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Confirmatory factor analysis of posttraumatic stress symptoms in Brazilian primary care patients: An examination of seven alternative models

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ABSTRACT

The DSM-IV-TR postulates that PTSD symptoms are organized into 3 clusters. This assumption has been challenged by growing number of factor analytical studies, which tend to favor 4-factor, first-order models. Our objective was to investigate whether the clusters of PTSD symptoms identified in North American and European studies could be replicated in a Brazilian sample composed of 805 primary care patients living in hillside slums. Volunteers were asked to fill out the Brazilian version of the Posttraumatic Stress Disorder Checklist—Civilian Version and a confirmatory factor analysis of this scale was conducted with the software LISREL 8.80. Seven models were tested and a 4-factor, first-order solution including an emotional numbing cluster was found to provide the best fit. Although PTSD has been characterized by some critics as a Western culture-specific disorder lacking universal validity, our results seem to uphold the cross-cultural validity of the 4-factor, first-order model.

1. Introduction

According to the most recent edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000), posttraumatic stress disorder (PTSD) is an anxiety disorder that can develop after exposure to a traumatic event (i.e., the person is confronted with, experiences, or witnesses an event involving actual or threatened death or serious injury, or a threat to the physical integrity of the self or others; Criterion A1) and when the person's response involves intense helplessness, fear, or horror (Criterion A2).

The DSM-IV-TR recognizes the existence of 17 symptoms of PTSD that are grouped into three clusters: reexperiencing of the event (e.g., recurrent and intrusive thoughts, distressing dreams), avoidance and emotional numbing (e.g., avoidance of reminders of the traumatic event, restricted range of affect), and hyperarousal (e.g., sleep difficulties, exaggerated startle response). To satisfy DSM-IV-TR criteria for PTSD, a person must have at least one reexperiencing symptom (criterion B), three avoidance and/or numbing symptoms (criterion C), and two hyperarousal symptoms (criterion D). Additionally, these symptoms must persist for at least a month (criterion E) and cause significant distress or impairment in social, occupational, or other important areas of functioning (criterion F).

Horowitz, Wilner, & Alvarez (1979) developed a pioneering conceptual framework for understanding PTSD symptoms structure, the two-factor information processing model, which distinguished only between intrusive and avoidant states. However, in DSM-III (American Psychiatric Association, 1980), the first official classification to include a diagnostic category for PTSD, there were 12 posttraumatic symptoms subsumed under three, not two, clusters: reexperiencing, numbing, and "other symptoms". The latter was a residual category encompassing a motley assortment of symptoms, such as survivor guilt, nonspecific memory impairment, avoidance of trauma-related activities, intensification of symptoms in response to trauma-related cues, and symptoms indicative of autonomic hyperarousal.

The definition of PTSD was modified in the revised edition of DSM-III (DSM-III-R; American Psychiatric Association, 1987) in order to incorporate evolving research findings, in particular, the increased emphasis on the avoidance phenomena (Turnbull, 1998). First, the symptom list was increased to seventeen. Second, a new symptom, distress at exposure to trauma-related cues, was added to the reexperiencing cluster. Third, the numbing cluster was reshaped into an avoidance and numbing one: avoidance of

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trauma-related activities and psychogenic amnesia for the trauma were moved here, and two new items, avoidance of trauma-related thoughts or feelings and sense of a foreshortened future, were introduced. Finally, the "other symptoms" cluster became the hyperarousal one: while two new symptoms, irritability and physiological reactivity to trauma-related cues, were added to it, survivor guilt was deleted, and avoidance and memory impairment were reassigned to the second cluster. In contrast, the only noteworthy change to the PTSD symptoms since the advent of the DSM-IV (American Psychiatric Association, 1994) was the reassignment of physiological reactivity from the hyperarousal to the reexperiencing cluster (Palmieri, Weathers, Difede, & King, 2007).

In spite of apparent progress, a number of critical questions still await unequivocal answers: what are the real dimensions underlying PTSD and how can they be reliably identified and empirically validated (Palmieri, Weathers et al., 2007). Factor analysis, a statistical method used to describe variability among observed variables in terms of fewer unobserved variables called factors, has been used to investigate the structural validity of the PTSD construct. There are two types of factor analyses. Exploratory Factor Analysis (EFA) seeks to identify the smallest number of interpretable factors that can adequately explain the correlations among a set of variables. This requires probing several different possibilities concerning the number of existing factors and ascertaining their loading patterns. In contrast, Confirmatory Factor Analysis (CFA) is usually based on already available theoretical knowledge or empirical research, allowing the investigator to specify a priori the exact factor model he/she wants to be tested. This model further specifies which variables will load on which factors and how these factors will correlate among themselves. CFA also allows researchers to model first-order factors defined by direct interrelationships between items and higher-order factors that unify the first-order factors. The DSM-IV-TR's implicit factor structure of PTSD, for instance, is a higher-order three-factor model, comprising three first-order symptom factors and a second-order PTSD factor (Rasmussen, Smith, & Keller, 2007).

While EFA is assumed to be primarily a theory-generating procedure, CFA is considered a theory-testing method (Stevens, 1996). Although EFA is not inappropriate for assessing the PTSD symptom structure, CFA is considered a more powerful and direct method of testing a hypothesized factor structure (Cordova, Studts, Hann, Jacobsen, & Andrykowski, 2000) and has of late become the standard for research in this area.

Table 1 lists recent factor analytic studies of PTSD symptoms and summarizes their main features. Perhaps, the most important observation to be made is that the vast majority of these studies have failed to uphold the three-cluster model adopted in the DSM-IV-TR. As pointed out by Lancaster, Melka, and Rodriguez (2009), of the studies reporting a three-factor solution, one failed to compare the DSM PTSD symptom clusters to any other models (Cordova et al., 2000), two found three clusters which were different from the DSM conceptualization (Foa, Riggs, & Gershuny, 1995; Lancaster et al., 2009) and one EFA study used the Civilian Mississippi Scale, which has been criticized in terms of its psychometric properties (Thatcher & Krikorian, 2005). Although two-factor solutions have received early theoretical (Foa, Zinbarg, & Rothbaum, 1992; Horowitz, 1986) and empirical support (Buckley, Blanchard, & Hickling, 1998; Maes et al., 1998a, 1998b; Taylor, Koch, Kuch, Crockett, & Passey, 1998), only one of the more recent and sophisticated studies (Thatcher & Krikorian, 2005) was able to provide at least a partial confirmation of this model.

A renewed interest in the two-factor model emerged from the recent proposal made by Spitzer, First, and Wakefield (2007) that the five PTSD symptoms that either overlap with those of major depression or of generalized anxiety disorder (e.g., anhedonia, irritability, or sleep problems) or have questionable clinical validity (e.g., psychogenic amnesia) be eliminated from DSM criteria. They also suggested consolidating the remaining avoidance, numbing, and arousal items in a combined C/D criterion, thus creating a new two-factor, first-order PTSD model. So far, the Spitzer et al. (2007) model has been investigated only twice, with Ford, Elhai, Ruggiero, and Frueh (2009) finding it superior to the 3-factor one and Elhai, Grubaugh, Kashdan, and Frueh (2008) reporting the opposite.

