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Mismatch of Posttraumatic Stress Disorder (PTSD) Symptoms and *DSM-IV* Symptom Clusters in a Cancer Sample: Exploratory Factor Analysis of the PTSD Checklist-Civilian Version

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Abstract

The *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV;* American Psychiatric Association, 1994a) conceptualization of posttraumatic stress disorder (PTSD) includes three symptom clusters: reexperiencing, avoidance/numbing, and arousal. The PTSD Checklist-Civilian Version (PCL-C) corresponds to the *DSM-IV* PTSD symptoms. In the current study, we conducted exploratory factor analysis (EFA) of the PCL-C with two aims: (a) to examine whether the PCL-C evidenced the three-factor solution implied by the *DSM-IV* symptom clusters, and (b) to identify a factor solution for the PCL-C in a cancer sample. Women ($N = 148$) with Stage II or III breast cancer completed the PCL-C after completion of cancer treatment. We extracted two-, three-, four-, and five-factor solutions using EFA. Our data did not support the *DSM-IV* PTSD symptom clusters. Instead, EFA identified a four-factor solution including reexperiencing, avoidance, numbing, and arousal factors. Four symptom items, which may be confounded with illness and cancer treatment-related symptoms, exhibited poor factor loadings. Using these symptom items in cancer samples may lead to overdiagnosis of PTSD and inflated rates of PTSD symptoms.

Posttraumatic stress disorder (PTSD) is an anxiety disorder occurring after exposure to severe trauma. The *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV;* American Psychiatric Association [APA], 1994a) diagnostic criteria for PTSD include 17 symptoms that fall into three symptom clusters: re-experiencing, avoidance or numbing, and arousal. Expert consensus established the *DSM-IV* symptom clusters (APA, 1994b). In 1994, the *DSM-IV* committee expanded the PTSD trauma criteria to include life-threatening illness. Posttraumatic stress disorder interview and self-report measures have been developed to correspond to the *DSM-IV* symptoms and symptom clusters (e.g., Clinician-Administered PTSD Scale—Blake et al., 1990; PTSD Checklist—Weathers, Litz, Herman, Huska, & Keane, 1991; PTSD Symptom Scale—Foa, Riggs, Dancu, & Rothbaum, 1993). In the current study, we examine a widely used self-report PTSD symptom measure, the PTSD Checklist-Civilian Version (PCL-C; Weathers et al., 1991).

Cancer was an early example of the type of life-threatening illness capable of producing PTSD (APA, 1994b). Since expansion of the trauma criteria, studies have tested for PTSD in cancer patients and report that PTSD symptoms occur in up to 50% of cancer patients (for a review, see Gurevich, Devins, & Rodin, 2002). Recent research and clinical efforts to identify PTSD symptoms in cancer patients suggest a need for valid screening measures of cancer-related PTSD. Structured clinical interviews represent the “gold standard” for assessing PTSD (e.g., Clinician-Administered PTSD Scale; Blake et al., 1990). Unfortunately, these measures can be impractical for many settings, as they are time consuming (45–60 minutes) and require

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trained interviewers. Self-report measures offer an alternative that is time efficient and lower in cost.

The PCL-C (Weathers et al., 1991) is a widely used self-report measure that assesses PTSD symptoms following noncombat-related traumas. The PCL-C may be preferred to other self-report measures (e.g., Impact of Events Scale, Horowitz, Wilner, & Alvarez, 1979; PTSD Symptom Scale, Foa et al., 1993) because (a) its items assess the full range of *DSM-IV* PTSD symptoms, (b) its items can be tailored to a specific trauma event, including cancer diagnosis and treatment, and (c) it assesses both the frequency and severity of symptoms. The PCL-C may represent a viable option for assessing PTSD symptoms in cancer patients. Past studies with cancer patients suggest that the PCL-C has adequate diagnostic utility (e.g., sensitivity, specificity; Andrykowski, Cordova, Studts, & Miller, 1998; Widows, Jacobsen, & Fields, 2000), internal consistency (Smith, Redd, DuHamel, Vickberg, & Ricketts, 1999), and test-retest reliability (Andrykowski, Cordova, McGrath, Sloan, & Kenady, 2000).

