



The validity and diagnostic efficiency of the Davidson Trauma Scale in military veterans who have served since September 11th, 2001

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ARTICLE INFO

Article history:

Received 29 February 2008

Received in revised form 14 July 2008

Accepted 25 July 2008

Keywords:

Posttraumatic stress disorder

Military veterans

Test validity

Differential diagnosis

Diagnostic efficiency

ABSTRACT

The present study examined the psychometric properties and diagnostic efficiency of the Davidson Trauma Scale (DTS), a self-report measure of posttraumatic stress disorder (PTSD) symptoms. Participants included 158 U.S. military veterans who have served since September 11, 2001 (post-9/11). Results support the DTS as a valid self-report measure of PTSD symptoms. The DTS demonstrated good internal consistency, concurrent validity, and convergent and divergent validity. Diagnostic efficiency was excellent when discriminating between veterans with PTSD and veterans with no Axis I diagnosis. However, although satisfactory by conventional standards, efficiency was substantially attenuated when discriminating between PTSD and other Axis I diagnoses. Thus, results illustrate that potency of the DTS as a diagnostic aid was highly dependent on the comparison group used for analyses. Results are discussed in terms of applications to clinical practice and research.

Published by Elsevier Ltd.

1. Introduction

Self-report measures are valuable tools for clinicians and researchers, as they are quick and cost-effective methods for assessing symptoms associated with mental illness. In the last two decades, several self-report measures of posttraumatic stress disorder (PTSD) have been developed (see Brewin, 2005; Norris & Hamblen, 2004; for reviews). Concurrently, there has been a growing appreciation for the reality that for a measure to have utility, it is essential that support for its validity has been demonstrated (Hunsley & Mash, 2005). As evidence accumulates for the negative impact of PTSD on overall health (Beckham et al., 1998; Dohrenwend et al., 2007; Taft, Stern, King, & King, 1999), family adjustment (Jordan et al., 1992) and health care costs (Walker et al., 2003) the need for brief and valid measures of PTSD symptoms has become clear.

Prior studies have validated various PTSD symptom questionnaires for use with several targeted groups, including breast cancer patients (Andrykowski, Cordova, Studts, & Miller, 1998),

crime victims (Wohlfarth, van den Brink, Winkel, & ter Smitten, 2003), Vietnam-era combat veterans (Forbes, Creamer, & Biddle, 2001), female veterans in primary care (Dobie et al., 2002; Lang, Laffaye, Satz, Dresselhaus, & Stein, 2003) and older adults in primary care (Cook, Elhai, & Areán, 2005). Replications such as these are important, as a symptom scale may take on different properties in different populations (Bossuyt et al., 2003; Brewin, 2005). For example, Blanchard et al. (1996) found that a score of 44 or higher on the PCL Checklist was most effective at identifying PTSD while minimizing false positives in a sample of motor vehicle accident and sexual assault victims. In contrast, Lang et al. (2003), using the same measure, found that a score in the range of 28–30 was most effective in detecting PTSD in female veterans who visited a primary care clinic.

Unfortunately, many populations that are at high-risk for trauma exposure do not have adequately-validated measures available. For example, in spite of the increasing need for valid PTSD screening instruments for returning military service personnel (Hoge et al., 2004), no self-report measure of PTSD has yet been validated with veterans who have served since September 11th, 2001 (post-9/11). It is estimated that 35% of OIF veterans will access mental health services in the year after returning home, and 5–20% will meet criteria for PTSD (Hoge, Auchterlonie, & Milliken, 2006; Hoge et al., 2004). As there are now several empirically-supported treatments for PTSD (American Psychiatric Association,

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2004; Bisson & Andrew, 2005; Department of Veterans Affairs & Department of Defense, 2004), there is compelling incentive to validate screening tools for the identification of PTSD in high-risk groups, such as military personnel and veterans.

Diagnostic tests are most efficient when a group identified as having the condition is compared to an equal number of those that exhibit none of the clinical characteristics of the condition, e.g. healthy controls. It is important to consider that clinical characteristics of the comparison group may have significant effects on the efficiency of the test in question, and thus their generalizability (Coyne & Thompson, 2007; Streiner, 2003). For example, individuals with Major Depressive Disorder endorse many of the symptoms that are found in PTSD (e.g., poor concentration, sleep difficulties, and anhedonia), and thus tend to score higher on PTSD symptom questionnaires than healthy controls (Shalev et al., 1998). In effect, a score that is very efficient when discriminating between PTSD and healthy controls may be less efficient in discriminating between PTSD and individuals with other presenting problems. The latter scenario more approximates conditions in a mental health clinic, in which most patients will be in distress and the clinician is faced with the often challenging task of differential diagnosis (cf. Hankin, Spiro, Miller, & Kazis, 1999). Unfortunately, prior studies have rarely described or assessed the clinical characteristics of their comparison groups. Thus, the literature provides little evidence for the diagnostic efficiency of PTSD symptom questionnaires in a mental health setting.