Two main 4-factor models have been tested. The PTSD–numbing or King model (King, Leskin, King, & Weathers, 1998; Krause, Kaltman, Goodman, & Dutton, 2007) splits the Criterion C symptoms of effortful avoidance and emotional numbing onto separate factors, thus establishing four intercorrelated factors. The PTSD–numbing modelĭs superiority over two- and three-factor solutions have been repeatedly demonstrated (Asmundson, Wright, McCreary, & Pedlar, 2003; DuHamel et al., 2004; King et al., 1998; Marshall, 2004; Palmieri & Fitzgerald, 2005). A second-order variant of the PTSD–numbing model, which portrays the disorder as four distinct symptom clusters of intrusions, avoidance, numbing, and hyperarousal unified under a higher-order PTSD factor failed, with one single exception (Asmundson et al., 2000), to demonstrate its superiority over the intercorrelated PTSD–numbing model (Asmundson et al., 2003; DuHamel et al., 2004; King et al., 1998; Marshall, 2004; Palmieri & Fitzgerald, 2005).

The PTSD–dysphoria model, proposed by Simms, Watson, and Doebbeling (2002), includes three factors comprising symptoms specific to PTSD and to other anxiety disorders (i.e., intrusions, effortful avoidance, and hyperarousal) and a fourth representing dysphoria (or general distress), which combines markers of numbing with a number of hyperarousal symptoms (i.e., sleep disturbance, irritability, and impaired concentration). This theoretical proposal is based on the tripartite model of anxiety and depression delineated by Clark and Watson (1991) to account for the overlapping features of anxiety and depression and which posits the existence of three independent factors: autonomical arousal, anhedonia and a "general distress factor". According to the tripartite model, autonomical arousal is the defining feature of anxiety, depression would be characterized by anhedonia and a "general distress factor", which is shared by both anxiety and depression, would account for their common symptoms. However, while some authors (Armour & Shevlin, 2010; Baschnagel, O'Connor, Colder, & Hawk, 2005; Boelen, van den Hout, & van den Bout, 2008; Carragher, Mills, Slade, Teesson, & Silove, 2010; Elklit, Armour, & Shevlin, 2010; Hetzel-Riggin, 2009; Olff, Sijbrandij, Opmeer, Carlier, & Gersons, 2009; Shevlin, McBride, Armour, & Adamson, 2009; Simms et al., 2002) found the PTSD–dysphoria model to have a better fit than all other first-order models proposed in the literature, others (Mansfield, Williams, Hourani, & Babeu, 2010; McDonald et al., 2008; Morina, Böhme, Morina, & Asmundson, 2011; Naifeh, Elhai, Kashdan, & Grubaugh, 2008; Palmieri & Fitzgerald, 2005) reported the PTSD–numbing model to be superior to the PTSD–dysphoria model. A second-order variant of the PTSD–dysphoria model was tested in only in two studies (Krause et al., 2007; Palmieri & Fitzgerald, 2005) which, nevertheless, failed to demonstrate its superiority over its first-order counterpart.

It has been suggested that methodological differences between studies may account, at least in part, for the inconsistencies in the number and type of clusters reported (Andrews, Joseph, Shevlin, & Troop, 2006). As shown in Table 1, there is considerable variation across studies regarding the size, nature (e.g., normal volunteers, treatment-seeking patients, high-risk groups, representative population-based samples), socio-demographic composition (e.g., college students, elderly, exclusively male or female samples, rescue workers, refugees), and medical characteristics (e.g., healthy subjects, primary care patients, individuals being treated for cancer) of the samples; type (e.g., combat-related vs. civilian life traumas) and modality of exposure to the traumatic event (exposure to one specific type of trauma vs. exposure to a wide range of

Table 1
Summary of studies comparing the factor structure of conventionally defined PTSD.

Study	Country	Method	Participants and trauma	Male (%)	Timing	Instrument
First-order two-factor models						
Maes et al. (1998a, 1998b)	Belgium	CFA & EFA	130 fire and 55 MVA victims	–	7–9 mo after trauma	CIDI
Taylor et al. (1998)	Canada	EFA	Sample 1: 103 MVA victims;	Sample 1: 40;	Sample 1: –	Sample 1: SCID & ADIS
			Sample 2: 419 UN peacekeepers stationed in Bosnia	Sample 2: 99	Sample 2: 6 mo	Sample 2: PSS
Thatcher and Krikorian (2005)[a]	USA	EFA	304 undergraduate students exposed to at least one trauma	42.8	–	IES and the MIS-Civ
Elhai et al. (2008)	USA	CFA	770 participants of the NCS-R Part II exposed to a variety of traumas	–	–	CIDI
Ford et al. (2009)	USA	CFA	3351 adolescents from the NSA exposed to a variety of traumas	–	–	DSM-IV criteria
Passos et al. (in press)	Brazil	EFA	Sample 1: 230 rescue workers; Sample 2: 343 police officers Both exposed to a variety of occupational traumas	Sample 1: 76.9; Sample 2: 100	–	PCL-C
Second-order two-factor models						
Buckley et al. (1998)	USA	CFA	217 survivors of serious MVA	30.4	1 ± 4 mo post-MVA	CAPS
First-order three-factors models						
Foa et al. (1995)	USA	PCA	158 victims of sexual (n = 72) and nonsexual (n = 86) assault	0	3 mo	PSS
Thatcher and Krikorian (2005)	USA	EFA	304 undergraduate students exposed to at least one trauma	42.8	–	IES and MIS-Civ
Elhai et al. (2008)	USA	CFA	Sample 1: 5692 adult from the NCS-R part II;	Sample 1: 24–24.6	–	Sample 1: CIDI; Sample 2: DSM-IV criteria
			Sample 2: 3351 adolescents from the NSA. Both exposed to a variety of traumas.	Sample 2: 30.4–32		
Griesel et al. (2006)	Germany	EFA	143 victims of a variety of traumas	40	54% of the sample > 5 yrs before.	PDS
Lancaster et al. (2009)	USA	CFA & EFA	344 college students exposed to a variety of traumas	39.8	–	PCL-C
Second-order three-factors models						
Anthony et al. (1999)	USA	CFA	5664 students exposed to Hurricane Hugo	49	3 mo	RI
Cordova et al. (2000)	USA	CFA	142 breast cancer survivors (12 with PTSD)	0	M = 35.6 mo (SD = 17.4 mo) after treatment	PCL-C
Anthony et al. (2005)	USA	CFA	Sample 1: 198 students exposed to Hurricane Hugo; Sample 2: 198 students exposed to Hurricane Andrew	Sample 1: 51; Sample 2: 40.4	3 mo	RI
First-order four-factors models including numbing						
Sack et al. (1997)	USA	PCA & EFA	194 adolescent refugees from cambodian war		6–10 yrs	PTSD module of the DICA
King et al. (1998)	USA	CFA	524 treatment-seeking combat veterans.	100	–	CAPS
Smith et al. (1999)	USA	EFA	111 adults who had undergonebone marrow transplant	51	–	PCL-C
Stewart et al. (1999)	Canada	PCA	295 female patients, abusing or dependent on alcohol and/or a depressant prescription drug (136 with PTSD).	0	–	PSS
Amdur and Liberzon (2001)	USA	CFA	195 combat veterans meeting with chronic PTSD	100	M = 20.4 yrs (SD = 3.2 yrs)	IES
Asmundson et al. (2003)	Canada	CFA	Sample 1: 400 UN male peacekeepers; Sample 2: 787 UN peacekeepers with (n = 427) or without (n = 341) chronic pain.	100	–	PCL-M