Empirical evaluation of the PCL-C's structure is important for both psychometric and conceptual reasons. The PCL-C includes three subscales that correspond to the *DSM-IV* clusters and the PCL-C symptom cluster scoring method uses these subscales to identify probable PTSD cases (a rating of 3 or above on a 5-point scale is considered a symptom and the *DSM-IV* diagnostic criteria are followed). The *DSM-IV* symptom clusters are based on empirical studies of combat veterans and theoretical formulations of PTSD (APA, 1994b). Empirical evaluation of the PCL-C is needed to examine whether subscales based on the *DSM-IV* accurately reflect PTSD symptom dimensions in cancer patients. For example, if factor solutions for the PCL-C in cancer samples differ from the *DSM-IV* symptom clusters, then the *DSM-IV* conceptualization of PTSD may fail to capture the clinical phenomena in this population.

Two studies with cancer patients have examined the PCL-C's structure. Cordova, Studts, Hann, Jacobsen, and Andrykowski (2000) used confirmatory factor analysis to test for the *DSM-IV* symptom clusters in a sample of breast cancer patients. Results indicated moderate fit of the *DSM-IV* structure, but suggested that numbing and avoidance symptoms represent separate symptom clusters. Smith, Redd, Peyser, & Vogl (1999) conducted principal-components analysis in a sample of cancer patients who received a bone marrow transplant. Analysis revealed a four-component solution that differed from the *DSM-IV* clusters. The four components were numbing (four avoidance/numbing items and one arousal item), dreams or memories of cancer treatment (two re-experiencing items indicating disturbing memories and dreams), arousal (two arousal items indicating difficulty sleeping and concentrating), and responses to cancer-related reminders and avoidance numbing (three reexperiencing items and three avoidance/numbing items). These inconsistent findings with cancer patients may relate to characteristics of the PCL-C, study methodology, the *DSM-IV* conceptualization of PTSD, or other variables.

For comparison, we reviewed factor-analytic studies of the PCL-C and other PTSD measures, which tested the *DSM-IV* symptom structure in other trauma populations (e.g., combat, motor vehicle accident, rape). Table 1 summarizes these studies. Across them, solutions have variable numbers of factors including two-, three-, and four-factor solutions. In addition, close inspection of the solutions reveals that different symptom items load on different factors, even across studies using the same PTSD measures. For example, Asmundson, Wright, McCreary, and Pedlar (2003) and Simms, Watson, and Doebbeling (2002) both assess PTSD symptoms with the PTSD Checklist-Military Version (PCL-M; Weathers et al., 1991). Both studies identify a four-factor solution, but Asmundson and colleagues (2003) report that numbing symptoms comprise a single factor, while Simms and colleagues (2002) report that numbing

symptoms load with several arousal symptoms. Examination of the existing literature does not reveal a consistent pattern of item loadings across studies (see Table 1).

Most (60%) factor analytic studies use confirmatory factor analysis (CFA) to examine the PTSD symptom structure. Confirmatory factor analysis explicitly tests the fit of a hypothesized factor structure and is appropriate for testing structures based on theory or prior research (Floyd & Widaman, 1995). While CFA directly tests model-data fit, it provides limited information regarding symptom item performance. Confirmatory factor analysis specifies which factor loadings can be nonzero and constrains all other loadings to zero. Therefore, this analytic strategy cannot provide information about item loadings across factors. Because we were specifically interested in symptom item performance, we chose to conduct exploratory factor analysis (EFA). This analytic strategy provides more information about item loadings across factors, as it allows all items to load on all factors and does not force any factor loadings to be zero.

Study Aims

In the present study, we conducted EFA with two goals. Primarily, we examined whether the PCL-C evidenced the factor solution implied by the *DSM-IV* symptom clusters. This test is particularly relevant for the PCL-C, as the PCL-C items comprise subscales identical to the *DSM-IV* symptom clusters. A second aim was to identify a factor solution for the PCL-C in a cancer sample. Factors identified would provide empirically derived PCL-C sub-scales for cancer patients. Aspects of the research design and methods are important. First, we controlled assessment timing to reduce variation in proximity to trauma exposure. All participants were assessed 18 months following diagnosis (approximately 6 months postadjuvant treatment) to capture chronic or late-onset PTSD symptoms. Second, a research assistant administered the PCL-C to aid in participants' understanding of the symptom items and to obtain complete data. Third, we used EFA, as it provides more information about item performance than CFA and is preferred when the number of factors is unclear or the location of zero loadings is unknown (Gorsuch, 1983). These features maximized the ability to identify PCL-C factors.

