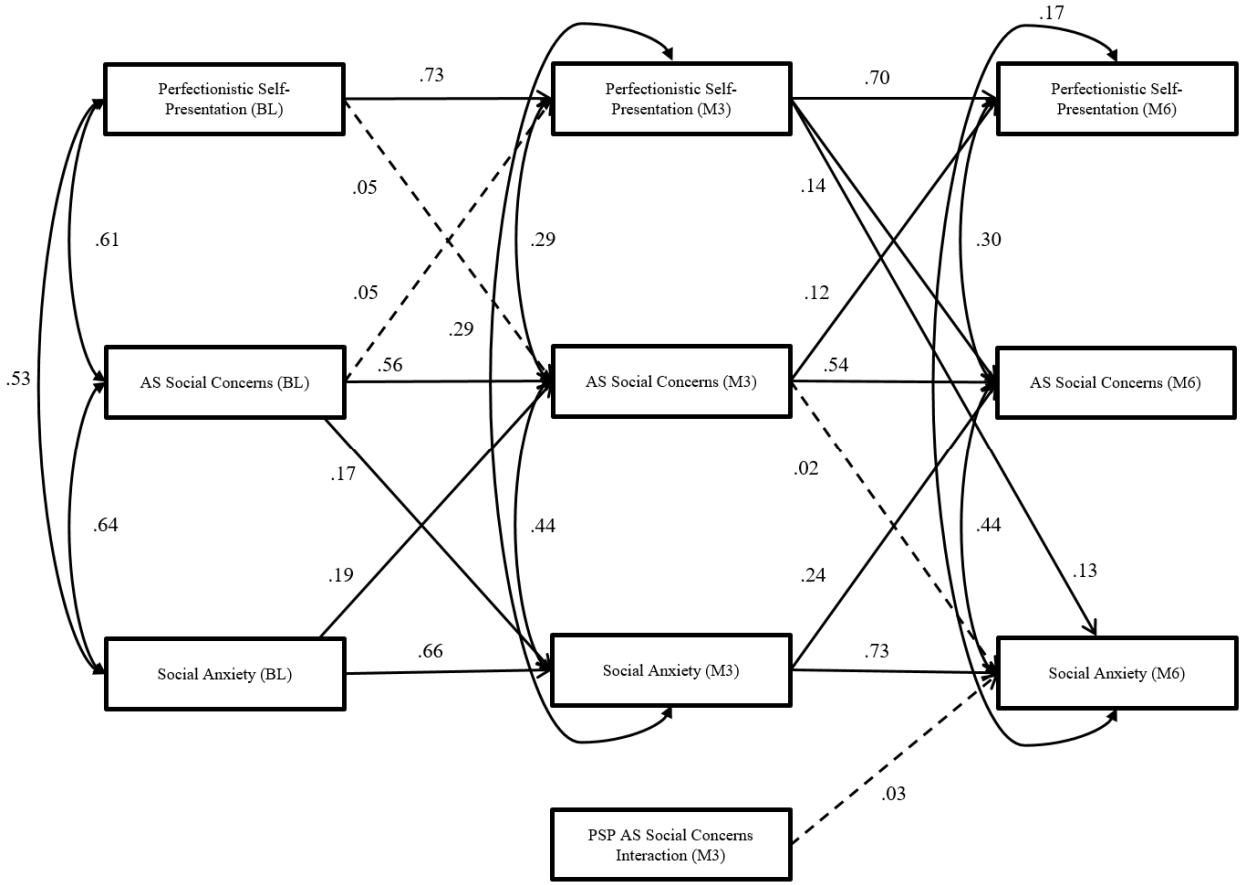
Because of suppression effects and model nonconvergence that resulted from modeling these constructs as latent variables, analyses were conducted to compare mediation and moderation models using manifest variables. Using manifest variables, the mediation model provided adequate fit to the data ($\chi^2 = 63.11$, $df = 13$, $p < .001$, CFI = .96, SRMR = .04, RMSEA = .10, 90% CI [.08, .13]). The standardized point estimates for this mediation model can be found in Figure 2. The moderation model using manifest variables also provided adequate fit to the data ($\chi^2 = 56.31$, $df = 12$, $p < .001$, CFI = .96, SRMR = .03, RMSEA = .10, 90% CI [.07, .12]). The standardized point estimates for the moderation model can be found in Figure 3. The PSP and AS social concerns interaction term was nonsignificant ($\beta = .03$, $p = .49$). Given the interaction term was nonsignificant, the mediation model was accepted as the most parsimonious model. The bootstrapped confidence interval point estimates were then calculated using ML for the mediation model with 5000 bootstrap resamples. This model provided adequate fit to the data ($\chi^2 = 85.13$, $df = 13$, $p < .001$, CFI = .95, SRMR = .04, RMSEA = .12, 90% CI [.10, .14]). There was no significant indirect effect between baseline PSP and month 6 social anxiety through month 3 AS social concerns ($B = .004$, 95% CI [-.01, .02]). There was a significant indirect effect between baseline social anxiety and month 6 PSP through month 3 AS social concerns ($B = .02$, 95% CI [.00, .05]). This model accounted for 66.5% of the variance in month 6 social anxiety.