The purpose of the current study was to examine the validity and diagnostic efficiency of the Davidson Trauma Scale (DTS; Davidson, Book, et al., 1997) in a group of veterans who served after September 11th, 2001. The DTS is a self-report measure of the 17 PTSD symptoms as described in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR; American Psychiatric Association, 2000). As a diagnostic tool, Davidson, Book, et al. (1997) demonstrated that the DTS performed well at discriminating 67 individuals with PTSD from 62 without PTSD (area under the curve [AUC] = 0.88, S.E. = 0.02) using a semi-structured interview (SCID; Spitzer, Williams, Gibbon, & First, 1990) as the reference standard. A DTS score of 40 was recommended as the optimal cut-point for accurate classification of those with or without PTSD (efficiency = 0.83). This cut-point correctly classified 69% of individuals with PTSD (sensitivity = 0.69) and 95% of those who did not have PTSD (specificity = 0.95).

No previous studies have examined the psychometric properties of the DTS in veterans who have served post-9/11. Like most PTSD screening measures, the ability of the DTS to discriminate between those with PTSD and other psychiatric disorders is unknown. Therefore, the current study tested the ability of the DTS to discriminate between veterans with PTSD and two comparison groups: (1) veterans with no Axis I diagnosis and (2) veterans without PTSD but with a current diagnosis of another Axis I disorder.

2. Method

2.1. Participants and procedures

The sample consisted of 226 volunteer participants in the Mid-Atlantic Mental Illness Research, Education and Clinical Center (MIRECC) Recruitment Database for the Study of Post-Deployment Mental Health. Participants were veterans who have served in the United States Armed Forces since September 11, 2001. About half (53%) of the participants had been stationed in a region of conflict in support of Operation Enduring Freedom or Operation Iraqi Freedom. Participants were recruited from four VISN-6 Veterans Affairs medical centers through mailings advertisements, and

clinician referrals. Informed consent was obtained after explaining procedures. The veterans were administered a battery of questionnaires related to post-deployment mental illness, including: psychiatric symptoms, mental-health service utilization, health, and health-related behaviors. Diagnosis was established by the Structured Clinical Interview for DSM-IV-TR Axis I Disorders (SCID-I/P; First, Spitzer, Gibbon, & Williams, 1994), a semi-structured interview administered by trained masters- or Ph.D.-level clinicians. Participants in this sample were among those used for an evaluation of the factor structure of the DTS, which is presented elsewhere (McDonald et al., 2008).

Of the initial pool of 226 participants, 158 veterans recorded a traumatic event on the DTS that clearly met DSM-IV Criterion A1 (i.e., “involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others”; APA, 2000, p. 467). Of those 158 veterans, 75 (47%) recorded war zone-related traumas (e.g., “my truck hit by an improvised explosive device”) and 83 (53%) recorded traumas occurring outside of their deployment (e.g., “near drowning of my son”). The remaining 68 participants recorded a traumatic event on the DTS that was either not a trauma as defined by the DSM-IV ($n = 11$; e.g., “back pain,” “not being able to talk to my kids”), included multiple, discrete traumatic events in the narrative ($n = 3$), was too vague to determine the nature of the trauma ($n = 32$; e.g., “the way I was treated”), or reported no lifetime exposure to trauma ($n = 21$). As a description of a bona fide traumatic event is necessary for the DTS to be considered valid (Davidson, 1996), these 68 participants were excluded. Thus, data from a total of 158 veterans were retained for analyses.

2.2. Measures

2.2.1. Davidson Trauma Scale (Davidson, 1996; Davidson, Book, et al., 1997)

The DTS is a 17-item self-report questionnaire of posttraumatic stress symptoms, developed for use with trauma survivors. For the current study, the original Davidson, Book, et al. (1997) version was used. Respondents are first asked to record “the trauma that is most disturbing to you.” Next, respondents are asked to read each of the 17 items, and “consider how often in the last week the symptom troubled you and how severe it was.” The first five items specifically refer to reexperiencing or avoiding the disturbing event. The frequency and severity of the symptoms are recorded using 5-point, Likert-type scales. Frequency and severity scores were summed for each symptom, resulting in a total of 17 variables used in analyses (Elhai et al., 2006). The DTS total score was computed by adding all item responses together, with a possible range of 0–136. The three DTS subscales (reexperiencing, avoidance/numbing, and hyperarousal) and separate subscales for avoidance and for numbing (McDonald et al., 2008) were computed by adding all subscale items together and dividing by the total number used in the scale, resulting in a possible range of 0–5.

In an early validation study, the DTS demonstrated good internal consistency ($\alpha = 0.99$), convergent validity (CAPS, $R = 0.78$), divergent validity (extroversion, $R = 0.04$), and concurrent validity, as well as strong test-retest reliability (Davidson, Book, et al., 1997; 0.86). A later study (Davidson, Tharwani, & Connor, 2002) demonstrated that the DTS is sensitive to treatment effects of selective serotonin reuptake inhibitors (SSRIs) for PTSD symptoms. Furthermore, the treatment effect size for the DTS was larger than the effect size for the Impact of Events Scale (Horowitz, Wilner, & Alvarez, 1979) and equal to those observed for the Clinician Administered PTSD Scale (CAPS; Blake et al., 1990) and Structured Interview for PTSD (SIP; Davidson, Malik, & Travers, 1997). Two studies have examined the factorial validity of the DTS.

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