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Gender differences in the factor structure of posttraumatic stress disorder symptoms in war-exposed adolescents

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ABSTRACT

DSM-IV's three-factor model of posttraumatic stress disorder (PTSD) is rarely empirically supported, whereas other four-factor models (King et al., 1998; Simms, Watson, & Doebbeling, 2002) have proven to be better representations of PTSD's latent structure. To date, a clear consensus as to which model provides the best representation of PTSD's underlying dimensions has yet to be reached. The current study investigated whether gender is associated with factor structure differences using the King et al. (1998) model of reexperiencing, avoidance, numbing, and hyperarousal PTSD symptoms. Participants were war-exposed Bosnian secondary/high school boys and girls ($N = 1572$) assessed nearly two years after the 1992–1995 Bosnian conflict. Confirmatory factor analytic tests of measurement invariance across PTSD model parameters revealed many significant sex-linked differences. Implications regarding the potential role of gender as a moderator of the King et al. (1998) model's factor structure are discussed.

1. Introduction

Posttraumatic stress disorder (PTSD) was first introduced into the *Diagnostic and Statistical Manual* (DSM) nomenclature in 1980 (American Psychological Association [APA], 1980). Since its initial inclusion, the diagnosis of PTSD has been visited with controversy (Spitzer, First, & Wakefield, 2007), including concerns relating to its latent factor structure. Namely, although PTSD is currently represented in the *DSM-IV* (APA, 1994) as a constellation of 17 symptoms grouped into three symptom clusters, this three-factor model has rarely received empirical support (cf. Shevlin, McBride, Armour, & Adamson, 2009). Indeed, the factor analytic literature to date has overwhelmingly supported a four-factor structure for PTSD (King, Leskin, King, & Weathers, 1998; Simms et al., 2002). Recent empirical studies addressing dimensionality of the construct of PTSD have focused increasingly on evaluating whether the goodness of fit of PTSD models is contingent on key moderating variables. In particular, gender is strongly related to the likelihood of a PTSD diagnosis (Tolin & Foa, 2006). However, the influence of gender as a potential moderator of PTSD's factor structure has yet to be systematically investigated.

The underlying dimensions of PTSD are currently represented in the *DSM-IV* by three factors: *Intrusion* (Criteria B1–B5), *Effortful Avoidance/Emotional Numbing* (C1–C7), and *Arousal* (D1–D5). Empirical support for this tripartite latent structure is rare (cf. Asmundson, Stapleton, & Taylor, 2004). In contrast, the majority of factor analytic studies have provided support for four-factor models. The two models receiving the most attention and support to date include that proposed by King et al. (1998), and that proposed by Simms et al. (2002). The major differences between the two models lie in their comparative placement of items D1 (sleeping difficulty), D2 (irritability or anger), and D3 (concentration difficulties).

The King et al. (1998) 17-item PTSD model structure was derived by allocating five items to an Intrusion factor (B1–B5), two items to an Avoidance factor (C1–C2), four items to an Emotional Numbing factor (C3–C7), and five items to an Arousal factor (D1–D5). This model differs from the three-factor *DSM-IV* model in that it splits the avoidance/emotional numbing factor into two separate factors based on evidence that emotional numbing and avoidance are separate pathology-related constructs (Asmundson et al., 2004).

In contrast, the Simms et al. (2002) model groups the 17 PTSD items by allocating five items to an Intrusion factor (B1–B5), two items to an Avoidance factor (C1–C2), eight items to a Dyspho-

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ria factor (C3–C7 and D1–D3), and two items to an Arousal factor (D4–D5). This conceptualization is based on studies linking the Dysphoria factor items to other mood and anxiety disorders (Watson, 2005). Reflecting this similarity in content across disorders, recent studies have found that the Dysphoria factor is less specific to PTSD than the other three PTSD factors (Armour, McBride, Shevlin, & Adamson, in press; Armour & Shevlin, 2010; Elklit, Armour, & Shevlin, 2010). For example, when controlling for depression across all PTSD items, Armour et al. (in press) and Elklit et al. (2010) both found a significant decrease in PTSD factor loadings, with the greatest degree of attenuation occurring in the Dysphoria factor.

The current literature is ambiguous with respect to which of the two models yields a more accurate representation of the latent structure of PTSD. Specifically, ample support can be found for both the King et al. (1998) model (most recently in Elhai, Engdahl, et al., 2009; Lancaster, Melka, & Rodriguez, 2009; Naifeh, Elhai, Kashdan, & Grubaugh, 2008; Palmieri, Marshall, & Schell, 2007; Schinka, Brown, Borenstein, & Mortimer, 2007), as well as the Simms et al. (2002) model (most recently in Armour & Shevlin, 2010; Boelen, van den Hout, & van den Bout, 2008; Elhai, Ford, Ruggiero, & Frueh, 2009; Elklit & Shevlin, 2007; Palmieri, Weathers, Difede, & King, 2007). Accordingly, a general consensus as to which of these two models provides the best representation of the underlying dimensions of PTSD has yet to be reached.