Figure 2.
Manifest Variable Mediation Model



Note. Residual variances and factor correlations are omitted for clarity. Solid lines indicate significant paths. Dashed lines indicate nonsignificant paths. BL= Baseline measurement. M3 = Month 3 measurement. M6 = Month 6 measurement. AS = Anxiety Sensitivity.

Figure 3.
Manifest Variable Moderation Model



Note. Residual variances and factor correlations are omitted for clarity. The interaction term was entered into the model as a saturated correlate. The correlations between the interaction term and other variables are omitted for clarity. Solid lines indicate significant paths. Dashed lines indicate nonsignificant paths. BL= Baseline measurement. M3 = Month 3 measurement. M6 = Month 6 measurement. AS = Anxiety Sensitivity. PSP = Perfectionistic Self-Presentation.

An additional mediation model was estimated using the AS total score to determine if the observed relations were specific to the AS social concerns subscale. Using manifest variables, this mediation model provided adequate fit to the data (χ^2 = 92.87, *df* = 13, $p < .001$, CFI = .95, SRMR = .03, RMSEA = .13, 90% CI [.10, .15]). In this model, there was no significant indirect effect between baseline PSP and month 6 social anxiety through month 3 AS (*B* = -.01, 95% CI [-.03, .01]). There was a significant indirect effect from baseline social anxiety and month 6 PSP through month 3 AS (*B* = .02, 95% CI [.00, .05]). This model accounted for 67.4% of the variance in month 6 social anxiety.

Discussion

The current study examined the relations between PSP, AS social concerns, and social anxiety in a longitudinal sample of community adults. These results did not support the hypothesis that PSP moderated the predictive effect of AS social concerns on social anxiety. Indeed, the planned moderation model using a latent variable interaction failed to converge, suggesting poor model specification. Additionally, a mediation model using latent variables showed evidence of suppression effects, limiting the conclusions that could be drawn. Due to the aforementioned difficulties estimating the moderation and mediation models using latent variables, the same models were computed using manifest variables. The resulting models provided limited evidence for AS social concerns mediating the relations between social anxiety and PSP, but given model misspecification suggested by the latent variable results, the results from the manifest variable mediation model should not be interpreted.