DuHamel et al. (2004)	USA	CFA	Sample 1: 100 BMT/SCT recipients. Sample 2: BMT/SCT recipients screened for a trial of CBT for PTSD.	50.9	Yrs since BMT/SCT Sample 1: 4.1 (SD = 2.8); Sample 2: 2.8 (SD = 1.6)	PCL-C
Marshall (2004)	USA	CFA	419 (299 English- and 120 Spanish-speaking) young adult survivors of community violence	94	Within days of hospital admission (*M* = 9.55 days; SD = 9.84 days).	English- and Spanish-language versions of the PCL-C
Palmieri and Fitzgerald (2005)	USA	CFA	1218 victims of workplace sexual harassment	0	Average job tenure = 5.0 yrs (SD = 5.0).	PCL-C
McWilliams et al. (2005)[b]	Canada	EFA & CFA	429 National Comorbidity Survey respondents with a lifetime history of PTSD caused by a variety of traumas.	31.6	–	PTSD module of the revised DIS
Shelby et al. (2005)	USA	EFA	148 women with Stage II or III breast cancer (3- 10 with probable PTSD).	0	At least 6 mo postadjuvant treatment	PCL-C
Andrews et al. (2006)	UK	CFA	485 emergency personnel (244 police officers, 207 fire brigade, 29 ambulance service and 4 coastguards) with a variety of occupational traumas.	86.7	Time since trauma: *M* = 7.39 yrs (SD = 6.29)	PSS
Elhai et al. (2007)	USA	CFA	510 college students with a variety of traumas.	34	–	PCL-C
Palmieri, Marshall et al. (2007)	USA	CFA	488 Cambodian refugees residing in USA	34.8	–	PCL-C
Palmieri, Weathers et al. (2007)[c]	USA	CFA	2960 utility workers exposed to the WTC Ground Zero site	96.9	–	PCL-C and CAPS
Rasmussen et al. (2007)	USA	CFA	885 refugees victims of political and ethnic violence from 22 West and Central African countries.	62.3	Mean time in USA was 21.1 (SD = 24.6) mo	HTQ
Schinka et al. (2007)	USA	CFA	142 elderly survivors of 2004 Florida hurricane disasters.	50	7–8 mo	PCL-C
McDonald et al. (2008)	USA	CFA	1447 veterans with military and civilian trauma.	93.6	–	DTS
Naifeh et al. (2008)	USA	CFA	252 medical patients exposed to a wide variety of traumas (not necessarily medical related).	27.4	–	PSS
Saul et al. (2008)	USA	CFA	1581adolescents from the NSA exposed to a variety of traumatic events	52.1	–	DSM-IV criteria
Elhai et al. (2009)[d]	USA	CFA	Sample 1: 218 college students referencing PTSD symptoms to their worst trauma; Sample 2: 234 college students referencing PTSD symptoms to their overall trauma history; Sample 3: 464 non-trauma-exposed college students.	33	–	PCL-C
Mansfield et al. (2010)	USA	CFA	15,593U.S. active duty military personnel.	75.1	–	PCL-C
Morina et al. (2011)	Kosovo	CFA	390 psychology and medicine studentswho have experienced war-related stress.	27.8	Eight to nine years after the war.	DTS

Table 1 (*Continued*)

Study	Country	Method	Participants and trauma	Male (%)	Timing	Instrument
First-order four-factor models including general dysphoria						
Simms et al. (2002)	USA	CFA	1896 deployed Gulf War veterans and 1799 nondeployed controls	91	–	PCL-M
Baschnagel et al. (2005)	USA	CFA	528 Western New York undergraduate students indirect exposed to the WTC terrorist attacks.	45	1 & 3 mo after the September 11th attacks.	PDS
McWilliams et al. (2005)	Canada	EFA & CFA	429 National Comorbidity Survey respondents with a lifetime history of PTSD caused by a broad range of traumatic events.	31.6	–	PTSD module of the revised DIS
Elkit and Shevlin (2007)	Denmark	CFA	1116 victims of MVA whiplash injuries	21	62 mo after trauma	HTQ
Krause et al. (2007)	USA	CFA	Sample 1: 396 low-income minority women screened positive for IPV while visiting primary or urgent care medical settings. Sample 2: 405 women seeking shelter or protective services or criminal prosecution for IPV.	0	Time 1: 3 mo after IPV; time 2: 1 yrs later	PCL-C
Palmieri, Weathers et al. (2007)	USA	CFA	2960 utility workers exposed to the WTC Ground Zero site	96.9	–	PCL-C
Boelen et al. (2008)	Netherlands	CFA	347 bereaved individuals	10.7	Mean time from loss:50 (SD = 92.9) mo	PSS
Elhai et al. (2009)	USA	CFA	Sample 1: 218 college students referencing PTSD symptoms to their worst trauma; Sample 2: 234 college students referencing PTSD symptoms to their overall trauma history; Sample 3: 464 non-trauma-exposed college students.	33	–	PCL-C
Olff et al. (2009)	Netherlands	CFA	Sample 1: 203 civilians exposed to a variety of traumas. Sample 2: 182 civilian treatment seeking trauma survivors.	Sample 1: 53.3 Sample 1: 41.8	Sample 1: 8.7 days, SD = 3; Sample 2: 41.4 days, SD = 15.7	Dutch version of the DTS
Hetzel-Riggin (2009)	USA	CFA	2378 female undergraduates at a large Midwestern university victims of sexual and/or physical abuse or assault.	0	–	PTSD-Q
Shevlin et al. (2009)	USA	CFA	12,467 individuals who satisfied the conditions for Criterion A of the diagnostic criteria for a DSM-IV diagnosis of PTSD in the NESARC.	47.3	–	AUDADIS-IV
Armour and Shevlin (2010)	USA	CFA	591 respondents from the NCS who had lifetime PTSD caused by different traumas.	32	–	CIDI
Elklit et al. (2010)	Denmark	CFA	Sample 1: 633 parents who had lost a child. Sample 2: 227 victims of recent rape (less than 4 weeks). Sample 3: 113 refugees resident in Denmark.	36.7	Sample 1. 5 days to18 yrs (M = 3.3 yrs) after trauma; Sample 2: last 4 weeks after trauma. Sample 3: had been a refugee for 6 mo–25 yrs (M = 6.6 yrs)	HTQ
Carragher et al. (2010)	Australia	CFA	2677 respondents from the 2007 NSMHWB who were exposed to a variety of traumas.	39	NR	CIDI
Other first-order four-factor models						
King et al. (2009)	Israel & USA	CFA	Sample 1: 235 Israeli emergency room patients with PTSD caused by a variety of traumas.	Sample 1: 55; Sample 2: 27	Sample 1: provided data on 3 occasions averaging 9.93, 39.78, and 168.37 days after admission; sample 2: average of 6.40 yrs	IES-R

