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The Structure of Vulnerabilities for Social Anxiety Disorder

Thomas L. Rodebaugh[a,*], **Cheri A. Levinson**[a], **Julia K. Langer**[a], **Justin Weeks**[b,1], **Richard G. Heimberg**[c], **Patrick J. Brown**[a,2], **Andrew R. Menatti**[b], **Franklin R. Schneier**[d], **Carlos Blanco**[d], and **Michael R. Liebowitz**[e]

[a]Department of Psychological and Brain Sciences, Washington University in St. Louis, St. Louis, MO, USA

[b]Department of Psychology, Ohio University, Athens, Ohio, USA

[c]Department of Psychology, Temple University, Philadelphia, PA, USA

[d]Department of Psychiatry, Columbia University College of Physicians and Surgeons, and Anxiety Disorders Clinic, New York State Psychiatric Institute, New York, NY, USA

[e]Columbia University College of Physicians and Surgeons, New York, NY, USA

Abstract

Social anxiety disorder symptoms are generally proposed to be related to broad temperamental vulnerabilities (e.g., a low level of approach and high level of avoidance temperament), specific psychological vulnerabilities (e.g., fears of negative and positive evaluation), and additional disorders (e.g., major depressive disorder). However, existing tests of such a model have either not considered depressive symptoms or relied on samples of undergraduates. We examined these and related questions via a latent variable model in a large dataset ($N = 2253$) that combined participants across a variety of studies. The model had adequate fit in the whole sample, and good fit in a subsample in which more participants completed the depression measure. The model indicated that low level of approach and high level of avoidance temperament contributed to fears of evaluation and social anxiety symptoms, and that fears of evaluation additionally contributed independently to social anxiety symptoms. The relationship between social anxiety and depressive symptoms was entirely accounted for by these vulnerabilities: Depressive symptoms were only predicted by avoidance temperament.

Keywords

Social anxiety disorder; social phobia; hierarchical models; structural equation modeling; depression

[*]Correspondence should be addressed to Thomas L. Rodebaugh, 1 Brookings Drive, Campus Box 1125 Psychology Building, Washington University, Saint Louis, MO 63130. rodebaugh@wustl.edu.

[1]Justin Weeks is now at the Department of Psychology at Nebraska Medical Center.

[2]Patrick J. Brown is now at the Department of Psychiatry at Columbia University College of Physicians and Surgeons.

1. Introduction

Two broad underlying temperamental factors appear to contribute to internalizing psychopathology generally and social anxiety disorder (SAD) in particular (Clark et al., 1994; Kotov et al., 2007; Naragon-Gainey et al., 2009; Watson, 2005). These two underlying factors appear to reflect general tendencies toward high levels of *avoidance* (neuroticism, negative affect) on the one hand, and low levels of *approach* (extraversion, positive affect) on the other hand (cf. Barlow et al., 2014; Elliot and Thrash, 2002). More specifically, although most investigators have either focused on affect-based measures (positive versus negative) or personality-based measures (neuroticism versus extraversion), theoretical discussions of these factors assume that findings regarding personality-based measures and affect-based measures reflect the same broad factors (see especially Barlow et al., 2014). Because multiple researchers proceed as if these broad factors exist, we prefer to explicitly state this assumption. We, consistent with other authors (e.g., Elliot and Thrash, 2002) define avoidance as a person's level of sensitivity to, and disposition to move away from, unpleasant stimuli, whereas we define approach as a person's level of sensitivity to and motivation toward desirable stimuli. Such broad factors plausibly set the stage for future problems with social anxiety (e.g., because social situations typically involve the possibility of both types of stimuli). However, multiple authors have also contended that more specific psychological vulnerabilities likely exist for some mental disorders (Barlow et al., 2004; Brown et al., 1998; Kotov et al., 2007; Wang et al., 2012). For SAD in particular, fear of negative evaluation has long been proposed as such a specific risk factor (Kotov et al., 2007; Levinson et al., 2014; Wang et al., 2012). More recently, fear of *positive* evaluation (FPE) has been investigated as a plausible additional specific risk factor (Fergus et al., 2009; Weeks et al., 2008a; Weeks et al., 2012; Weeks et al., 2008b).

