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THE CONSTRUCT OF POSTTRAUMATIC STRESS DISORDER IN POST-GENOCIDE RWANDA

PhD thesis

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LIST OF ABBREVIATIONS

AIC	Akaike information criterion
APA	American Psychiatric Association
BIC	Bayesian information criterion
CFA	Confirmatory factor analysis
CFI	Comparative fit index
DESNOS	Disorders of extreme stress not otherwise specified
DSM	Diagnostic and Statistical Manual of Mental Disorders
DSM-III	Diagnostic and Statistical Manual of Mental Disorders, Third Edition
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, Forth Edition
DSM-5	Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition
EFA	Exploratory factor analysis
HIC	High income country
ICD	International Classification of Diseases
LMIC	Low- and middle-income country
LPA	Latent profile analysis
LRT	Lo-Mendell-Rubins adjusted likelihood ratio test
MDD	Major depressive disorder
MINI	Mini International Neuropsychiatric Interview
NACM	Negative alterations in cognitions and mood
PCL-C	Posttraumatic Stress Disorder Checklist – Civilian Version
PGD	Prolonged grief disorder
PILOTS	Published International Literature on Traumatic Stress
PTE	Potentially traumatic event
PTSD	Posttraumatic stress disorder
RMSEA	Root-mean square error of approximation
SRMR	Standardized root-mean square residual
TLI	Tucker-Lewis index
WEIRD	Western, educated, industrialized, rich, democratic societies
WHO	World Health Organization
WLSMV	Weighted least squares means and variance adjusted estimation

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1. INTRODUCTION

Around 40 violent conflicts are currently active in the world with an estimated 100,000 related casualties in 2014. Armed conflicts and mass violence are widespread occurrences globally. Since World War II there has been 259 conflicts in 159 locations – with a minimum of 25 battle-related fatalities incurred each (Pettersson and Wallensteen, 2015). Some of the most atrocious armed conflicts that resulted in the most civilian deaths of the post-1946 era are the Cambodian Genocide, the Balkan wars, Srebrenica, and the Rwandan Genocide. Since the fall of the Soviet Union about 33% of the conflicts took place on the African continent which mostly gives place to low and middle income countries (LMIC, The World Bank, 2015a).

Approximately 80% of people with mental disorders live in low and middle income countries (Jacob and Patel, 2014).[1] Armed conflicts have been major cause of not only mortality but also physical and mental injuries contributing substantially to the global burden of disease (Murray et al., 2002, Whiteford et al., 2013). Global psychiatric epidemiological research has been engaged with the accurate measurement of the mental health consequences of traumatization of such violence. The framework for this measurement is mainly based on nosological systems of the West[2] such as the *Diagnostic and Statistical Manual of Mental Disorders* (DSM) and the *International Classification of Diseases* (ICD). This leads to the following consequences: (1) the conceptualization of post-trauma distress is generally rooted in theoretical ideas of disease not empirical evidence, (2) the knowledge base used as reference consists of documents nested in Western cultures, (3) the universality of all mental disorders are assumed and (4) a categorical model of psychopathology is applied – instead of a dimensional model – meaning that a mental disorder is either present or absent, a condition is either normal or abnormal (Patel, 2001a; Summerfield, 2008). It is a central rule of measurement that the data we collect, analyze and interpret are determined by the prerequisite categories we apply to them. Unless Western concepts of disease – including the concept of

[1] The terms low-, middle-, and high-income countries are used throughout the PhD thesis as defined and classified by the World Bank.

[2] Throughout the PhD thesis the words „Western", „Euro-American", and „developing" are used interchangeably and refer to high and middle income countries located in North America and Europe.

posttraumatic stress disorder (PTSD) – are statistically validated in foreign cultures the conclusions drawn from them could be biased and misleading (Hermosilla, 2015). Furthermore, the knowledge base of posttraumatic stress research should not only come from Euro-Western societies but from all areas affected, in reality all of the world (Fodor et al., 2014).

1.1. Rwanda

1.1.1. The context of the study: the Rwandan Genocide

Rwanda is a sub-Saharan country located in east-central Africa in the African Great Lakes region. Rwanda is inhabited by three ethnic groups: the Twa, Hutu and Tutsi. The population is currently around 11.5 million people. The three ethnic groups share the same language (Kinyarwanda) and religious makeup (largely a mixture of Catholic and Protestant). Other official languages besides Kinyarwanda are English and French (Clay and Lemarchand, 2015). Its economy is based mostly on rural subsistence agriculture with gross national income per capita per annum less than 1045 USD. Rwanda is currently classified as one of the 31 low income economies by the World Bank. Life expectancy at birth has been increasing and is currently at 64 years of age (The World Bank, 2015b).

Primarily, Rwanda was an organized clan-based kingdom before being colonized by Germans and Belgians. During Belgian colonialism informal ethnic classifications were developed based on cattle ownership and perceived physical differences. Tutsis generally were considered the elite that occupied the higher end of the social system, while the Hutus being the commoners, mostly dealing with agriculture (Isabirye and Mahmoudi 2000; Pottier 2002; Uvin 1998). Households where there were 10 heads of cattle or more were classified as Tutsi, and everyone else as Hutu (Niazi 2002). The distinction of the two groups were always more of class- and economical-based than an ethnic one, it was thus possible to achieve intergroup mobility through gathering of wealth or marriage.

After German and Belgian colonial reign Rwanda gained its independence in 1962. Political and ethnic tension had been building up between the Hutu and Tutsi population. In the 1990s differences flared, leading to constant conflicts, a civil war (1990-1993) and to the Rwandan Genocide that sorrowfully gave international attention to the country in

the 1990s (Clay and Lemarchand, 2015; Liebhafsky Des Forges, 1999). By 1994, Rwanda's population stood at more than 7 million people with Hutus being the majority (85%), Tutsis the minority (14%) and Twa, a segregated group (1%). From the 6th of April, 1994 – in the course of about 100 days – Hutu extremist slaughtered an estimated 800,000 (500,000-1,000,000) Tutsis and moderate Hutus, while another 2,000,000 fled the country or were displaced in the following years. It is estimated that about 200,000 Hutus participated in the killings some forced, some encouraged by radio broadcasts of hateful propaganda (Prunier, 2008). The purpose of the mass murder was politically motivated, to exterminate the minority Tutsi population, gain their power and to annihilate them as a people. The methods for killing were brutal, with crude instruments such as machetes often employed to attack and injure victims. An estimated 150-250,000 women were raped with the deliberate attempt to infect them with HIV (Donovan, 2002; Human Rights Watch, 2006). The international peacekeeping forces, placed in Rwanda to prevent or limit outbreaks of violence, were rapidly withdrawn on orders from UN headquarters once the genocide had started, leaving the Tutsi entirely without hope of international intervention and therefore with the expectation that the killing would end only with their extinction. Many Tutsi who are alive survived because of the action of Hutu who were courageous to risk their lives to deliver food or offer protection over many weeks (Hall, 1994; Liebhafsky Des Forges, 1999).

The Rwandan Genocide is the largest mass murder of the late 20th century with inconceivable horror and suffering leaving individuals in despair, grief and the society broken. Since 1994, criminal trials on international (International Criminal Tribunal of Rwanda), national (Rwandan National Court), and community (Gacaca courts) level aided the peace and reconciliation process that led to political stability and social healing (Brouneus, 2010; Pozen et al., 2014). Ethnicity has been formally outlawed in Rwanda, in the effort to promote a culture of healing and unity. The discussion of the different ethnic groups have legal consequences (Lemarchand, 2006). Rwandans who have been infected with HIV can now receive antiretroviral therapy in health centers across the country (Mandelbaum-Schmid, 2004).

1.1.2. Studies of post-genocide Rwandan mental health

Although considerable time has passed since 1994, the country has been in the limelight of interdisciplinary research, even though research in Rwanda has its obstacles (Thomson, 2010). The extreme nature of physical and psychological suffering of individuals and the society, gives a unique opportunity to study mental health, medicine (e.g. infectology), transitional justice processes and political stabilization. As almost the whole nation experienced some sort of potentially traumatic event (PTE) or threat of a PTE directly or indirectly, Rwanda gives opportunity for the traumatic stress field to further their knowledge of trauma and distress under such extreme circumstances in a non-Western setting.

In the following section there will be a brief review of research studies that were conducted in Rwanda on the topic of mental health effects of the genocide. Very early accounts of stress reactions are not available, presumably beacuse in the early aftermath of the genocide political stabilization was the most important objective with humanitarian services attaining to the physical safety of people. Therefore, there is no information on the acute stress responses of individuals. Most of the mental health studies of adults in Rwanda were conducted later on, even years after the events and were mainly epidemiological in nature. General aims were to establish a prevalence rate of common post-trauma mental disorders such as posttraumatic stress disorder, major depressive disorder (MDD), anxiety and grief, and to look at associated factors. Only a few research projects applied an ethnocultural, qualitative approach and searched for specific symptoms only present in Rwanda, also called “cultural syndromes” (Bolton, 2001; Hagengimana et al., 2003; Schaal and Elbert, 2006; Zraly and Nyirazinyoye, 2010). Noted, in all published articles some extent of cultural sensitivity is expressed. The epidemiological studies looked at the general population, specific regions where the killings were more pronounced, and different age cohorts. Publications with children and adolescents will not be discussed here in detail (i.e. Boris et al, 2008; Dyregrov et al., 2000; Neugebauer et al., 2009; Roth et al., 2014).

Prevalence rates of probable depression have been reported to be between 15.5 and 48 percent (Bolton et al., 2002; Cohen et al., 2009; Eytan et al., 2014; Harbertson et al., 2013;

Heim and Schaal, 2014; Munyandamutsa et al. 2012; Rieder and Elbert, 2013; Rugema et al., 2015; Schaal et al., 2011; Schaal et al., 2012a, 2012b). The lowest rate was measured in 1999 in a representative sample of adults (Bolton et al., 2002). The varying prevalence rates could be because (1) instruments and study procedures were not as refined (e.g. translations and interviewers), (2) displaced individuals and people taking refuge in neighboring countries were not present in Rwanda to be interviewed, (3) depressive symptoms could develop later, as late-onset symptoms. The highest rate of depression was recorded among widows (Schaal et al., 2011).

Sudden and violent death of family and friends was also prevalent during and after the genocide, often on a very large scale. While grief is an expected initial emotional reaction to loss, associated with physical disability (e.g. chronic pain, cardiovascular problems) and impairment in social functioning (Stroebe et al., 2007), the majority of bereaved individuals are able to adjust to the loss, returning to their daily activities within several months (Bonanno et al., 2011). However, if someone fails to recover, with severe grief responses persisting beyond six months, grief is considered to be taking a pathological form, termed prolonged grief disorder (PGD) or complicated grief (Prigerson and Jacobs, 2011; Shear at al., 2011;). It comprises symptoms, such as difficulty accepting the loss and avoidance of reminders of the reality of the loss. These features together with a persistent sense of longing or yearning for the deceased are hallmark symptoms of the condition (Horowitz et al., 1997; Prigerson et al., 2009). The percent of bereaved people who develop PGD in the general population has been estimated to be 7% (Kersting et al, 2011), however prevalence rates vary in a wide range depending on sample characteristics and measurement instruments (Fujisawa et al., 2010). In post-conflict areas this rate is likely to be considerably higher given the greater levels of violence and massive loss of life, further aggravated by other life stressors, an insufficiency of advanced infrastructure and therapeutic resources.

Despite the catastrophic levels of bereavement experienced during the Rwandan Genocide, research on prolonged grief in this country is surprisingly scant (Schaal et al., 2009, 2010, 2012a, 2012b; Mutabaruka et al., 2012). Schaal and colleagues (2010) reported that in their non-representative sample of widows and orphans about 8% met

criteria for probable PGD a mean 11.5 years after their loss; 84.4% of whom who met criteria for PGD also had probable PTSD. Their sample (*n* = 400) was of females who lost their spouses and orphans who were under 18 years of age in 1994 (88% females). The same authors (Schaal et al., 2012a) investigated the relation of PGD to bereavement-related depression and posttraumatic stress disorder using principal axis factoring presumably on the same sample. They found that the symptoms were strongly linked to each other. In another study of a convenience sample of 102 Rwandans who survived the genocide and were 18 or older when it happened, grief symptoms had a 0.60 correlation with PTSD symptoms (Mutabaruka et al., 2012). While these studies are important, advanced sampling and statistical methods would give a more comprehensive description of grief symptoms and its relationship with other disorders.

The results of the articles describing point prevalence of PTSD are presented in Table 1. Probable PTSD rates are quite different (4.2-59.5%), however samples are also diverse (women only, orphans, widows, general population) and methods of measurement (self-report or interview format) also differ. In the two studies that draw a representative sample, the rate of PTSD is between 24.8-26.1 percent (Munyandamutsa et al., 2012; Pham et al., 2004). The amount of time at data collection since the genocide is between 8 to 18 years. Generally, among males lower rates of PTSD were found while in samples where individuals with additional problems (e.g. HIV, bereavement) were targeted PTSD prevalence was higher.

In conclusion, Rwanda has been of much research interest since 1994 however most of the studies conducted are lacking methodological rigor, therefore findings are difficult to interpret and generalize. Secondly, none of the presented studies aimed to validate the PTSD measure utilized or investigate the construct of PTSD from a critical stance.

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TABLE 1. Overview of articles reporting results of posttraumatic stress disorder point prevalence in Rwanda since 1994

Author (year)	**Year of study (time since the genocide)**	**Sample**	**Instrument**	**Diagnostic criteria**	**PTSD prevalence (%)**
Cohen et al. (2009)	2005 (11 yrs)	HIV +/- adult women (*N* = 850)	Harvard Trauma Questionnaire (HTQ)	NA	**59.5**
Harbertson et al. (2013)	2008/2010 (14-16 yrs)	male Rwanda Defence Forces military personnel (*N* = 1238)	Posttraumatic Stress Disorder Checklist – Military Version (PCL-M)	DSM-IV-TR algorithm	**4.2**
Heim and Schaal (2014)	2011 (17 yrs)	adults from Kigali (*N* = 200)	PTSD Symptom Scale Interview (PSS-I)	DSM-IV-TR algorithm	**11.0**
Munyandamutsa et al. (2012)	2008 (14 yrs)	representative sample of adults (*N* = 962)	M.I.N.I.	DSM-IV-TR algorithm	**26.1** (M: 20.5; F:30.0)
Pham et al. (2004)	2002 (8 yrs)	representative sample of adults (*N* = 2091)	Posttraumatic Stress Disorder Checklist – Civilian Version (PCL-C)	44 point cutoff	**24.8** (M: 19.6; F:29.7)

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Rieder and Elbert (2013)	2010 (16 rys)	genocide survivors (n = 90) and prisoners (*n* = 83)	PTSD Symptom Scale Interview (PSS-I)	DSM-IV-TR algorithm	**22.0-25.0**
Rugema et al. (2015)	2011-2012 (17-18 yrs)	sample of adults (*N* = 917)	Short Harvard Trauma Questionnaire (HTQ)	NA	**13.6** (M: 7.1; F: 19.6)
Schaal et al. (2011)	2007 (11 yrs)	orphans (*n* = 206) and widows (*n* = 194)	PTSD Symptom Scale Interview (PSS-I)	DSM-IV-TR algorithm	**28.6-40.7**
Schaal et al. (2012a)	2009 (15 yrs)	genocide survivors (*n* = 269) and prisoners (*n* = 114)	PTSD Symptom Scale Interview (PSS-I)	DSM-IV-TR algorithm	**13.5-46.4**
Sinayobye et al. (2015)	2005 (11 yrs)	HIV infected women (*n* = 710)	Harvard Trauma Questionnaire (HTQ)	mean HTQ score ≥ 2	**58.5**

Notes. Citations for measures: Harvard Trauma Questionnaire (Fabri, 2008; Mollica et al., 1998); Posttraumatic Stress Disorder Checklist (Weathers et al., 1993); Postraumatic Stress Diagnostic Scale (Foa and Tolin, 2000); M.I.N.I. (Lecrubier et al., 1997).
DSM-IV-TR: Diagnostic and Statistical Manual of Mental Disorders, fourth edition, text revised (APA, 2000); M: male; F: female; NA: not available.

1.2. The construct of posttraumatic stress disorder

In global mental health research and aid, the nosological structure of post-trauma/post-conflict mental distress has been equated with the posttraumatic stress disorder diagnosis. PTSD is a complex psychological condition that is based on experience, namely that a pattern of psychological phenomena occurs in some of the individuals who go through an experience or a sequel of experiences that go beyond normal life stress, and involves feelings of fear, horror or helplessness with the threat of death or injury to oneself or others. As defined before, these events are called potentially traumatic events or PTEs. While there are many possible pathways following a PTE such as acute distress, acute stress disorder, effective coping or resilience, and subsyndromal reactions (Bonanno, 2004; Bonanno et al., 2011; Pietrzak et al., 2014), the importance of PTSD as a diagnosis is that it captures the causal relationship between an external factor and psychological reactions which makes PTSD distinct from most of the other disorders included in the consecutive editions of the DSMs.