There were several examples of suppression effects in the latent variable mediation model, which can result when there is a high degree of multicollinearity between predictor variables (Johnson, 2000). Conger (1974) states that suppression can occur when predictors with positive zero order correlations are negatively correlated after being entered in a regression equation. Another sign of suppression is that the predictive ability of variables seemingly increase when multiple variables are entered into a model (Bentler & Chou, 1987; MacKinnon et al., 2000), which can result in improbable effects (e.g., two variables correlating above 1.0). In the latent variable mediation model there was evidence of predictors with positive zero order correlations becoming negatively related after being entered in the SEM (e.g., the beta-weight of month 3 AS Social Concerns predicting month 6 Social Anxiety was -1.58). Additionally, there was evidence of improbable effects (e.g., the beta-weight of month 3 PSP predicting month 6 PSP was 2.81). Further, the standard errors of the path estimates were inflated in the latent variable models, which can also be evidence of suppression effects (MacKinnon et al., 2000). For example, the standard error of the bivariate correlation between month 3 PSP and month 6 PSP was .05. However, the standard error of the path estimate from month 3 PSP to month 6 PSP was 1.04. Taken together, the increased predictive validity of variables, the inconsistent signs of zero order correlations and path estimates, and the inflated standard errors provide evidence for suppression effects in the latent variable mediation model. Thus, conclusions were not drawn from these results.

One potential reason for the observed suppression effects is that the constructs were stable across time. In particular, social anxiety was especially consistent over the course of this study. Indeed, the beta-weights of the cross-lagged relations between social

anxiety latent variables were all above .83, which suggests that almost 70% of the variance in social anxiety could be explained by past levels of social anxiety. This is the first study to find evidence of the stability of social anxiety in a sample of participants recruited on Mturk. However, in non-Mturk samples, social anxiety has remained consistent over time (e.g., Beard et al., 2011; Beard, Rodriguez, Weisberg, Perry, & Keller, 2012; Gautreau, Sherry, Mushquash, & Stewart, 2015; Sibrava et al., 2013). For example, individuals diagnosed with social phobia had lower probability of recovery over a 12 year period compared to individuals diagnosed with generalized anxiety disorder and panic disorder (Bruce et al., 2005). However, there is mixed evidence for the stability of SAD diagnoses. For instance, other researchers found that individuals diagnosed with SAD had fairly low SAD persistence rates (i.e., less than 40% retaining an SAD diagnosis; Cox, Turnbull, Robinson, Grant, & Stein, 2011; Vriends et al., 2007), although there is some evidence that higher AS increases SAD persistence rates (Vriends et al., 2007). In adolescent samples, there is evidence that social anxiety symptoms are stable as well (Calvete, Orue, & Hankin, 2015; Xiao-jiao, Xiao-yi, Yang, & Xiu-yun, 2013), with baseline social anxiety predicting month six social anxiety at .73 in a sample of 10-17 year olds (Pabian & Vandebosch, 2016). Together, these findings suggest that social anxiety is a stable construct over time. Thus, the stability of social anxiety may have driven the observed suppression effects.

In addition to the stability of social anxiety across the six months of measurement in this study, PSP and AS social concerns were also relatively stable across time. For PSP, the beta-weights of the cross-lagged relations were above .78. This is the first study

to find evidence of the stability of PSP in an Mturk sample. However, there is evidence of stability for PSP in community samples (Hewitt et al., 2003; Mackinnon & Sherry, 2012). For example, baseline PSP was highly predictive of future PSP in a three-wave study that gathered data at 45 and 130 days after baseline (i.e., standardized path coefficients of .79 and .81, respectively; Mackinnon & Sherry, 2012). Additionally, AS social concerns was stable across time in the current study (i.e., the beta-weights of the cross-lagged relations were above .79). The stability of AS social concerns was consistent with previous research (Li & Zinbarg, 2007; Rodriguez et al., 2004). There has been no research on the stability of AS social concerns in Mturk samples; however, AS social concerns has demonstrated stability in clinical (Rodriguez et al., 2004) and community (Li & Zinbarg, 2007) samples. In a community sample, the bivariate correlations between AS social concerns over time were between .45 and .71 (Li & Zinbarg, 2007), suggesting AS social concerns is a stable construct. Thus, the findings of the current study provide further support that both PSP and AS social concerns are stable over time.