			Sample 2: 306 U.S. undergraduate students, with 88% reporting had experienced at least one traumatic event.			
Second-order four-factor models including numbing						
Asmundson et al. (2000)	USA	CFA	349 patients with routine medical problems seen in a primary care medical clinic	42	–	PCL-C

Note. CFA = confirmatory factor analysis; EFA = exploratory factor analysis; mo = months; CIDI = Composite International Diagnostic Interview PTSD Module (Smeets and Dingemans, 1993); MVA = motor vehicle accident; UN = United Nations; F = female, M = male; SCID = Structured Clinical Interview for the DSM (Spitzer et al., 1990); ADIS = Anxiety Disorders Interview Schedule (Di Nardo et al., 1994); PSS = PTSD Symptom Scale (Foa et al., 1993); IES = Impact of Event Scale (Horowitz et al., 1979); MIS-Civ = Mississippi Scale for Posttraumatic Stress Disorder, Civilian version (Vreven et al., 1995); NCS-R = National Comorbidity Survey Replication; NSA = National Survey of Adolescents; PCL-C = PTSD Checklist-Civilian Version (Weathers et al., 1993); CAPS = Clinician-Administered PTSD Scale (Blake et al., 1995); PCA = principal component analysis; yrs = years; PDS = Posttraumatic Diagnostic Scale (Foa et al., 1997); RI = Frederick's Reaction Index for Children (Frederick, 1987); DICA = Diagnostic Interview for Children and Adolescents (Welner et al., 1987); BMT = bone marrow transplant; PCL-M = PTSD Checklist-Military Version (Weathers et al., 1994); SCT = stem cell transplant; CBT = cognitive behavioral therapy; DIS = Diagnostic Interview Schedule (Breslau et al., 1999); WTC = World Trade Center; DTS = Davidson Trauma Scale (Davidson et al., 1997); HTQ = Harvard Trauma Questionnaire (Mollica et al., 1992); IPV = intimate partner violence; PTSD-Q = Posttraumatic Stress Disorder Questionnaire (Cross and McCanne, 2001); NESARC = Epidemiologic Survey on Alcohol and Related Conditions; AUDADIS-IV = Alcohol Use Disorder and Associated Disabilities Interview Schedule - DSM-IV version (Grant et al., 2001); NCS = National Comorbidity Survey; NSMHWB = National Survey of Mental Health and Wellbeing; IES-R = Impact of Event Scale-Revised (Weiss and Marmar, 1997).

[a] Thatcher and Krikorian's study (2005) features twice in Table 1, because different results were obtained with the IES and the MIS-Civ.

[b] McWilliams et al.'s study (2005) is shown twice in Table 1, since different results were obtained with the use of CFA and RFA.

[c] Palmieri, Weathers et al.'s study (2007) features twice in Table 1 because different results were obtained with the use of the PCL-C and of the CAPS.

[d] Elhai et al. (2009) is shown twice in Table 1, since different results were obtained with trauma-specific, trauma-general and non-trauma-exposed participants.

traumatic experiences), the proportion of PTSD cases in the sample, and the instruments employed to assess posttraumatic symptoms. Some of these features may limit the generalizability of the findings.

A noteworthy omission in this otherwise comprehensive array of studies is that very few of them were conducted outside the Anglo-Saxon or Western European social and cultural environment. This is surprising, particularly considering that the validity of the diagnosis of PTSD has been repeatedly challenged by critics who claim that this disorder is a culture-bound construct created by and for Western professionals and thus does not constitute a universal response to traumatic events (Miller et al., 2009).

The objective of this study was to investigate whether the clusters of PTSD symptoms identified in North American and European studies could be replicated in a Brazilian sample composed of primary care patients from an underprivileged socio-economic background exposed to a large variety of traumatic events. More specifically, we hypothesized, based on recent research, that the model with four intercorrelated factors which splits the criterion C symptoms of effortful avoidance and emotional numbing would yield the best fit with the data. The accomplishment of this goal was expected to provide further evidence supporting the cross-cultural validity of the PTSD construct.

2. Method

2.1. Participants

This study was part of CAMELIA research project, which investigated the health status of individuals assisted under the "Family Doctor Health Program" of the city of Niterói, in the metropolitan area of Rio de Janeiro, Brazil. Although Niterói is considered a predominantly middle-class town, about 10% of its inhabitants are currently living in *favelas*, a characteristically Brazilian type of shanty town. A *favela* is an urban cluster of poorly-built wood or brick houses, which are typically self-constructed, unlicensed, and illegally occupied. Most *favelas* appeared in the 1960–1970 when, due to a massive rural exodus, many people left the poor Northeastern Brazil regions and moved to its largest cities; those who could not a get a place to live (or afford it), ended up building one by themselves in a *favela*. Unlike the inner-city ghettos of the United States, the favelas are racially mixed, since segregation in Brazil is driven mostly by economic forces, rather than by ethnic prejudices (Oliveira, 1996). Most *favelas* are precariously built on hillsides and are exposed to landslides during rainy periods (Fernandes et al., 2004). In recent decades, *favelas* have been troubled by drug-related crime and gang warfare. Most *favelas* are now ruled by drug lords, and shoot-outs between drug dealers and the police are frequent and murder rates far exceed those found elsewhere in Brazil (Zaluar, 2000). Given that most favela dwellers lack any kind of health insurance, the Family Doctor Health Program was specifically developed to provide them with primary medical services.

The primary objectives of the CAMELIA study were to investigate the family aggregation of metabolic syndrome components and their association to different risk factors. Married couples and their children, including hypertensive, diabetics and healthy probands, were randomly selected in thirteen *favelas* assisted by the "Family Doctor Health Program", and invited to participate in the study. A total of 1098 individuals from 362 families were examined. The research work was conducted by trained examiners between July 2006 and December 2007 in the same *favelas* where the volunteers lived. Research assistants provided help to respondents with limited reading skills to understand and fill out questionnaires. All participants signed an informed consent. The project was approved by the Internal Review Board of the Hospital Universitário Antonio Pedro under the number CEP CMM/HUAP in 220/05.

2.2. Measures

Participants were asked to fill out the Brazilian-Portuguese version (Berger, Mendlowicz, Souza, & Figueira, 2004) of the Posttraumatic Stress Disorder Checklist - Civilian Version (PCL-C) (Weathers, Litz, Herman, Huska, & Keane, 1993), a DSM-IV criteria-based, 17-item questionnaire that is one the most widely used self-report instrument for screening posttraumatic stress symptoms in adults (Brewin, 2005; Elhai, Gray, Kashdan, & Franklin, 2005). Respondents indicate to what degree they have been disturbed by these symptoms during the last month, by classifying them from not at all to very much (1–5). The PCL-C score ranges from 17 to 85, with higher values implying more severe PTSD symptoms

To ensure the semantic equivalence of the PCL-C–Brazilian-Portuguese Version (Berger et al., 2004), multiple methods were used, including back-translation, the committee approach, and pretest techniques, as suggested by Beck, Bernal, and Froman (2003). The back-translation process involved four translators who were fluent in both American English and Brazilian Portuguese. In the committee approach, the Brazilian translators convened together to review the results of the back-translations and try to reach a group consensus on problematic items. In pretesting, the PCL-C–Brazilian-Portuguese Version was field-tested with 21 average Brazilian citizens. The Brazilian-Portuguese Version of the PCL-C was found to have good internal consistency (Cronbach's $\alpha = 89$) and test-retest reliability ($r = 83$) (Berger et al., 2007).