1.2.1. The historical background to PTSD

Since the study of traumatic stress has been led by the study of PTSD, it is often assumed that recognition of traumatic stress as a conceptual category took place as recently as the second part of the 20th century, brought to awareness after the return of the Vietnam veterans in the United States (Reyes et al., 2008). However, there are references to traumatic symptom presentations in literature as early as ancient times (e.g. epic of Gilgamesh), reinforcing arguments from evolutionary psychology that traumatic stress has been part of the human condition from our earliest origins (Birmes et al., 2003).

From a medical perspective traumatic stress first became focus of interest in the end of the 19th century. Oppenheim (1889) described a syndrome that consisted of hysteric and neurasthetic features and was observed after life threatening events. He coined it *trauma neurosis* (Lasiuk and Hegadoren, 2006). Other early accounts included the work of Charcot, Janet and Freud's investigations of hysteria and related conditions, descriptions of *railway spine* by Eichsen in 1866, Da Costa's documentation of *soldier's heart* during the American Civil War, and descriptions of conditions such as *shell shock* during World War I (Kinzie and Goetz, 1996). In the Hungarian psychoanalytic literature, Ferenczi

wrote (1933) about traumatic stress reactions and its etiological importance. What later became the first diagnostic criteria for PTSD best resembled Adam Kardiner's *war neurosis* whose hallmark symptoms were dissociative amnesia and hypervigilance, aslo symptoms of the current concept of acute stress disorder and PTSD (Kardiner, 1941).

In retrospect, these historic conditions have all came to be recognized as the predecessors of PTSD. Herman (1992) has proposed that it was the fortunate conjunction of particular ideological shifts and social movements in history that allowed for the formation of the construct of PTSD, including the public exposure of topics such as domestic and gender violence by the feminist movement and the return of Vietnam veterans from war. Certainly, the introduction of the formal diagnostic category of PTSD coincides with these particular events, and even today, the field of traumatic stress studies is strongly influenced by research into combat experiences and military personnel.

The focus on combat experiences has arguably guided the research progress and determined particular characterizations of the construct, even though it has been complemented by research into a wide variety of PTEs such as sexual violence, child abuse, physical injury, motor vehicle accidents, natural disasters, and mass conflicts (e.g. genocide). The fact that traumatic stress studies encompass such a broad range of conditions both enriches and complicates the field (Eagle and Kaminer, 2014).

1.2.2. The description of PTSD

Posttraumatic stress disorder is relatively prevalent with lifetime estimates in nationally representative samples reaching 6.8% in the US (Kessler and Üstün, 2008). While the prevalence of PTSD generally has been found to be higher in North America (Creamer et al., 2001; Karam et al., 2014), the risk of experiencing a potentially traumatic event and developing mental health problems is higher in countries with a low economic status, especially when armed conflict is present (Demyttenaere et al., 2004). Therefore, the prevalence of PTSD is presumably higher in these regions, but often not measured in representative samples.

The prevalence of PTEs is an important related factor to PTSD as experiencing a trauma has a causal role to PTSD. In a study of 368 patients from a primary care clinic, 65 percent reported a history of exposure to severe PTEs, but only 12 percent went on to develop PTSD (Stein et al., 2000). The frequency with which PTSD occurs after a traumatic event has been found to be influenced by characteristics of the individual and the event. For example, women are four times more likely to develop PTSD than men, after adjusting for exposure (Vieweg et al., 2006). The rates of PTSD are similar among men and women after events such as accidents (6.3 vs 8.8 percent), natural disasters (3.7 vs 5.4 percent), and sudden death of a loved one (12.6 versus 16.2 percent). The rate of PTSD is lower in men compared with women after events such as sexual abuse (12.2 vs 26.5 percent) and physical assault (1.8 vs 21.3 percent). A multi-location study of representative community-based samples in 24 countries estimated the conditional probability of PTSD for 29 types of traumatic events (Kessler et al., 2014). These rates were 33% for sexual violence including rape, childhood sexual abuse and intimate partner violence. Thirty percent for unexpected death of a loved one, life-threatening illness of a child. Twelve percent for physical violence (childhood physical abuse, assault) and also 12% for life-threatening traumatic events such as motor vehicle accidents or natural disasters. Finally, 11% for organized violence (e.g., combat exposure, witnessing death/serious injury or discovering a deceased, accidentally or purposefully causing death or serious injury).

The symptoms of PTSD are characterized by intrusive thoughts (also in the form of nightmares and flashbacks), avoidance of reminders of trauma, and hypervigilance (e.g. sleep disturbance), all of which lead to considerable social, occupational, and interpersonal dysfunction. According to the current diagnostic standards – the DSM-5 (APA, 2013) –, PTSD is characterized by four symptom clusters. The symptom clusters, also known as factors, are used in diagnostic algorithms to determine (based on minimum symptom counts) when someone does or does not meet diagnostic criteria. The DSM-5 diagnosis of PTSD can currently be given when those who experienced a trauma report at least one symptom from the re-experiencing factor (B1–B5), at least one symptom from the avoidance factor (C1–C2), two or more symptoms from the negative alterations in cognitions and mood (NACM) factor (D1–D7), and two or more symptoms from the

alterations in arousal and reactivity factor (E1–E6). Criteria includes significant functional impairment and at least one-month duration of the symptoms (APA, 2013).

1.2.3. Development through the nosological systems

Posttraumatic stress disorder was first defined in 1980 in the third edition of the DSM (APA, 1980). Since then it has been recognized as a significant stress related disorder both in the DSM of the American Psychiatric Association and in the ICD diagnostic system of the World Health Organization (WHO) with diagnostic refinements across revised versions of both systems over the last several decades. These refinements lead some of the research work resulting in our current criteria of PTSD dominated by Euro-American research findings (Fodor et al., 2014). The evolution of the PTSD diagnostic criteria throughout the DSMs is overviewed in Table 2.

The initial PTSD diagnosis was altered in DSM-III-TR (APA, 1987) and more specific definitions were included of traumatic stressors as events "outside the range of usual human experience". Also, the memory impairment symptom was removed. Avoidance symptoms were extended and relocated to the cluster with emotional numbing. In DSM-IV (APA, 1994) the requirement that traumatic events must be outside the range of usual human experience was removed and the possibility that the event be witnessed, indirectly or directly experienced by the person was added. It also required both an objective definition of the traumatic stressor (as a life-threatening event or a violation of bodily integrity) and an initial subjective response of extreme fear, horror, or helplessness with a minimum of 1 month duration and an adverse effect on social or vocational functioning. DSM-IV also added Acute Stress Disorder as a diagnosis, similar to PTSD but with more focus on dissociative symptoms and with the requirement that it must begin and end within 1 month of experiencing the traumatic stressor. While the DSM-III was being finalized, the major classification system for medical illnesses, the ICD was amended (Lasiuk and Hegadoren, 2006) to include "reactions to severe stress" as a syndrome in its ninth edition (WHO, 1979). In the next edition, ICD-10 (WHO, 1999), PTSD was coded parallel to the PTSD criteria in the DSM-IV. The ICD-10 also included categories reflecting enduring personality changes following exposure to psychological trauma, but the DSM-IV rejected a proposed parallel diagnosis of complex PTSD (Disorders of

Extreme Stress Not Otherwise Specified, DESNOS) and included DESNOS features as optional additional features to PTSD.

TABLE 2. The evolution of the diagnostic criteria of posttraumatic stress disorder throughout the Diagnostic and Statistical Manual of Mental Disorders 1980-2013

Diagnostic and Statistical Manual of Mental Disorders (DSM)					
Edition	**III***	**III-R**	**IV**	**IV-TR**	**5**
Year of publication	1980	1987	1994	2000	2013
Criterion/symptom					
Potentially traumatic event	x	x	x	x	x
Arousal	x	x	x	x	x
Intrusion	x	x	x	x	x
Avoidance	x	x	x	x	x
Negative cognitions and mood					x
Duration > 1 month	x	x	x	x	x
Functional Impairment			x	x	x
Exclusion criteria					
Symptoms not results of other illness or treatment					x
Subscales					
Preschool (< 6 years)					x
Dissociative subtype					x

Notes. *The diagnosis of PTSD is first introduced. R: revised; TR: text revised.

PTSD is characterized in the DSM-5 in a new chapter on Trauma- and Stressor-Related Disorders, a shift from the anxiety disorders where it had resided in DSM-III, DSM-IV, and DSM-IV-TR (APA, 2013). The formulation of the DSM-5 was stated to be a very conservative process in which high levels of evidence were required to add, delete, or revise any DSM-IV diagnostic criterion. With three decades of clinical, epidemiological, psychobiological, and other findings on PTSD, there is a high threshold for change in any diagnostic criterion. Proposed revisions were thoughtfully considered, and only included

if strong empirical support was behind them (Friedman et al., 2010; Friedman 2013a, 2013b).

While the clinical definition of PTSD has evolved over time, the central components of experiencing a precipitating PTE coupled with the responses related to re-experiencing, avoidance and arousal for over one month have continued to be present in the definition. According to the new DSM-5, the PTE is required to be experienced by the individual directly or indirectly (through a close friend or relative), once or repeatedly (Echterling et al., 2015). A PTE could be exposure to death, the threat of death, serious injury (or its threat), or violence including sexual abuse (or its threat). The individual's response must involve intrusive symptoms related to memories, nightmares, dissociative reactions, physical or emotional distress upon being confronted with PTE stimuli. The response also include avoidance of trauma-related thoughts, feelings, or external reminders such as people, locations, and activities. The response includes persistent negative beliefs, expectations, distorted blame, diminished interest, alienation, negative emotions, restricted affect, or failures to recall central details of the PTE. Finally, the responses are characterized by increased arousal and reactivity such as impulsiveness, hyper-vigilance, exaggerated startle response, behavior or problems with concentration and sleep.

1.2.4. Traumatic stress research: the knowledge base

Traumatic stress research is an umbrella term for all research disciplines that investigate the aftermath of PTEs from a mental health perspective. The medical model formulation of PTSD has induced that a major part of published research into traumatic stress has focused on measuring the epidemiological impact of PTSD, refining criteria for diagnosis and assessment, identifying causal pathways and risk factors. In addition, there has also been considerable research into treatment methods with increasing emphasis on evidence-based psychotherapeutic practices, pharmacology and randomized controlled trials.

Over time, this refinement of knowledge has occurred with a rapid growth of literature over the past 35 years. Since 1980, it has been the focus of increasing attention. Palmer and colleagues (2004) reported that the output of PTSD literature has increased by an average of 24% every 2 years. Schnurr (2010) found that the number of publications about

traumatic stress grew over ninefold between 1980-1984 and 1995-1999, from 930 to 8,606.

Recently, researchers raised the question, where this knowledge base is coming from (Figueira et al., 2007; Fodor et al., 2014; Vallières et al., 2016). The overwhelming majority of evidence gathered over the past 35 years with regard to the manifestation of psychological responses to trauma has been obtained from WEIRD samples. The acronym stands for 1) Western, 2) educated, 3) industrialized, 4) rich and 5) democratic societies (Henrich et al., 2010). Ironically, the evidence suggests that individuals from non-Western, low-income countries are more likely to experience trauma than are people from high income countries (HIC) (Demyttenaere et al., 2004). The risk of experiencing a potentially traumatic event and developing mental health disorders is higher due to the risk factors associated with poverty, social exclusion (Patel, 2001b; Patel and Kleinman, 2003) and experiences of loss, trauma, and displacement (e.g., De Jong et al., 2001; Fazel et al., 2005; Steel et al., 2009).Today, 81% of the world's population live in low- and middle income countries (LMICs), with the fastest growth of population occurring in the countries with the lowest incomes (UN, 2015).

Although recognized as important, contributions to the international traumatic stress literature from LMICs have „largely been contextualized against the backdrop of theorization from the global north and therefore have been read as adjunctive rather than central to framing the phenomenon" (Eagle and Kaminer, 2014, p. 24.). There is research evidence from bibliometric analyses that traumatic stress research has not been evenly occurring in different areas of the world (Bedard et al., 2004; Figueira et al., 2007; Fodor et al., 2014; Olff and Vermetten, 2013; Patel and Sumathipala, 2001).

For instance, author affiliations of 13,865 trauma publications from 1987 through 2001 indexed in the ProQuest *PILOTS* database were analyzed (Bedard et al., 2004). It was found that the frequency of articles has steadily increased: in 1987, authors from only 18 countries were represented as compared with 44 countries in 2001. In another bibliometric review of the PTSD literature between 1983 and 2002, it was reported that overall, 69% of the papers originated from the United States. This percentage decreased from 88% in

the period 1983-1987 to 62% in the period 1998-2002 (Figueira et al., 2007). Presumably, the expansion of the term "PTSD" took a few years from its first appearance in the literature. Although the number of publishing countries increased (36 countries contributed to PTSD literature in total), only 25% counted as LMICs according to the current classification by The World Bank (2015a). In the most recent study (Fodor et al., 2014), it was found that even though there is an increasingly diverse background to recent trauma literature, it is still dominated by HICs and opportunities to build capacity in LMICs are underutilized. Among the randomly selected articles (n = 1000) published in 2012, empirical studies were conducted in 56 different countries and corresponding authors were affiliated with 50 countries. These results suggest that the internalization of trauma literature is ongoing, however, the majority of the papers were from HICs. Continents such as Africa and South America were strongly underrepresented and there was a disproportionately small amount of literature on heavily populated countries such as China and India. Less than five percent of papers on traumatic stress research result from collaborations between HIC and LMIC researchers. Moreover, 45% of the articles on LMIC studies with a HIC researcher as corresponding author did not involve any LMIC co-authors. This suggests that even when HIC researchers reach out to LMICs to study local issues, they often do not collaborate with on-site researchers on an equal basis, leaving many opportunities to build research capacity in LMICs untouched. Altogether, the large majority of papers in 2012 (88%) were published by research teams from HICs only (Fodor et al., 2014).

Bedard and colleagues (2004) suggested that with an increasing awareness of violence occurring across the globe, there is a greater need for traumatic stress research stemming from all cultures and societies. Furthermore, the traumatic stress research community needs to ensure that all trauma related research and mental health needs are met regardless of nationality (Fodor et al., 2014). Schnyder (2013) further stated that: trauma is a global issue and traumatic stress research needs worldwide, interdisciplinary collaborations over competition. Often, the beneficial effects of research do not extend to developing regions, leading to inequalities (e.g., Saxena et al., 2011). LMIC face a significant burden of unmet mental health needs including trauma-related challenges (WHO, 2001). "To reduce this strain and narrow the gap between high income countries, a comprehensive knowledge

base is needed. Well-designed policies that lead to cost effective, evidence based, feasible interventions are essential to effective health care practice and can only be derived from research (Patel, 2000; Wei, 2008). Therefore, to achieve adequate mental health care systems around the world, research into posttraumatic mental health should be just as global as the impact of the phenomenon" (Fodor et al., 2014, p. 2.).

1.3. Cross-cultural considerations: PTSD in non-Western, LMIC societies

Posttraumatic stress disorder has been a controversial diagnostic category ever since it was introduced. Main argument against the construct is that: (1) it ignores everything that we know about trauma reactions before PTSD was introduced in the Western nomenclature (e.g. historical descriptions), (2) it's knowledge base (including what led to the current diagnostic criterion) is based on research findings of the West, (3) its development was highly influenced by political and social attitudes (e.g. anti-war movements), (4) it narrows down the natural reactions to trauma to a number of symptoms that are currently in the nomenclature let it be DSM or ICD and ignores other representations of post-trauma phenomena, (5) it medicalizes human suffering that is natural and needs no intervention, (6) and finally that it was generalized worldwide without stringent evidence of its universality as a construct. In the next section these issues will be reviewed with special regard to cross-cultural consideration of the use of PTSD in Rwanda.

It is inevitable that traumatic experiences and human suffering are universal phenomena, however the construct of PTSD is often criticized as a culture-bound disorder specific to Western societies. Some experts go as far as doubting its clinical utility viewing it rather as a sociopolitical instrument that medicalizes natural human responses (Fodor et al., 2015; Young, 1997; Summerfield, 2001). PTSD „is glued together by the practices, technologies, and narratives with which it is diagnosed, studied, treated, and represented and by the various interests, institutions and moral arguments that mobilize these efforts and resources" (Young, 1995, p. 5).