Method

Participants

Eligibility—Women diagnosed with regional (Stage II or III) breast cancer, surgically treated, and awaiting adjuvant therapy were recruited for participation in a randomized clinical trial of a psychosocial intervention ($N = 227$). Exclusion criteria for the clinical trial included prior cancer diagnoses, refusal of cancer treatment, age <20 or >85 years, residence >90 miles from the research site, diagnoses of mental retardation, severe or untreated psychopathology (e.g., schizophrenia), neurological disorders, dementia, or immunologic conditions or diseases. Participants in the clinical trial were eligible for the current study if they had completed adjuvant therapy (i.e., radiation and chemotherapy), remained disease free, and completed the PTSD screening ($N = 148$).

Procedure

The women were consecutive patients at a university-affiliated National Cancer Institute designated Comprehensive Cancer Center or self- and physician-referred patients from the community. Informed consent was obtained at the initial assessment (postsurgery) followed by in-person collection of questionnaire data with a female research assistant. Participants were accrued to a randomized clinical trial testing the efficacy of a psychosocial intervention; the intervention was completed during the 4 months following the initial assessment. Follow-up has continued; patients complete assessments every 6 months for 10 years. This study includes

data collected as part of the 18-month postsurgery assessment. Because we were interested in identifying PTSD symptoms posttreatment, the first PTSD symptom screening was conducted at the 18-month assessment when all participants were at least 6 months postadjuvant treatment.

Measures

The Post-Traumatic Stress Checklist-Civilian Version (PCL-C) is used to assess PTSD symptoms in civilian populations (Weathers et al., 1991) and has been used in cancer samples (see Table 1). The PCL-C consists of 17 items, each corresponding to a *DSM-IV* PTSD symptom. When completing the PCL-C, women were asked to consider their experience in “Being diagnosed with and treated for breast cancer,” and “How much each symptom has bothered them in the last month.” Respondents used a 5-point scale, ranging from (1) *not at all* to (5) *extremely* for each item. The PCL-C yields a total score (summing all items, range = 17, no symptoms, to 85) with higher scores indicative of more PTSD symptoms. A total score of 50 or more suggests probable diagnosis of PTSD. The scale authors defined three subscales that correspond to the *DSM-IV* symptom clusters: reexperiencing, avoidance/numbing, and arousal. The PCL-C subscales can be used to identify probable cases of PTSD by considering a rating of 3 (*moderately*) or greater as a symptom, then following the *DSM-IV* diagnostic criteria for PTSD. Internal consistency for this sample was .88, which is consistent with other estimates (Smith et al., 1999; Widows et al., 2000).

Results

Preliminary Analysis and Sample Description

Of the patients approached, 57% agreed to participate. Analyses contrasting participants versus nonparticipants found no significant differences ($ps > .10$) on demographics, disease or prognostic characteristics, or cancer treatment variables. Reasons for refusal were “Too far to drive” (25%, > 60 miles), “Insufficient time” (20%), “Not interested” (17%), “Too stressed” (10%), and “Miscellaneous/not specified” (28%). Because women were participating in a randomized clinical trial, we conducted analyses (t tests and χ^2 tests) comparing demographics, disease or prognostic characteristics, cancer treatment variables, and PCL-C scores by study arm. There were no differences across clinical trial arms ($ps > .10$) and so groups were collapsed for all remaining analyses.

Participants were 148 (65%) women with Stage II (91%) or Stage III (9%) breast cancer. Seventy-one (48%) women received lumpectomy and 77 (52%) received modified radical mastectomy or bilateral mastectomy. For adjuvant therapy, 87% ($n = 129$) received chemotherapy and 62% ($n = 91$) received radiation therapy. Participants ranged in age from 28 to 84 years ($M = 50.47$; $SD = 10.45$) with the majority (68%) having a spouse or partner. Ninety-three percent of the sample was Caucasian (African American = 7%). The sample was well educated (some high school = 3%; high school graduate = 23%; some college = 30%; college graduate = 22%; and postgraduate work = 22%). Most participants (70%) were employed part-time or full-time outside of the home. The distribution of annual household income was < \$15,000 = 7%; \$15,000–\$29,000 = 16%; \$30,000–\$49,000 = 21%; \$50,000–\$79,000 = 25%; and $\geq$ \$80,000 = 31%.