2.3. Analysis

2.3.1. Tested models

On the basis of prior research on the factorial structure of the PCL-C (Asmundson et al., 2000; DuHamel et al., 2004; Krause et al., 2007), we decided to assess seven models of PTSD symptoms clustering (see Fig. 1). Initially, we tested four first-order factors: the Spitzer et al. (2007) two-factor model (Model 1), a 3-factor model (including reexperiencing, avoidance/numbing, and arousal) (Model 2), and two 4-factor models, the first one splitting avoidance and numbing symptoms (King et al., 1998) (Model 3) and the other including a dysphoria factor that combined numbing and nonspecific hyperarousal symptoms (Simms et al., 2002) (Model 4). Next, we tested three hierarchical factor models of PTSD: 1) three first-order factors (reexperiencing, avoidance/numbing, and arousal) subsumed under a second-order factor (Model 5), 2) four first-order factors including a numbing one subsumed under a second-order factor (Model 6), and 3) four first-order factors including a dysphoria one subsumed under one second-order factor (Model 7) (see Table 2 for the standardized factor loadings for all PTSD models).

2.3.2. Second order factor

From an empirical point of view, higher-order or second-order factors can be thought of as one way of accounting for the covariance between constructs just as first-order factors account for covariation between observed variables. A second-order factor model accounts for covariation among constructs by specifying another higher-order factor(s) that cause(s) the first-order factors. All the considerations and rules apply to second-order factors just as they do to first-order factors, the sole difference being that the researcher must now consider the first-order constructs as indicators of the second-order constructs.

2.3.3. Analytic strategy

In this study we accepted the assumption that, despite the fact that this study focused on participants of families, the data are not correlated. Analyses were conducted through the use of the program LISREL 8.80 (Jöreskog & Sörbom, 2006). To test the different factor structures, PCL-C items were submitted to a series of confirmatory factor analyses. Each item was set to load on a single factor, error covariances were constrained to zero, and factors were allowed to correlate with each other. The extraction method used was Unweighted Least Square which is suitable for categorical variables (Brown, 2006). The descriptive indicators of overall assessment express the ability of the model to reproduce the observed relations between the indices of the matrix observed. Indices can be categorized as adjustment: absolute, parsimonious, and comparative. In this paper, we presented at least one index for each category. Chi square tests a model's badness of fit but, as they are very sensitive to sample size, they indicate poor fit even if only small differences exist between the data and the model; therefore, they were not considered in this analysis. The Root Mean Square Error of Approximation (RMSEA; Steiger, 1990) measures discrepancy per degree of freedom. The Standardized Root Mean Square Residual (SRMSR; Bentler, 1990) measures the discrepancy between fitted and sample correlation matrices. Like the RMSEA, the Akaike Information Criterion (AIC; Akaike, 1987) attempts to balance goodness of fit and model complexity. The AIC is recommended primarily as an unbiased index with which to compare the fit of different models. The single sample Expected Cross-Validation Index (ECVI; Browne, 1989) is a measure of the discrepancy between the fitted covariance matrix in the current sample and the expected covariance matrix that would be obtained in another sample of the same size. The Non-Normed Fit Index (NNFI; Bentler & Bonett, 1980) compares the fit of a hypothesized model to that of a null model while attempting to minimize the influence of sample size. The LISREL Goodness of Fit Index (GFI) measures the degree of variation among observed variables that is accounted for by the model. The Adjusted GFI Index (AGFI) adjusts for the complexity of the model by taking into account the degrees of freedom of a model relative to the number of variables. In relative terms, models with lower RMSEA, SRMSR, AIC, and ECVI values and higher NNFI, GFI, and AGFI values are thought to be better fitting. There are no strict guidelines for evaluating fit indices, but a rule of thumb suggests that fit is adequate when the RMSEA is .08 or lower (Browne & Cudeck, 1993), the SRMSR is .05 or lower, and the NNFI, GFI, and AGFI are .90 or higher. The Comparative Fit Index (CFI) is equal to the discrepancy function adjusted for sample size. CFI ranges from 0 to 1 with a larger value indicating better model fit. Acceptable model fit is indicated by a CFI value of 0.90 or greater (Hu & Bentler, 1999). Brown (2006), however, suggested that in the evaluation of competing, non-nested models, those with the lowest AIC and ECVI values should be considered to fit the data better than alternative solutions. It must be noted that the AIC and ECVI do not provide a statistical comparison of competing models but rather foster the comparison of the overall fit of models. When nested solutions are compared, these indices must be used *in tandem* with the chi-square difference tests (which include significance testing).

3. Results

The CAMELIA project recruited 488 women and 411 men; however, volunteers who left unanswered any PCL-C item ($n = 94$; 11.7%) were excluded from the present study. General information about the 805 individuals effectively participating in the research is presented in Table 3. At the time of the assessment, respondents' mean age was 41.24 years (SD = 13.29, range = 18–80 years). Most participants were female (53.4%), married (76.7%), non-Caucasian (68.2%), and had not graduated from elementary school (66.7%).

The absolute and relative frequencies of responses to the items of the PCL-C are provided in Table 4.

The covariance matrix is shown in Table 5.