Various behaviors and reactions can be expressed as a result of burdening social and environmental circumstances. These can be seen as either a natural responses or as symptoms which lead to the medicalization of the specific reaction. People who live in the center of armed conflicts and whose lives have been constrained and damaged by political violence often do not see themselves as ill. Conrad and Baker claim (2010) that such medicalization can depoliticize the individuals suffering, decreasing the demand for societal change and even delay aid and individual recovery. When social suffering is medicalized, the socio-political and economic context of the problem is ignored and

suffering is viewed as an individual problem. Often efforts are directed towards diagnosing the condition, missing the underlying causes of the problem. Therefore one can argue that PTSD is a powerful political vehicle in which one can advocate for aid, and prevent suffering, although the concept may not be specifically relevant to the cultural expression of trauma. In other words, medical labels such as PTSD have been associated with an increase in receiving humanitarian help (Kohrt and Hrushka, 2010). It is a "taken-for granted dimension of [global] humanitarian assistance" (Breslau, 2004, p. 114).

Other investigators propose that the application of PTSD in non-Euro-American settings is legitimate but examining its validity and taking culture as a determinant into consideration should be mandatory in order to avoid misinterpretation (Marsella, 2010; Moghimi, 2012). From this vantage point, the integration of current psychiatric research methods with ethnography holds great potential for maximizing the benefits of Western findings when refracted through local priorities (Fodor et al., 2015; Moghimi, 2012; Patel, 2001a). The studies described under „*Studies of post-genocide Rwandan mental health*" have used various instruments to measure the prevalence of PTSD. The items of all these scales are derived from the DSM-IV symptom clusters, based on an unproven assumption that these clusters are culturally and conceptually valid in different sociocultural contexts. Using such PTSD scales that are derived from a Western based conceptualization in other countries, even when they are translated into the local language, does not guarantee that the instruments are identifying equivalent conceptualizations or the same experiences in a different population. The fact that Rwandan respondents could endorse the same symptom on a standard PTSD questionnaire as a respondent from Europe or the US does not mean that they have the same internal biological, psychological, social reactions or that the symptom has the same diagnostic meaning. This logic is often raised in planning of research in LMICs however it is just as often ignored.

The majority of researchers accept that PTSD is a universal construct, applicable worldwide without limit. This universalistic stance considers PTSD to be a concept that is valid cross-culturally, which leads to the possible conclusion that context is not necessarily a determinant (Costa et al., 2011; Kienzler, 2008). Although De Jong (2005) advocates for the understanding of local perceptions of trauma outcomes, he notes that

similar findings across cultures have suggested that PTSD symptoms fit a universal experience. PTSD seems to provide a framework to understand suffering and is not limited to the West, as it has been recognized as a valid construct among many non-Western cultures who do not receive any direct benefit from the diagnosis. Researchers have also noted that PTSD is the most frequently reported description of post-trauma symptoms, especially regarding interpersonal trauma, suggesting its universal applicability (Fox, 2003). The growth of PTSD as a construct in non-Western LMICs has been noted to be a combination between Western researchers passionate interest into the investigation of human suffering often as extreme as they would not have the opportunity to study at their own location and local forces advancing their political awareness and agendas on the global stage (Breslau, 2004).

Although PTSD's universality is often assumed without any precautions especially in epidemiological and psychological first aid projects, there has been some concern regarding the use of PTSD as a valid construct among non-Western LMICs. Some researchers criticize PTSD as a historical and cultural phenomenon created by Western psychiatry, therefore cultural factors must be taken into account for the sake of validity (Yeomans and Forman, 2009). Arguably, when prevalence rates of PTSD could range from 5% to 90% among trauma-affected LMIC populations, in how trauma symptoms are expressed the cultural context must have significant effect (Breslau, 2004; Hinton and Lewis-Fernández, 2011; Wells et al., 2015). Along this line of thinking some ethnographic researchers claim that PTSD is a culturally specific construct not created by sound science but rather the result of political, economic, legal and medical influences (Young, 1995).

Even researchers with such ideas admit that PTSD has been useful in providing evidence of human rights violations and supporting legal advocacy efforts (Kohrt and Hrushka, 2010). But, at the same time, mental health care providers' current use of PTSD as a diagnosis may not be able to fully describe the application of the term in LMIC, especially to take into account local conceptualizations of suffering (Kohrt and Hrushka, 2010; Summerfield, 2001). Only relying on cultural syndromes or local idioms of distress can be limited because there is no framework to guide how the idioms fit into a larger

understanding of suffering within the specific culture (Kohrt and Hrushka, 2010). Specifically, researchers have suggested that use of Western-based trauma instruments in LMIC can potentially lead to a missed opportunity to capture the personal meaning and contextual beliefs related to the trauma experience. This, in turn, can result in the development of inappropriate interventions which do not account for local perceptions (Bolton et al., 2007; Kagee and Naidoo, 2004; Shoeb et al., 2007).

Not only is there concern regarding the application of PTSD cross-culturally, LMIC often lack valid and reliable instruments to assess mental health outcomes in response to trauma (Hollifield et al., 2002; Patel et al., 2008). Moreover, a lack of attention and importance placed on reporting solid psychometric properties (from reliability to factor structure) in research among populations in LMIC adds additional difficulty in using appropriate PTSD instruments and advancing the field in this area (Hollifield et al., 2002; Patel et al., 2008). In order to address this challenge, Western PTSD measures are often used for assessments and subsequent treatment planning both in non-Western, low resource countries and among displaced persons who may reside in Western countries (e.g., Ichikawa et al., 2006; Palmieri et al., 2007a; Smith Fawzi et al., 1997). However, researchers have argued that Western-based PTSD assessments among non-Western, low resource populations are not appropriate or relevant to different cultural expressions of trauma (Fox, 2003; Hollifield et al., 2002). Examination of the psychometric properties of Western-based instruments is crucial as most studies assessing PTSD among trauma-affected populations living in their home country use Western-based instruments (e.g., Hinton et al., 2006; Tremblay et al., 2009). Sound psychometric properties, specifically related to construct validity will give some evidence for the universality of PTSD as a diagnostic construct. Further, it will aid in the understanding of PTSD as the potential impact of culture in the expression of trauma symptoms.

1.3.1. Construct (factorial) validity of PTSD

Validity is one of the most important concepts in psychometrics. Construct validity is the most extensive type of validity referring to the validity of the content of the construct (Nagybányai Nagy, 2006). In other words this type of validity corresponds to the extent to which a measure assesses the theoretical construct it is intended to measure (Van Ommeren, 2003). Empirical findings are only as strong as the clarity of the constructs under study. If the construct is noisy, diffuse, lacking validity, it becomes increasingly difficult to study the phenomenon.

Wells and colleagues (2015) collected three typical errors that can undermine the validity and the assumptions about validity of PTSD in non-Western, LMIC populations. The first error is to assume that symptoms in a different cultural context carries the same significance as they do in Western culture (Kleinman, 1988). Culturally specific norms inform the way that emotional, cognitive and behavioral phenomena are interpreted, contributing to understandings of what constitutes normal and abnormal within a given framework. Since distress may be expressed in a different manner in different cultural contexts, psychological measures which have been validated in one context, may not be valid in another, as items lack cultural relevance and do not include local idioms of distress (Velde et al., 2009). The second error is when the identification of symptoms associated with PTSD is taken as evidence to support the conclusion that PTSD is a cross-cultural phenomenon; a form of circular reasoning. In this case, researchers who employ western derived measurement instruments to measure PTSD symptoms in diverse cultures and take this as evidence that PSTD is a universal phenomenon, have actually assumed this by applying western categories as if there were self-evident (Summerfield, 2001). The third error is the assumption that the identification of symptoms associated with PTSD means that individuals have PTSD. This error in reasoning takes the form: if you have PTSD, then you have these symptoms. You have these symptoms, therefore you have PTSD.

The scientifically valid procedure is to first assess the scale for construct and criterion (convergent and discriminant) validity in the local context. Criterion validity is established by examining the relationship between scores on the checklist and some

external criterion (Van Ommeren, 2003). The common use of unvalidated symptom checklists in humanitarian settings may medicalize reactions to stress as noted before.

In the case of PTSD, construct validity is often measured by the investigation of its factorial validity, the latent structure of the symptoms. The latent structure of PTSD, or the way in which the symptoms are organized across the different factors, is therefore clinically relevant and has been a topic extensively debated for over two decades. Identifying the correct latent structure of PTSD also allows researchers to assess whether particular symptom sets drive the course of the disorder and/or result in comorbidity with additional disorders. The identification of the correct latent structure of PTSD would provide practicing clinicians with a valid tool for working with trauma survivors. The need for accurate and valid psychiatric diagnoses and their clinical utility has been highlighted in the literature (Armour et al., 2016a; Elhai and Palmieri, 2011; Kendell and Jablensky, 2003; King et al., 2006, Yufik and Simms, 2010). Psychiatric diagnoses provide invaluable information regarding prognosis and treatment planning, but clinical utility is closely linked to the validity of the diagnostic criteria.

1.3.2. Convergent and discriminant validity: the issue with comorbidity

PTSD is a highly comorbid disorder, in US general population depressive disorders, anxiety disorders, and substance abuse are two to four times more prevalent in patients with PTSD (Kessler et al., 1995). Substance abuse is often due to the patient's attempts to self-medicate symptoms. The high comorbidity of PTSD and MDD is also well-established in samples drawn from high income industrialized nations. In general about 45–52% of individuals with PTSD have comorbid MDD. Individuals with military history or interpersonal traumas tend to have higher rates of MDD besides PTSD than civilian samples and survivors of natural disasters (Elhai et al., 2008; Rytwinski et al., 2013). Furthermore, Neria and his colleagues (2007) report that 43% and 36% of individuals with PGD (prolonged grief disorder) had MDD and PTSD, respectively.

From a theoretical perspective the rates suggest that these disorders could not be entirely separate constructs, however a large amount of research support the notion of distinctiveness (Boelen and van den Bout, 2014; Cao et al., 2015; Golden and Dalgleish,

2010; Nickerson et al, 2014; Schnyder et al., 2001; Shalev et al., 1998). There could be several reasons for high rate of comorbidity including: an overlap in diagnostic criteria, shared etiological factors, same underlying biological mechanisms, one disorder being an early presentation of another disorder or one leading to another, and using categorical model of diagnosis when a dimensional one may be more informing and accurate (Breslau et al., 2000; Haslam et al., 2012; Maj, 2005).

Studies in conflict and early post-conflict settings so far have generally had a comparatively limited public health agenda of estimating the prevalence of specific psychiatric disorders alone, such as PTSD and MDD and reporting the overlap of these disorders (Steel et al., 2009). While identifying the rates of these disorders in such vulnerable populations is important, among other reasons for the purpose of planning specific interventions, another way of examining mental consequences of violence is to explore the severity and pattern of symptoms irrespective of whether they reach a diagnostic level. Categorical models of psychopathology assume that a disorder is qualitatively different from normality, having distinct causes and outcomes. In contrast, dimensional models of psychopathology view disorders as being quantitatively different from normality; disorders are extreme variants of normal processes (Coghill and Sonuga-Barke, 2012; Haslam et al., 2012). Using the term „comorbidity" takes a categorical model as its premise by indicating that an individual has two or more distinct disorders. Comorbidity analyses usually rely on categorical variables, e.g., diagnoses based on direct clinical assessment or, alternatively, "probable diagnosis" with the absence or presence of the diagnosis established using a cut-point on a screening tool. However, assigning caseness based on cutoff scores or on algorithms necessarily loses information about subsyndromal symptoms, and of possible symptom patterns, irrespective of diagnosis and a misrepresentation of the relationship between these disorders (Fava et al., 2014; Grubaugh et al., 2005; McLaughlin et al., 2015). Indeed the use of the term „comorbidity" has been heavily criticized (Krueger and Markon, 2006; Insel at el., 2010; Maj, 2005).

Categorical classifications are unlikely to advance our understanding of the phenomenology of post-trauma psychopathology beyond what is already widely known

(Au et al., 2013; Cao et al., 2015). Hence statistical approaches that apply a person-centered, dimensional framework and study co-occurring, subthreshold symptoms rather than comorbid disorders may be able to advance our understanding (e.g. Au et al., 2013; Galatzer-Levy and Bryant, 2013). Latent variable modelling holds promise as one method of achieving further progress. The identification of latent symptom patterns allows for the empirical distinction of subsamples rather than imposing rigid external constraints based on a priori definitions (Galatzer-Levy and Bryant, 2013). Latent class analysis (LCA) or latent profile analysis (LPA) of PTSD symptoms alone (Breslau et al., 2005), PTSD and depressive symptoms together (Armour et al., 2015; Au et al., 2013; Cao et al., 2015) and PTSD and grief symptoms together (Nickerson et al., 2014) have been conducted. However, to our knowledge no study has assessed the heterogeneity in PTSD-depression-grief symptom patterns using LPA in a highly traumatized, low-income sample.

1.4. Systematic literature review of the factor structure of PTSD in non-Western populations

Discussions and disputes about the validity and cross-cultural applicability of the construct of posttraumatic stress disorder (PTSD) are ongoing. While there is agreement that posttraumatic stress disorder is a multidimensional disorder encompassing different symptom clusters, there has been considerable debate around PTSD's factorial validity, and more specifically into the exact symptom structure of PTSD (Armour et al., 2016a; Elhai and Palmieri, 2011; Gootzeit and Markon, 2011; Yufik and Simms, 2010). While the clinical definition of PTSD has changed over the years, the central components of experiencing a PTE coupled with the responses related to re-experiencing, avoidance and arousal have and continue to be present in the definition.

As argued before psychometrically sound concept and measures of PTSD can provide evidence for the universal applicability of the construct and offer insight into the impact culture may have on trauma symptoms. It can further refine diagnostic algorithms, better predict treatment outcomes, highlight symptom clusters that are most related to impairment, and with reference to population-based epidemiological studies, improve the sensitivity and specificity of screening tools (Fodor et al., 2015). The psychometric credentials of PTSD measures serve to establish PTSD's standing as a distinctive disorder and lead to identification of fundamental psychobiological processes by defining core features (Baschnagel et al., 2005; Elhai and Palmieri, 2011). "Further, evidence of cross-cultural invariance in the factor structure of PTSD symptoms would support the use of PTSD measures, developed in Western industrialized research settings in non-Western regions" (Fodor et al., 2015, p. 9).

The DSM-IV conception of PTSD symptoms is based on a three-factor model – intrusion, avoidance, and hyperarousal (APA, 2000). Starting in the 1990s, this structure has received critical attention from exploratory and confirmatory factor analytic (EFA, CFA) studies. The studies concluded that the three-factor model does not provide the most adequate fit using various US and European samples and focusing on the 17 DSM-IV PTSD symptoms (Armour et al., 2016a; Elhai and Palmieri, 2011; Yufik and Simms, 2010). Since then, other models, have more empirical support. For example, King et al.

(1998) found that a four-factor model, in which the avoidance dimension was split into "effortful avoidance" and "emotional numbing" holds a more accurate characterization of the latent structure of PTSD. Simms et al. (2002) also found that a four-factor model provided a better fit. In their analyses, sleep disturbance, irritability and difficulty concentrating (categorized under DSM-IV's hyperarousal) loaded with the emotional numbing items to form a general dysphoria factor. The remaining hyperarousal items comprised the fourth factor in addition to intrusion, effortful avoidance and general dysphoria. Recently, Elhai and colleagues (2011) have theorized that these D1-D3 symptoms represent dysphoric arousal, whereas the remaining arousal symptoms are related to anxiety. Their work lead to the five factor model consisting intrusion, avoidance, numbing, dysphoric arousal and anxious arousal symptom clusters. This latest model, called Dysphoric Arousal model has considerable theoretical and clinical appeal, aslo supported by substantial evidence and the model's superiority has been established under a range of circumstances from nationally representative samples, military personnel to civil victims of violence and earthquake survivors (Armour et al., 2013a; Pietrzak et al., 2012; Hansen et al., 2012; Wang et al., 2011a, 2011, 2011c). For an overview of the most prevalent factor models of the 17 DSM-IV PTSD symptoms see Table 3.

Interest in a two-factor model emerged by Spitzer, First, and Wakefield (2007). It was proposed that the five PTSD symptoms that either overlap with those of MDD or generalized anxiety disorder (e.g., anhedonia, irritability, sleep problems) or have questionable clinical validity (e.g., psychogenic amnesia) be eliminated from DSM criteria, leaving 12 PTSD symptoms behind, grouped into re-experiencing and avoidance/hyperarousal. This model however has not been empirically supported (Elhai et al., 2008).