Levinson and colleagues (2014) accordingly proposed a model in which approach and avoidance temperament constituted vulnerability for both social anxiety symptoms and fears of (positive and negative) evaluation, and these fears of evaluation in turn further predicted social anxiety symptoms. In contrast, Levinson et al.'s model suggested that depression would be predicted by approach and avoidance temperament, but not the specific vulnerabilities. Three studies have tested some aspects of the model implied above (Kotov et al., 2007; Wang et al., 2012; Weeks, 2015) and their results generally support its predictions. However, there has thus far been no test of such specific factors (fears of evaluation) and temperament (e.g., approach and avoidance) in either (a) a larger community-based sample or (b) a sample with a sizeable number of participants with SAD (although see Blanco et al., 2014 for a test of several specific factors relating to anxiety disorders and depression; that study did not focus on temperament).

An additional source of vulnerability to SAD has been proposed by multiple authors: the perception that some aspect of oneself makes one unacceptable to others (Moscovitch and Huyder, 2011; Rodebaugh, 2009). The tendency to view oneself as not acceptable to other people, referred to as a core extrusion schema by some authors and negative self-portrayal by other authors (Levinson et al., in press; Moscovitch and Huyder, 2011; Moscovitch et al., 2013; Rodebaugh, 2009), also seems plausible as a source of vulnerability relatively specific to SAD, but none of the previous hierarchical tests included such a factor in their models.

Note that although we focus here on what could be considered temperamental, psychological, or cognitive vulnerabilities, we do not wish to suggest that other forms of risk (e.g., genetic; fear circuitry) do not exist (cf. Blanco et al., 2014). In addition, other psychological vulnerabilities may certainly exist (cf.Weeks 2015).

We examined latent models of vulnerabilities to and symptoms of SAD, as well as symptoms of depression (assessed due to well-established shared correlates between these disorders). We conducted these analyses using a large dataset with a sizeable minority of participants diagnosed with SAD. We first tested a latent variable model in which broad temperamental factors, fears of both negative and positive evaluation, social anxiety symptoms, and depression symptoms were correlated but separate latent variables. We then tested the predictive relationships between the latent variables against our hypothetical model. This model is described above and depicted in Figure 1. Finally, we examined whether the belief that one must hide oneself to avoid rejection showed signs of being an additional specific vulnerability.

2. Methods

2.1. Participants

A combination of six datasets (N = 2253) consisting of clinical (n = 282), community (n = 535), and undergraduate participants (n = 1436) was utilized. Rodebaugh et al. (2011) reported on a significant subset of these participants, and multiple additional studies (full list available from the first author) have employed some of the measures from some of the datasets; however, no previous study examined these data in regard to latent variable models of social anxiety. A detailed description of each dataset is provided in the supplementary material, and a general description is provided below.

In the full dataset (N = 2253), 1483 (66%) participants identified as women; participants identified with ethnicities including White (n = 1771, 79%), Asian or Pacific Islander (n = 173, 8%), Black or African American (n = 166, 7%), another ethnicity not listed (n = 48, 2%), multiple ethnicities (n = 32, 1%), Hispanic (n = 27, 1%), American Indian (n = 11, < 1%), and Caribbean (n = 1, < 1%). Participants had a mean age of 30.47, but a median age of 20 (SD = 20.04). A total of 261 participants (11.6% of full study sample) were diagnosed with generalized SAD as part of the study of origin. However, an unknown additional number of participants were likely to have SAD because the samples included both community and student participants who were not screened out due to social anxiety.

2.2. Measures

In all cases the measures used were either the gold standard measure or among the gold standard measures for the construct in question. The supplemental material provides a more exhaustive description of each measure and its psychometric qualities, which in each case was good to excellent for the current purposes.

Social anxiety symptoms were measured by the Social Phobia Scale (SPS; Mattick and Clarke, 1998) and the Social Interaction Anxiety Scale-Straightforward items (SIAS-S; (Rodebaugh et al., 2011) drawn from the Social Interaction Anxiety Scale (SIAS; Mattick

and Clarke, 1998). The SPS (administered to 56% of the combined sample, $n = 1256$) measures fear of public scrutiny whereas the SIAS (administered to 100% of the combined sample, $n = 2253$) is a 20-item self-report questionnaire that measures anxiety-related reactions to different social interactions. Depressive symptoms were assessed by the Beck Depression Inventory-II (BDI-II Beck et al., 1996) (administered to 14% of the combined sample, $n = 325$). Approach and avoidance tendencies were measured by the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988) and the Mini-International Personality Item Pool (MINI-IPIP; Donnellan et al., 2006). The PANAS (administered to 49% of the combined sample, $n = 1108$) is a frequently-used measure of positive (e.g., excited; proud) and negative (e.g., upset; scared) activated affect. The MINI-IPIP (administered to 79% of the combined sample, $n = 1790$) is a 20-item measure of the broad five factors of personality. We used the neuroticism and extraversion items.

