*Research Article*

# SYMPTOM SEVERITY AND LIFETIME AND PROSPECTIVE HEALTH SERVICE USE AMONG MILITARY VETERANS EVALUATED FOR PTSD

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***We used structural equation modeling with 174 treatment-seeking military trauma survivors evaluated for posttraumatic stress disorder (PTSD) at a VA Medical Center PTSD clinic to examine relationships among lifetime mental health service use, PTSD symptom severity and medical problems (from self-report), as well as prospective (1-year) mental health and medical care use visit counts extracted from medical records. We discovered an adequate statistical fit to a hypothesized model of previous and prospective health service use, and current PTSD severity and health-related problems. Previous inpatient mental health treatment was significantly related to PTSD severity and prospective outpatient mental health use. However, PTSD severity was unrelated to prospective use of mental health or medical services. Health problems were related to prospective medical service use. Clinical and administrative implications in predicting health care use among trauma survivors are discussed. Depression and Anxiety 24:178–184, 2007.*** *© 2006 Wiley-Liss, Inc.*

**Key words:** ***posttraumatic stress disorder; mental health services; structural model; service utilization***

## INTRODUCTION

A significant body of literature has examined the impact of both traumatic event exposure and posttraumatic stress disorder (PTSD) on health care utilization. For example, nationally representative community studies demonstrate that trauma history increases the likelihood of mental health (MH) and medical treatment use [Rosenheck and Massari, 1993; Sorenson and Siegel, 1992], and PTSD increases the intensity of MH service use [Greenberg et al., 1999]. However, little is known about trauma survivors' health care use over time, or the potential mediating effect of posttraumatic symptom severity.

Two recent articles reviewed the literature on health care use among trauma survivors [Elhai et al., 2005c; Walker et al., 2004]. Across studies, PTSD was a significant predictor of health care use [Elhai et al., 2005c]. Specifically, studies demonstrate that a PTSD diagnosis predicts a greater likelihood (and intensity) of MH [Boscarino et al., 2002; New and Berliner, 2000;

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Zhang et al., 2004] and medical services [Fagan et al., 2003; Zhang et al., 2004]. Three investigations also reveal that PTSD severity increases the likelihood of MH care use [Calhoun et al., 2002; Goto et al., 2002; Weine et al., 2000], whereas two studies fail to support this finding [Elhai et al., 2004; Schwarz and Kowalski, 1992].

In light of evidence that PTSD is highly comorbid with other mental disorders [Kessler et al., 1995], it should be noted that among trauma survivors, comorbid psychopathology is significantly associated with increased MH and medical service use [for a review, see Elhai et al., 2005c]. However, more recent studies have demonstrated that comorbidity alone does not account for the relationship between PTSD and service use, and in fact PTSD has been found to contribute above and beyond psychiatric comorbidity in explaining health service use [Brown et al., 1999; Schnurr et al., 2000].

A potentially important variable that can affect health service use is physical health status. Health-related problems among trauma survivors were associated with increased MH service use in studies of military soldiers and refugees [Solomon, 1989; Weine et al., 2000], and greater medical care use in studies of military veterans [Marshall et al., 1997, 1998]. Thus, health problems can also explain health service use patterns in trauma survivors.

Although predictors of trauma survivors' health care utilization have been examined, the structural relationships between different types of health care use, at different time intervals, have not been explored. Furthermore, the mediating effect of PTSD severity on different types of health care use has been neglected. We aimed to examine these relationships using structural equation modeling in a sample of military veterans evaluated for PTSD, using survey and archival records methodology.

Based on previous research [Elhai et al., 2005c; Walker et al., 2004] we hypothesized that (1) lifetime MH service use would predict PTSD severity; (2) PTSD severity would mediate the relationship between lifetime MH care use and prospective mental and physical health care use during the year after PTSD evaluations; and (3) health-related problems would mediate the relationship between lifetime MH care use and prospective medical care use. This examination could yield valuable information about which factors contribute to trauma survivors' use of different treatments, and could assist in planning referrals and allocating treatment resources for this population.

# MATERIALS AND METHODS

Archival data were drawn from medical charts supplied by a Veterans Affairs (VA) Medical Center located in the midwestern United States. Participants included 221 adult treatment-seeking veterans (203 men, 18 women), evaluated for and consecutively enrolled (from 2000 to 2003) in outpatient treatment within a VA PTSD clinic for posttraumatic stress related to their military service. Institutional review board approval was obtained for using these archival clinic data, in compliance with the Declaration of Helsinki.