Total PCL-C scores ranged from 17 to 62 (possible range 17 to 85), with a mean score of 27.25 ($SD = 8.73$), skew of 1.04, and kurtosis of .93. Three women (2%) scored above the PCL-C cutoff of 50, suggesting probable PTSD. For the three PCL-C subscales, reexperiencing scores ranged from 5 to 20 (possible range 5 to 25), with a mean score of 7.70 ($SD = 3.20$), skew of 1.63, and kurtosis of 2.54. The avoidance/numbing subscale ranged from 7 to 24 (possible range 7 to 35), with a mean score of 10.62 ($SD = 3.74$), skew of 1.34, and kurtosis of 1.47. Finally, the arousal subscale ranged from 5 to 24 (possible range 5 to 25), with a mean of 8.93

($SD = 3.59$), skew of 1.0, and kurtosis of 1.05. Ten women met the symptom cluster scoring method criteria for probable PTSD diagnosis.

Exploratory Factor Analyses

Maximum likelihood EFA was conducted. We first extracted a three-factor solution to test for the *DSM-IV* symptom clusters. A four-factor solution was also extracted to test for the four factors identified in past studies (see Table 1). As an additional test for these solutions, the data were under- and over-factored by extracting two- and five-factor solutions. Under- and over-factoring provides data for confirming the optimal number of factors. We predicted that the two- and five-factor solutions would evidence poor fit. Oblique Direct Quartimin rotation (Jennrich & Sampson, 1968) was applied. This procedure allows factors to become correlated; this should improve the quality of the simple pattern of loadings (Fabrigar, Wegener, MacCallum, & Strahan, 1999). The Comprehensive Exploratory Factor Analysis (CEFA) program (Browne, Cudeck, Tateneni, & Mels, 1998) was used. The Comprehensive Exploratory Factor Analysis provides the Root Mean Square Error of Approximation (RMSEA; Browne & Cudeck, 1993) as a quantitative means of assessing goodness of model fit per degree of freedom. For the current study, the sample size ($N = 148$) results in an item to participant ratio of 1:9. This ratio meets the guidelines indicated by Gorsuch (1983) and Kline (1979), which suggest 5 to 10 participants per item.

Items were normally distributed with the exception of five items: “Repeated, disturbing memories” (skew = 4.02, kurtosis = 16.99), “Feeling emotionally numb” (skew = 3.23, kurtosis = 10.45), “Feeling distant or cut-off” (skew = 2.37, kurtosis = 6.38), “Avoid activities and situations” (skew = 2.61, kurtosis = 6.51), and “Having physical reactions to reminders” (skew = 2.26, kurtosis = 5.40). We conducted a square root transformation (Box & Cox, 1964; Dunlap, Burke, & Greer, 1995), which successfully reduced skew and kurtosis. Exploratory factor analysis was then conducted using the transformed items. The pattern and magnitude of loadings and indices of fit did not differ for EFA using the untransformed versus transformed items. Thus, below we report results of the EFA using untransformed items.

Three- and Four-Factor Extractions—The RMSEA value for the three-factor solution indicated mediocre fit and the null hypothesis for the test of close fit was rejected ($p < .05$; see Table 2). Table 3 displays the factor loadings for the three-factor solution. Moreover, the items comprising the three factors differed from the symptom clusters specified by the *DSM-IV*. Numbing and avoidance symptoms did not load on the same factor. Instead, numbing symptoms loaded with arousal symptoms and avoidance symptoms loaded on a separate factor with a reexperiencing symptom (see Table 3). The variance explained by each factor was 6.20% for reexperiencing, 7.79% for avoidance, and 30.06% for numbing/arousal.

The RMSEA value for the four-factor solution indicated reasonable fit (see Table 2). In addition, the null hypothesis for the test of close fit was retained ($p = .10$). Table 4 displays the four-factor solution. The pattern of loadings suggests that a four-factor solution best represents the interrelationships among PCL-C items. The variance explained by the four factors was 30.63% for re-experiencing, 7.93% for avoidance, 4.83% for numbing, and 6.40% for arousal. Review of the eigenvalues and the scree test (Cattell, 1966) also support the four-factor solution. Four eigenvalues (5.70, 1.80, 1.50, 1.30, 0.96) exceeded the Kaiser–Guttman criterion of 1.0 for selecting the number of factors (Guttman, 1954). Further, the scree test indicated four factors, as the last large discontinuity in the magnitude of eigenvalues occurred between values four and five. These data provide additional support for a four-factor solution.