Specific risk factors were assessed by the Brief Fear of Negative Evaluation Scale-Straightforward Items (BFNE-S; Rodebaugh et al., 2004; Weeks et al., 2005), the Fear of Positive Evaluation Scale (FPES; Weeks et al., 2008a), and the Hidden Self (HS) subscale of the Core Extrusion Schema-Revised (CES-R) (Rodebaugh, 2009). The BFNE (Leary, 1983) (administered to 100% of the combined sample, with 99%, $n = 2237$, having provided at least partial data) is a 12-item self-report measure of fear and distress related to negative evaluation from others. The 10-item FPES (administered to 73% of the combined sample, $n = 1650$) is the only scale available to assess the fear of positive evaluation construct, and evidence suggests that the scale has good reliability and validity for measuring the construct (Fergus et al., 2009; Weeks et al., 2008a; Weeks et al., 2012; Weeks et al., 2008b; Weeks et al., 2010). The HS of the CES-R (administered to 27% of the combined sample, $n = 619$) includes four items assessing a tendency to hide the self due to concerns of inadequacy. In previous research, the HS subscale showed good indications of producing reliable and valid scores; further, the HS subscale appeared to be strongly related to social anxiety, above and beyond other constructs (Levinson et al., in press; Rodebaugh, 2009).

2.3. Procedure

Participants completed measures as part of a battery that included a variety of different measures across studies and time. Most participants completed measures as part of a paper and pencil packet ($n = 1319$), but a sizeable group completed measures online ($n = 934$).

2.4. Data Analytic Plan

All analyses were conducted on the combined dataset. Missing data were common, primarily because some measures were not administered to all participants (see *Measures* section). However, all samples were administered the SIAS, and all measures were administered to at least some participants diagnosed with social anxiety disorder. Measures not administered to a given set of participants, as well as transient lack of response from participants, were modeled as data missing at random (see **Discussion** for caveats for this decision). Missing data were estimated using multiple imputation (MI) performed in Amelia II (Honaker et al., 2006–2008); more information about the MI procedure is available in the supplemental material. Because some measures, particularly the BDI-II and HS, were administered to fewer participants, we also examined a model in which missingness was

more limited for those measures (i.e., a higher percentage of participants completed the measures) to provide assurance that findings were not artifacts due to high missingness of data.

Confirmatory factor analyses (CFAs) and exploratory factor analyses (EFAs, via both standard EFA and exploratory structural equation modeling) were conducted in Mplus 7.31 (Muthén and Muthén, 1998–2012) using the robust weighted least squares estimator (referred to as WLSMV), which is appropriate for multivariate nonnormal data in general, as well as the specific items analyzed. All of the items were treated categorically (i.e., as ordered categories, or ordinal: cf. Rodebaugh et al. 2004, among others) with the exception of the 10-response-option items from the Hidden Self scale and FPES. When models only included non-categorical variables, the Satorra-Bentler chi-square, referred to as the MLM estimator in Mplus, was used. Model building proceeded in the first random half of the database, with plans to cross-validate the fit of the factor model prior to testing the paths between constructs. We consulted the following fit indices to determine global model fit: (a) Tucker-Lewis incremental fit index (TLI) (Tucker and Lewis, 1973), (b) comparative fit index (CFI) (Bentler, 1990), and (c) root mean square error of approximation (RMSEA) (Steiger and Lind, 1980). To determine a good fit of the model to the data, the following values were used: TLI and CFI ranging from .95 to 1, and RMSEA below .06 (Hu and Bentler, 1999). In accordance with broad practice, we also consider TLI and CFI above .90 but below .95, as well as RMSEA below .08 but above .059 to represent adequate fit.

Notably, the model displayed in Figure 1 portrays main effects only. Estimation of latent interactions proved unworkable given the complexity of the model, but we did test for interactions among factor scores in regression. We found no evidence for two- or three-way interactions in these models (all *p*s > .05).

3. Results

3.1. Factor models

Initial models focused on one construct at a time in the first half of the data and are described in the supplemental material; all models for individual constructs achieved good to excellent fit. In each case the construct's final model included a single factor (whether higher-order, or in the case of depression the general factor of a bifactor model) that included direct or indirect loadings from all items for that construct.