Participants had a mean age of 52.07 years ($SD = 10.59$). Education level averaged 12.98 years ($SD = 1.95$). Racial makeup was predominantly Caucasian, with minorities constituting only 16.3% of patients. Vietnam veterans comprised 71.9% ($n = 159$), and combat exposure was endorsed by the majority of participants ($n = 196$, or 88.7%; the remaining endorsed primarily military-related physical or sexual assaults). Unemployment was high, with only 26 (16.1%) employed. One-third ($n = 72$, or 33.6%) of patients received VA disability payments for PTSD, with a mean VA psychiatric disability rating percentage of 56.14% ($SD = 29.18$; on the VA's scale of 0 to 100, with higher ratings indicating greater disability benefit receipt).

Interviews and self-report measures were utilized to obtain intake mental health diagnoses. Administration of a DSM-IV-based PTSD symptom checklist (Foa et al., 1999) was conducted in interview-format, finding 198 subjects (91.7%) meeting criteria for PTSD and 14 (6.5%) with significant subclinical PTSD (numerous symptoms, failing to meet full criteria; although psychometric data are not available for this instrument, it is quite similar in content and wording to other validated PTSD instruments). Nonstandardized interviews were used to evaluate the presence of current comorbid DSM-IV mental health diagnoses, including substance abuse/dependence ($n = 120$, or 55.3%) and mood disorders ($n = 172$, or 79.3%; a standard set of Axis I and II diagnoses were queried, as set forth in the National Center for PTSD's PTSD Status Form, required at intake in VA PTSD clinics, but no standardized questions were used). These data converge with prior work on PTSD's significant psychiatric comorbidity [Kessler et al., 1995]. Additional measures are discussed below.

## MEASURES

**Trauma Symptom Inventory (TSI).** The TSI [Briere, 1995] is a 100-item, multiscale instrument that assesses the emotional impact of trauma exposure in adults age 18 or older. It is Likert-scaled, assessing symptom frequency with item responses ranging from 0 (*never*) to 3 (*often*), and has an estimated administration time of 20 minutes. It is one of the most widely used assessments of trauma-related effects [Elhai et al., 2005a]. Participants are instructed to reference the previous 6 months when responding. The TSI contains three validity scales (assessing random responding, as well as underendorsement and overendorsement of symptoms) and 10 clinical scales, with internal consistency ranging from .84 to .87 [Briere et al.,

1995]. Its Intrusive Experiences (IE, tapping intrusive thoughts about one's trauma), Anxious Arousal (AA, tapping posttraumatic hyperarousal), and Defensive Avoidance (DA, measuring avoidance of trauma-related cues) scales correspond with the three DSM-IV PTSD symptom criteria. McDevitt-Murphy et al. [2005] discovered that a regression model of these three TSI scales, along with its Atypical Response (ATR, assessing symptom overendorsement) and Depression (D) scales, correctly predicted presence–absence of a Clinician-Administered PTSD Scale diagnosis in 86% of trauma victims. We created a single PTSD severity index by summing these five scales' normalized *T* scores, with a possible range of 194 to 486 (with higher scores indicating greater severity).

**Chart Review: Service Utilization.** Face-to-face outpatient health care visit counts within 365 days following initial PTSD evaluations were tabulated using the regional VA network's computerized medical charts (excluding Vet Centers, and non-VA facilities). Clinics were categorized into the following groups: PTSD, (non-PTSD) MH/substance abuse, primary care, and specialty care. For specialty care visit counts we included all medical treatment services not listed as our other study variables, excluding visits related to routine nursing care (e.g., flu shots, labs), research, and less traditional health care (e.g., speech pathology, recreation therapy), similar to the exclusion criteria used by Koss et al. [1991].

**Self-Reported Health Problems and Previous Health Service Use.** Self-report of chronic physical health problems and previous inpatient and outpatient MH service use were taken from the National Center for PTSD's PTSD Status Form. These questions include (1) "Does the veteran have any chronic medical problems (e.g., diabetes, high blood pressure, epilepsy) that continue to interfere with his/her life?"; (2) "Has the veteran ever been hospitalized for treatment of an emotional or substance use problem, including war stress (PTSD)?"; and (3) "Has the veteran ever received professional treatment as an outpatient for an emotional or substance use problem, including war stress (PTSD)?" These variables were analyzed as dichotomous "Yes"–"No" variables. Despite possible concerns about subjects' recall difficulties when queried about previous MH service use, studies demonstrate accurate self-reported recall when validated against medical records, with only a trend toward the underestimation of visit frequency [Roberts et al., 1996; Wallihan et al., 1999].

