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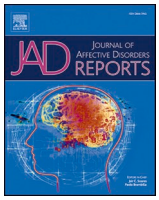

Research Paper

Nature and prevalence of PTSD as per DSM-5 and ICD-11 after natural and unnatural deaths☆

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ABSTRACT

The death of a loved one may lead to posttraumatic stress disorder (PTSD). Although it is conceivable that unnatural losses (caused by e.g., accidents, homicide, or suicide) render people more vulnerable to PTSD than natural losses (e.g., caused by illnesses) this is an understudied issue. The current study sought to enhance knowledge about the presentation and prevalence of PTSD symptoms, in people confronted with natural, non-sudden and unnatural, sudden losses. Considering that PTSD is defined differently in DSM-5 and ICD-11, we compared PTSD severity and prevalence rates between these diagnostic systems. Self-reported data were available from a heterogeneous sample of 1064 bereaved people (Mage = 52.13 years, 86 % female). Confirmatory factor analyses supported the DSM-5-based and ICD-11-based symptom clustering. DSM-5 yielded higher prevalence rates of probable PTSD than ICD-11 criteria. PTSD cluster and total scores were significantly higher for participants confronted with unnatural losses than participants confronted with natural losses. Rates of probable PTSD (based on DSM-5 and ICD-11) were also higher in the former group. Confrontation with an unnatural loss was not associated with PTSD scores beyond other sociodemographic and loss-related variables considered. Results show that bereavement-related PTSD is assessed differently in DSM-5 and ICD-11. Cause of death affected PTSD but less strongly than anticipated.

1. Introduction

In the aftermath of negative life events, people may develop symptom of posttraumatic stress disorder (PTSD). One of the most commonly experienced events leading to PTSD is the unexpected death of a close person (Atwoli et al., 2017; Keyes et al., 2014). In international representative surveys, Atwoli et al. (2017) found an average PTSD prevalence of 5.2 % in people exposed to unexpected deaths. Unexpected deaths are generally considered to be more distressing and disruptive than expected deaths due to, e.g., illness (Kristensen et al., 2012). However, after experiencing non-sudden losses, severe PTSD symptomatology may develop in a considerable number of people (e.g., O'Connor, 2010). Notably, evidence from community based studies suggests that sudden and non-sudden deaths are associated with similar rates of PTSD (e.g., Mol et al., 2005).

There is a continued need to examine differences and similarities in rates and manifestations of PTSD symptomatology following different types of losses. This is relevant for the theoretical understanding of the consequences of loss. In addition, this has clinical relevance, considering that knowledge about the linkage between different types of loss-events and different outcomes can inform the development of diagnostic and treatment methods that may be used to identify and mitigate these outcomes. From a clinical perspective, it is conceivable that, compared to people who lost close persons to illness, people who experienced an unnatural loss, e.g., caused by an accident, suicide, or homicide, are more prone to develop posttraumatic stress (Kristensen et al., 2012). That is, circumstances of unnatural losses likely give more rise to intrusive memories and disruptions of cognitions about the self and the world, as well as tendencies to avoid and hypervigilance towards stimuli reminding of these circumstances. However, differences between PTSD symptomatology following different types of losses are largely understudied.

The current study was designed to enhance knowledge on similarities and differences in the presentation and prevalence of PTSD symptoms, between people confronted with natural, non-sudden and unnatural, sudden deaths of close persons. Is so doing, we considered PTSD both as defined in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association

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(APA), 2013) as well as PTSD as defined in the 11th edition of the International Classification of Diseases (ICD-11; World Health Organization (WHO), 2019). DSM-5 includes 20 symptoms, categorized into four clusters of reexperiencing, avoidance, negative alterations in cognitions and mood (NACM), and hyperarousal, respectively. ICD-11 includes six symptoms, representing clusters of reexperiencing, avoidance, and a sense of threat. Several studies showed that DSM-5 criteria yield higher PTSD prevalence rates than ICD-11 criteria (e.g., Hafstad et al., 2017; Hansen et al., 2015; Hyland et al., 2016). However, other studies reported no differences (Stein et al., 2014) or higher rates based on ICD-11 (Cao et al., 2020).

In this study, we used self-reported data from a large heterogeneous bereaved sample to enhance knowledge about PTSD following natural and unnatural losses. Five aims guided our study. The first aim was to examine the latent structure of DSM-5- and ICD-11-based PTSD symptoms in our bereaved sample, using confirmatory factor analysis (CFA). The second aim was to examine prevalence rates of DSM-5- and ICD-11-based probable PTSD caseness and to examine diagnostic agreement between these diagnostic systems. We did so both in the whole sample and in the two subsamples confronted with natural and unnatural losses, respectively. Based on previous research, cited above, we expected DSM-5-based criteria to yield higher prevalence rates. Our third aim was to compare scores on the DSM-5- and ICD-11-based symptom clusters between the two subsamples confronted with natural and unnatural deaths. The fourth aim was to compare rates of DSM-5-based and ICD-11-based probable PTSD caseness between these subsamples. Considering prior evidence that unnatural deaths render people more vulnerable to psychopathology (e.g., Burke and Neimeyer, 2013; Djelantik et al., 2020), we anticipated that scores on PTSD clusters and prevalence rates of probable PTSD would be higher in participants confronted with unnatural deaths. Our fifth and last aim was to investigate whether confrontation with natural vs. unnatural losses explained variance in PTSD cluster scores above and beyond sociodemographic and loss-related variables considered. We anticipated that cause of death would hold up as a correlate of PTSD symptoms.