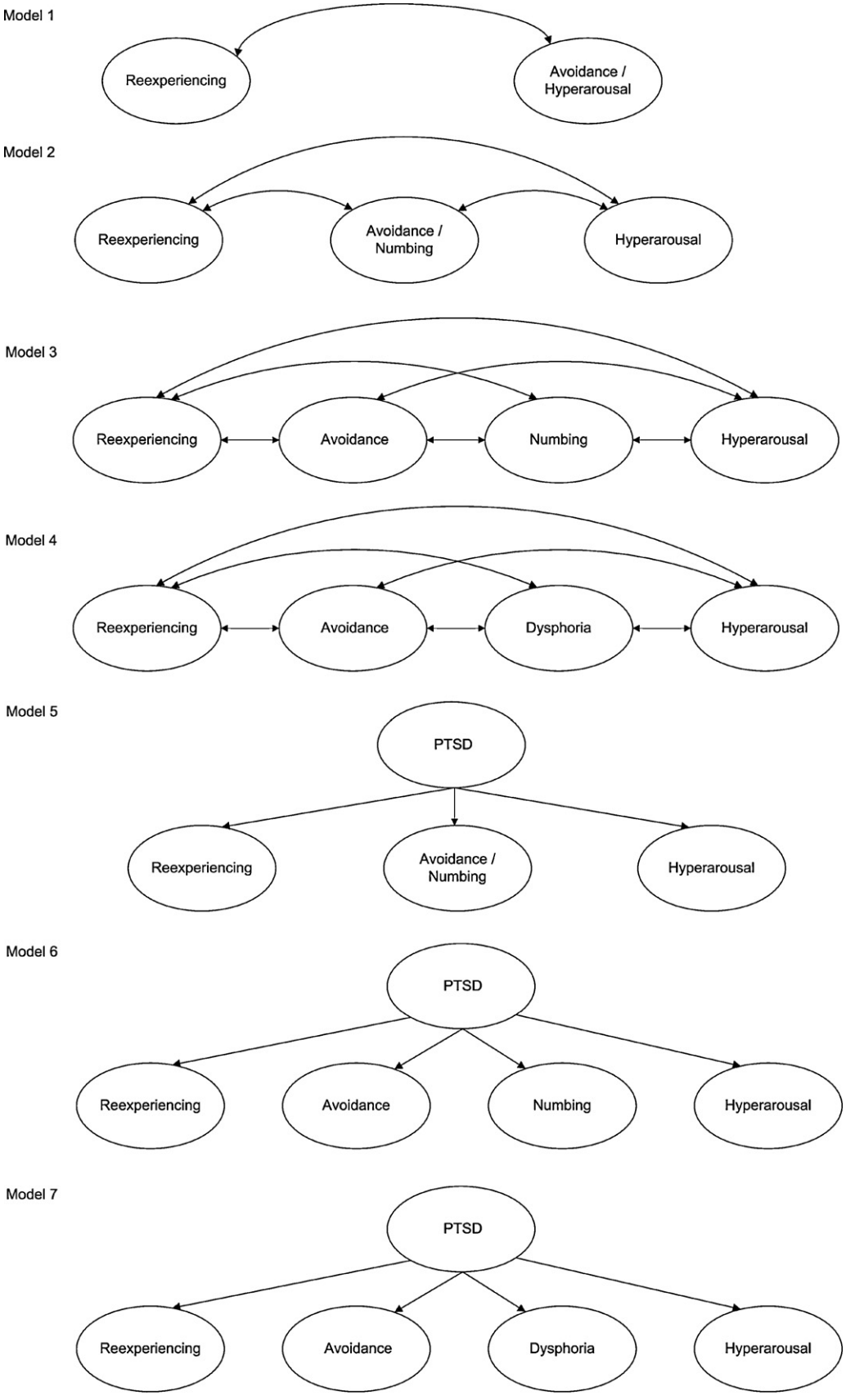

Fig. 1. Posttraumatic stress disorder (PTSD) symptom cluster models.

Table 2
Standardized factor loadings for PTSD models.

Item (DSM-IV PTSD)	2-Factor model		3-Factor model			4-Factor model (with numbing)				4-Factor model (with dysphoria)			
	R	A/H	R	A/N	H	R	A	N	H	R	A	D	H
1 (B1)	0.67		0.66			0.66				0.66			
2 (B2)	0.64		0.64			0.64				0.64			
3 (B3)	0.69		0.69			0.69				0.69			
4 (B4)	0.79		0.79			0.79				0.79			
5 (B5)	0.70		0.70			0.71				0.71			
6 (C1)		0.61		0.59			0.75				0.76		
7 (C2)		0.70		0.66			0.85				0.85		
8 (C3)				0.47				0.50				0.47	
9 (C4)				0.59				0.65				0.61	
10 (C5)		0.55		0.62				0.68				0.64	
11 (C6)		0.50		0.54				0.58				0.55	
12 (C7)		0.55		0.60				0.65				0.61	
13 (D1)					0.54				0.54			0.53	
14 (D2)					0.72				0.71			0.70	
15 (D3)					0.64				0.65			0.64	
16 (D4)		0.32			0.37				0.37				0.40
17 (D5)		0.66			0.78				0.77				0.86

Note. R = Reexperiencing; A/H = Avoidance/Hyperarousal; A/N = Avoidance/Numbing; H = Hyperarousal; A = Avoidance; N = Numbing; D = Dysphoria. Two-factor model: five items were excluded in accordance with Spitzer et al. (2007) proposal.

The factor correlations for Model 1 through Model 4 are depicted in Table 6. All correlations were higher than .50.

The seven hypothesized models depicted in Fig. 1 were tested; Table 7 summarizes the fit indices for both first-order and second-order models.

The results indicate that Model 3 (numbing model) provided a better fit than the other three first-order models, namely, the dysphoria four-factor model (Model 4), the three-factor model (Model 2) and the Spitzer et al. (2007) two-factor model (Model 1), on all fit indices, its AIC (Akaike information criterion), RMSEA, SRMSR and ECVI being the smallest of all (440.15, .052, .036 and .55, respectively). The NNFI, GFI, AGFI and CFI values for the four first-order models were similar, being all higher than .90. It must be stressed, however, that as posited to Brown (2006) the smallest values of AIC and ECVI are the key elements that indicate that Model 3 has the best fit among the competing models.

Table 3
Sociodemographic characteristics of the sample.

Sociodemographic characteristics	*n*	%
Gender		
Female	430	53.4
Male	375	46.6
Marital status		
Single	172	21.4
Been married ≥ 1 year	600	74.5
Been married < 1 year	18	2.2
Divorced	13	1.6
Widowed	1	0.1
Unknown	1	0.1
Educational level in years of schooling		
≤5 years	304	37.8
6–9 years	233	28.9
≥10 years	267	33.2
Unknown	1	0.1
Ethnic background		
Black	203	25.2
Mulatto	346	43.0
White	248	30.8
Unknown	8	1.0
Age at interview in years		
Mean ± standard deviation	41.24 ± 13.29	
Range	18–80	

Model 4 (dysphoria), Model 2 (three-factor model) and Model 1 (two-factor model) received less support in the present study. Their RMSEA were higher than 0.06 and the *p* values were <01. The SRMSR was acceptable for Model 4 (.039) but not for the Model 2 (.053) and for the Model 1 (.062). Their AIC and ECVI indices were higher than those of Model 3. Regarding the three remaining indices, CFI, AGFI and NNFI, there were no differences between the fitness of the four models, all of them being in the acceptable range.

The comparison between first- and second-order models – models 2 and 5 (three-factor models), 3 and 6 (four-factor models including a numbing dimension), and 4 and 7 (four-factor models including a dysphoria dimension) – was statistically significant only for the 4-factor models (chi-square = 49.07, df = 2, $p < .001$; and chi-square = 46.04, df = 2, $p < .001$; respectively). These findings indicate that while both first-order 4-factor models are better than their second-order counterparts, the first- and second-order three-factor models are equivalent.

Model 3, the best fitting one, resulted in standardized factor loadings that ranged from .37 ("Being *superalert* or watchful on guard") to .85 ("Avoid *activities* or *situations* because *they remind you* of a stressful experience from the past"), with only the former being lower than .50. The correlations among the factors ranged from .54 to .83.

4. Discussion

Since its inception in 1980, the diagnosis of PTSD has generated considerable controversy. However, thirty years later, these uncertainties seem to have reached epic proportions. Virtually every aspect of the current definition of PTSD has come under heavy attack, including the definition of a traumatic event (Criterion A1), the requirement that the person's response involve intense fear, helplessness, or horror (Criterion A2), the tripartite symptom structure (Criterion B, C, and D), and the issue of functional significance (Criterion F) (North, Suris, Davis, & Smith, 2009; Rosen & Lilienfeld, 2008).

The original concept that postttraumatic symptoms could be clustered into three independent factors, in particular, has been repeatedly challenged by an ever-growing empirical literature. Although consensus on this subject has yet to emerge, some important trends have been identified. Out of the 54 studies on the factors analysis of posttraumatic symptoms summarized in Table 1, nearly half (*n* = 23) favored a four-factor, first-order solution that included

Table 4
Absolute and relative frequency of responses to the PCL-C items.