Inconsistent with the three clusters specified by the *DSM-IV*, our data suggest four-factors that are labeled *reexperiencing*, *avoidance*, *numbing*, and *arousal*. Moreover, examination of the items on each factor reveals item assignment differing from the *DSM-IV* symptom cluster

assignment. As seen in Table 4, Factor 1 (Reexperiencing) consists of four reexperiencing symptoms, one avoidance/numbing symptom, and one arousal symptom. Factor 2 (Avoidance) consists of two avoidance symptoms and one reexperiencing symptom. Factor 3 (Numbing) includes four numbing symptoms. Factor 4 (Arousal) includes four arousal symptoms. To adequately reflect a PTSD symptom dimension, symptom items should exhibit high factor loadings on that dimension and low factor loadings on other dimensions (Floyd & Widaman, 1995). The criterion recommended by Fürntratt (1969; $a^2/h^2 > .5$) was used to identify weak items. Four items were identified: “Feeling your future will be cut short”; “Being super-alert, watchful, or on guard”; “Having physical reactions to reminders”; and “Having difficulty concentrating.”

According to the *DSM-IV*, PTSD is a single phenomenon comprised of interrelated symptom dimensions. Thus, we examined factor intercorrelations from the four-factor solution to determine shared variance among factors. The oblique rotation showed significant factor intercorrelations (see Table 5). We computed PCL-C subscales corresponding to each of the four factors by summing the items that loaded on each factor. These subscales exhibited adequate internal consistencies. Table 5 displays Chronbach’s alpha indices with 95% confidence intervals for each subscale.

Two- and Five-Factor Extractions—Indices of fit are provided in Table 2. As predicted, the two-factor solution exhibited poor fit (RMSEA = .12; test of close fit rejected at $p < .05$). The first factor included four symptoms from the reexperiencing cluster. The second factor included all other symptoms. The variance explained by each factor was 7.70% for the first factor and 29.39% for the second factor. The RMSEA value (.06) for the five-factor extraction suggested reasonable model fit and the null hypothesis for the test of close fit was retained ($p = .18$). However, no items exhibited their highest loading on the fifth factor and the remaining four factors were identical to those for the four-factor solution. The variance explained by each factor was 30.40% for re-experiencing, 8.07% for avoidance, 4.95% for numbing, 6.78% for arousal, and 2.64% for the fifth factor. Thus, while including an additional factor accounted for more variance (and, therefore, a lower RMSEA value), the five-factor solution was overfactored.

Discussion

In contrast to the *DSM-IV* conceptualization of PTSD, our findings suggested that a four-factor solution best represented the interrelationships among symptom items on the PCL-C. The four-factor solution supported the *DSM-IV* reexperiencing and arousal symptom clusters, but suggested that avoidance and numbing symptoms represent separate, related phenomena. Several past CFA studies are consistent with our findings (see Table 1). Theoretical formulations of PTSD also suggest that this four-factor solution captures the clinical phenomena of PTSD. Foa, Zinbarg, and Rothbaum’s (1992) formulation of PTSD is consistent with our four-factor solution and proposes that avoidance and numbing symptoms represent separate mechanisms. According to this theory, arousal symptoms give rise to numbing symptoms and avoidance symptoms occur in response to reexperiencing symptoms. Longitudinal studies examining the course of PTSD symptoms provide support for this formulation of PTSD. For example, McFarlane (1988) followed 50 fire-fighters for 42 months after trauma exposure. Consistent with other longitudinal studies (Blank, 1993; Karlehage, Malt, & Hoff, 1993), the pattern of symptoms suggested that reexperiencing symptoms were frequent following trauma, but decreased in later phases of the disorder as avoidance and numbing symptoms increased.

Empirical tests of the *DSM-IV* symptom clusters are important, as the current diagnostic approach requires individuals to meet a minimum number of symptoms from each symptom

cluster. This diagnostic strategy assumes that PTSD is a single phenomenon with three distinct symptom dimensions. Our data do not support the *DSM-IV* conceptualization of PTSD and suggest that several symptoms do not represent their *DSM-IV* assigned symptom cluster. While these findings have implications for the *DSM-IV* PTSD diagnostic approach, our results need to be replicated with diverse groups (e.g., men), other trauma populations, and other measures of PTSD. For example, the current study examined subsyndromal PTSD symptoms, which may have influenced EFA results by constraining item variances. Additional studies are needed to test whether samples with higher PTSD symptom levels exhibit the same symptom structure. If additional studies do not support the *DSM-IV* symptom clusters, revision of the *DSM-IV* diagnostic criteria and its underlying assumptions should be considered.