TABLE 3. Most commonly studied factor models of posttraumatic stress disorder of the 17 PTSD symptoms defined by the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders

Name of model	DSM-IV-TR	Emotional Numbing	Dysphoria	Dysphoric Arousal
Number of factors	3	4	4	5
Originally published by	APA (2000)	King et al. (1998)	Simms et al. (2002)	Elhai et al. (2011)
DSM-IV PTSD symptoms				
B1. intrusive thoughts	R	R	R	R
B2. nightmares	R	R	R	R
B3. reliving trauma/flashbacks	R	R	R	R
B4. emotional cue reactivity	R	R	R	R
B5. physiological cue reactivity	R	R	R	R
C1. avoidance of thoughts	A/N	A	A	A
C2. avoidance of reminders	A/N	A	A	A
C3. trauma-related amnesia	A/N	N	D	N
C4. loss of interest	A/N	N	D	N
C5. feeling detached	A/N	N	D	N
C6. feeling numb	A/N	N	D	N
C7. hopelessness	A/N	N	D	N
D1. trouble sleeping	H	H	D	DA
D2. irritability/anger	H	H	D	DA
D3. difficulty concentrating	H	H	D	DA
D4. overly alert	H	H	H	AA
D5. exaggerated startle response	H	H	H	AA

Notes. A: avoidance; AA: anxious arousal; D: dysphoria; DA: dysphoric arousal; DSM-IV-TR: Diagnostic and Statistical Manual of Mental Disorders, fourth edition, text revised (APA, 2000); H: hyperarousal; N: numbing; R: re-experiencing.

The great heterogeneity in published findings regarding prevalence, representation and associations of PTSD could be the result of an imprecise conceptualization of the construct (beyond documented limitations in study designs). The discrepancy resulted in the study of potential moderating variables that could affect the model fit and thereby the latent structure of PTSD. In a sample of disaster workers, the Emotional Numbing model fit better when PTSD was assessed using a structured clinical interview and the Dysphoria model fit better when a self-report tool was used (Palmieri et al., 2007b). Similar analyses have been conducted on the moderating effects of gender (Armour et al., 2011; Hall et al., 2012) and ethnic background (Hoyt and Yeater, 2010).

In the last two years, since the publishing of the DSM-5, alternative PTSD models based on the twenty DSM-5 symptoms surfaced. These models include the DSM-5 version of the four-factor Dysphoria model, the DSM-5 version of the five-factor Dysphoric Arousal model, and three newly proposed DSM-5 models, the six-factor Anhedonia model (Liu et al., 2014), the six factor Externalizing Behaviors model (Tsai et al., 2014), and the seven-factor Hybrid model (Armour et al., 2016b).

The wealth of factor analytic research on the 17 DSM-IV PTSD symptoms has not been culturally or geographically evenly distributed. Studies from non-Euro-American samples from the global south are exceedingly sparse. In this section the objective is to systematically review and synthesize the empiric literature on PTSD symptom structure in non-Euro-American samples that are also mostly LMIC. The explicit goal of the search is to identify a possible universal factor structure.

1.4.1. Methods

Selection of articles. I conducted a systematic search on the 26th of January 2016 from PubMed and ProQuest *PILOTS*, on PTSD symptom structure to identify studies in which PTSD factor structure was analyzed in non-Western populations. The following keywords were used: “PTSD factor structure”, “PTSD symptom cluster”, “PTSD symptom dimension” and “PTSD factor analysis”. In *PILOTS*, the term “PTSD” was not used as a keyword as all articles indexed in that database relate to traumatic stress.

Additionally, MeSH entries were also reviewed for possible search terms. The search was restricted to English language, peer-reviewed publications from 1980-2015.

Inclusion criteria. Those articles were included in the review in which 1) the study location is not in North America, Europe, Australia or New Zeeland, or subjects from non-Western countries were involved but the research was conducted in a Western country as long as possible traumatization was related to life in the original country (such as migrants, refugees, or other displaced individuals), 2) explicit symptom factor distribution or endorsement statistics were reported, 3) the study used a *DSM-IV* based PTSD measure. Article inclusion criteria was determined by reviewing all abstracts and full-text articles. Citations from the identified articles were also evaluated for inclusion to the study.

1.4.2. Results

PubMed search identified 1264 citations while PILOTS identified 96. Of those, 52 were duplicates and removed. 1308 were screened against inclusion criteria, 1217 records were excluded based on title review and a further 79 were excluded based on abstract review. Finally, 12 articles were included and reviewed.

Characteristics of included studies. Table 4 presents a brief description of articles included in the final review. The articles were published between 2007 and 2014. Study samples included natural disaster survivors (Armour et al., 2013b; Bal and Jensen, 2007; Charak et al., 2014; Wang et al., 2011b), individuals involved in armed conflicts and other violence (Charak et al., 2014; Costa et al., 2011; Sack et al., 1997; Semage et al., 2013; Vinson and Chang, 2012; Wang et al., 2011b) and refugees (Elklit et al., 2010; Palmieri et al., 2007a; Rasmussen et al., 2007). Six studies were conducted in Asia (Armour et al., 2013b; Charak et al., 2014; Mordeno, 2012; Semage et al., 2013; Wang et al., 2011b), two in Europe (Bal and Jensen, 2007; Elklit et al., 2010), three in the US (Palmieri et al. 2007a; Rasmussen et al., 2007; Sack et al., 1997), one in Africa (Vinson and Chang, 2012) and one in South America (Costa et al., 2011). The European and American studies had Middle Eastern (2), Asian (2), and African subjects. The most commonly applied

measurement tools were the Posttraumatic Stress Disorder Checklist (5), the Harvard Trauma Questionnaire (3) and the Posttraumatic Stress Diagnostic Scale (2).

The most regularly tested models of the 17 DSM-IV symptoms were the three-factor DSM-IV model, the four-factor Emotional Numbing model, the four-factor Dysphoria model, and the five-factor Dysphoric Arousal model. Out of the 12 reviewed articles, one supported the DSM-IV model (Bal and Jensen, 2007), two supported the Dysphoria model (Ellkit et al., 2010; Vinson and Chang, 2012) and three supported the Emotional Numbing model (Costa et al., 2011; Palmieri et al., 2007a; Sack et al., 1997). The Dysphoric Arousal model was the superior model in five studies (Armour et al., 2013b; Charak et al., 2014; Mordeno, 2012; Semage et al., 2013; Wang et al., 2011b).

***The factor structure of PTSD symptoms in African samples*.** Among the factor analytic studies from non-Euro-American populations only two have examined the construct of PTSD symptoms in sub-Saharan Africa or Africal people. In a study exploratory and confirmatory factor analysis was used to investigate the factor structure of PTSD symptoms among West Africans (N = 3,803) living in refugee camps in Guinea and Sierra Leone (Vinson and Chang, 2012). The Posttraumatic Stress Diagnostic Scale's (PDS) section of 17 items was used to measure PTSD symptoms. Four-factor models were compared using CFA and the dysphoria model best fit the data. These interesting results, based on samples of individuals uprooted from their homes and country and placed in the stagnant, immobilizing environments of refugee camps may be difficult to extend to other contexts. In the other work**,** Rasmussen and colleagues (2007) tested several models of PTSD with CFA in a sample of 400 West and Central African refugees residing in the US. Rasmussen et al.'s PTSD measure was the Harvard Trauma Questionnaire (HTQ), a 16 item scale asking about symptoms in the past week but without referring to a specific trauma. Traumatic experiences associated with political and ethnic violence were the most commonly reported. The significance of Rasmussen et al.'s research is that besides testing existing models they also proposed an altered model that could be specific to African populations, based on the few qualitative accounts available in the literature (Fox, 2003; McCall and Resick, 2003) and strongly influenced by their own clinical observations. The population specific four-factor model was termed "Aroused Intrusion"

and comprised avoidance, numbing, hyperarousal and intrusion, with the last factor including items pertaining to sleep disturbance and concentration problems. This model best described the data. The use of the HTQ that aligns only imprecisely with DSM-IV symptoms, addition of material from clinical observations, and the fact that the assessed individuals resided in the US, complicates interpretation and assessment of this four factor Aroused Intrusion model.

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TABLE 4. Overview of articles that investigated posttraumatic stress disorder factor structure in non-Western samples since 1980

Citation	**Sample description**	***N***	**PTE**	**PTSD measurement**	**Language**	**Statistic method**	**Model not confirmed**	**Superior model**	**Rate of probable PTSD (%)**
Armour et al. (2013b)	Malaysian adults	250	2004 tsunami	PDS (DSM-IV)	Malay	CFA	EN, D	Dysphoric Arousal (5-factor)	**18.8**
Bal et al. (2007)	Turkish children and adolescent	293	1999 earthquake	CPTSD-RI (DSM-IV)	Turkish	CFA	-	DSM-IV (3-factor)	**59.4**
Charak et al. (2014)	Indian adults	313	2010 flash flood/displacement due to armed conflict	PCL (DSM-IV)	Ladakhi, Dogri (regional languages)	CFA	EN, D	Dysphoric Arousal (5-factor)	**16.9-20.4**
Costa et al. (2011)	Brazilian adults from favelas	805	na	PCL (DSM-IV)	Brazilian Portuguese	CFA	2-factor, DSM-IV, D	Emotional Numbing (4-factor)	na

Elklit et al. (2010)	Middle Eastern refugees in Denmark	113	na	HTQ (DSM-IV)	Danish	CFA	1-factor, 2-factor, DSM-IV, EN	Dysphoria (4-factor)	**97.3***
Mordeno (2012)	Filipino adults	1794	diverse	PCL-C (DSM-IV)	five Filipino languages	CFA	1-factor, 2-factor, DSM-IV, EN, D	Dysphoric Arousal (5-factor)	**23.0**
Palmieri et al. (2007a)	Cambodian refugees in the US	488	armed conflict	HTQ (DSM-IV)	Khmer	CFA	1-factor, 2-factor, DSM-IV, D	Emotional Numbing (4-factor)	**62.0**
Rasmussen et al. (2007)	West and Central African refugees in the US.	400	political or ethnic violence	HTQ (DSM-IV)	English, French	CFA	1-factor, 2-factor, DSM-IV, EN, D	Aroused Intrusion (4-factor)	na
Sack et al. (1997)	Cambodian adolescents in the US	194	armed conflict	diagnostic interview DSM-III	English	PCA	na	Emotional Numbing (4-factor)	na

Semage et al. (2013)	Sri Lankan soldiers	1586	combat related	PCL-M (DSM-IV)	Sinhalese	CFA	1-factor, 2-factor, DSM-IV, EN, D	Dysphoric Arousal (5-factor)	**10.5**
Vinson et al. (2012)	West African civilians in refugee camps	3802	armed conflict, torture	PDS (DSM-IV)	English, Kissi, Mende, Kono, Krio	EFA, CFA	EN, AI	Dysphoria (4-factor)	na
Wang et al. (2011b)	Chinese adults	2419	2009 violent riot, 2008 earthquake	PCL (DSM-IV)	Chinese	CFA	DSM-IV, EN, D	Dysphoric Arousal (5-factor)	**24.6** (violent riot) **12.1** (earthquake)

Notes. AI: Aroused Intrusion model (Rasmussen et al., 2007); CFA: confirmatory factor analysis; CPTSD-RI: Post-Traumatic Stress Disorder Reaction Index for Children; D: dysphoria model; EFA: exploratory factor analysis, EN: emotional numbing model; HTQ: Harvard Trauma Questionnaire (Mollica et al., 1992); na: not available; PCA: Principal component analysis; PCL: Posttraumatic Stress Disorder Checklist (Weathers et al., 1993; PDS: Posttraumatic Stress Diagnostic Scale (1995); PTE: potentially traumatic event; *Only those meeting PTSD criteria were included.

1.4.3. Discussion

For years it was believed that the DSM-IV three-factor model was the best representation of PTSD symptom clusters. Then the same was assumed for four-factor models, although no consensus has emerged regarding the exact composition of the four factors. When the five-factor Dysphoric Arousal model arrived, it was first found to be superior to the Emotional Numbing and Dysphoria models in a sample of domestic violence victims (Elhai et al., 2011) and these results were subsequently replicated across different trauma populations and measurement instruments (e.g., Arnberg et al., 2014; Pietrzak et al., 2012; Witte et al., 2015).

There are only a few articles to date examining the latent structure of PTSD in non-Western LMICs. These studies have just as heterogeneous results as the heterogeneity of the samples and contexts of the study. Important to note, that the trend seen in the results is very similar to international trends meaning that in those studies where the five factor Dysphoric Arousal model was tested, it was always superior to the DSM-IV and four-factor models. These findings can add to the notion of factor structure universality. Also important to note however, that the number of studies is very low compared to the number of epidemiological and humanitarian projects in which the construct is used around the world.

1.5. Summary of introduction

The following conclusion can be drawn from reviewing the literature:

1. Traumatic stress research is mainly from HICs. Findings from these studies led and still lead how PTSD is viewed and how theoretical concepts are formed.
2. When studies are done in LMICs the universality of PTSD is assumed with few exceptions by using the construct in research planning, using measures based on Western nosological systems and by not taking culture as a determinant into consideration.
3. The validity of the construct of PTSD should be explored whenever it is used in unexplored populations by investigating construct validity (e.g. factorial validity, convergent validity). Identifying a universal, empirically supported, multifactorial model of PTSD would strengthen cross-study and population comparisons, guiding intervention and policy development.
4. The validity of the PTSD construct often used in Rwanda have not been tested with psychometric methods so far.

2. OBJECTIVES

The intensity and scope of the traumas experienced by people living in Rwanda, in this subsistence agricultural society represent conditions, is entirely remote from that of typical Western studies of PTSD. It affords, thereby, a scientifically strategic opportunity to test assumptions about PTSD's construct validity, factorial invariance and comorbidity. This opportunity motivates the current investigation. We hope that the results will add to the understanding of the construct of PTSD in non-Western societies under conditions of extreme collective traumas, and inform interpretations of research data in these underrepresented areas. The main objective of this work is to explore the construct of posttraumatic stress disorder from a critical perspective especially in terms of cross-cultural adaptability, construct and factorial validity.

Objective 1: To compare the following five models of PTSD factor structure with confirmatory factor analysis. All models are based on the 17 DSM-IV symptoms. The models tested in the analysis are (1) DSM-IV's three-factor model (APA, 2000), (2) four-factor Emotional Numbing model (King et al., 1998), (3) four-factor Dysphoria Model (Simms et al., 2002), (4) four-factor Aroused Intrusion model (Rasmussen et al., 2007), and finally (5) the five-factor Dysphoric Arousal model (Elhai et al., 2011). We hypothesize that based on findings in the West the five factor Dysphoric Arousal model will best fit the data (Elhai et al., 2011).

Objective 2: To investigate whether a distinct subset of individuals emerge with only PTSD, only MDD or only PG symptoms or people only differ in terms of symptom severity. Latent profile analysis is employed to investigate whether subpopulations characterized by different symptom profiles could be identified among genocide survivors exposed both to significant trauma and bereavements. We hypothesized a priori based on previous findings that classes will differ based on symptom severity rather than symptom type (Armour et al., 2015; Au et al., 2013; Contractor et al., 2015). Second, we hypothesize that classes significantly differ along basic demographic factors (gender, age, education) and the level of traumatic experiences (Roberts and Browne, 2011).

3. METHODS

3.1. Procedures

Interviews were conducted in February and March of 2011 in Rwanda, in or near the homes of the respondents. Trained locals lead data collection procedures that were closely supervised from the US through frequent communication (phone, email) and documented pictures. The surveys were administered in an interview format. The interviewing team comprised 11 native Rwandan college graduates with at least BA degrees in psychology (from the National University of Rwanda) and a minimum of one year of clinical or survey experience in the mental health field. The interviewers were trained regarding each component of the survey battery by one or more of the principal investigators (mainly Richard Neugebauer, Joanna Pozen) over the period of a week prior to subject recruitment (Fodor et al., 2015; Pozen et al., 2014). Monitoring of protocol adherence was administered throughout data collection by senior interviewers and by unannounced visits by the Rwandan co-investigators (Joseph Ntaganira, Vincent Sezibera). I took responsible roles in planning of the materials, overlooking and coordinating data collection, data cleaning, data synthesis and data analysis.

3.1.1. Survey Sites and Sampling

Rwanda comprises 5 provinces divided into 30 districts that are subdivided into 418 sectors, sectors into 9165 cells, cells into villages, the last constituting the smallest administrative unit. The study area comprises 17 contiguous cells, containing 132 villages, occupying approximately 88 square kilometers in the Huye district, South Province. This area is exactly coterminous with the former commune of Ngoma, an area heavily affected by the genocide, and one of the four communes studied in 2002 by Pham and colleagues (Pham et al., 2004).