Due to the evidence of suppression effects, models were computed using manifest variables. In these models, the interaction term was nonsignificant, and there was limited evidence of an indirect effect from baseline social anxiety to month 6 PSP through month 3 AS social concerns. Social anxiety predicting changes in PSP is consistent with other studies that found social anxiety predicted changes in perfectionism (i.e., Gautreau et al., 2015). However, there are limitations of the manifest variable models in the current study and the Gautreau and colleagues (2015) study that should be considered. Specific to the Gautreau and colleagues study, the sample was over 70% female and 90% White. Thus,

these findings may not be robust across more diverse samples. A more serious concern (in both the current study and the Gautreau et al., 2015 study) is the use of manifest variables in path analysis. There is robust evidence that manifest variable path analysis is fallible when measures are not perfectly reliable (Cole & Preacher, 2014). There are several serious problems associated with path analysis when measurement error is not controlled, including path coefficients may be over- or under-estimated, power is diminished which can prevent invalid models from being rejected, valid models can appear invalid, and differential measurement error in a single model can change conclusions derived from the path analysis (including indirect effects; Cole & Preacher, 2014). Further, the problems associated with manifest variable path analysis worsen when models become increasingly complex (Cole & Preacher, 2014), as is the case in the current study. Thus, given the limitations of manifest variable path analysis and the model misspecification suggested by the latent variable results, the results from the manifest variable mediation model should not be interpreted.

In addition to the aforementioned suppression effects, several limitations should be considered when interpreting results from the present investigation. First, this study was conducted in an unselected community sample. Perhaps using a developmental sample may circumvent issues related to the suppression effects observed in the current study, given PSP, AS social concerns, and social anxiety may still be developing. Alternatively, an intervention study targeting PSP or AS social concerns may elucidate the process that contributes to the development of social anxiety. Another limitation is that this study included a sample of participants recruited on Mturk. Therefore, the results

may not generalize to other populations. Future work should attempt to extend these findings within a more heterogeneous sample of participants. Finally, this study relied solely on self-report data. Future work should extend these findings across multiple methods of assessment, in keeping with recent initiatives (e.g., Research Domain Criterion; Insel et al., 2010) to facilitate scientific gains by moving past self-report and integrating findings across multiple levels of measurement. For example, fearful responding to a speech task in which publicly observable symptoms of anxiety are pharmacologically increased has been identified as a biological challenge paradigm to measure AS social concerns (Allan, Saulnier, Cooper, Oglesby, & Schmidt, *Revise and resubmit*). By integrating multiple methods of assessment a deeper understanding of the factors that contribute to the development of social anxiety may be gained.

There are several important implications and future directions suggested by the current study. This study adds to the body of evidence (e.g., Cole & Preacher, 2014) that path analytic models can produce inconsistent results when measurement error is not controlled. In the current study, not controlling for measurement error yielded results that were inconsistent with results in which measurement error was controlled. Further, not controlling for measurement error resulted in findings that are inconsistent with prior research and the theoretical understanding of social anxiety (i.e., social anxiety predicting changes in risk factors for social anxiety). Given the potential impact of uncontrolled measurement error in path analytic models, researchers should use caution when conducting, and interpreting results from, path analytic models. Finally, more research is needed to elucidate the processes underlying the relations between PSP, AS social

concerns, and social anxiety. Future work should present longitudinal data from developmental samples or treatment studies to examine the temporal relations between PSP, AS social concerns, and social anxiety. Such research could inform prevention and intervention efforts designed to reduce the societal burden of social anxiety.