The chronic nature of cancer may have impacted the factor solution identified in this study. Unlike discrete trauma events (e.g., rape, natural disaster, motor vehicle accidents), the cancer experience involves multiple traumatic events including diagnosis, surgery, adjuvant therapy, and for some women, recurrence. The course of trauma exposure experienced with cancer is potentially similar in time course to other chronic traumatic stressors such as war, domestic violence, or incest. The response to multiple, prolonged, or intermittent traumatic exposures may differ qualitatively and quantitatively from stress responses following discrete traumatic events (Gurevich et al., 2002). Review of past factor analytic studies reveals that factor solutions vary by type of trauma (see Table 1). Four studies included samples exposed to discrete trauma events (e.g., fire, motor vehicle accidents, rape, or assault). Three of these studies identified a two-factor solution (Buckley, Blanchard, & Hickling, 1998; Maes et al., 1998a, 1998b; Taylor, Kuch, Koch, Crockett, & Passey, 1998) and one found a three-factor solution (Foa, Riggs, & Gershuny, 1995). In contrast, of the seven studies examining chronic trauma events (e.g., combat, cancer), five studies identified a four-factor solution (see Table 1). Our data also support a four-factor solution. If the clinical phenomenon of PTSD differs by trauma characteristics, the *DSM-IV* diagnostic strategy for PTSD may need to be reconsidered. Specifically, requiring individuals to meet a minimum number of symptoms from each symptom cluster may be inappropriate.

Some PTSD symptom items may not reflect PTSD clinical phenomena in cancer patients. Our findings support a four-factor solution, but suggest that several PCL-C items fail to represent PTSD symptom dimensions for cancer patients. Four symptom items loaded with symptoms from other dimensions or exhibited significant loadings on multiple factors. The symptom items that loaded poorly (“Feeling your future will be cut short”; “Being super-alert, watchful, or on guard”; “Having physical reactions to reminders”; and “Having difficulty concentrating”) may be confounded with illness, cancer treatment-related symptoms, or vigilance for signs and symptoms of recurring disease (Green, Epstein, Krupnick, & Rowland, 1997; Smith et al., 1999). Including symptom items associated with cancer and cancer treatments may lead to overdiagnosis of PTSD and inflated rates of PTSD symptoms (Gurevich et al., 2002). Our data and past studies (Cordova et al., 1995; Green et al., 2000; Jacobsen et al., 1998; Smith et al., 1999) suggest that these symptom items are among the most frequently reported PTSD symptoms in cancer samples. Thus, retaining these PCL-C items may yield false-positive PTSD cases and inflated symptom rates in cancer samples.

The primary aims of this study were to test for the factor solution implied by the *DSM-IV* symptom clusters and to identify a factor solution for the PCL-C in a breast cancer sample. Our findings have implications for future use of the PCL-C in breast cancer samples. First, the PCL-C symptom cluster method may be inappropriate for breast cancer samples, as our data fail to support the *DSM-IV* symptom clusters (and PCL-C sub-scales) used for this strategy. Second, if PCL-C subscales are needed, we recommend that future studies use four PCL-C subscales: reexperiencing, avoidance, numbing, and arousal. Our findings suggest that separate subscales for avoidance and numbing might better reflect the interrelationships among PCL-

C items. Finally, several PCL-C items may be confounded with illness or cancer treatment-related symptoms and thus, fail to represent PTSD symptom dimensions for cancer patients. Removing these items may result in a more accurate measure of PTSD symptoms for breast cancer patients and reduce the risk of inflated PTSD symptom rates. In conclusion, these findings contribute to our understanding of the interrelationships among PTSD symptoms following cancer treatment. Additional factor analytic studies are needed to improve our understanding of the PTSD symptom structure and the stability of that structure over time.