## PROCEDURE

The VA's multidisciplinary outpatient PTSD clinical team (consisting of psychiatrists, clinical psychologists, and social workers) conducted the intake evaluations. Semistructured interviews assessed psychosocial history, military and trauma history, PTSD and other psychiatric disorders, with the TSI and other self-report measures administered (part of a larger battery). Questions adapted from the War Stress Interview [Fontana et al., 1990] and the Kadushin Combat Scale [1981] were used to assess combat trauma. Other types of military trauma (e.g., assault, accidents) were queried using nonstandardized questions at intake.

## ANALYSES

Participants (original $n = 221$) were excluded from analyses if they scored at least 75 on the TSI's Inconsistent Response scale (indicating random responding; Briere, 1995], resulting in six subject exclusions (revised $n = 215$). Additionally, because of significant concern of symptom overreporting (e.g., for PTSD disability payments) among veterans presenting for PTSD evaluations [Frueh et al., 2005a, 2000], we chose to exclude patients scoring higher than 90 on ATR [a very conservative cutoff score, strongly indicating malingering; Briere, 1995; Elhai et al., 2005b], to obtain a fairly genuine patient sample. This criterion resulted in an additional 41 subjects excluded (revised $n = 174$). Despite this relatively large group of excluded patients, excluded and included participants were not significantly different on any demographic or military history variables (all $Ps > .05$, and representing "small" effect sizes).[1] Three of the resulting 174 participants had missing TSIs, and their PTSD indexes were replaced with the series mean.

We found substantial positive skewness (of greater than 1) [Tabachnick and Fidell, 2001] and a large number of "0" visit count values in our continuous-scaled service use variables, identified as a problem in this literature [Walker et al., 2004]. We treated these data by adding a constant (five visit counts) and conducting logarithmic transformations [Tabachnick and Fidell, 2001], which resulted in improved skewness (less than or near 1 for all variables) and much more normalized distributions (it should be noted that adding five visits was necessary in moving the transformations out of the 0–1 range).

Structural equation modeling analyses were two-tailed, using AMOS 5.0 [SPSS, Inc., 2003] with maximum likelihood procedures. Standardized parameters are presented to facilitate interpretation. For all analyses, $\chi^2$ tests of model fit were examined in conjunction with goodness-of-fit indices. These indices include the Tucker–Lewis index (TLI), comparative fit index (CFI), root-mean-square error of approximation (RMSEA), and standardized root-mean-square residual (SRMR), with robust empirical support for their sensitivity to recognize well-fitting models [Hu and Bentler, 1998].

[1]We computed our primary analyses with these subjects included. However, because of their extreme, overreported PTSD scores, the analysis yielded a poorer fit in the structural equation model analyses.

# RESULTS

Descriptive statistics for the primary variables were as follows: Previous inpatient MH services were used by 80 (45.7%) patients, whereas outpatient MH care was used by 130 (74.3%). Chronic medical problems were reported in 147 (84.5%) of participants. Mean PTSD severity scores were 349.79 ($SD = 38.84$), ranging from 257.54 to 454.56, normally distributed and not skewed or kurtotic. Primary care medical visits averaged 3.06 ($SD = 2.62$), specialty care averaged 8.13 ($SD = 11.79$), outpatient MH/substance use care averaged 11.89 ($SD = 23.56$), and PTSD visits averaged 20.04 ($SD = 16.36$).

We tested hypotheses using a model (Fig. 1) assessing the relationships between previous MH service use (inpatient and outpatient), PTSD severity and medical problems during intake, and health service use within 1 year of intake (PTSD, MH/substance abuse, primary care, specialty care). Each measure was examined as an observed variable in our structural model.

Our initial hypothesized model had a moderately acceptable fit to the data [$\chi^2$ (17, $N = 174$) = 22.68, $P = .16$, TLI = .91, CFI = .94, RMSEA = .04, SRMR = .07; e.g., for good-fitting models, RMSEA $\leq .06$, SRMR $< .08$; Hu and Bentler, 1998]. However, several pathways were not significant, including lifetime history of outpatient MH treatment to PTSD severity ($P = .73$) and pathways with PTSD severity as a predictor of prospective service use ($P$s $> .70$). Based on theory and modification indices [Byrne, 2001; Tabachnick and Fidell, 2001], we trimmed several pathways and added one. Our final model (Fig. 2) fit the data very well [$\chi^2$ (20, $N = 174$) = 22.98, $P = .29$, TLI = .96, CFI = .97, RMSEA = .03, SRMR = .06]. We bootstrapped this final model, randomly selecting 200 subsamples from our data set to test the model fit for our sample as compared to the cumulative bootstrap subsamples, finding at least as good fit in 69% of bootstrapped samples, and support that the null hypothesis's final model (Fig. 2) should not be rejected (Bollen–Stine bootstrapped $P > .05$).