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Appendix A

Ohio University Online Consent Form

Title of Research: Longitudinal Investigation of Personality and Behaviors

Researchers: Dr. Nicholas Allan (allan@ohio.edu), Kevin Saulnier (ks981615@ohio.edu)

You are being asked to participate in research. For you to be able to decide whether you want to participate in this project, you should understand what the project is about, as well as the possible risks and benefits in order to make an informed decision. This process is known as informed consent. This form describes the purpose, procedures, possible benefits, and risks. It also explains how your personal information will be used and protected. Once you have read this form and your questions about the study are answered, you will be asked to participate in this study. You may print a copy of this document for your records.

Explanation of Study

This study involves answering a series of questions about your personality, emotional response patterns, and behavior. You will also be asked to answer questions about aspects of behavioral health, including eating habits, emotional functioning, and habits related to blood donation. You will also be asked to rate your response to images. These images include images related to uncertainty, blood donation, and mildly threatening situations (e.g., images including animals or scenes that people might perceive as dangerous). Some of these images might evoke negative emotions, and you may discontinue participation at any time.

If you agree to participate, you will be asked to complete a series of questionnaires and rate some images. After you complete these questionnaires, you may be contacted every 3 months (on Mturk) over the course of the next year to complete follow-up questionnaires. You will be compensated for every set of questionnaires you complete. You should not participate in this study if you are under 18 years of age.

Risks and Discomforts

Some of the questions and images may evoke negative thoughts and emotions. As a participant, you may withdraw from the study at any point.

Benefits

This study is important to science because it will help researchers better identify factors that impact behavioral health. Your participation could aid in the development of novel approaches to identify people who might be at risk for difficulty in handling life stressors.

As participants, you will be exposed to scientific research and will learn how scientists conduct research in the field of psychology. You may benefit from the satisfaction of

contributing to research examining behavioral health. You will also be exposed to the research process, which will hopefully be a valuable experience that provides greater insight into your behavior and cognitive processes, as well as fostering an understanding of the process of the scientific method.

Confidentiality and Records

Your study information will be provided anonymously, so the researchers will not be able to connect your responses to any personally identifiable information.

For maximum confidentiality, please clear your browser history and close the browser before leaving the computer.

Compensation

As compensation for your time/effort, you will receive **$1.25**. It is reasonably estimated that you should be able to complete the survey in 45 minutes to 1 hour.

Contact Information

If you have any questions regarding this study, please contact one of the investigators, Dr. Nicholas Allan (allan@ohio.edu) or Kevin Saulnier (ks981615@ohio.edu).

If you have any questions regarding your rights as a research participant, please contact Dr. Chris Hayhow, Director of Research Compliance, Ohio University, (740)593-0664 or hayhow@ohio.edu.

By agreeing to participate in this study, you are agreeing that:

- You have read this consent form and have been given the opportunity to ask questions and have them answered;
- You have been informed of potential risks and they have been explained to your satisfaction;
- You understand Ohio University has no funds set aside for any injuries you might receive as a result of participating in this study;
- You are 18 years of age or older;
- Your participation in this research is completely voluntary;
- You may leave the study at any time; if you decide to stop participating in the study, there will be no penalty to you and you will not lose any benefits to which you are otherwise entitled.

o I agree
o No Thanks

Appendix B

Month 3 Study Reminder Email

Hello research participant,

A few months ago you began your participation in a research study by completing several questionnaires and rating some pictures. You were told at that time you would receive an invitation to complete the next series of questionnaires in a few months. This is why we are contacting you today, to inform you that the next batch of questionnaires is ready for you to complete.

We are making several changes to our original questionnaires to benefit you. For example, you will be paid more for completing this second wave of questionnaires. You will also be entered into a drawing for one of two $25 bonuses, applied directly to your Mturk account.

The HIT is entitled: A Longitudinal Investigation of Personality and Behaviors. It will show up on your mturk account.

We greatly appreciate your continued participation!

Sincerely,
Dr. Nicholas Allan (allan@ohio.edu), Kevin Saulnier (ks981615@ohio.edu)

Month 6 Study Reminder Email

Hello research participant,

A few months ago you began your participation in a research study by completing several questionnaires and rating some pictures. You were told at that time you would receive an invitation to complete the next series of questionnaires in a few months, and you have been receiving emails about this for the past few weeks. This is why we are contacting you today, to inform you that we have a shorter batch of questionnaires for you to complete. These shortened questionnaires should make your continued participation easier.