Employing probability proportional to size (PPS) sampling, we selected 50 villages from which to recruit study subjects, with a planned sample size of approximately 500 individuals. Official records enumerated four villages in error, reducing the number to 46. The average number of households per villages was 161.54 (SD 64.26) ranging from 45 to 407 (Fodor et al., 2015; Pozen et al., 2014). Villages were visited in random order to

protect against the confounding of order effect with possible symptom level changes over time. Selection of the first house employed a procedure widely used and validated in rural areas in the global South known as random walks (Coghlan et al., 2009; Patel et al., 2007). The interviewing team located itself at the approximate center of each village and selected the first house "at random" by spinning a pencil on the ground and then proceeding to the house indicated when the pencil came to rest. Subsequent houses were identified via systematic sampling.

At each residence, the interviewer invited one adult to participate in the study, with selection based on simple random sampling from among all adults residing in that house, including those not physically present at time of visit. If the individual was unwilling or unable to participate or absent on that day and proved unavailable after two return visits, the selected individual was excluded from further consideration. No substitution by other members of the household was accepted. Five hundred and twenty-six individuals were approached and 22 declined to participate making the response rate 96% (Fodor et al., 2015; Pozen et al., 2014).

3.1.2. Consent Process and IRB Approval

Study eligibility required being at least 18 years of age, understanding the consent form and consenting to study entry. Non-literate subjects were read the form and their consent was indicated by a witnessed mark on the page. The Institutional Review Board of NYS Psychiatric Institute and the Rwandan National Ethics Committee (RNEC) approved the research protocol. At RNEC's suggestion, participants were offered $10 in Rwandan francs as compensation for their time (Fodor et al., 2015; Pozen et al., 2015).

3.2. Materials: interview measures

3.2.1. Sociodemographic and socioeconomic factors

The interview recorded date of birth, gender, highest level of education achieved, monthly income, living conditions, possession of modern durable goods. “Ethnicity,” a concept anathema to current political discourse in Rwanda, was not asked.

3.2.2. Trauma history and traumatic losses

Trauma history was assessed using a 7 item trauma checklist that was specifically developed to measure exposure to genocidal violence (Pham et al., 2004). The seven types of exposure to violence and bereavement with yes/no response options meet DSM PTSD criterion A1. Respondents were also asked to name all relatives that they had lost over the years with exact cause and date of death.

3.2.3. Posttraumatic Stress Disorder Checklist (PCL-C)

PTSD was measured by the Posttraumatic Stress Disorder Checklist-Civilian Version (PCL-C, Blanchard et al., 1996). The PCL-C is an easily administered 17-item checklist of PTSD symptoms based closely on the DSM-IV criteria. Each item is rated on a 5-point Likert scale reflecting severity of symptoms ranging from “not at all” (1) to “extremely” (5) with reference to the last month. The PCL-C symptom questions are not asked with reference to a specific event; they refer to "a stressful experience from the past". Scores can range from 17 to 85. The English version of the measure has been widely used and has sound psychometric properties (McDonald and Calhoun, 2010; Ruggiero et al., 2003). The PCL-C’s correlation with the Clinician Administered PTSD Scale (CAPS) is 0.93, estimates of internal consistency (Cronbach's alpha) range from 0.94 (Blanchard et al, 1996) to 0.97 (Weathers et al. 1993). Test-retest reliability reports range from 0.96 at 2-3 days to 0.88 at 1 week (Blanchard et al., 1996; Ruggiero et al., 2003). To identify probable PTSD a cutoff score of 44 points was used which proved to have better sensitivity (.94) and specificity (.86) than higher cutoffs (Blanchard et al., 1996).

The instrument has been widely used in studies of non-Western populations due to its straightforward wording that simplifies translation processes and administration to people with limited education (Pham et al., 2004). In non-Western population studies excellent

internal consistency is repeatedly reported, with all reviewed studies disclosing satisfactory Cronbach alphas, e.g.: China: .77; .95-.97 (Wu et al., 2008; Wang et al., 2011a, respectively); Nepal: .90 (Thapa and Hauff, 2005); South Africa: .89 and .97 (Peltzer et al., 2013); Chile: .89 (Vera-Villarroel et al., 2011).

The first Kinyarwanda version of the PCL-C was produced by Pham and colleagues (2004) from English using forward-backtranslation methods and fielded in a sample of over 2000 individuals without any apparent difficulties in comprehension or item equivalence. However psychometric data on the scale are not available in the peer reviewed literature. In the current sample Cronbach's alpha of the scale is .96. For the Kinyarwanda version of the PCL-C see Appendix A.

3.2.4. Mini International Neuropsychiatric Interview Depression module (M.I.N.I.)

Depression symptoms were assessed with the Depression module of the M.I.N.I. (Lecrubier et al., 1997). The 9 items in the module correspond to the DSM-IV depression symptom criteria pertaining to the preceding 2 weeks. Responses are limited to "yes/no" answer options. The measure has excellent psychometric properties (Lecrubier et al., 1997; Sheehan et al., 1997). It has been used in Rwanda previously (Munyandamutsa et al., 2012; Schaal et al., 2009), although its psychometric properties have not been reported. In the current sample Cronbach's alpha of the scale is .88.

3.2.5. Prolonged grief measure

The interview battery contained in total 22 items on pathological grief reactions derived from the work of Prigerson and colleagues (Prigerson et al., 2009; Prigerson and Jacobs, 2001). Ten symptoms considered most salient in the Rwandan setting were selected by the research team (comprising local mental health nurses, an American anthropologist with five years of experience living in rural Rwanda, and the US team members) based on their experiences with Rwandan Genocide survivors and mindful of issues of cultural relevance. These 10 items represented in effect a modified version of Prolonged Grief-13 (Prigerson et al., 2009). The correlation between the sum of all 22 items and the sum of the selected 10 items is r = .96 ($p < 0.001$). Items were each asked on a five-point Likert scale. Response options ranged from "never" (0) to "always" (4). This abbreviated

measure comprised the following 10 symptoms: inability to accept the death; being stunned, shocked, dazed; feelings of anger; feeling emotionally numb; longing for the deceased; feeling as if part of one's self died along with the deceased; difficulty moving on; losing one's ability to care for others; feeling emotional pain and sorrow; confusion about one's role in life. Prior to administration of these grief items, respondents were asked: "During the conflict in 1994 and in the years afterwards, many people lost members of their family or other people whom they loved very much. Did you lose a loved one during 1994 or afterwards from violence, illness, or other cause?" followed by "Who was that person"? If the respondent listed more than one individual, they were asked to identify the individual whom they missed/longed for the most. This individual was then the focus of the questions on grief. Although the close approximation of 10 selected items to the items in the Prolonged Grief-13 measure, permitting a prorated Prolonged Grief-13 score, we treated this measure as dimensional rather than categorical with the sum of item scores employed to indicate severity of symptoms. Cronbach's alpha of the scale is .92.

Translations of English study materials to Kinyarwanda were obtained through standard forward and backtranslation methods with differences resolved by reaching consensus between translators and investigators. Previously fielded Kinyarwanda translations of the PCL-C and M.I.N.I.-D were generously made available to the current team by other colleagues (Munyandamutsa et al., 2012; Pham et al., 2004). These translations were subjected to independent review, with several items selected for repeat forward-backtranslation. They were fielded after minor adjustments.

3.3. Participants

Five hundred and four people participated in the study. Mean age of the sample was 41 (*SD* = 15.1) with 40% below age 35. Women comprised over 75% of those surveyed, which reflects the male to female ratio of the habitants of the area and is a result of the fact that males were overrepresented among those who were killed. This ratio was found in previous research as well (Pham et al., 2004). Most respondents lived in Rwanda prior to 1994. About 70% had no education beyond primary school; 45% reported no monetary income in the preceding year; about 20% were widowed; 60% were Catholic. A third of

respondents obtained their water from public wells; 20% had no access to any type of toilet facilities except the bushes. Several assets, notably radios and mobile phones, were available to over half of respondents. For an overview of demographics see Table 5.

TABLE 5. Sociodemographic characteristics of respondents (*N* = 504)

Sex, female, n (%)	377 (74.8)
Age, mean (SD), yrs	41 (15.1)
Age groups, n (%)	
18-24 yrs	66 (13.3)
35-34 yrs	137 (27.5)
35-44 yrs	108 (21.7)
45-54 yrs	84 (16.9)
55-64 yrs	60 (12.0)
65+ yrs	43 (8.6)
Under 18 yrs in 1994	82 (15.6)
Marital status, n (%)	
single	99 (19.8)
married/in relationship	290 (58.1)
widowed	110 (22.1)
Education, n (%)	
No schooling	88 (17.5)
Some/completed primary	262 (52.2)
Some completed secondary	113 (22.5)
Some completed university or higher	39 (7.8)
Monthly income, n (%)	
No income	231 (45.8)
< 20 USD	176 (34.2)
20-260 USD	74 (14.7)
260+ USD	12 (2.4)
No response or missing data	3 (0.6)
N of people in household, mean (*SD*)	4.85 (2.4)

Religion, n (%)	
Catholic	294 (58.4)
Protestant	142 (28.2)
Other	67 (13.3)
Residence in Rwanda in 1994, n (%)	442 (89.5)
Displaced during 1994*, n (%)	396 (89,6)

Notes. Denominators of each percentage vary because of item level missing data.*Among respondents who were residing in Rwanda before 1994. USD: US Dollars;

3.4. Data analysis

For a detailed account of the data analysis also see Fodor et al., 2015. Descriptive statistics were calculated using SPSS 21.0.

3.4.1. Confirmatory factor analysis

Confirmatory factor analysis consisted of CFA of five alternative models of factor structure. These models are all based on DSM-IV symptoms: (1) DSM-IV's three-factor model (APA, 2000), (2) four-factor Emotional Numbing model (King et al., 1998), (3) four-factor Dysphoria model (Simms et al., 2002), (4) four-factor Aroused Intrusion model (Rasmussen et al., 2007), and finally (5) the five-factor Dysphoric Arousal model (Elhai et al., 2011). The CFA was conducted using Mplus 6.12 software (Muthén and Muthén, 1998-2011). The analytic subsample comprised n = 465 subjects (explanation see under "*Results of the confirmatory factor analysis*"). From the 465 subjects, seven were missing data on the PCL-C and in each case, only one item was missing. We decided to use all available PCL-C item responses and conduct the analysis with full information employing maximum likelihood procedures (Schafer and Graham, 2002; Graham, 2009). Item level descriptive statistics (see Table 6 under "*Results of the confirmatory factor analysis*") and preliminary normality testing revealed substantially non-normal distribution of item scores. We used robust maximum likelihood estimation (MLR) which provides standard errors and mean adjusted chi-square test statistics robust to non-normality (Muthén and Muthén, 1998-2011). Observed variables were treated as

continuous, the first item's factor loading in each latent factor was fixed to 1, error covariances were fixed to zero, and all factors were permitted to correlate.

Goodness of fit was evaluated using the comparative fit index (CFI), the Tucker-Lewis index (TLI), the standardized root-mean square residual (SRMR), and the root-mean square error of approximation (RMSEA). A good fit is indicated by CFI and TLI $\geq .95$, SRMR $\leq .08$, and RMSEA $\leq .06$ (Hu and Bentler, 1999). For comparisons of nested models we used Santorra-Bentler scaled chi-squared difference test (S-Bχ^2diff, Santorra and Bentler, 2001). For non-nested models (the four-factor models) the Bayesian information criterion (BIC) was considered. BIC difference of 6-10 indicates strong, while more than 10 indicates very strong support for the model with the lower BIC (Kass and Raftery, 1995).

After initial CFAs, the testing of construct-criterion validity was performed with an external latent factor of depression added to the models that obtained good fit in initial analyses. In a previous study it was found that the numbing factor of the King et al. model (1998) and the dysphoria factor of the Simms et al. model had higher correlation with depression than with the other PTSD factors, whereas other factors of PTSD have higher correlations with each other than with depression (Gros et al., 2010). Depression therefore was chosen for convergent and discriminant validity testing as it is a co-occurring phenomenon with PTSD symptoms and specific patterns of association between factors have been established (Breslau et al., 2000; Gootzeit and Markon, 2011). Due to the M.I.N.I. depression items being dichotomous variables, weighted least squares means and variance adjusted estimation (WLSMV) was used in the analysis. No depression items were missing in the dataset. Finally, to assess gender differences across PTSD factors, we tested a MIMIC model in which gender was added as a covariate. The best fitting model was chosen to perform this analysis on (Fodor et al., 2015).

3.4.2. Latent profile analysis

Latent profile analysis is a statistical technique employed to determine the number of homogeneous groups based on data from continuous latent variables. LPA – a special subtype of latent class analysis (LCA) – utilizes continuous variables, in this context symptoms and symptom clusters, and based on the symptom patterns, groups individuals

into latent classes. Individuals within a group should display similar patterns of responses on indicator variables and display different patterns of responses when compared to individuals assigned to different groups (Laursen and Hoff, 2006). LPA is a superior statistical technique to the more traditional methods of cluster analysis because LPA is based on a statistical model that allows for more formal criteria to compare classes, which is not possible with cluster analysis (DiStefano and Kamphaus, 2006; Vermunt and Magidson, 2003).

Sum scores for the five PTSD subscales were calculated[3]: re-experiencing, avoidance, numbing, and dysphoric arousal and anxious arousal. LPA was conducted on PTSD subscale sum scores and the individual items of the depression and prolonged grief measure to minimize the number of indicators and facilitate model convergence, while maximizing the interpretability of different solutions.

LPA was conducted using Mplus 6.2 full-information maximum likelihood estimation with robust standard errors (Muthén and Muthén, 1998-2011). To determine the optimal number of latent classes fitting the data, 1 to 5 class solutions were evaluated and compared based on fit statistics, interpretability, and theoretical considerations (Vermunt and Magidson, 2003). Model fit were determined by a variety of fit indices; the Akaike Information Criterion (AIC; Akaike, 1987), the Bayesian Information Criterion (BIC; Schwartz, 1978), the sample size adjusted Bayesian Information Criterion (ssaBIC; Sclove, 1987), the Lo-Mendell-Rubins adjusted likelihood ratio test (LRT; Lo et al., 2001), and entropy values (Ramaswamy et al., 1993). Guidelines state that with reference to the AIC, BIC, and ssaBIC the lower the values the superior the fit (Hu and Bentler, 1999). However, as more classes are added to the model, fit tends to improve with the AIC, BIC, and ssaBIC continually lowering (DiStefano and Kamphaus, 2006). On the basis of parsimony the solution with fewer classes should be accepted. If the LRT for a particular class solution is deemed significant (<0.05) then the solution is acceptable, however, if the LRT value is not significant (>0.05) this indicates that a solution with one less class should be used. Ramaswamy et al. (1993) reported that high entropy values

[3] These five subscales were chosen based on the results of the confirmatory factor analysis.

indicate good classification, with one indicating perfect classification, but it should not be evaluated in isolation. Variables were treated as conditionally independent.

Once the optimal number of classes fitting the data was determined, each participant was assigned to one of the classes based on latent conditional probabilities and the Mplus statistical estimate of most likely class membership. Probabilities closer to one for a single class and closer to zero for the remaining classes suggest good group assignment and distinct classes. SPSS 21.0 was used for subsequent analyses. To examine the characteristics of each class, ANOVAs and χ^2 tests were used to evaluate between-class differences in demographics (gender, age, education, income and marital status), trauma history and traumatic losses and symptoms.

3.4.3. Power estimation

A priori power estimation was not conducted during the planning of the research, instead a posteriori power calculation was considered. For the confirmatory factor analysis the following rule of thumb is often calculated with limited importance (Myers et al., 2011): the ratio of *N* to the number of variables in a model (p), $N/p \geq 10$. In our analysis the sample size is n = 465, whilst the number of parameters is p = 17, therefore the ratio is: $N/p = 465/17 = 27$. The results of the post-hoc power calculation based on Preacher and Coffman's online calculator (2006) is presented in the results section under „*Results of the confirmatory factor analysis*".

A recent simulation study that investigated optimal sample size and power in LPA indicated the increase of sample size above n = 250 has little effect on statistical power (Tein et al., 2013).