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Table 1

Factor Analytic Studies of the *DSM-IV* PTSD Symptoms

Study	Sample and type of trauma	Analytic strategy	Time since trauma	Measure	Findings
Two-factor solution Buckley et al., 1998	<i>N</i> = 217 Motor-vehicle accident survivors	CFA	1–4 months	CAPS	Two-factor model: Intrusions/ avoidance and arousal/numbing
Maes et al., 1998a, 1998b	<i>N</i> = 185 Hotel fire survivors (<i>n</i> = 130) and motor-vehicle accident survivors (<i>n</i> = 55)	PCA CFA	7–9 months	CIDI PTSD Module	Two-components: Depression/ avoidance and anxiety/arousal.
Taylor et al., 1998	Sample 1: <i>N</i> = 103 Motor-vehicle accident survivors Sample 2: <i>N</i> = 419 United Nations peacekeepers stationed in Bosnia	EFA	Sample 1: not reported Sample 2: 6 months	Sample 1: SCID or ADIS Sample 2: PSS	Two-factors: Intrusions/avoidance and arousal/numbing
Three-factor solution Cordova et al., 2000	<i>N</i> = 142 Women with breast cancer Treated with traditional cancer therapies (<i>n</i> = 99) and BMT (<i>n</i> = 43)	CFA LM test	36 months (range 2–72 months)	PCL-C	Three-factor hierarchical model: Reexperiencing, avoidance/ numbing, arousal
Foa et al., 1995	<i>N</i> = 158 Female victims of sexual (<i>n</i> = 72) and nonsexual (<i>n</i> = 86) assault	PCA	3 months	PSS	Three-components: Arousal/ avoidance, numbing, intrusion.
Four-factor solution Asmundson et al., 2000	<i>N</i> = 349 Primary care out-patients with routine medical problems	CFA	N/A	PCL-C	Four-factor hierarchical model: Reexperiencing, numbing, avoidance, and arousal
Asmundson et al., 2003	Sample 1: <i>N</i> = 400 UN peacekeepers	CFA LM test	Not reported	PCL-M	Sample 1: Four-factor intercorrelated model: Reexperiencing, numbing, avoidance, and arousal. Sample 2: Four-factor intercorrelated model: Reexperiencing, numbing, avoidance, and arousal
King et al., 1998	Sample 2: <i>N</i> = 787 UN peacekeepers Chronic pain (<i>n</i> = 427) vs. no chronic pain (<i>n</i> = 341)	CFA	Range WW II to Operation Desert Storm.	CAPS	Four-factor intercorrelated model: Reexperiencing, numbing, avoidance, and arousal
Sack et al., 1997	<i>N</i> = 524 Veterans of WWII (7%), Korean (5%), Vietnam (81%), Desert Storm (4%), and other wars (3%)	PCA EFA CFA	6–10 years 5 years	DICA PTSD Module PCL-M	Four-factors: Reexperiencing, numbing, avoidance, and arousal. Four-factor intercorrelated model: Reexperiencing, avoidance, dysphoria (numbing and arousal symptoms), and arousal
Simms et al., 2002	<i>N</i> = 194 Khmer adolescent refugees Sample 1: <i>N</i> = 1,896 National Guard or U.S. Army Reserve deployed in the Gulf				
Smith et al., 1999	Sample 2: <i>N</i> = 1,799 National Guard or U.S. Army Reserve not deployed <i>N</i> = 111 Cancer patients treated with bone marrow transplant	PCA	4 years (range .55–11.5 years)	PCL-C	Four-components: Numbing, dreams or memories of cancer treatment, arousal, and responses to cancer-related reminders and avoidance-numbing.
Stewart et al., 1999	<i>N</i> = 295 Women with alcohol or prescription drug abuse/dependence	PCA	N/A	PSS	Four-components: Reexperiencing, avoidance, numbing, and arousal

Study	Sample and type of trauma	Analytic strategy	Time since trauma	Measure	Findings
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Note. ADIS = Anxiety Disorders Interview Schedule (DiNardo & Barlow, 1988); CAPS = Clinician-Administered PTSD Scale (Blake et al., 1990); CIDI PTSD Module = Composite International Diagnostic Interview PTSD Module (Smeets & Dingemans, 1993); DICA PTSD Module = Diagnostic Interview for Children and Adolescents PTSD Module (Welner, Reich, Herjanic, Jung, & Amado, 1987); PCL-C = PTSD Checklist-Civilian Version (Weathers et al., 1991); PCL-M = PTSD Checklist-Military Version (Weathers et al., 1991); PSS = PTSD Symptom Scale (Foa et al., 1993); SCID = Structured Clinical Interview for the DSM (Spitzer, Gibbon, Skodol, Williams, & First, 1994).

Table 2
Indices of Fit for EFA Two, Three, Four, and Five-Factor Extractions

Indices	2 Factors	3 Factors	4 Factors	5 Factors
RMSEA (90% confidence interval) ^a	.12 (.10, .13)	.09 (.08, .11)	.07 (.04, .09)	.06 (.04, .09)
Goodness of fit test statistic (χ^2)	302.47	197.77	121.88	96.19
Test of close fit <i>p</i> value ^b	<.001	<.001	.10	.18

^aRMSEA < .05 suggests close fit, .05–.08 suggests reasonable fit, .08–.10 suggests mediocre fit, and >.10 suggests poor fit (Browne & Cudeck, 1993).

