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Revisiting the latent structure of the anxiety sensitivity construct: More evidence of dimensionality

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ABSTRACT

Anxiety sensitivity (AS) was initially conceptualized as existing along a continuum; however, emerging evidence from taxometric analyses is mixed as to whether the latent structure of AS is dimensional or taxonic. The purpose of the present study was to further evaluate the latent structure of AS in an effort to clarify the contrasting findings reported in the literature. To do so, we examined the latent structure of AS in two large independent samples unselected with regard to AS level (comprising undergraduate respondents and/or community residents). MAXEIG and MAMBAC analyses were performed with indicator sets drawn from distinct self-report measures of AS within either sample. MAXEIG and MAMBAC, as well as comparison analyses utilizing simulated taxonic and dimensional datasets, yielded converging evidence that AS has a dimensional latent structure. Implications of these finding for the conceptualization and measurement of AS are discussed and future research directions are highlighted.

The anxiety sensitivity (AS) construct represents a heritable propensity (Stein, Jang, & Livesley, 1999) to fear anxiety-related sensations based on the belief that they have harmful physical, psychological, or social consequences (Reiss & McNally, 1985; Taylor, 1999). High levels of AS have been associated with increased reactivity to stress (Isyanov & Calamari, 2004), increased avoidance of behaviours associated with arousal (McWilliams & Asmundson, 2001) and reduced proclivity for behaviours associated with arousal reduction or affect regulation (Norton et al., 1997), increased chronic pain and other chronic health conditions (Asmundson, Norton, & Norton, 1999; Asmundson, Wright, & Hadjistavropoulos, 2000), as well as increased panic attacks and anxiety-related psychopathology (Maller & Reiss, 1992; Reiss & McNally, 1985; Schmidt, Lerew, & Jackson, 1997). Collectively, these results indicate that AS acts as a vulnerability factor for the pathogenesis of putative stress and anxiety-related conditions.

There have been a number of progressive attempts to establish reliable and valid self-report measures of AS, including the Anxiety Sensitivity Index (ASI; Peterson & Reiss, 1987), the Anxiety Sensitivity Index-Revised (ASI-R; Taylor & Cox, 1998a), and the Anxiety Sensitivity Profile (ASP; Taylor & Cox, 1998b). Factor analytic investigations of the ASI indicate that it comprises three internally consistent lower-order factors representing fear of somatic sensations (e.g., "It scares me when my heart beats rapidly"), fear of cognitive dyscontrol (e.g., "When I cannot keep my mind on a task, I worry that I may be going crazy"), and fear of socially observable anxiety reactions (e.g., "It is important to me not to appear nervous") that load onto a single higher-order factor (Lilienfeld, Turner, & Jacob, 1993; Taylor, Koch, Woody, & McLean, 1996; Zinbarg, Barlow, & Brown, 1997). Despite the relative popularity of the ASI, the measure is not without limitations. AS was not originally conceptualized as a multidimensional construct (e.g., Reiss & McNally, 1985) and, as such, the ASI was not created with multidimensional construct-driven factorial subscales in mind. Indeed, the factor structure of the ASI is unstable across studies, with researchers also reporting two- (Zvolensky et al., 2003), four- (Taylor & Cox, 1998a), and six- (Taylor & Cox, 1998b) factor solutions. The ASI-R has also demonstrated difficulties with respect to its factor structure (Taylor, 1999), with recent evidence suggesting item reductions and significant model modifications to sustain an invariant four-factor structure (Arnau, Broman-Fulks, Green, & Berman, 2009). Similar concerns regarding item retention and factorial stability have been raised regarding the ASP (Olatunji et al., 2005; Van der Does, Duijsens, Eurelings-Bontekoe, Verschuur, & Spinhoven, 2003). Subsequent research has led to the development of a new 18-item measure of AS – the ASI-3 (Taylor et al., 2007) – that appears to resolve the factorial difficulties related to measuring a multidimensional construct of AS. Thus far, the ASI-3 has proven to be robust, with a replicable factor structure comprising three

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factors consistent with those described above for the original ASI, and good performance on indices of reliability and validity.

AS has most often been conceptualized as existing along a continuum (Taylor, 1999; also see Taylor, Rabian, & Federoff, 1999). However, a series of studies conducted by Bernstein and co-workers (Bernstein, Leen-Feldner, Kotov, Schmidt, & Zvolensky, 2006; Bernstein, Zvolensky, et al., 2006; Bernstein, Zvolensky, Feldner, et al., 2005; Bernstein, Zvolensky, Norton, et al., 2007; Bernstein, Zvolensky, Stewart, & Comeau, 2007; Bernstein, Zvolensky, Weems, Stickle, & Leen-Feldner, 2005; Zvolensky, Forsyth, Bernstein, & Leen-Feldner, 2007) has provided evidence that the latent structure of AS may not be dimensional. Using a number of procedures belonging to the applied mathematical approach of taxometric analyses, Bernstein and co-workers have shown that the latent structure of AS may be taxonic; that is, AS may comprise two qualitatively distinct classes, one lower- (i.e., nonclinical; complement class) and the other higher-scoring (i.e., pathological; taxon class). The precedent series of studies has provided replicated evidence of AS taxonicity across various nonclinical samples from North America and Russia, across sex, and using various measures (e.g., ASI, ASI-R, Childhood ASI); as such, the results regarding the purportedly taxonic nature of AS have garnered considerable attention from researchers and theorists.