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4. RESULTS

4.1. Descriptive statistics

Ninety-two percent (n = 466) of the subjects reported traumas related to the genocide on the trauma checklist. Those who did not report any traumas (n = 38) are considered to be at the lowest exposure level, not truly unexposed, because of the well-documented ubiquity of the genocide and the presence of PTSD symptoms among these respondents. Reported genocide related traumas from most frequent to least were the death of a family member due to illness as a result of the genocide (66.1%), hearing people getting injured or killed (64.5%), property being destroyed (44.7%), killing of family members and close friends (43.1%), witnessing someone's murder (42.5%), forced to flee home (32.3%), physical injury (15.6%), and witnessing sexual violence of a family member (15.0%). Eighty percent of the sample lost at least one close family member or friend during or in the aftermath of the genocide. Almost half of the sample lost one (30%) or both parents (12%). Twenty percent lost at least one sibling and 14 % lost at least one child. Trauma exposure and traumatic losses of the whole sample (N = 504) is shown in Table 6. Table 7 depicts rates of probable PTSD and MDD and corresponding mean scores.

TABLE 6. Trauma exposure and traumatic losses related to the 1994 Genocide in the current sample

Traumatic events, *n* (%), *n* = 501	
Close family member died of illness	331 (66.1)
Heard people injured or killed	323 (64.5)
Property destroyed	224 (44.7)
Close relative/friend killed	216 (43.1)
Saw people killed	213 (42.5)
Forced to flee home	163 (32.3)
Physical injury	78 (15.6)
Witnessed sex/violence to close family member	75 (15.0)
Mean number of traumas, mean (*SD*)	3.24 (2.1)
Traumatic losses 1994-1998, n = 504	
Parents (one or both)	214 (42.4)
Sibling	102 (20.2)
Child	70 (13.9)
Spouse	53 (10.5)
Lost at least one close relative of friend in 1994	403 (79.9)
Mean number of close relatives lost, mean (*SD*)	1.71 (2.3)

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TABLE 7. Probable diagnosis of posttraumatic stress disorder, major depressive disorder and mean scores across samples

	Total (N = 504)	Female (n = 377)	Male (n = 127)	Subsample for CFA* (n = 465)	Subsample for LPA** (n =403)
Probable diagnosis of PTSD, n (%)	110 (20.9)	98 (26.1)	12 (9.6)	106 (22.8)	103 (25.6)
Probable diagnosis of MDD, n (%)	142 (27.0)	122 (32.4)	20 (15.7)	131 (28.2)	125 (31.0)
PCL-C, mean (SD), 17-85	30.7 (15.7)	32.5 (16.3)	25.5 (15.2)	31.4 (15.8)	32.8 (16.0)
M.I.N.I. Depression, mean (SD), 0-9	2.8 (2.9)	3.2 (2.9)	1.9 (2.3)	2.9 (2.9)	3.1 (2.9)
PG, mean, SD, 0-40	10.6 (8.6)	11.5 (8.9)	7.9 (6.8)	11.0 (8.8)	10.6 (8.6)

Notes. CFA: confirmatory factor analysis; LPA: latent profile analysis; PTSD: posttraumatic stress disorder; MDD: major depressive disorder; PCL-C: Posttraumatic Stress Disorder Checklist-Civilian Version (Blanchard et al., 1996); PG: prolonged grief. *subsample for CFA is described under „Results of the confirmatory factor analysis"; ** subsample for LPA is described under „Results of the latent profile analysis".

4.2. Results of the confirmatory factor analysis

We have adopted the stringent assumption that persons who did not endorse any of the items on the exposure checklist were not exposed to any traumatic events meeting DSM-IV Criterion A1. While initial sample size was 504, those who provided no answers to the PTSD measure (n = 4) or reported no traumatic events on the measure (n = 38) were excluded from subsequent analysis resulting in a sample of N = 465[4]. It is important to note however, that it is extremely unlikely that people living in the former commune of Ngoma, an area especially heavily affected by the genocide, did not witness or experience extreme violence. Other studies conducted in Rwanda have assumed essential universal exposure (Pham et al., 2004). The CFA results based on the complete sample do not differ significantly from those reported here.

Seventy-five percent of the analytic subsample was female. Age ranged from 18 to 83 (M = 41.06, SD = 14.9). Among participants 57% was married or living with a partner and 22% widowed. Half of the respondents received primary school education (52%), while almost 18% reported not receiving any schooling. The majority (81%) reported having a monthly income of less than 30 USD. The most common traumas in the analytic subsample were destruction or looting of property (48.2%), seeing people being killed (45.8%) and being forced to flee one's home (34.8%). Approximately 70% of respondents lost at least one close relative during this period. The mean score on the PCL-C was 31.4 points (SD = 15.8, max. 79), while the mean number of depression symptoms was 2.9 (SD = 2.9). The prevalence of probable PTSD and depression was 23.2 and 28.8%, respectively.

For item level descriptive statistics (item mean, standard deviation, number and percentage of people reporting "quite a bit" or "extremely" on a single item, kurtosis, skewness), see Table 8. The estimated power of the RMSEA value (H0 RMSEA = 0.05; H1 RMSEA = 0.065) with the given sample size (N = 465) for the Dysphoric Arousal model calculated with an alpha value of 0.05, and a df of 109 is 0.90.

[4] Three respondents did not report any traumas and also did not comple the PTSD measure, hence 39 subjects were excluded from the analysis.

TABLE 8. Item-level descriptive statistics of the 17 posttraumatic stress symptoms (Fodor et al., 2015)

PCL-C item (*N* = 465)	M (95% CI)	*SD*	> 3	%	Sk	Ku
B1. intrusive thoughts	2.09 (1.99-2.21)	1.23	86	18.5	.65	-.95
B2. nightmares	2.10 (1.99-2.22)	1.28	92	19.8	.66	-.99
B3. reliving trauma/flashbacks	1.88 (1.77-1.98)	1.17	68	14.6	.98	-.45
B4. emotional cue reactivity	2.25 (2.13-2.37)	1.29	122	26.2	.42	-1.39
B5. physiological cue reactivity	2.10 (1.98-2.22)	1.27	99	21.3	.64	-1.10
C1. avoidance of thoughts	2.12 (2.00-2.23)	1.28	100	21.5	.63	-1.09
C2. avoidance of reminders	2.17 (2.06-2.29)	1.27	103	22.2	.51	-1.22
C3. trauma-related amnesia	1.90 (1.79-2.00)	1.18	74	15.9	.97	-.46
C4. loss of interest	2.13 (2.01-2.25)	1.29	98	21.1	.65	-1.02
C5. feeling detached	1.60 (1.51-1.70)	1.05	45	9.7	1.59	1.27
C6. feeling numb	1.49 (1.40-1.58)	1.01	46	9.9	1.89	2.14
C7. hopelessness	1.88 (1.76-2.00)	1.29	92	19.8	1.09	-.37
D1. trouble sleeping	2.15 (2.03-2.27)	1.29	101	21.7	.68	-.95
D2. irritability/anger	1.72 (1.62-1.83)	1.11	59	12.7	1.31	.38
D3. difficulty concentrating	1.53 (1.44-1.62)	.97	32	6.9	1.81	2.38
D4. overly alert	1.41 (1.33-1.49)	.86	27	5.8	2.13	3.56
D5. exaggerated startle response	1.83 (1.72-1.94)	1.22	77	16.6	1.14	-.18
PCL-C total	31.44 (30.7-32.2)	15.76			.83	-.36

Notes. PCL-C: Posttraumatic Stress Disorder Checklist Civilian Version (Blanchard et al., 1996); score range: 1-5; > 3 represents the number of people scoring greater than 3 (“quite a bit” or “extremely”) on a single item; % represents the percentage of people scoring greater than 3; Ku: kurtosis; Sk: skewness.

Table 9 depicts the fit indices for the five competing models. Noteworthy is that the four-factor Emotional Numbing and Dysphoria models and the five-factor Dysphoric Arousal model achieved almost identical, good fit indices. On the other hand, the aroused intrusion model had worse indices and the DSM-IV model did not fit the data at all.

TABLE 9. Results of the confirmatory factor analysis: goodness of fit indices and model comparisons for tested models (*N* = 465) (Fodor et al., 2015)

Models	χ^2	df	CFI	TLI	SRMR	RMSEA (90% CI)	BIC
DSM-IV	502.34	116	.897	.879	.050	.085 (.077-.092)	19389.97
Emotional Numbing	313.89	113	.946	.935	.042	.062 (.054-.070)	19080.50
Dysphoria	314.27	113	.946	.935	.041	.062 (.054-.070)	19083.68
Aroused Intrusion	346.50	113	.938	.925	.045	.067 (.059-.075)	19138.51
Dysphoric Arousal	310.42	109	.946	.933	.041	.063 (.055-.071)	19099.99

Notes. χ^2: robust chi square; df: degrees of freedom; CFI: comparative fit index; TLI: Tucker-Lewis index; SRMR: standardized root mean square residual; RMSEA: root mean square error of approximation; CI: confidence interval; BIC: Bayesian information criterion. All chi-square tests were significant ($p < 0.01$).

Comparing nested models, firstly model 1 differed significantly from models 2 and 3 (S-Bχ^2_{diff} (3, N = 465) = 196.57, $p < 0.01$ and S-Bχ^2_{diff} (3, N = 465) = 244.04, $p < 0.01$, respectively), that is, model 2 and 3 were superior to the DSM-IV tripartite model. Models 2 and 3 did not differ significantly from model 5 (S-Bχ^2_{diff} (4, N = 465) = 3.65, p = .46 and S-Bχ^2_{diff} (4, N = 465) = 5.02, p = .29, respectively). Among the non-nested four factor models, both the emotional numbing and the dysphoria models significantly fit better than the aroused intrusion model based on BIC values (BIC_{diff} = -58.01 and -54.83, respectively). The BIC value difference between the emotional numbing and the

dysphoria model is insufficient to establish superiority of either model (BIC_{diff} = -3.18). In the current sample the emotional numbing, the dysphoria and the Dysphoric Arousal models all fit the data acceptably with statistical tests indicating little or no difference between these three models. The standardized factor loading of these models are presented in Table 10.

TABLE 10. Standardized factor loadings for the Emotional Numbing, Dysphoria and Dysphoric Arousal models (*N* = 465) (Fodor et al., 2015)

PCL-C item	Emotional Numbing		Dysphoria		Dysphoric Arousal	
B1. intrusive thoughts	.86	f1	.86	f1	.86	f1
B2. nightmares	.84	f1	.84	f1	.84	f1
B3. reliving trauma/flashbacks	.83	f1	.83	f1	.83	f1
B4. emotional cue reactivity	.89	f1	.89	f1	.89	f1
B5. physiological cue reactivity	.87	f1	.87	f1	.87	f1
C1. avoidance of thoughts	.92	f2	.91	f2	.91	f2
C2. avoidance of reminders	.92		.92		.92	
C3. trauma-related amnesia	.76	f3	.76	f3	.76	f3
C4. loss of interest	.83	f3	.83	f3	.83	f3
C5. feeling detached	.75	f3	.74	f3	.75	f3
C6. feeling numb	.80	f3	.80	f3	.80	f3
C7. hopelessness	.79	f3	.79		.79	f3
D1. trouble sleeping	.76	f4	.75	f3	.76	
D2. irritable/angry	.76	f4	.75	f3	.76	f4
D3. difficulty concentrating	.78	f4	.77	f3	.78	
D4. overly alert	.60	f4	.61	f4	.61	f5
D5. exaggerated startled response	.80	f4	.83		.83	

Notes. All loadings are significant at $p < 0.01$. PCL-C: Posttraumatic Stress Disorder Checklist-Civilian version (Blanchard et al., 1996).

4.2.1. Testing of construct validity with depression

A depression factor was added to the models of Emotional Numbing, Dysphoria and Dysphoric Arousal. Analysis showed that these extended models have acceptable fit indices. The emotional numbing model had the following fit indices: robust χ^2 (289, N = 465) = 513.322 ($p < 0.01$), CFI = .925, TLI = .916, RMSEA = .041 [90% CI = .035-.047], WRMR = .65; the dysphoria model: robust χ^2 (289, N = 465) = 507.647 ($p < 0.01$), CFI = .927, TLI = .918, RMSEA = .040 [90% CI = .034-.046], WRMR = .645; and the Dysphoric Arousal model: robust χ^2 (284, N = 465) = 502.931 ($p < 0.01$), CFI = .927, TLI = .917, RMSEA = .041 [90% CI = .035-.046], WRMR = .644). Table 11 presents the correlation coefficients of the depression factor with the PTSD factors of the competing models.

The numbing and dysphoric arousal factors have high correlations with the depression factor (.71 and .73, respectively, $p < 0.01$), thus supporting the emotional numbing and the Dysphoric Arousal model's convergent validity. On the other hand, the dysphoria model's dysphoria factor has a slightly weaker association with depression (.63, $p < 0.01$) affording less evidence of convergent validity. The avoidance factors – which is an anxiety related factor – on all models have lower correlation with depression supporting their discriminant validity. However, for the hyperarousal factors the association with depression is higher than expected.

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TABLE 11. Standardized correlation coefficients between depression and model factors (Fodor et al., 2015)

Factors	Intrusion	Avoidance	Numbing	Hyperarousal		Dysphoria	Dysphoric arousal	Anxious arousal
	B1-B5	C1-C2	C3-C7	D1-D5	D4-D5	C3-C7, D1-D3	D1-D3	D4-D5
Models (*N* = 465)					**Depression**			
Emotional Numbing	.68	.52	.71	.69	-	-	-	-
Dysphoria	.68	.52	-	-	.72	.63	-	-
Dysphoric Arousal	.68	.52	.71	-	-	-	.73	.63

Notes. All values are significant at $p < 0.01$.

4.2.2. Gender differences across PTSD factors

The CFA with gender as a covariate was performed on the Dysphoric Arousal model. The model was chosen because it has good fit indices and construct validity and is well established in the literature (e.g. Armour et al., 2013a; Pietrzak et al., 2012). The model with gender as a covariate added, had acceptable fit (robust χ^2 (121, N = 465) = 332.965 ($p < 0.01$), CFI = .947, TLI = .933, RMSEA = .061 [90% CI = .054-.069], SRMR = .040).

Table 12 depicts the unstandardized regression coefficients from the analysis. All factors were associated with gender with females having higher scores than males. This association is the strongest in the case of re-experiencing and dysphoric arousal factors; the weakest regarding the avoidance and anxious arousal factors.

TABLE 12. Unstandardized regression coefficients of the Dysphoric Arousal model on gender in a MIMIC model (Fodor et al., 2015)

Factors of Dysphoric Arousal model of PTSD (*N* = 465)	B	S.E.	*z*-test	Direction of effect
Factor 1: Re-experiencing	.46**	.11	4.31	
Factor 2: Avoidance	.29*	.13	2.27	
Factor 3: Numbing	.41**	.09	4.87	F > M
Factor 4: Dysphoric Arousal	.46**	.09	3.91	
Factor 5: Anxious Arousal	.25**	.06	4.22	

Notes. F > M = females have higher scores than males (coding of gender M (male) = 1, F (female) = 2); ** $p < 0.01$; * $p < 0.05$.

4.3. Results of the latent profile analysis

The initial sample size was 504. To qualify for administration of the PG items, respondents had to answer in the affirmative to the question: "Did you lose a loved one during 1994 or afterwards from violence, illness, or other cause?" Among respondents, 403 satisfied this criterion for the PG questions. Persons eligible and ineligible for the PG measure did not differ significantly on distribution by gender or age ($\chi^2(1) = .02$, $p > .1$; $F(1, 100) = 1.37$, $p > .1$).

Seventy-five percent of the reduced sample (n=403) was female. Age ranged from 18 to 83 (*M* = 41.4, *SD* = 15.01). Among participants 55.9% were married or living with a partner: and 23.3% widowed. Half of the respondents received primary school education was this some primary school or was this completed primary school (51.1%), while 17.2% had no schooling. Among the participants who were included in the analysis close to half reported 1 to 3 traumatic events (45.2%), whilst the rest reported 4 to 7 traumatic events on the checklist. The most common traumas were destruction or looting of property (48.3%), seeing people being killed (47.5%) and being forced to flee one's home (33.3%). All included participants lost at least one relative during or after the conflict. Forty-eight percent of the participants lost one or both of their parents; 23% lost a brother or sister, 16% lost at least one child and 11% lost their spouse. One hundred and seven people (26.7%) lost some other relative (e.g. in laws, grandchildren, grandparents). The comorbidity rate of probable PTSD and MDD are presented in Table 13.

TABLE 13. Comorbidity of current posttraumatic stress disorder and major depressive disorder based on frequencies of probable diagnoses

	Total sample (n = 504)	Subsample for LPA (n = 403)
No PTSD or MDD, n (%)	327 (64.9)	248 (61.5)
Both PTSD and MDD, n (%)	78 (15.5)	74 (18.4)
Only PTSD, n (%)	32 (6.3)	29 (7.2)
Only MDD, n (%)	63 (12.5)	51 (12.7)

Notes. LPA: latent profile analysis; MDD: major depressive disorder; PTSD: posttraumatic stress disorder.