We are making several changes to our original questionnaires to benefit you. For example, you will be paid more for completing this second wave of questionnaires. You will also be entered into a drawing for one of two $25 bonuses, applied directly to your Mturk account. **We also shortened these questionnaires, so they should only take you 30-35 minutes to complete.** There will be two more survey periods (3 and 6 months from now) for which we will also include bonuses and will be asking much shorter surveys. If you do complete all four rounds of surveys, you could be entered into a drawing for a $100 bonus.

The HIT is entitled: **Longitudinal Investigation of Personality and Behaviors Shortened (1 or 2)**. It will show up in the HITs available to you section of your Mturk account. If you can't locate it there, you can search for the HIT ID (**Longitudinal Investigation of Personality and Behaviors**) in the search bar, and you will see two HITs with the same name. One of those will be available to you.

If you have any difficulties accessing the survey or are ineligible, please send your Mturk ID number to Kevin (ks981615@ohio.edu) and he will send you a direct link to the survey. After you complete the questionnaires, he will pay you directly as a bonus.

We greatly appreciate your continued participation!

Sincerely,
Dr. Nicholas Allan (allan@ohio.edu), Kevin Saulnier (ks981615@ohio.edu)

Appendix C

Questionnaires

Social Phobia Scale-6

INSTRUCTIONS: Rate each of the following statements on a scale of 1 (not typical of me) to 5 (very typical of me). Please do not leave any item blank.

		Not at all characteristic or true of me	**Slightly characteristic or true of me**	**Moderately characteristic or true of me**	**Very characteristic or true of me**	**Extremely Characteristic or true of me**
1.	I get nervous that people are staring at me as I walk down the street.	0	1	2	3	4
2.	I worry about shaking or trembling when I'm watched by other people.	0	1	2	3	4
3.	I would get tense if I had to sit facing other people on a bus or train.	0	1	2	3	4
4.	I worry I might do something to attract the attention of other people.	0	1	2	3	4
5.	When in an elevator, I am tense if people look at me.	0	1	2	3	4
6.	I can feel conspicuous (like I stand out) standing in a line.	0	1	2	3	4

Perfectionistic Self-Presentation Scale

Listed below are a group of statements. Please rate your agreement with each of the statements using the following scale. If you strongly agree, circle 7; if you disagree, circle 1; if you feel somewhere in between, circle any one of the numbers between 1 and 7. If you feel neutral or undecided the midpoint is 4.