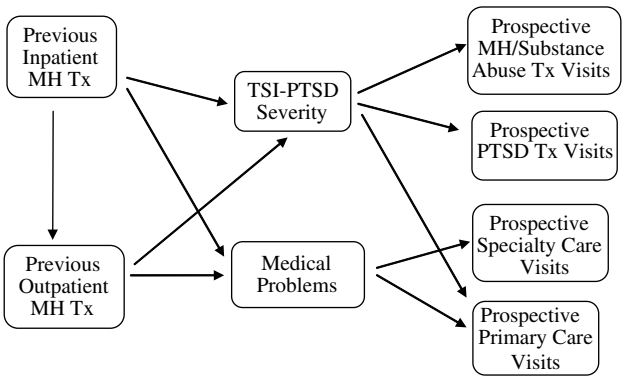


**Figure 1. Hypothesized model for relationships among mental health treatment history, PTSD, and medical symptoms, and 1-year prospective mental and physical health service use.**

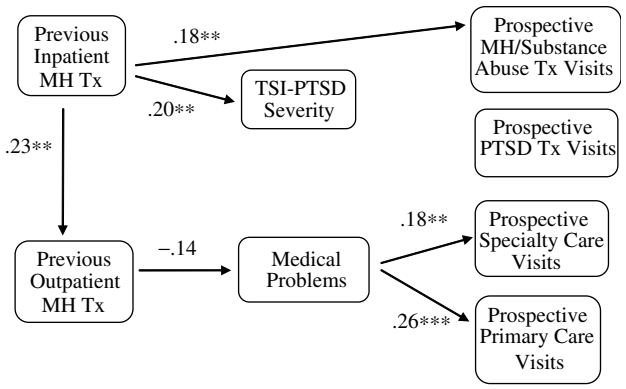


**Figure 2. Temporal relationships among mental health treatment history, PTSD, and medical symptoms, and 1-year prospective mental and physical health service use. *Note.* $N = 174$, $^{*}P < .05$, $^{**}P < .01$, $^{***}P < .001$. Parameter estimates shown are standardized. Except for TSI-PTSD Severity and variables on the right (which are continuously scaled), all other variables are dichotomously scaled ("yes"–"no").**

Lifetime history of inpatient MH treatment was positively related to outpatient MH service use intensity ($\beta = .23$, $P = .002$) and predicted greater PTSD severity ($\beta = .20$, $P = .008$) and number of MH/substance abuse visits ($\beta = .18$, $P = .007$). Lifetime history of outpatient MH treatment had a marginally negative relationship with medical problems ($\beta = -.14$, $P = .06$). Medical problems predicted greater use of specialty ($\beta = .18$, $P = .007$) and primary care ($\beta = .26$, $P < .001$). Contrary to prediction, lifetime history of outpatient MH treatment had no relationship with PTSD severity or prospective MH service use intensity. Additionally, PTSD severity had no relationship with prospective medical or MH service use intensity. Thus, PTSD severity failed to meet the necessary criteria to mediate relationships between lifetime history of MH services and 1-year prospective service use intensity following PTSD evaluation (see hypothesized model in Figure 1).

# DISCUSSION

We discovered several significant relationships between dichotomous-scaled lifetime MH service use variables, medical and PTSD difficulties, and continuous-scaled prospective health service use variables among treatment-seeking military veterans evaluated for PTSD. These findings are somewhat novel, because use of structural models to examine health care consumption across lifetime and prospective time trajectories has not been previously used.