Items	(1) Not at all		(2) A little bit		(3) Moderately		(4) Quite a bit		(5) Extremely	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
1. Repeated, disturbing memories, thoughts, or images of a stressful experience from the past?	450	55.90	183	22.73	74	9.19	44	5.47	54	6.71
2. Repeated, disturbing dreams of a stressful experience from the past?	631	78.39	71	8.82	47	5.84	23	2.86	33	4.10
3. Suddenly acting or feeling as if a stressful experience were happening again as if you were reliving it?	552	68.60	128	15.90	57	7.10	29	3.60	39	4.80
4. Feeling very upset when something reminded you of a stressful experience from the past?	399	49.57	191	23.73	73	9.07	69	8.57	73	9.07
5. Having physical reactions, e.g., heart pounding, trouble breathing, or sweating when something reminded you of a stressful experience from the past?	522	64.84	117	14.53	53	6.58	56	6.96	57	7.08
6. Avoid thinking about or talking about a stressful experience from the past or avoid having feelings related to it?	395	49.07	135	16.77	61	7.58	67	8.32	147	18.26
7. Avoid activities or situations because they remind you of a stressful experience from the past?	496	61.61	101	12.55	49	6.09	66	8.20	93	11.55
8. Trouble remembering important parts of a stressful experience from the past?	603	74.91	78	9.69	49	6.09	31	3.85	44	5.47
9. Loss of interest in things that you used to enjoy?	518	64.35	144	17.89	47	5.84	48	5.96	48	5.96
10. Feeling distant or cut off from other people?	517	64.22	136	16.89	57	7.08	42	5.22	53	6.58
11. Feeling emotionally numb or being unable to have loving feelings for those close to you?	663	82.36	65	8.07	21	2.61	29	3.60	27	3.35
12. Feeling as if your future will somehow be cut short?	595	73.91	93	11.55	41	5.09	32	3.98	44	5.47
13. Trouble falling or staying asleep?	466	57.89	132	16.40	66	8.20	54	6.71	87	10.81
14. Feeling irritable or having angry outbursts?	328	40.75	236	29.32	88	10.93	68	8.45	85	10.56
15. Having difficulty concentrating?	429	53.29	188	23.35	62	7.70	58	7.20	68	8.45
16. Being “super alert” or watchful on guard?	298	37.00	159	19.80	92	11.40	122	15.20	134	16.60
17. Feeling jumpy or easily startled?	350	43.48	211	26.21	100	12.42	67	8.32	77	9.57

an independent “emotional numbing” cluster alongside the reexperiencing, active avoidance and hyperarousal ones (Model 3).

In the present study, we confirmed that the three-factor DSM-IV-TR PTSD conceptualization (Model 2) was not the best fitting model. Although it provided acceptable fit to the data, we found that a four-symptom cluster model with avoidance, reexperiencing, numbing, and hyperarousal as intercorrelated factors (Model 3) provided the best fit among the seven models tested. This fit was not improved by the addition of a higher order factor (Model 6) and the chi-square difference test was significant, indicating that the first-order four-factor, numbing model is better than its second-order counterpart.

Table 5
Covariance matrix.

	1 (B1)	2 (B2)	3 (B3)	4 (B4)	5 (B5)	6 (C1)	7 (C2)	8 (C3)	9 (C4)	10 (C5)	11 (C6)	12 (C7)	13 (D1)	14 (D2)	15 (D3)	16 (D4)	17 (D5)
1 (B1)	1.45	.60	.66	.90	.61	.62	.66	.27	.38	.43	.32	.43	.38	.53	.42	.26	.63
2 (B2)		1.03	.59	.62	.56	.41	.45	.28	.30	.40	.35	.41	.40	.47	.39	.22	.48
3 (B3)			1.18	.73	.66	.53	.61	.29	.36	.40	.32	.41	.34	.58	.48	.27	.58
4 (B4)				1.75	.91	.93	.90	.37	.61	.58	.35	.53	.55	.81	.56	.31	.81
5 (B5)					1.58	.69	.85	.36	.43	.40	.37	.46	.50	.71	.49	.37	.71
6 (C1)						2.46	1.44	.49	.50	.51	.35	.41	.53	.62	.53	.41	.67
7 (C2)							2.05	.55	.52	.49	.34	.44	.41	.61	.50	.41	.67
8 (C3)								1.26	.44	.39	.37	.34	.34	.35	.45	.32	.35
9 (C4)									1.40	.68	.36	.53	.51	.55	.61	.41	.63
10 (C5)										1.44	.51	.57	.55	.66	.68	.36	.72
11 (C6)											.91	.50	.33	.39	.41	.23	.40
12 (C7)												1.24	.53	.52	.56	.31	.58
13 (D1)													1.90	.76	.57	.45	.71
14 (D2)														1.77	.77	.51	.95
15 (D3)															1.66	.44	.88
16 (D4)																2.29	.69
17 (D5)																	1.73

Table 6
Factor correlations of the PTSD symptom models studied.

	Factors Model 1	
	Reexperiencing	Avoidance/numbing/hyperarousal
Factor 1: Reexperiencing	–	
Factor 2: Avoidance/Numbing/Hyperarousal	.84	–

	Factors Model 2		
	Reexperiencing	Avoidance/Numbing	Hyperarousal
Factor 1: Reexperiencing	–		
Factor 2: Avoidance/Numbing	.81	–	
Factor 3: Hyperarousal	.73	.81	–

	Factors Model 3			
	Reexperiencing	Avoidance	Numbing	Hyperarousal
Factor 1: Reexperiencing	–			
Factor 2: Avoidance	.68	–		
Factor 3: Numbing	.69	.55	–	
Factor 4: Hyperarousal	.73	.54	.83	–

	Factors Model 4			
	Reexperiencing	Avoidance	Dysphoria	Hyperarousal
Factor 1: Reexperiencing	–			
Factor 2: Avoidance	.68	–		
Factor 3: Dysphoria	.74	.56	–	
Factor 4: Hyperarousal	.66	.51	.86	–

If, on one hand, our study has provided additional corroborative evidence in favor of a four-factor, first-order solution that included an independent "emotional numbing" component (Model 3), already the most empirically supported model of the structure of posttraumatic symptoms, on the other hand, our findings have expanded the applicability of this model beyond its usual geographic and cultural boundaries. Most of the published research on the factorial structure of posttraumatic symptoms was conducted in North America, Western Europe or Australia with local populations. The only exceptions to this rule were three studies that have assessed Khmer (Palmieri, Marshall, & Schell, 2007; Sack, Seeley, & Clarke, 1997) and Central and East African refugees (Rasmussen et al., 2007) living in the United States. Additionally, an article describing the factor structure of PTSD symptoms in a sample of Albanian-speaking students of the University of Prishtina, Kosovo, who have experienced war-related stress during the years 1998/99 was due to be published soon (Morina et al., 2011).