^bIf $p < .05$, then one rejects the null hypothesis that the model fits the data.

Table 3

Factor Loadings for the EFA Three-Factor Extraction of the PCL-C

DSM-IV Cluster ^a	Factors and items	Factors			Communality
		I	II	III	
	Reexperiencing (Factor I)				
R	Repeated, disturbing memories	.87	.13	-.01	.81
R	Acting/feeling experience happening again	.71	-.02	.03	.51
R	Repeated, disturbing dreams	.68	-.13	-.07	.40
R	Feeling upset when reminded	.59	.25	.11	.56
	Avoidance (Factor II)				
AN	Avoid thinking or having feelings	-.02	.80	.12	.71
AN	Avoid activities or situations	.03	.77	-.01	.59
R	Having physical reactions to reminders	.27	.35	.15	.34
	Numbing and arousal (Factor III)				
A	Feeling irritable or having angry outbursts	-.11	.11	.77	.59
A	Trouble falling or staying asleep	.14	-.34	.71	.53
A	Feeling jumpy or easily startled	-.03	.11	.61	.42
A	Having difficulty concentrating	.01	-.10	.35	.19
AN	Trouble remembering important parts	-.05	.05	.44	.32
AN	Feeling emotionally numb	.05	.20	.43	.26
AN	Loss of interest in activities	.08	.14	.40	.42
AN	Feeling your future will be cut short	.35	.03	.39	.24
AN	Feeling distant or cutoff	.20	.12	.30	.24
A	Being super-alert, watchful, or on-guard	.23	.10	.28	.24

^a DSM-IV PTSD symptom clusters: R = Reexperiencing, AN = Avoidance/Numbing, and A = Arousal.

Table 4

Factor Loadings for the EFA Four-Factor Extraction of the PCL-C

DSM-IV Cluster ^a	Factors and items	Factors				Communality
		I	II	III	IV	
	Reexperiencing (Factor I)					
R	Repeated, disturbing memories	.84	.11	.14	-.07	.81
R	Acting/feeling experience happening again	.70	.01	-.04	.07	.53
R	Repeated, disturbing dreams	.66	-.14	.05	-.08	.41
R	Feeling upset when reminded	.59	.31	-.08	.17	.62
AN	Feeling your future will be cut short ^b	.36	.04	.20	.26	.42
A	Being super-alert, watchful, or on-guard ^b	.23	.11	.16	.18	.24
	Avoidance (Factor II)					
AN	Avoid thinking or having feelings	-.03	.78	.14	.03	.70
AN	Avoid activities or situations	.01	.74	.14	-.08	.59
R	Having physical reactions to reminders ^b	.28	.43	-.16	.26	.42
	Numbing (Factor III)					
AN	Loss of interest in activities	.03	.02	.81	-.07	.64
AN	Feeling emotionally numb	.02	.12	.65	.04	.52
AN	Feeling distant or cutoff	.19	.06	.47	.02	.34
AN	Trouble remembering important parts	-.06	.02	.38	.20	.23
	Arousal (Factor IV)					
A	Trouble falling or staying asleep	.18	-.27	.03	.69	.57
A	Feeling irritable or having angry outbursts	-.09	.18	.13	.68	.63
A	Feeling jumpy or easily startled	-.02	.20	-.01	.63	.49
A	Having difficulty concentrating ^b	.04	-.09	.28	.42	.34

^a DSM-IV PTSD symptom clusters: R = Reexperiencing, AN = Avoidance/Numbing, A = Arousal.^b Weak items identified using the criterion suggested by Furrtratt ($a^2/n^2 > .5$; 1969).

Table 5

Factor Intercorrelations for the PCL-C Four-Factor Solution and Internal Consistencies (Cronbach's alphas) With 95% Confidence Intervals^a

	Reexperiencing	Avoidance	Numbing	Arousal
Reexperiencing	.80 (.74, .84)			
Avoidance	.21	.73 (.65, .80)		
Numbing	.31	.27	.71 (.63, .78)	
Arousal	.42	.29	.43	.74 (.67, .80)

Note. All factor intercorrelations significant at $p < .05$.

^aValues on the diagonal are internal consistencies (Cronbach's alphas) with 95% confidence intervals for subscales corresponding to each of the four factors.