We found some support for our first hypothesis, regarding lifetime MH service use predicting PTSD severity. Specifically, we discovered that lifetime inpatient MH treatment use was related to PTSD

severity. However, we failed to find a relationship between lifetime outpatient MH treatment use and PTSD severity. Since previous outpatient MH care was used by nearly three-quarters of participants, perhaps the lack of variability could have accounted for the lack of significance for the outpatient MH service use–PTSD severity path. Other possible explanations for the significant association with PTSD severity for inpatient but not outpatient service use could include the following: (1) Inpatient treatment use often implies a more severe state of illness than outpatient use, which could then present as a later marker of disorder severity (e.g., PTSD severity) or (2) it is possible that inpatient hospitalization can serve as a breeding ground for traumatic experiences, which can serve to increase the likelihood for later developing PTSD [Frueh et al., 2005b]. Interestingly, few studies of trauma survivors examined the relationship between lifetime MH service use and current PTSD diagnoses or severity. Of those examining this issue, Rosenheck and Fontana [1995] discovered that lifetime MH treatment use was related to the presence of current PTSD diagnoses among military veterans. However, Ullman and Brecklin [2002] revealed no such relationship among sexual assault victims. Thus, previous findings are mixed, and it should be noted that neither study classified treatment use into outpatient or inpatient types.

We failed to find support for our second hypothesis, involving PTSD as a mediator between lifetime and prospective health care use. In fact, PTSD severity did not predict prospective MH or medical treatment use intensity. In fact, most previous studies examined such a relationship using PTSD as a dichotomous diagnostic variable, finding significant associations with MH care use, whereas PTSD severity has yielded mixed results in MH care use prediction [Elhai et al., 2005c]. Only the Calhoun et al. [2002] study of military veterans and the Goto et al. [2002] study of disaster victims examined PTSD severity as a predictor of prospective MH service use, finding positive relationships. However, Calhoun et al. [2002] studied only combat-exposed veterans, using the Mississippi Combat PTSD Scale to determine PTSD severity; Goto et al. [2002] studied disaster victims regardless of PTSD, used the Impact of Event Scale—Revised (IES-R) to gauge PTSD severity, and relied on self-report of prospective MH service use. Other studies find no such relationship between PTSD severity and MH service use for combat veterans [Elhai et al., 2004] and witnesses to a shooting [Schwarz and Kowalski, 1992]. Thus, based on the current and past studies, we cannot conclude whether PTSD severity predicts prospective medical or MH service use.

We found some support for our third hypothesis concerning health problems as a mediator between lifetime MH care use and prospective medical service use. Specifically, and not surprisingly, health problems were related to prospective medical care use, consistent with two previous studies of Vietnam veterans inquiring about (albeit, previous) medical care use [Marshall et al., 1997, 1998]. However, health status did not mediate the relationship between lifetime MH treatment use and prospective health care use, which is inconsistent with a study of combat veterans [Solomon, 1989] and another with refugees [Weine et al., 2000], both of which found relations between previous MH care use and current health status. Thus, from these studies we may only suggest that among trauma survivors health problems are related to medical care use.

There were several limitations inherent with this study. First, we only examined veterans seeking PTSD-specific treatment, and in fact this group represented individuals with fairly high use of previous MH services. Thus, our results may not generalize to a heterogeneous group of community-resident trauma survivors or survivors seeking more general MH services. Second, we only accessed health care records of the particular regional VA network to which patients were connected. Third, we did not use structured diagnostic interviews to confirm PTSD diagnoses, and we do not have psychometric data on the semistructured PTSD checklist we used. Fourth, our measure of PTSD severity only has recent, limited validation data; furthermore, it was only measured at intake evaluation, a potential problem because we had multiple measurement timepoints (i.e., past, at intake, and prospective). Finally, we must acknowledge that despite our attempts to remove potential malingerers from analyses, it is possible that some symptom overreporting was represented among included participants, possibly resulting in inflated PTSD symptom severity and the resulting nonsignificant association with MH service use. Despite these limitations, this somewhat novel study contributes to the literature on health care utilization among trauma survivors.

## CONCLUSIONS

This study's findings are interesting and have clinical utility in two primary ways. First, the significant relationship between lifetime inpatient MH treatment use and prospective MH/substance service use can provide beneficial information to PTSD clinic administrators in forecasting treatment use and thus allocating their resources and treatment providers to treat this population. Second, the lack of relationship between PTSD severity and prospective MH health service use supports recent findings demonstrating significant MH care barriers among military personnel with psychiatric problems [Hoge et al., 2004]. Third, the significant medical problems experienced by trauma survivors [Schnurr and Green, 2004], coupled with this study's relationship between medical problems and medical care use, demonstrate the importance for PTSD clinicians to make proper medical care referrals for this population. Furthermore, it may even be beneficial to explore an integration of medical care into

MH clinics for this population, such as a primary care intervention model.

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