Correlations of the class indicators are presented in Table 14. The goodness-of-fit indices for the one to five class models are presented in Table 15. Based on fit indices and interpretability of class solutions, a three-class solution was judged to be optimal. While a two-class solution yielded marginally higher entropy values the non-significant Lo-Mendell-Rubins adjusted likelihood ratio test of the four class solution indicated that the three-class solution should be chosen. Thus the more parsimonious three-class solution was retained. For the three-class solution strong discrimination between classes was evidenced by high mean probabilities for class membership (0.97–0.99).

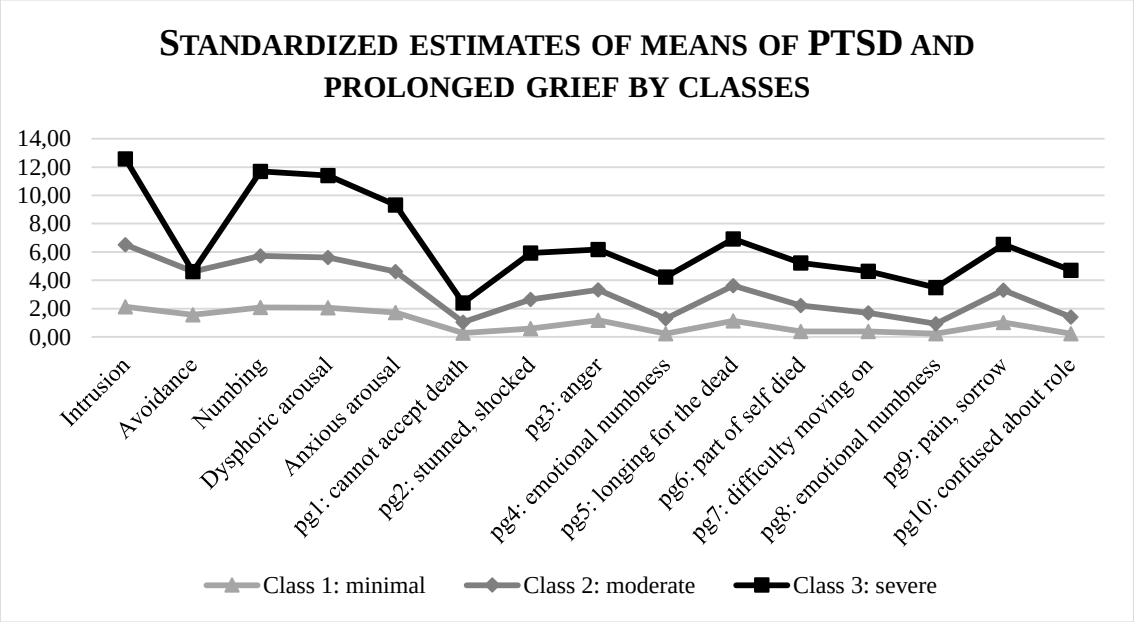
TABLE 14. Correlation of class indicators included in the latent profile analysis (N = 465)

	1 Intrusion	2 Avoidance	3 Numbing	4 Dysphoric Arousal	5 Anxious Arousal	6 Depression	7 Prolonged grief
1	1						
2	.687*	1					
3	.827*	.643*	1				
4	.796*	.597*	.830*	1			
5	.699*	.509*	.734*	.747*	1		
6	.631*	.451*	.675*	.653*	.529*	1	
7	.695*	.518*	.667*	.657*	.604*	.585*	1

Notes. *Correlation is significant at the p < 0.01 level (2-tailed).

This solution comprises three classes that show symptoms of PTSD, depression and prolonged grief in each class but with different severity. These are Class 1: no/minimal symptoms (47.9%), Class 2: a moderate symptoms (32.5%) and a Class 3 severe symptoms (19.6%). Within each class, PTSD symptom severity co-occurred with comparable depression and prolonged grief symptom severity. None of the three classes reflected a high PTSD/low depression-grief profile, or vice versa. It should be noted however that the avoidance subscale in both moderate and severe classes has similar estimated mean values (standardized means 3.06 and 3.78, respectively). Also the item

about acceptance of the death did not show elevated scores in the severe class as the other items did (see Figure 1.).



Notes. PTSD: posttraumatic stress disorder; pg: prolonged grief.

FIGURE 1. Standardized estimates of mean scores of posttraumatic stress disorder and prolonged grief by latent classes

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TABLE 15. Fit indices for different latent class solutions (Fodor et al., 2016)

Model (N = 403)	Log likelihood	AIC	BIC	ssaBIC	Entropy	LMR	LMR p value
One class	-14043.638	28165.267	28321.235	28197.484			
Two classes	-12297.113	24722.226	24978.158	24775.079	.969	3457.033	.00*
Three classes	**-11803.374**	**23784.748**	**24140.653**	**23858.247**	**.955**	**977.296**	**.02***
Four classes	-11601.937	23431.874	23887.753	23526.019	.952	398.720	.10
Five classes	-11396.944	23071.889	23627.741	23186.680	.953	405.758	.16

Notes. AIC: Akaike Information Criterion; BIC: Bayesian Information Criterion; ssaBIC: sample size adjusted BIC; LMR: Lo-Mendell-Rubins adjusted likelihood ratio test. *p < 0.05

4.3.1. Comparison of classes

The ANOVA and χ^2 tests were employed to determine if the classes were significantly different in terms of demographic characteristics and mean scores on symptom measures (see Table 16). All pairwise comparisons were significant ($p < 0.01$), therefore the three classes were significantly different from each other along all examined variables. The severe class comprised mostly women (92.4% female), the mean age was comparatively higher than in the other classes (45.5 years), fewer people had achieved secondary level of education or higher (16.5%), more than half of the class was single or widowed, from the seven traumas a mean of 5 was experienced in that class. On average, people in this most severe class lost 3 close relatives. The PTSD mean score was 56.8, almost all of them were above the 44 point cutoff score, thereby meeting criteria for probable PTSD. Their depression and grief scores were also elevated compared to other classes. On the other hand the no/minimal symptom group was the youngest (mean age: 39.6 years), the highest percent male (33%), less traumatic exposure (2.7 on average) and fewer losses (M = 1.28).

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TABLE 16. Comparison of different characteristics of the latent classes that the latent profile analysis determined

	Class 1 "No/Minimal"	Class 2 "Moderate"	Class 3 "Severe"	Total sample	Comparisons of means (ANOVAS)	Group comparisons χ^2(df)
N (%)	193 (47.9)	131 (32.5)	79 (19.6)	403 (100)		
Sex						
Male, n (%)	64 (33.2)	31 (23.7)	6 (7.6)	101 (25.1)		19.71(2)
Female, n (%)	129 (66.8)	100 (76.3)	73 (92.4)	302 (74.9)		
Age M (SD)	39.64 (14.75)	41.59 (15.20)	45.48 (14.73)	41.4 (15.01)	F(2, 397) = 4.26	
Education						
No schooling, n (%)	23 (11.9)	21 (16.0)	25 (31.6)	69 (17.2)		34.63(6)
Primary, n (%)	93 (48.2)	72 (55.0)	40 (50.6)	205 (51.1)		
Secondary, n (%)	48 (24.9)	33 (25.2)	13 (16.5)	94 (23.4)		
Higher, n (%)	28 (14.5)	5 (3.8)	0	33 (8.3)		
Marital status						
Married/in relationship, n (%)	118 (61.1)	71 (54.2)	34 (43.0)	223 (55.9)		15.45(4)
Single/widowed, n (%)	74 (38.3)	59 (42.8)	43 (54.4)	176 (44.1)		
Monthly income						
No income	67 (34.7)	71 (54.2)	58 (73.4)	196 (48.6)		41.46(8)
Less than 30 USD	74 (38.3)	41 (31.3)	16 (20.3)	131 (32.5)		

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Between 30-330 USD	44 (22.8)	16 (12.2)	4 (5.1)	64 (15.9)		
More than 330 USD	7 (3.6)	2 (1.5)	0	9 (2.2)		
N of traumas M (SD)	2.65 (1.77)	3.95 (1.93)	5.09 (2.01)	3.55 (2.09)	F(2, 401) = 52.06	
N of losses M (SD)	1.28 (1.84)	2.06 (2.29)	3.39 (3.32)	1.98 (2.49)	F(2, 363) = 21.15	
Bereavements between 1994-1998						
Spouse, n (%)	11 (5.7)	16 (12.2)	18 (22.8)	45 (11.1)		4.25(2)
Child, n (%)	19 (9.8)	26 (19.8)	20 (25.3)	65 (16.1)		8.01(2)
Sibling, n (%)	35 (18.1)	34 (25.9)	24 (30.4)	93 (23.1)		16.9(4)
Parent, n (%)	73 (37.8)	69 (52.7)	52 (65.8)	194 (48.1)		
Other relative, n (%)	70 (36.3)	28 (21.4)	9 (11.4)	107 (26.6)		
PTSD (PCL total, 17-85)	19.75 (4.73)	37.66 (9.09)	56.84 (8.44)	33.8 (16.06)	F(2, 403) = 741.93	
Intrusion (5-25)	6.38 (2.17)	13.24 (3.83)	18.41 (3.16)	10.97 (5.62)	F(2, 403) = 505.22	
Avoidance (2-10)	2.82 (1.59)	5.51 (2.02)	6.80 (1.99)	4.47 (2.46)	F(2, 403) = 165.09	
Numbing (5-25)	5.84 (1.44)	10.24 (3.48)	16.81 (3.98)	9.42 (5.01)	F(2, 403) = 427.03	
Dysphoric arousal (3-12)	3.52 (.91)	6.08 (2.08)	9.89 (2.41)	5.60 (2.95)	F(2, 403) = 393.64	
Anxious arousal (2-10)	2.18 (.59)	3.60 (1.52)	5.94 (1.86)	3.38 (1.89)	F(2, 403) = 250.36	
Probable PTSD diagnosis n (%)	0	31 (23.7)	73 (92.4)	104 (25.8)		250.45(2)
Depression (M.I.N.I.-D, 0-8)	1.10 (1.48)	4.05 (2.54)	6.34 (2.43)	2.89 (2.69)	F(2, 403) = 200.22	
Probable depression diagnosis n (%)	6 (3.1)	57 (43.5)	62 (78.5)	125 (31.0)		162.99(2)
Prolonged grief (mod. PG-13, 0-40)	5.56 (5.06)	14.8 (5.53)	26.39 (5.12)	12.65 (9.48)	F(2, 403) = 461.08	

5. DISCUSSION

The first objective was to test alternative models of DSM-IV PTSD symptoms in a population that is markedly different from those in which such factor structure has been examined previously. The universality of PTSD is somewhat supported by data on its epidemiology and underlying psychobiological processes (de Jong et al., 2001; Hinton and Lewis-Fernández, 2011), however research into the structural validity of the PTSD construct is necessary in certain socioeconomically impoverished areas (Fodor et al., 2015).

Five competing models of DSM-IV PTSD symptoms were specified and estimated using confirmatory factor analysis. We found that, as is the case in Euro-American samples, the Emotional Numbing, Dysphoria and Dysphoric Arousal models all fit the data well, whereas the DSM-IV three-factor and aroused intrusion models did not. The Emotional Numbing and Dysphoric Arousal models also possess good construct validity as the numbing and dysphoric arousal factors had strong associations with the depression factor. In previous research studies it was established that the dysphoria model's dysphoria factor has a strong relationship with depression (Simms et al., 2002; Gootzeit and Markon, 2011). It was also suggested that because of this strong association the Simms et al. dysphoria model is superior at differentiating specific and general symptoms of PTSD (Watson, 2009; Gootzeit and Markon, 2011). In the current study this association proved to be weaker and the emotional numbing and dysphoric arousal factors had higher correlations with depression. These two models may be preferable to the dysphoria model. It is also notable that in the Emotional Numbing and Dysphoric Arousal models three factors are identical, i.e., intrusion, effortful avoidance and numbing. Among these, the numbing factor has been associated with onset and maintenance of symptoms (North et al., 2002). The prominence of the numbing factor in the current sample may be due to the possible over-representation of chronic and late onset PTSD symptoms as compared with samples drawn in the first year or two of trauma occurrence (Fodor et al., 2015). The comparatively poor fit of the DSM-IV three-factor model is consistent with previous research (e.g. Elhai and Palmieri, 2011; Yufik and Simms; 2010). Moreover, the Emotional Numbing model contains four dimensions that closely resemble the DSM-5

PTSD criteria (APA, 2013) therefore our findings grant additional support of the revised DSM symptom clusters.

The Aroused Intrusion model (Rasmussen et al., 2007), which is a population specific model and highlights and includes sleep and concentration difficulties in the intrusion factor, was not supported in this sample. The aroused intrusion model was specified based on clinical observations of African refugees, resettled in the US, and applying for care at a torture treatment center. The current cluster random survey are likely to offer more representative responses to symptom items than refugees, a self-selected group from the outset, providing symptom reports on the basis of which they might be offered treatment (Fodor et al., 2015).

Our findings are consistent with another work situated in Africa, in refugee camps, in which the Aroused Intrusion model also obtained a poor fit (Vinson and Chang, 2012). Even though the factor structure did not hold, the authors noted that sleep difficulties were highly endorsed. This result could suggest that the special role of insomnia is not limited to African populations per se but rather a contribution of the refugee/migrant status and associated living arrangements. In our sample the most frequently endorsed items were on the intrusion and avoidance factors, an intuitively appealing finding since in the Rwanda setting, the reminders of the trauma are nearly ubiquitous as compared with refugees who are often physically removed from many physical reminders of the events (Fodor et al., 2015).

Some researchers suggest that PTSD symptom patterns can vary according to the relative contribution of biological and environmental factors to their expression. For example, hyperarousal and re-experiencing symptoms may be more biologically driven, involving autonomic nervous system responses, while effortful avoidance involves cognitive processes that are more accessible to cultural-environmental influences (Marsella et al., 1996; Hinton and Lewis-Fernandez, 2011). However, the fact that Euro-American factor models are supported in this sub-Saharan sample suggests that the currently used PTSD symptoms may capture a universal set of trauma responses, largely unaffected by culture or other environmental factors.

For our second objective, we employed a rigorous quantitative approach to establish symptom patterns of PTSD, depression and prolonged grief, the results provide evidence for three classes that differ by symptom severity but not by symptom type.

Several explanations for the high comorbidity of these disorders have been advanced, we focus on two, related concepts to further the interpretability of our findings. One of them, a symptom-level explanation, emphasizes the interrelationships of symptoms in co-occurring conditions (Borsboom et al., 2011). For example emotional numbness is present in PTSD, depression and prolonged grief. This symptom may well underpin the general distress factor underlying these three disorders, some form of dysfunctional mechanism that leads to numbness. In another model comorbidity is explained by a non-specific factor common to both anxiety and depression. This factor could be a higher order latent factor not an explicit set of symptoms. For example PTSD and depression share general distress (Watson et al., 2011). In this line of thinking prolonged grief could also be related to these distress disorders. As expressed by Neria and Litz (2004) concurrent trauma and loss constitute a “dual emotional burden” on the person. The combination of traumatic and loss-related aspects of this experience may yield both fear-related symptoms (i.e., PTSD symptoms), mood symptoms and grief reactions. Thus, experiencing a traumatic event and a loss concurrently appears to have an especially deleterious impact on the mental health of the trauma survivor.

A substantial body of literature emphasizes the distinctiveness of PTSD from depression and grief (Boelen and van den Bout, 2014; Cao et al., 2015; Golden and Dalgleish, 2010; Schnyder et al., 2001; Shalev et al., 1998). Even though comorbidity rates are often high, depression does occur without PTSD after trauma implying different vulnerability factors (Blanchard et al., 1998; Schnyder et al., 2001; Shalev et al., 1998). The distinctiveness of PTSD and of depression from grief has also been established (Nickerson et al., 2014; Golden and Dalgleish, 2010; Boelen and van den Bout, 2014). In the current study we did not find a distinct group of people who only experience one set of symptoms. Previous research has also shown that while depression is distinct from PTSD in the immediate months after trauma, this distinction may fade over time and a more general set of

symptoms co-occur (Armour et al., 2015; Au et al., 2013; O'Donnell et al., 2004, 2007). Therefore, these disorders are indeed distinct, but commonly co-occur, especially in the long term or more clearly those who maintain symptoms and follow a chronic trajectory could have a set of more generic distress symptoms. This notion builds on previous latent class investigations that have documented pervasive disturbance classes (as opposed to distinct classes) in civilian and military populations across PTSD symptoms (Breslau et al., 2005; Steenkamp et al., 2012), thereby suggesting that there is a group of people who exhibit pervasive distress across symptom types, rather than being characterized by a particular diagnostic category of symptoms such as PTSD or PG.