3.1.1. Combined model with all constructs (i.e., measurement model)—All of the final models of each construct were included in a combined model of avoidance, approach, fear of negative and positive evaluation, hidden self, social anxiety, and depression, with all of the highest-order, substantive latent factors permitted to correlate. Two subfactors of depression, Somatic and Cognitive, were also permitted to correlate with all factors except each other and the General depression factor. Overall fit was adequate to good globally (CFI = .92, TLI = .91, RMSEA = .04), and all items loaded on their intended factors (with the exception of some loadings onto the Somatic and Cognitive factors, which were not considered substantive factors in these analyses). To avoid the possibility that elements of our factor model were based on idiosyncrasies of the first half of the data, we

tested the final structure in the second half of the data; this model had slightly better fit (CFI = .93, TLI = .92, RMSEA = .04). We therefore moved on to test pathways with the full dataset.

3.2 Vulnerability model (i.e., structural model)

Figure 1 depicts overall results from the SEM analysis of the full sample, omitting effects that were nonsignificant ($p > .05$) or in regard to a nonsubstantive factor (i.e., only the General depression factors and not the Somatic or Cognitive subfactors of depression were predicted in this model). The Hidden Self is omitted from the figure based on its results (see below). In the specified model, Approach and Avoidance predicted FNE and FPE, and all four of those latent variables predicted both Social Anxiety and General depression factors. Latent variables at each level were permitted to correlate. The model fit acceptably, but not excellently, well (CFI = .91, TLI = .91, RMSEA = .04). As expected, both Avoidance and Approach predicted both FNE and FPE. Although Avoidance was the stronger predictor for both constructs, FPE was more related to Approach than was FNE, and FNE was more related to Avoidance than was FPE. All of the vulnerabilities predicted Social Anxiety uniquely, whereas only Avoidance predicted Depression.

3.2.1. Reduced sample model—We fitted the model to a reduced dataset ($n = 564$) that excluded the three largest datasets in which the BDI-II was not administered (Datasets 4, 5, and 6). The BDI-II was administered to 58% of this sample. Due to convergence problems, we used a single-factor model of the BDI-II items rather than the preferred model with subfactors (see supplemental material). The model had good fit in this dataset (CFI = .95, TLI = .95, RMSEA = .03), and all predictive paths were substantively identical to those shown in Figure 1 (although some were significant only at the $p < .04$ level, which should be expected given the reduced power). Finally, a Bayesian analysis with a simplified model in the same limited sample (using a distinct data imputation procedure) is presented in the supplementary material. This model largely supported the paths in Figure 1, but suggested: (a) The (negative) path from approach to social anxiety might be weaker than depicted (one-tailed p-value of .033) (b) the (positive) path from FPE to depression might be stronger than predicted (one-tailed p-value < .001) and (c) both FPE and FNE might not be predicted by approach (one-tailed p-values > .05). All other findings were similar to Figure 1. Findings from the primary analysis are emphasized because the Bayesian model could only be implemented in a simplified fashion in the limited subsample.

3.2.2. Addition of Hidden Self to model—We tested whether the Hidden Self factor added to prediction above and beyond fears of evaluation. Against hypothesis, the Hidden Self factor score did not add to prediction ($b^* = -.13$, $p = .099$), indicating that any effect for the Hidden Self scale was fully accounted for by the other predictors. Because the Hidden Self scale was among the variables most affected by missing data, we also examined this test via a regression of factor scores restricted to those participants who completed the measure; results suggested the same conclusion.

4. Discussion

We employed a large dataset comprised of a wide variety of participants to determine whether social anxiety symptoms can be modeled as a latent variable influenced by both broad temperamental factors and specific vulnerabilities. Our analyses suggested that social anxiety symptoms can be modeled as arising from approach and avoidance temperament, as well as fears of both positive and negative evaluation. Neither depression nor a proposed additional risk factor (belief that one must hide a flawed self) added to prediction of social anxiety symptoms in this model, and depression itself was predicted only by avoidance temperament. Model fit was good once missingness for depressive symptom items was reduced by focusing on a specific subsample.

The results are thus almost entirely in keeping with the model hypothesized by Levinson and colleagues (2014). Two findings run counter to the model: (a) Depression and social anxiety had no remaining correlation once the vulnerabilities were accounted for and (b) depression was predicted only by avoidance, not approach. These findings should be interpreted within the limitations of our sample. Although the size of the samples completing each measure was at least moderately large (e.g., $n = 325$ for depression), the fact remains that some measures had much missing data (primarily because the study did not include the measure). The results involving higher missing data, depression and the belief that one is flawed or inferior, are thus in particular need of replication. Concerns regarding the results for depressive symptoms might be magnified because no sample of participants who were known to be depressed without having SAD were included. It would be helpful for future research to systematically include such individuals.