1 Disagree Strongly **2** **3** **4 Neutral** **5** **6** **7 Agree Strongly**

		Disagree Strongly						Agree Strongly
1.	It is okay to show others that I am not perfect	1	2	3	4	5	6	7
2.	I judge myself based on the mistakes I make in front of other people	1	2	3	4	5	6	7
3.	I will do almost anything to cover up a mistake	1	2	3	4	5	6	7
4.	Errors are much worse if they are made in public rather than in private	1	2	3	4	5	6	7
5.	I try always to present a picture of perfection	1	2	3	4	5	6	7
6.	It would be awful if I made a fool of myself in front of others	1	2	3	4	5	6	7
7.	If I seem perfect, others will see me more positively	1	2	3	4	5	6	7
8.	I brood over mistakes that I have made in front of others	1	2	3	4	5	6	7
9.	I never let others know how hard I work on things	1	2	3	4	5	6	7
10.	I would like to appear more competent than I really am	1	2	3	4	5	6	7
11.	It doesn't matter if there is a flaw in my looks	1	2	3	4	5	6	7
12.	I do not want people to see me do something unless I am very good at it	1	2	3	4	5	6	7
13.	I should always keep my problems to myself	1	2	3	4	5	6	7
14.	I should solve my own problems rather than admit them to others	1	2	3	4	5	6	7
15.	I must appear to be in control of my actions at all times	1	2	3	4	5	6	7
16.	It is okay to admit mistakes to others	1	2	3	4	5	6	7
17.	It is important to act perfectly in social situations	1	2	3	4	5	6	7
18.	I don't really care about being perfectly groomed	1	2	3	4	5	6	7
19.	Admitting failure to others is the worst possible thing	1	2	3	4	5	6	7
20.	I hate to make errors in public	1	2	3	4	5	6	7
21.	I try to keep my faults to myself	1	2	3	4	5	6	7
22.	I do not care about making mistakes in public	1	2	3	4	5	6	7
23.	I need to be seen as perfectly capable in everything I do	1	2	3	4	5	6	7
24.	Failing at something is awful if other people know about it	1	2	3	4	5	6	7
25.	It is very important that I always appear to be "on top of things"	1	2	3	4	5	6	7
26.	I must always appear to be perfect	1	2	3	4	5	6	7
27.	I strive to look perfect to others	1	2	3	4	5	6	7

Anxiety Sensitivity Index-3
AS social concerns items are bolded.

INSTRUCTIONS: Circle the **one phrase** that best represents the extent to which you agree with the item. If any of the items *concern something* that is not part of your experience, answer on the basis of how you think you might feel *if you had* such an experience. Otherwise, answer all items on the basis of your own experience.

1. It is important to me not to appear nervous.
VERY LITTLE A LITTLE SOME MUCH VERY MUCH

2. When I cannot keep my mind on a task, I worry that I might be going crazy.
VERY LITTLE A LITTLE SOME MUCH VERY MUCH

3. It scares me when my heart beats rapidly.
VERY LITTLE A LITTLE SOME MUCH VERY MUCH

4. When my stomach is upset, I worry that I might be seriously ill.
VERY LITTLE A LITTLE SOME MUCH VERY MUCH

5. It scares me when I am unable to keep my mind on a task.
VERY LITTLE A LITTLE SOME MUCH VERY MUCH

6. When I tremble in the presence of others, I fear what people might think of me.
VERY LITTLE A LITTLE SOME MUCH VERY MUCH

7. When my chest feels tight, I get scared that I won't be able to breathe properly.
VERY LITTLE A LITTLE SOME MUCH VERY MUCH

8. When I feel pain in my chest, I worry that I'm having a heart attack.
VERY LITTLE A LITTLE SOME MUCH VERY MUCH

9. I worry that other people will notice my anxiety.
VERY LITTLE A LITTLE SOME MUCH VERY MUCH

10. When I feel "spacey" or spaced out, I worry that I may be mentally ill.
VERY LITTLE A LITTLE SOME MUCH VERY MUCH

11. It scares me when I blush in front of people.
VERY LITTLE A LITTLE SOME MUCH VERY MUCH

12. When I notice my heart skipping a beat, I worry that there is something seriously wrong with me.
VERY LITTLE A LITTLE SOME MUCH VERY MUCH

13. When I begin to sweat in social situations, I fear people will think negatively of me.
VERY LITTLE A LITTLE SOME MUCH VERY MUCH

14. When my thoughts seem to speed up, I worry that I might be going crazy.
VERY LITTLE A LITTLE SOME MUCH VERY MUCH

15. When my throat feels tight, I worry that I could choke to death.
VERY LITTLE A LITTLE SOME MUCH VERY MUCH

16. When I have trouble thinking clearly, I worry that there is something wrong with me.
VERY LITTLE A LITTLE SOME MUCH VERY MUCH

17. I think it would be horrible for me to faint in public.
VERY LITTLE A LITTLE SOME MUCH VERY MUCH

18. When my mind goes blank, I worry that there is something terribly wrong with me.
VERY LITTLE A LITTLE SOME MUCH VERY MUCH

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