As part of continuing efforts to clarify the strengths and potential drawbacks of the two models, recent studies have highlighted a number of moderating variables that may be linked to the latent structure of PTSD. Identifying potential moderators is of particular value because it helps to clarify the circumstances under which a given model fits best, and by extension, to identify specific populations, settings, or applications for which the model may be better suited. For example, studies have found that PTSD model fit varies as a function of measurement format (e.g., interview vs. self-report) (Palmieri, Weathers, et al., 2007), and whether respondents are instructed to rate PTSD symptoms based on their worst trauma vs. their global trauma history (Elhai, Engdahl, et al., 2009).

In addition to these efforts to evaluate the comparative fit of the two PTSD factor models, a related line of studies have focused on evaluating the stability (as gauged by the variance vs. invariance of selected model parameters) of key model features as a function of specific sample or setting characteristics. For example, the factorial invariance of models of PTSD has been evaluated across groups that differ in their native language (Marshall, 2004; Norris, Perilla, & Murphy, 2001), military deployment status (Mansfield, Williams, Hourani, & Babeu, 2010; Simms et al., 2002), and era of military service combined with treatment-seeking status (McDonald et al., 2008). Of particular note, few studies have conducted comprehensive measurement invariance testing, but instead have tested for model invariance in one or two focal model parameters (e.g. McDonald et al., 2008).

To date, gender remains an understudied potential moderator of the factor structure of PTSD. The relevance of gender to the ongoing evaluation of competing models of PTSD is underscored by findings that although men tend to experience higher rates of exposure to potentially traumatic events, women have a two-fold higher risk of experiencing PTSD following exposure to traumatic events (Breslau, Davis, Andreski, & Peterson, 1991; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). This two-fold risk for PTSD in trauma-exposed women was supported by a meta-analysis of 52 studies (Tolin & Foa, 2006). Women are also more likely to develop chronic forms of PTSD compared to men (Breslau & Davis, 1992; Breslau et al., 1998).

Few compelling explanations for these gender differences in PTSD prevalence rates have been offered. One explanation centers on the joint propositions that (1) different types of traumatic events and circumstances differ in their etiological potency for developing PTSD (cf. Layne et al., 2010); (2) men and women have differential rates of exposure to different types of trauma; and therefore, (3) the specific types of trauma to which women have comparatively higher rates of exposure are more likely to lead to PTSD. However, multiple studies have documented higher rates of PTSD in women even after controlling for trauma categories that occur more frequently in women, including sexual assault and domestic violence (Breslau, Chilcoat, Kessler, & Davis, 1999; Fullerton et al., 2001; Stein, Walker, & Forde, 2000).

A second explanation for differential prevalence rates in PTSD between the genders is based on findings that women are twice more likely than men to report depression and anxiety symptoms (Tolin & Breslau, 2007). Accordingly, higher prevalence rates of PTSD in women may reflect a higher general prevalence of psychological distress or of psychiatric disorder. However, Breslau, Davis, Andreski, Peterson, & Schultz (1997) reported that gender differences in PTSD rates remained even after controlling for pre-existing psychiatric disorders such as depression and anxiety.

A third explanation for gender-linked differences in PTSD prevalence rates centers on PTSD Criterion A, which, serves a key "gatekeeper" function to a PTSD diagnosis. Specifically, Criterion A is comprised of both objective (A1: traumatic experience) and subjective (A2: intense emotional reaction) components. Given evidence that women are more likely than men to disclose initial adverse emotional reactions to trauma exposure by endorsing Criterion A2 (Brewin, Andrews, & Rose, 2000), Criterion A2 may permit gender to play a pivotal role in determining who qualifies as having experienced a Criterion A event.

In light of these gender-linked differences in variables linked to the diagnosis or prevalence of PTSD, the current study examined links between gender and the factorial invariance of an empirically supported model of PTSD. Of particular interest, both the King et al. (1998) and Simms et al. (2002) models were originally developed using samples consisting of mostly or entirely adult men – specifically military veterans. Notwithstanding this methodological artifact, factor analytic support has been found in all-female samples for both the King et al. (1998) model (Palmieri & Fitzgerald, 2005), as well as the Simms et al. (2002) model (Krause, Kaltman, Goodman, & Dutton, 2007).

Although generalization in four-factor PTSD model fit from adult male military veterans to adult female civilian samples is a notable advance, PTSD factor analytic research to date has nevertheless been largely embedded within the adult literature. Few studies, focusing on model fit, have used child or adolescent samples despite strong evidence that these younger age groups experience PTSD symptoms in response to varying trauma types (Goenjian et al., 1995; McLeer, Deblinger, Henry, & Orvaschel, 1992; Sack, Clarke, & Seeley, 1995). Valuable exceptions to this general trend include Saul, Grant, and Carter's (2008) CFA study, using a sub-sample of 1581 adolescents from the National Survey of Adolescents (NSA), and Elhai, Ford, et al.'s (2009) study of 4023 adolescents, the full NSA sample, both of which found support for the King et al. model. Saul et al. (2008) found that magnitudes of factor loadings of the King et al. model significantly differed between boys and girls. This evidence of factorial *variance* across gender groups points to the potentially influential role that gender and other demographic variables may play as moderators of the latent structure of PTSD across diverse groups. Of particular interest, measurement invariance and comparative fit of both the King et al. and Simms et al. models of PTSD have not been comprehensively tested across gender groups within the same study sample in either the adult or adolescent literatures.

Given lack of clear consensus in the factor analytic literature as to which four-factor model better represents the latent structure of PTSD, we did not formulate specific hypotheses concerning which of the two models would best fit the data. However, we planned