Our study represents the first investigation of the structure of posttraumatic stress symptoms carried out in Latin America with a local population living under stressful conditions. Given that PTSD has been dismissively characterized by some critics as a Western culture-specific disorder lacking universal validity (Marsella & Christopher, 2004), it is noteworthy that in our study as well as in those of Palmieri, Marshall et al. (2007), Rasmussen et al. (2007), Sack et al. (1997), and Morina et al. (2011), the model that provided the best fit of the data was the four-factor, first-order solution, containing the correlated dimensions of re-experiencing, avoidance, numbing and arousal. The remarkable similarity of the findings across these studies strongly suggests that not only PTSD may be a universal response to traumatic events but also that its symptom structure is common to many, if not most, cultural groups.

The eventual acknowledgment that a four-factor solution including reexperiencing, avoidance, numbing, and arousal represents a superior alternative to the three-factor DSM-IV PTSD conceptualization may have important implications for the clinical description of this disorder. Although it is beyond the purpose of the current study to delve into the fine details of this important issue, it is evident that the forthcoming DSM-V criteria for PTSD would have to evolve in order to incorporate the expanded understanding of the role of emotional numbing as one of the key clinical features of posttraumatic reactions. While authors like North et al. (2009) have discouraged revisions to PTSD criteria based solely on the results of factor analytic studies of posttraumatic symptoms (i.e. before the models that emerge from this kind of research are subjected to additional validation procedures), a growing body of empirical evidence indicates the importance of emotional numbing to the diagnosis and prognosis of PTSD. Numbing has been related to the onset and maintenance of PTSD (Hagenaars, van Minnen, & Hoogduin, 2007; North, 2001; North, McCutcheon, Spitznagel, & Smith, 2002), to the development of heavy smoking (Cook, Jakupcak, Rosenheck, Fontana, & McFall, 2009), and to poorer response to cognitive-behavior therapy (Taylor et al., 2001) and to pharmacological treatment (Connor et al., 2001). Additionally, it has been shown to be a strong predictor of functional impairment in both civilian and military samples (Kuhn, Blanchard, & Hickling, 2003; Maguen, Stalnaker, McCaslin, & Litz, 2009; Malta, Levitt, Martin, Davis, & Cloitre, 2009; Ruscio, Weathers, King, & King, 2002).

Our analysis revealed that item 16 of the Brazilian version of the PCL-C ("Being '*super alert*' or watchful on guard?") was the only one which had standardized loading lower than .50. In fact, problems with this particular item were reported in several factor analytic studies. Buckley et al. (1998) noted that hypervigilance loaded on the Intrusion and Avoidance factor rather than with the other hyperarousal items in a sample of North American victims of motor vehicle accidents and attributed it to the fact that hypervigilance is a vaguely defined term. McWilliams, Cox, and Asmundson (2005) found that hypervigilance loaded on the Cued Reexperiencing and Avoidance factor in a Canadian nationally representative sample and suggested that this might reflect a problem with the wording of the interview question. Passos, Figueira, Mendlowicz, Morales, and Freire Coutinhos (in press) reported that hypervigilance failed to load in any of two factors they have identified (re-experience/avoidance, numbing/hyperarousal) in their sample of Brazilian policemen and rescue workers. It is conceivable that the idea of hypervigilance itself may have positive connotations among

Table 7
Fit statistics indices of PTSD symptom models.

Fit indices	1st order models				2nd order models		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
RMSEA (CI 90%)	.11 (.10–.12)*	.085 (.079–.090)*	.052 (.046–.058)**	.061 (.055–.067)***	.085 (.079–.090)*	.056 (.051–.062)****	.064 (.058–.070)*
SRMSR	.062	.053	.036	.039	.053	.042	.044
CFI	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AIC	636.17	857.64	44.15	528.97	857.64	485.42	571.01
ECVI (CI 90%)	.79 (.70–.89)	1.07 (.96–1.18)	.55 (.48–.62)	.66 (.58–.74)	1.07 (.96–1.18)	.60 (.53–.69)	.71 (.63–.80)
GFI	.98	.98	.99	.99	.98	.99	.99
AGFI	.97	.98	.99	.99	.98	.99	.98
NNFI	1.01	1.01	1.01	1.01	1.01	1.01	1.01

Note. RMSEA = root mean square error of approximation; SRMSR = standardized root mean square residual; CFI = comparative fit index; AIC = Akaike information criterion; ECVI = expected cross-validation index; GFI = goodness of fit index; AGFI = adjusted goodness of fit index; NNFI = non-normed fit index. *p* value of RMSEA > .05 indicates a good fitness of the model (Brown, 2006, p. 84).

* *p* value = .00.
** *p* value = .27.
*** *p* value = .0013.
**** *p* value = .036.

certain social groups in Brazil: while for policemen and rescue workers being alert may be considered a prerequisite for professional excellence, among *favela* dwellers it would be an essential survival tactic. Additional research aimed at determining how best to assess and conceptualize trauma-related hypervigilance is warranted (McWilliams et al., 2005).

The present study has some limitations that need to be discussed. First, we did not investigate whether the participants have in fact been exposed to trauma. We simply assumed that people living in an underprivileged environment, with a high crime rate and a propensity for landslides, would have much higher odds of having experienced a wide variety of traumatic events. It would have been important to collect information about the type, the number and the degree of recency of any of these events. Second, our study did not provide any information concerning the diagnostic status of the subjects (e.g., whether or not they suffered from PTSD). Third, although many Brazilian citizens still live in the *favelas* under the difficult conditions described above, they are by no means representative of the actual Brazilian population. Therefore, a full investigation of the cross-cultural applicability of the PTSD syndrome to Brazilian society would require studies with different populations. Fourth, our sample was composed by members of 362 families from 13 communities. Although our analysis assumed that the data was not nested within families or communities, this may be only partially true. Not only are PTSD symptoms moderately heritable but genetic factors can influence the risk of exposure to some forms of trauma, perhaps through individual differences in personality that influence environmental choices (Stein, Jang, Taylor, Vernon, & Livesley, 2002). Further, some potentially traumatic events like mudslides would presumably affect many, if not all members, of a family or community. Fifth, as pointed out by King et al. (2009), the current DSM–IV-TR list of 17 PTSD symptoms is the result of a yet unfinished iterative process involving the addition, deletion, and revision of individual symptoms; it could be argued that the current DSM–IV-TR symptom list do not necessarily reflect the construct of PTSD perfectly. Therefore, the use of research instruments like the PCL-C, that are based on the DSM–IV-TR 17 PTSD symptoms list, may hinder the progress of the investigation on the factor structure of PTSD. To clarify the structure of PTSD further, it would be necessary to conduct additional factor analytic studies using multi-item scales with well-demonstrated reliability and validity that measure individual symptoms or components of PTSD. Sixth, PTSD factor structure research has been limited to cross-sectional designs; as King et al. (2009) have pointed out, the demonstration of factorial stability over time would be critically important for establishing the clinical utility and interpretability of brief, self-report symptom questionnaires and for providing insight regarding the development and course of PTSD. Finally, we have not carried out any other type of validation procedure, as recommended by North et al. (2009).

Despite these limitations, the current study was able to contribute to the growing literature on the underlying structure of the symptoms of PTSD by providing evidence concerning the cross-cultural validity of four-factor, first-order model in a cultural background that is fundamentally different from that of North America and Western Europe. We hope that additional cross-cultural studies on posttraumatic symptoms structure will help establish a scientific consensus on this important issue.

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