Compared to simply calculating comorbidity rates based on cut-off scores a higher percent of the participants were identified to be affected by the disorders. This emphasizes the importance of latent variable modelling, the consideration of subsyndromal symptoms and the unusefulness of diagnostic algorithms. Half of the sample showed no or minimal symptoms at the time of data collection. This fact indicates that either they did not develop any symptoms after the genocide, or possibly their symptoms naturally decreased with time. In 2002 the probable PTSD rate of Rwandan women from the same region was almost 40% (Pham et al., 2004) while in our sample it was considerably lower indicating a tendency of decreasing symptoms. Both pathways can be interpreted as evidence of resilience or a natural decrease in symptoms over time (Bonanno, 2011). The high rate of PTSD almost 20 years after the events indicates that this natural decline can take decades for those without therapeutic interventions. Research shows that PTSD symptoms usually fluctuate over time (Maercker et al., 2013) and such fluctuation may differ by gender (Neugebauer et al., 2014). Common trajectories of long term post-trauma symptoms include resilience, delayed onset, chronicity and recovery (Bonanno, 2004; Bonanno et al., 2011; Pietrzak et al., 2014). Because our study was cross-sectional we can only assume that the no/minimal symptom class contained both resilient and recovered individuals.

On the other end of the continuum, 19.6% of the sample had extremely elevated symptoms. This group significantly differed from the remainder of the sample. The group had characteristics that have been proven to be risk factors for PTSD, such as being

female, lower education and income, and more trauma exposure (Brewin et al, 2000; Roberts and Browne, 2011). These people could either have delayed onset symptoms or chronic symptoms (Maercker et al., 2013; Pietrzak et al., 2014).

Two specific findings require further mention. First, all grief items were endorsed highly in the severe class except for the "acceptance of the loss" item. This result could mean that emotional symptoms of loss (such as sorrow, shock, longing) are processed and resolved more quickly, than the cognitive symptom of for instance, accepting the loss. Second, in contrast to the other symptom groups, the score on the avoidance subscale is not elevated in any of the three classes. Possibly the ubiquity of reminders had produced habituation among the study participants, thereby decreasing the need and impulse to avoid. It is an intriguing finding because the currently preferred evidence-based psychotherapeutic tool for PTSD is exposure therapy (Powers et al., 2010), however in our sample, the low rate of avoidance symptoms (also indicating exposure to reminders) did not correspond to a similar reduction in other PTSD symptoms. Further research should be invested in the effectiveness of exposure therapy for chronic PTSD in settings where exposure is inevitable. Alternatively, the duration and persistence of PTSD symptoms may depend, in the longer term, on so-called daily stressors – interpersonal, social, economic distress (Miller and Rasmussen, 2010) – more than on memories of past traumas.

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6. CONCLUSIONS

Since PTSD is recognized and endorsed globally in epidemiological projects, its symptoms as defined by Western nosology arguably correspond to a universal human experience. While local idioms of distress might be useful in a clinical setting, the construct of PTSD serves as a common framework of human suffering that permits, facilitates and promotes global discussion (Breslau, 2004; Hinton and Lewis-Fernández, 2011).

The unique scale and horror of the Rwandan Genocide provides a distinctive research opportunity. The majority of prior studies of PTSD were conducted in middle and high income nations in the US and Europe. Typically, when interest focused on a single index trauma affecting large numbers of people, natural disasters, e.g., hurricanes, earthquakes, floods, have been the major context for this research (e.g., Armour et al., 2013b; Wang, 2011a). However, natural disasters are less traumatic and less productive of PTSD symptoms than crises involving interpersonal and political violence, where the intentional aim of such violence focuses on the destruction of people as well as property (Kumar and Fonagy, 2013; Norris et al., 2006). Rwanda was and remains among the poorest nations in the world (UN Development Program, 2014). The society is based on rain fed subsistence agriculture where the great majority of the population is farmers.

Examining construct of PTSD under these catastrophic conditions serves as a unique opportunity under markedly different circumstances. As a consequence, we can expect with some confidence that findings regarding disease etiology, associated difficulties in social functioning and the development of effective, evidence-based interventions and treatments could prove reasonably generalizable across different cultures (Fodor et al., 2015). Certainly the effectiveness of several treatment modalities, borrowed from western societies, has been demonstrated in quite a number of studies (Bolton et al., 2003; Bass et al., 2013; Tol et al., 2013).

6.1. Summary of main findings

We have investigated current models of the factor structure of DSM-IV PTSD symptoms among Rwandans who experienced genocidal violence. To the best of our knowledge this work represents the most systematic and comprehensive assessment of DSM-IV PTSD symptom factor structure in sub-Saharan Africa (Fodor et al., 2015). The great similarity among the three models of the factor structure of PTSD symptoms in post-genocide society provides important, additional support for the utility and stability of current conceptualization of PTSD symptoms. The recruitment of the study respondents using (cluster) random sampling contributes additional rigor and increases the likelihood of generalizability to the findings. The current study extends our knowledge of PTSD's characteristics in an important, rarely studied region of the world, a region that is also at present witness to acts of unspeakable cruelty against civilians.

We found that the latent structure of PTSD is similar to that found in Euro-American samples and the weight of the evidence supports the Emotional Numbing and Dysphoric Arousal models. These results suggest that the internal structure of PTSD symptoms is similar in Rwanda to that found in other parts of the world. However, we emphasize that a complete understanding of PTSD in Rwanda would require ethnographic and qualitative studies conducted in combination with the types of approaches employed here. Nonetheless, our findings provide further evidence for the generalizability of the Emotional Numbing and Dysphoric Arousal models and add to our more general understanding of PTSD symptomatology in extraordinarily traumatized populations (Fodor et al., 2015).

Additionally, we also employed LPA to investigate symptom profiles of PTSD, MDD and PG among Rwandan adults who lived through the genocide and were dually exposed to trauma and loss. Three distinct symptom profiles emerged from the data, all differed in symptom severity but not symptom type. A significant proportion of the sample experienced elevated distress symptoms from each of the three disorders. These elevated distress symptoms could take the form either of acute, late-onset or chronic course.

Conflict-affected populations are at heightened risk for developing disabling mental disorders like PTSD and PG as a result of exposure to trauma and loss. Our results underscore the importance of identifying specific symptom profiles in individuals exposed to both trauma and loss. This may facilitate the development of intervention strategies that target specific types of distress in survivors of persecution and conflict.

Most existing research on trauma and its impact has emphasized the diagnosis of PTSD rather than the relationship of traumatic events to broader indicators of health. To this extent, the diagnostic construct of PTSD has narrowed the focus of research in a manner that has not been helpful. Trauma and traumatic events encompass much wider experiences than the medically constructed label of PTSD. These include the experience of loss at the personal and community level, the personal and cultural meanings of trauma, the idioms of distress in which reactions are expressed, the collective and political meaning of these experiences, and ways in which all of these factors may contribute to continuing a cycle of violence or to successful coping and adaptation. Trauma research studies, with a much wider focus that can encompass these areas, are urgently needed in communities that are exposed to continuing violence and political conflict situations.

6.2. Limitations

The strengths of this work include the stringent sampling method, use of CFA and LPA as statistical techniques, and the recruitment of participants that were exposed to severe violence and loss at approximately the same time (Fodor et al., 2015).

The most important limitation of this study that we only assessed 17 PTSD symptoms and with only one type of measure (self-report interview format), whereas manifestations of responses to traumatic stress may be more extensive and diverse. With DSM-5 (APA, 2013), previous models of PTSD – based on the 17 DSM-IV symptoms – are of diminished importance. New models of PTSD have emerged based on new symptom criteria (Armour et al., 2014; Pietrzak et al., 2014; Tsai et al., 2014); these symptom criteria were of course introduced well after our study was completed. However, it is a major limitation of our study that these models could not be tested.

Secondly, our study is cross-sectional and relies on retrospective recall of traumatic experiences. While we can draw certain conclusions from the current mental status of the participants we cannot know what symptom trajectories they experienced over the preceding 17 years. The findings may not be generalized to less violent conflicts or less atrocious exposures and to other cultures.

An additional limitation of the current study, although it does not impinge directly on study inferences, is that trauma symptoms were measured years after the genocide without assessment of possible intervening traumatic life events. As a result we cannot be sure of the exact nature, origin or dating of the trauma reactions. However these uncertainties do not undermine the validity of the reported symptom patterns that serve as the basis of the analysis. Finally, it will be crucial to employ qualitative, ethnographic methods when testing for possibly additional, culturally specific aspects of PTSD.

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7. SUMMARY

Introduction. Experiencing some sort of violence is one of many causal factors in developing posttraumatic stress disorder (PTSD). What we currently know of the cross-cultural adaptability of the construct of PTSD is often criticized because it is based on Western ideas of disease, the knowledge base of posttraumatic stress research is from high income countries, and the construct of PTSD is assumed to be universal and therefore used without constraints around the world in humanitarian projects (Fodor et al., 2014; 2015). The 1994 Rwandan Genocide gives a scientifically unique opportunity to test some of the issues raised against the PTSD construct due to its extreme nature.

Objectives. We tested the factorial validity of PTSD measured using the Posttraumatic Stress Disorder Checklist (PCL) with confirmatory factor analysis and also investigated co-occurring symptom patterns of PTSD, depression and grief to test the construct validity of PTSD.

Methods. Data collection was conducted in 2011 in the Southern region of Rwanda, heavily affected by the 1994 genocide. Five hundred and four subjects responded resulting in a response rate of 96%. Probability proportionate to size sampling was employed. Interview measures included the above mentioned PCL, the Mini International Neuropsychiatric Interview Depression module and a custom developed prolonged grief measure.

Results. The confirmatory factor analysis supported a model of PTSD factor structure that has been widely accepted in Euro-American studies, namely the Dysphoric Arousal model (Elhai et al., 2011). The latent profile analysis showed that participants differ in symptom severity rather than symptom type meaning that no distinct classes of PTSD, depression or grief emerged.

Conclusions. With adequate caution of interpretation of the results we can conclude that PTSD in Rwanda is still prevalent even 17 years after the genocide. The construct of PTSD can be safely used due to its expressed validity, however universality based on this work cannot be assumed.

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8. ÖSSZEFOGLALÁS

Bevezetés. A poszttraumás stressz zavar (PTSD) diagnózis használata szerte a világon elterjedt annak ellenére, hogy kultúrák közötti validitása kérdéses. Az, hogy univerzális jelenségként tekintenek rá, azért problematikus, mert nyugati betegségmodellen alapszik, a kutatások többsége magas jövedelmű, nyugati országokból származik, és kevés olyan tanulmány van, ami a konstruktum validitását tesztelné (Fodor et al., 2014; 2015). Az 1994-es ruandai népirtás szélsőségesen erőszakos jellege lehetőséget nyújt a PTSD, a nyugatitól jelentősen eltérő kultúrában való tanulmányozására.

Célkitűzések. Megerősítő faktorelemzéssel vizsgáltuk a PTSD faktoriális struktúráját, hogy a PTSD validitásáról és esetleges univerzalitásáról vonjunk le következtetéseket. Ezen felül a PTSD, depresszió és gyász tüneti mintázatát vizsgáltuk a konstruktum validitás további tesztelésére.

Módszer. Az adatfelvétel 2011-ben zajlott, Ruanda déli részén, ahol a népirtás különösképpen nagy mértéket öltött. Összesen 504 személy válaszolta meg a teljes interjú battériát, a válaszadási ráta 96%-os volt. A legfontosabb mérőeszközök a Posttraumatic Stress Disorder Checklist, a Mini International Neuropsychiatric Interview depresszió modulja és egy erre a célra kialakított komplikált gyász kérdőív.

Eredmények. A faktorelemzés a PTSD faktorstruktúrájának egy olyan modelljét erősítette meg, amely a nyugati mintákon is széles körben elterjedt, ez a Diszfóriás Arousal modell (Elhai et al, 2011). A látens profilelemzés alapján, a vizsgálati személyek tünetei inkább súlyosságuk, mint típusuk alapján különböztek, ami azt jelenti, hogy a PTSD, a depresszió és a gyász tüneti képe nem különült el.

Következtetések. Az eredmények óvatos értelmezése alapján elmondható, hogy a PTSD még 17 évvel a népirtás után is gyakori mentális zavar Ruandában, valamint a PTSD, mint konstruktum biztonságosan használható és validnak tekinthető, habár az univerzalitásra vonatkozóan ezek alapján az eredmények alapján nem vonhatunk le következtetést.

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10.1 Publications related to the PhD Thesis

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10.2 Publications unrelated to the PhD Thesis

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12. APPENDICES

Appendix A: Kinyarwanda translation of the Posttraumatic Stress Disorder Checklist Civilian version

Reka ngusomere urutonde rw'ibibazo n'ingaruka rimwe na rimwe abantu bahura na byo kubera ihahamuka. Kuri buri ngingo, ndagira ngo ubwire niba hari icyaba cyarakubayeho mu kwezi gushize. Urakoresha ibimenyetso bikurikira: nta na rimwe (1), gakeya (2), mu rugero (3), kenshi (4), bikabije (5).

Now I will read you a list of problems and complaints that people sometimes have in response to stressful experiences in life. For each one, please tell me how much you have been bothered by that problem in the past month: 1) not at all, 2) a little bit, 3) moderately, 4) quite a bit, or 5) extremely.

	Nta na rimwe *Not at all*	**Gakeya** *A little bit*	**Mu rugero** *Moderately*	**Kenshi** *Quite a bit*	**Bikabije** *Extremely*
Gusubira mu nzozi z'ibibi byakubayeho? *Repeated, disturbing dreams of a stressful experience from the past?*	1	2	3	4	5
Gukora cyangwa kumera nk'aho ibyagukuye umutima hambere byongeye kuba (gusa n'usubiye mu bya kera)? *Suddenly acting or feeling as if a stressful experience were happening again (as if you were reliving it)?*	1	2	3	4	5
Kumva ucitse intege iyo hagize ikikwibutsa ibibi byakubayeho mu gihe cyashize? *Feeling very upset when something reminded you of a stressful experience from the past?*	1	2	3	4	5
Kugira ikimenyetso ku mubiri (urugero, guteraguzwa k'umutima, guhumeka nabi, kubira ibyuya) iyo hagize ikikwibutsa agahangayiko k'ibya kera?	1	2	3	4	5

Having physical reactions (e.g., heart pounding, trouble breathing, sweating) when something reminded you of a stressful experience from the past?					
Kwirinda gutekereza cyangwa kuvuga ibiguhangayikishije byakubayeho cyangwa kwirinda icyo bifitanye isano cyose? *Avoiding thinking about or talking about a stressful experience from the past or avoiding having feelings related to it?*	1	2	3	4	5
Kwirinda ibikorwa cyangwa ibintu byose bikwibutsa ibibi byakubayeho mu gihe cyashize? *Avoiding activities or situations because they reminded you of a stressful experience from the past?*	1	2	3	4	5
Kuba utagishishikariye ibintu byagushimishaga kera? *Loss of interest in activities that you used to enjoy?*	1	2	3	4	5
Kumva utagishyikirana cyangwa waritandukanije n'abandi bantu? *Feeling distant or cut off from other people?*	1	2	3	4	5
Kumva uri nk'igiti cyangwa utagishoboye gukunda abawe? *Feeling emotionally numb [feeling like a tree] or being unable to have loving feelings for those close to you?*	1	2	3	4	5
Kubura icyizere cy'ubuzima buri imbere? *Feeling as if your future will somehow be cut short?*	1	2	3	4	5
Kudashobora kwita ku cyo urimo gukora *Having difficulty concentrating?*	1	2	3	4	5
Guhora uca ibikuba, ugenzura buri kantu cyangwa wirinze cyane? *Being "super-alert" or watchful or on guard?*	1	2	3	4	5

Ibitekerezo bigenda bigaruka kandi bibabaje cyangwa uko ibyakubayeho bihangayikishije mu gihe cyahise byari bimeze? *Repeated, disturbing memories, thoughts, or images of a stressful experience from the past?*	1	2	3	4	5
Kugira ingorane mu kwibuka ingingo z'ingenzi z'ibibi byakubayeho mu gihe cyahise? *Trouble remembering important parts of a stressful experience from the past?*	1	2	3	4	5
Kugira ingorane zo kubura ibitotsi cyangwa zo gusinzira umwanya uhagije? *Trouble falling or staying asleep?*	1	2	3	4	5
Kurakazwa n'ubusa cyangwa kugira umujinya w'umuranduranzuzi? *Feeling irritable or having angry outbursts?*	1	2	3	4	5
Gushikagurika cyangwa gukangwa n'akantu gato? *Feeling jumpy or easily startled?*	1	2	3	4	5