The use of MI to handle missing data might seem unusual; however, the appropriateness of MI does not rest on whether a researcher intended to administer certain items, but instead on the extent to which items were missing nearly at random relative to participant characteristics: Items missing because an experimenter did not choose to include a measure would seem at least as randomly missing (perhaps more so) than items missing because a participant chose not to answer. Nevertheless, fewer missing data would have been preferable even within this strategy. It should be noted that the student samples included were less likely to be administered the BDI-II; this might affect the precision of estimates relevant to that measure. We note in particular that the hypothesized model only achieved good fit once the sample was reduced to subsamples with fewer BDI-II data missing. Another limitation concerns measurement: In most cases, perhaps most pressingly for avoidance and approach temperament, there are additional existing measures for the constructs investigated here, as well as additional constructs that are relevant to those dimensions. Further tests with alternative measures are in order.

Ultimately, the limitation of most concern to us is also the source of our primary call for future research: the need to move beyond cross-sectional data. Most investigations similar to this one have also used cross-sectional data. Longitudinal data are necessary to clearly understand how social anxiety and other psychopathology symptoms relate to risk factors over time; an excellent model study of this type is presented by Brown (2007), although that

study focuses on general vulnerabilities and not specific vulnerabilities (e.g., fears of evaluation).

Our current findings indicate that low approach and high avoidance temperament may combine to produce risk for fears of evaluation, which in turn have a strong association with social anxiety. Further, these risk factors were fairly specific to social anxiety symptoms, with only avoidance showing similar relationships with depressive symptoms. Contrary to the assertions of multiple authors (e.g., Rodebaugh, 2009), we found no evidence that self-portrayal concerns added to the predictive power of these factors. These observations may be useful to clinicians, in that they indicate that an individual presenting for treatment who displays high avoidance temperament and low approach temperament (e.g., high neuroticism and low extraversion) is quite likely to have elevated social anxiety symptoms; however, knowing about the person's level of fear of evaluation should add considerably to prediction of their level of social anxiety symptoms, yet minimally to prediction of their depressive symptoms. Longitudinal data is sorely needed to test whether these findings reflect processes over time, because, ultimately, purported vulnerabilities are only meaningful to the extent that they precede the onset of clinical problems.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

American Psychiatric Association. Diagnostic and statistical manual of mental disorders: DSM-IV. 4. Author; Washington, DC: 1994.

Barlow DH, Allen LB, Choate ML. Toward a unified treatment for emotional disorders. Behavior Therapy. 2004; 35(2):205–230.

Barlow DH, Sauer-Zavala S, Carl JR, Bullis JR, Ellard KK. The nature, diagnosis, and treatment of neuroticism: Back to the future. 2014; 2:344–365.

Beck, AT., Steer, RA., Brown, GK. Beck Depression Inventory-II Manual. The Psychological Corporation; San Antonio, TX: 1996.

Bentler PM. Comparative fit indexes in structural models. Psychol Bull. 1990; 107(2):238–246. [PubMed: 2320703]

Blanco C, Rubio J, Wall M, Wang S, Jiu CJ, Kendler KS. Risk factors for anxiety disorders: common and specific effects in a national sample. Depress Anxiety. 2014; 31(9):756–764. [PubMed: 24577934]

Brown TA. Temporal course and structural relationships among dimensions of temperament and DSM-IV anxiety and mood disorder constructs. J Abnorm Psychol. 2007; 116(2):313–328. [PubMed: 17516764]

Brown TA, Chorpita BF, Barlow DH. Structural relationships among dimensions of the DSM-IV anxiety and mood disorders and dimensions of negative affect, positive affect, and autonomic arousal. Journal of Abnormal Psychology. 1998; 107(2):179–192. [PubMed: 9604548]

Carleton RN, Collimore KC, McCabe RE, Antony MM. Addressing revisions to the Brief Fear of Negative Evaluation scale: Measuring fear of negative evaluation across anxiety and mood disorders. Journal of Anxiety Disorders. 2011; 25:822–828. [PubMed: 21565463]

Clark LA, Watson D, Mineka S. Temperament, personality, and the mood and anxiety disorders. Journal of Abnormal Psychology. 1994; 103(1):103–116. [PubMed: 8040472]

DiNardo, PA., Brown, TA., Barlow, DH. Anxiety Disorders Interview Schedule for DSM-IV: Lifetime Version (ADIS-IV-L). The Psychological Corporation; San Antonio, TX: 1994.