Only recently have attempts at replication of AS taxonicity been published by a group of independent researchers. Specifically, Broman-Fulks et al. (2008, 2010) have published two studies using multiple measures of AS from large nonclinical samples, both of which have failed to replicate evidence of an AS taxon class and, instead, support a dimensional conceptualization of AS. Broman-Fulks et al. (2010) have suggested that methodological limitations in the Bernstein studies may be responsible for the divergent findings. For example, the studies by Bernstein and co-workers generally used mathematically equivalent taxometric analyses (i.e., MAXimum COVariance [MAXCOV; Waller & Meehl, 1998] and MAXimum EIGenvalue [MAXEIG; Waller & Meehl, 1998), and did not employ objective, quantifiable measures of data interpretation (i.e., Comparative Curve Fit Index [CCFI]; see Ruscio, Ruscio, & Meron, 2007). In contrast, Broman-Fulks and co-workers utilized a number of mathematically non-redundant analyses as well as CCFIs. Variations in taxometric findings may also have resulted from Broman-Fulks and co-workers using multiple measures of AS to examine AS taxonicity, including the more psychometrically-robust ASI-3, where the other research team has not (Broman-Fulks et al., 2010).

Precedent work from both teams of researchers (e.g., Bernstein, Leen-Feldner, et al., 2006; Broman-Fulks et al., 2010; Zvolensky et al., 2007) has underscored the necessity of additional research in this area to further inform conceptualization of the AS construct. Understanding the latent structure of AS, a seemingly critical construct associated with several disorders (Taylor, 1999), will have important implications for future research and clinical applications. The purpose of the present investigation was to further evaluate the latent structure of AS in an effort to clarify the contrasting findings reported by each of Bernstein and co-workers and Broman-Fulks and co-workers. Specifically, we conducted two studies in independent samples utilizing two independent assessments of AS (i.e., the ASI and ASI-3), and mathematically non-redundant taxometric analyses (MAXEIG and MAMBAC [mean above minus below a cut]; Meehl & Yonce, 1994), as well as objectively quantifiable CCFIs.

1. Study 1

1.1. Participants

The first study included two subsamples comprising 1151 participants. The first subsample included 580 undergraduates from the University of Regina (167 men, 18–37 years [M_{age} = 20.9; SD = 3.2] and 413 women, 17–50 years [M_{age} = 20.9; SD = 4.6]) who completed the primary study measure as part of a larger study approved by the University Research Ethics Board. Most participants identified their ethnicity as White/Caucasian (89%), First Nations (3%), or Asian (3%), and reported being employed part time (55%). Regarding marital status, 86% reported being single, and 13% reported being married or common-law. The second subsample included 571 English-speaking community volunteers from across Canada (187 men, 18–55 years [M_{age} = 27.9; SD = 10.4] and 384 women, 18–55 years [M_{age} = 28.7; SD = 10.8]) who completed the primary study measure as part of a larger web-based study approved by the University Research Ethics Board. Most participants identified their ethnicity as White/Caucasian (84%), First Nations (3%), or Asian (5%), reported having at least some post-secondary education (67%), and being employed part time (21%) or full time (35%). Regarding marital status, 56% reported being single, 35% reported being married or cohabitating, and 9% reported being divorced.

1.2. Measures

Anxiety Sensitivity Index (ASI; Peterson & Reiss, 1992). The ASI is a 16-item self-report measure assessing the tendency to fear anxiety-related sensations based on the belief that they may have harmful consequences (e.g., "It scares me when I feel faint"). Items are rated on a 5-point Likert scale ranging from 0 (*very little*) to 4 (*very much*). Overall, factor analytic investigations indicate that the ASI comprises three internally consistent lower-order factors that load onto a single higher-order factor (Taylor et al., 1996; Zinbarg et al., 1997; but see also Taylor & Cox, 1998a, 1998b). The three factors include (1) fear of somatic sensations (i.e., *somatic*; e.g., "It scares me when my heart beats rapidly"), (2) fear of cognitive dyscontrol (i.e., *cognitive*; e.g., "When I cannot keep my mind on a task, I worry that I may be going crazy"), and (3) fear of socially observable anxiety reactions (i.e., *social*; e.g., "It is important to me not to appear nervous"). The reliability and validity of the ASI total and the above subscale scores have been well documented (see Peterson & Plehn, 1999; Taylor, 1999). Investigations of AS have demonstrated unique incremental validity beyond trait anxiety (Rapee & Medoro, 1994) and trait-level negative affectivity/neuroticism (Zvolensky, Kotov, Antipova, Leen-Feldner, & Schmidt, 2005). For the undergraduate sample, the internal consistency was acceptable for the total (α = .89) and subscale (somatic, α = .87; cognitive, α = .79; social, α = .56) scores, as was the average inter-item correlation (r = .35). For the community sample, the internal consistency was acceptable for the total (α = .91) and subscale scores (somatic, α = .87; cognitive, α = .79; social, α = .61), as was the average inter-item correlation (r = .39).

1.3. Procedure

The community and undergraduate subsamples completed a voluntary web-administered questionnaire. Community members were uncompensated, whereas undergraduate students were compensated with course credit where applicable. Web-based data collection has been demonstrated to be a valid approach for questionnaire-based research in North America that is comparable to other data collection methods (e.g., self-report; see Gosling, Vazire, Srivastava, & John, 2004), and is a method we have used successfully in related investigations of fear constructs (Carleton & Asmundson, 2009; Carleton, Sharpe, & Asmundson, 2007). Listwise deletion was utilized in the overall sample (resulting in one participant being excluded), as the taxometric package used in the present analyses does not account for missing data (Ruscio, 2009a).