Donnellan MB, Oswald FL, Baird BM, Lucas RE. The Mini-IPIP Scales: Tiny-yet-effective measures of the big five factors of personality. Psychological Assessment. 2006; 18(2):192–203. [PubMed: 16768595]

Dozois DJA, Dobson KS, Ahnberg JL. A psychometric evaluation of the Beck Depression Inventory-II. Psychological Assessment. 1998; 10(2):83–89.

Egloff B, Schmukle SC, Burns LR, Kohlmann CW, Hock M. Facets of dynamic positive affect: differentiating joy, interest, and activation in the Positive and Negative Affect Schedule (PANAS). Journal of Personality and Social Psychology. 2003; 85(3):528–540. [PubMed: 14498788]

Elliot AJ, Thrash TM. Approach-avoidance motivation in personality: Approach and avoidance temperaments and goals. Journal of Personality and Social Psychology. 2002; 82(5):804–818. [PubMed: 12003479]

Feldman Barrett L, Russell JA. Independence and bipolarity in the structure of current affect. Journal of Personality and Social Psychology. 1998; 74(4):967–984.

Fergus TA, Valentiner DP, McGrath PB, Stephenson K, Gier S, Jencius S. The Fear of Positive Evaluation Scale: Psychometric properties in a clinical sample. Journal of Anxiety Disorders. 2009; 23(8):1177–1183. [PubMed: 19700259]

Gilbert P. Evolution and social anxiety: The role of attraction, social competition, and social hierarchies. Psychiatric Clinics of North America. 2001; 24(4):723–751. [PubMed: 11723630]

Goldstein AJ, Chambless DL. A reanalysis of agoraphobia. Behavior Therapy. 1978; 9(1):47–59.

Harpole JK, Levinson CA, Woods CM, Rodebaugh TL, Weeks JW, Brown PJ, Heimberg RG, Menatti AR, Blanco C, Schneier F, Liebowitz M. Assessing the straightforwardly-worded Brief Fear of Negative Evaluation Scale for differential item functioning across gender and ethnicity. Journal of Psychopathology and Behavioral Assessment. 2015; 37(2):306–317. [PubMed: 27642228]

Heimberg RG, Mueller GP, Holt CS, Hope DA, Liebowitz MR. Assessment of anxiety in social interaction and being observed by others: The Social Interaction Anxiety Scale and the Social Phobia Scale. Behavior Therapy. 1992; 23:53–73.

Honaker, J., King, G., Blackwell, M. Amelia II: A program for missing data, 1.2–17 ed. Authors; 2006–2008.

Hu LT, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. Structural Equation Modeling-a Multidisciplinary Journal. 1999; 6(1):1–55.

Hughes AA, Heimberg RG, Coles ME, Gibb BE, Liebowitz MR, Schneier FR. Relations of the factors of the tripartite model of anxiety and depression to types of social anxiety. Behaviour Research and Therapy. 2006; 44(11):1629–1641. [PubMed: 16457777]

Kashdan TB. The neglected relationship between social interaction anxiety and hedonic deficits: Differentiation from depressive symptoms. Journal of Anxiety Disorders. 2004; 18(5):719–730. [PubMed: 15275949]

Kashdan TB. Social anxiety spectrum and diminished positive experiences: Theoretical synthesis and meta-analysis. Clinical Psychology Review. 2007; 27(3):348–365. [PubMed: 17222490]

Kotov R, Watson D, Robles JP, Schmidt NB. Personality traits and anxiety symptoms: The multilevel trait predictor model. Behaviour Research and Therapy. 2007; 45(7):1485–1503. [PubMed: 17240351]

Kupper N, Denollet J. Social anxiety in the general population: Introducing abbreviated versions of SIAS and SPS. Journal of Affective Disorders. 2012; 136(1–2):90–98. [PubMed: 21903277]

Leary MR. A brief version of the Fear of Negative Evaluation Scale. Personality and Social Psychology Bulletin. 1983; 9:371–375.

Levinson, CA., Kaplan, SC., Rodebaugh, TL. Personality: Understanding the socially anxious temperament. In: Weeks, JW., editor. The Wiley Blackwell Handbook of Social Anxiety Disorder. Wiley Blackwell; New York: 2014. p. 111-132.

Levinson CA, Rodebaugh TL, Lim MH, Fernandez KC. The Core Extrusion Schema-Revised: Hiding oneself predicts severity of social interaction anxiety. Assessment. in press.

Mattick RP, Clarke JC. Development and validation of measures of social phobia scrutiny fear and social interaction anxiety. Behaviour Research and Therapy. 1998; 36(4):455–470. [PubMed: 9670605]

Moscovitch DA, Huyder V. The Negative Self-Portrayal Scale: Development, validation, and application to social anxiety. Behavior Therapy. 2011; 42(2):183–196. [PubMed: 21496505]

Moscovitch DA, Rowa K, Paulitzki JR, Ierullo MD, Chiang B, Antony MM, McCabe RE. Self-portrayal concerns and their relation to safety behaviors and negative affect in social anxiety disorder. Behaviour Research and Therapy. 2013; 51(8):476–486. [PubMed: 23778055]

Muthén, LK., Muthén, BO. Mplus user's guide. 6. Muthén & Muthén; Los Angeles, CA: 1998–2012.

Naragon-Gainey K, Watson D, Markon KE. Differential relations of depression and social anxiety symptoms to the facets of extraversion/positive emotionality. Journal of Abnormal Psychology. 2009; 118(2):299–310. [PubMed: 19413405]

Rodebaugh TL. Hiding the self and social anxiety: The Core Extrusion Schema Measure. Cognitive Therapy and Research. 2009; 33(1):90–109.

Rodebaugh TL, Heimberg RG, Brown PJ, Fernandez KC, Blanco C, Schneier FR, Liebowitz MR. More reasons to be straightforward: Findings and norms for two scales relevant to social anxiety. Journal of Anxiety Disorders. 2011; 25(5):623–630. [PubMed: 21388781]

Rodebaugh TL, Lim MH, Fernandez KC, Langer JK, Weisman JS, Tonge N, Levinson CA, Shumaker EA. Self and friend's differing views of social anxiety disorder's effects on friendships. Journal of Abnormal Psychology. 2014; 123(4):715–724. [PubMed: 25314261]

Rodebaugh TL, Shumaker EA, Levinson CA, Fernandez KC, Langer JK, Lim MH, Yarkoni T. Interpersonal constraint conferred by generalized social anxiety disorder is evident on a behavioral economics task. Journal of Abnormal Psychology. 2013; 122(1):39–44. [PubMed: 23231458]

Rodebaugh TL, Woods CM, Heimberg RG. The reverse of social anxiety is not always the opposite: The reverse-scored items of the Social Interaction Anxiety Scale do not belong. Behavior Therapy. 2007; 38:192–206. [PubMed: 17499085]

Rodebaugh TL, Woods CM, Thissen DM, Heimberg RG, Chambless DL, Rapee RM. More information from fewer questions: The factor structure and item properties of the original and Brief Fear of Negative Evaluation scale. Psychological Assessment. 2004; 16(2):169–181. [PubMed: 15222813]

Safren SA, Turk CL, Heimberg RG. Factor structure of the Social Interaction Anxiety Scale and the Social Phobia Scale. Behaviour Research and Therapy. 1998; 36(4):443–453. [PubMed: 9670604]

Steiger, JH., Lind, JC. Statistically-based tests for the number of factors. Psychometric Society; Iowa City, IA: 1980.

Tucker LR, Lewis C. A reliability coefficient for maximum likelihood factor analysis. Psychometrika. 1973; 38(1):1–10.

Wang WT, Hsu WY, Chiu YC, Liang CW. The hierarchical model of social interaction anxiety and depression: The critical roles of fears of evaluation. Journal of Anxiety Disorders. 2012; 26:215–224. [PubMed: 22137463]

Ward LC. Comparison of factor structure models for the Beck Depression Inventory--II. Psychological Assessment. 2006; 18(1):81–88. [PubMed: 16594815]

Watson D. Rethinking the mood and anxiety disorders: a quantitative hierarchical model for DSM-V. Journal of Abnormal Psychology. 2005; 114(4):522–536. [PubMed: 16351375]

Watson D, Clark LA, Tellegen A. Development and validation of brief measures of positive and negative affect: The PANAS scales. Journal of Personality and Social Psychology. 1988; 54:1063–1070. [PubMed: 3397865]

Weeks JW. Replication and extension of a hierarchical model of social anxiety and depression: Fear of positive evaluation as a key unique factor in social anxiety. Cognitive Behaviour Therapy. 2015; 44(2):103–116. [PubMed: 25530031]

Weeks JW, Heimberg RG, Fresco DM, Hart TA, Turk CL, Schneier FR, Liebowitz MR. Empirical validation and psychometric evaluation of the Brief Fear of Negative Evaluation Scale in patients with social anxiety disorder. Psychological Assessment. 2005; 17(2):179–190. [PubMed: 16029105]

Weeks JW, Heimberg RG, Rodebaugh TL. The fear of positive evaluation scale: Assessing a proposed cognitive component of social anxiety. Journal of Anxiety Disorders. 2008a; 22(1):44–55. [PubMed: 17884328]

Weeks JW, Heimberg RG, Rodebaugh TL, Goldin PR, Gross JJ. Psychometric evaluation of the Fear of Positive Evaluation Scale in patients with social anxiety disorder. Psychological Assessment. 2012; 24(2):301–312. [PubMed: 21966932]

Weeks JW, Heimberg RG, Rodebaugh TL, Norton PJ. Exploring the relationship between fear of positive evaluation and social anxiety. Journal of Anxiety Disorders. 2008b; 22(3):386–400. [PubMed: 17531437]

Highlights

- We tested a model of underlying vulnerabilities for social anxiety disorder (SAD)
- Overall the model fit well, especially in a low-missingness subsample
- The model demonstrated differing vulnerabilities for SAD and depression
- The model specifies general vulnerabilities: Approach and avoidance temperament
- Two specific vulnerabilities included fears of positive and negative evaluation

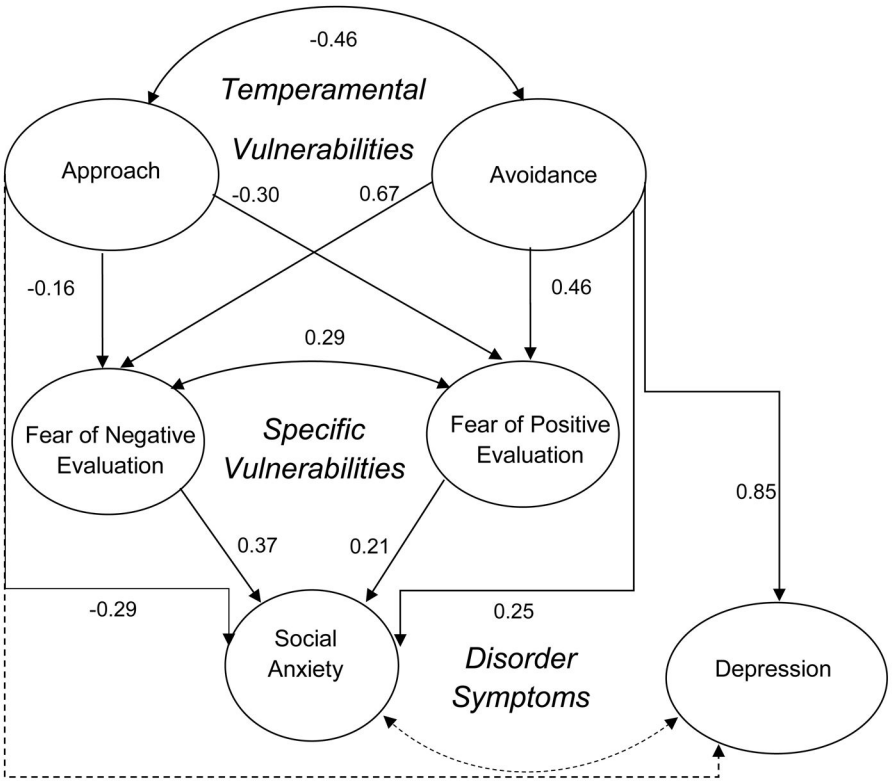

Figure 1.

The hypothesized latent variable model with standardized regression coefficients. The paths from temperamental vulnerabilities to symptoms are such that they are above and beyond prediction by specific vulnerabilities. Paths in dashed lines were hypothesized but not supported by the final model. The following are not shown: individual items, error terms, lower-order factors, and regression coefficients that were statistically nonsignificant ($p > 0.05$). All paths shown in solid lines are $p < 0.009$. The depression factor shown is the General depression factor; Somatic and Cognitive subfactors of depression were modeled but not shown here. The only significant effect associated with those subfactors was for the Somatic subfactor correlating strongly with Avoidance ($r = 0.65$, $p < 0.001$).