2. Methods

2.1. Participants and procedure

Data were gathered in the context of a survey-based research project studying cognitive behavioral correlates of emotional problems after bereavement, called the Utrecht Longitudinal Study on Adjustment to Loss (ULSATL study). Participants were recruited via announcements on internet websites and online platforms providing information about grief and bereavement care. The announcements explained the aims of the project and invited bereaved adults to participate. After completing an online application form, people received a personal login code and were referred to a secured website where more information about the study was offered. After providing informed consent, they completed the questionnaire battery. Participants bereaved within the past year were invited to complete several follow-up questionnaires. In this study, we only used baseline data. In the period of data collection (2012–2020), 2104 people filled in an application form, 1170 (56 %) of whom started completion of the questionnaire. Of this group, 106 were not included in further analyses, because they were younger than 18 years, discontinued completion of the questionnaire after completing the first questions on demographics, or appeared to enter unreliable data, leaving $N = 1064$ participants available for the current analyses. Parts of these data have been examined in earlier studies addressing different study aims (e.g., Djelantik et al., 2022; Eisma et al., 2020).

2.2. Measurements

2.2.1. Sociodemographic and loss-related characteristics

A self-constructed questionnaire was used to map sociodemographic (gender, age, education) and loss-related characteristics (time since loss in months, relationship with the deceased, cause of death).

2.2.2. Posttraumatic stress symptoms

PTSD symptoms were assessed using the PTSD Symptom Scale Self-Report version (PSS-SR), developed by Foa et al. (1993). This measure includes 17 items, corresponding to DSM-IV-based PTSD (APA, 2000). Participants rate how often they experienced each symptom during the preceding month on 4-point scales with anchors 0=*not at all* and 3=*five/more times per week/almost always*. The index event was defined as "the death of your loved one" (e.g., "How often did you have unpleasant dreams or nightmares about the death of your loved one?"). Good psychometric properties of the PSS-SR have been reported in English (Foa et al., 1993) and Dutch samples (Engelhard et al., 2007).

Items rated with 0 and 1 were considered as indicating "symptom absent" and scores 2 and 3 were considered as indicating "symptom present". The 17 items were mapped onto DSM-5 symptom clusters, using Rosellini et al.'s (2015) suggestions. That is, the five items measuring distressing recollections, distressing dreams, acting as if the event recurred, and psychological distress and physiological reactivity at confrontation with reminders represented the five items of the re-experiencing cluster. Two items measuring avoidance of thoughts/-feelings and of activities represented the two items of the avoidance cluster. The five items inability to recall aspects, foreshortened future, diminished interested, detachment/estrangement, and restricted affect represented five of seven items from the NACM cluster. The five items measuring irritability, hypervigilance, exaggerated startle, difficulty concentrating, and difficulty sleeping represented five of the six items from the arousal cluster. Criteria for probable DSM-5-based PTSD were met if participants endorsed at least one re-experiencing symptom, one avoidance symptom, two NACM symptoms, and two arousal symptoms. Items that we selected that corresponded to ICD-11 symptoms were items measuring distressing dreams and flashbacks (re-experiencing cluster), avoidance of thoughts and avoidance of external reminders (avoidance cluster), and hypervigilance and startle (sense of threat cluster) (cf. Glück et al., 2016). Criteria for probable ICD-11-based PTSD were met if participants endorsed at least one of both symptoms, from all three clusters. In the current sample, internal consistencies for all 17 items and for the six ICD-11 items were excellent (Cronbach's $\alpha = 0.91$ and 0.77, respectively).

2.3. Statistical analyses

For our first aim, we used CFA implemented in JASP (JASP Team, 2023). We evaluated the fit of the four-factor DSM-5-model, consecutively using the items scored on their original 0–3 item scale and, then, dichotomized item scores. To compare, we also examined the fit of the one-factor model. Similarly, we compared the three-factor ICD-11 model with a one-factor model, again using both the original 0–3 item ratings and dichotomized item ratings. In all CFAs, the default "auto" estimation method was used.

All the other statistics were calculated using SPSS 28.0. For our second aim, we computed prevalence estimates of DSM-5- and ICD-11-based probable PTSD. We used coefficient Kappa to quantify the agreement between the two systems and McNemar's test to examine differences in prevalence rates between the two systems (cf. Cao et al., 2020). Regarding the third aim, we summed the item scores (scored 0–3) of DSM-5- and ICD-11-based symptom clusters and compared these scores between people confronted with natural vs. unnatural losses, using t-tests and Cohen's d effect sizes. To achieve our fourth aim, we calculated rates of DSM-5- and ICD-11-based probable PTSD and compared these rates between the two groups, using Chi square statistics. For our fifth aim, we consecutively regressed the DSM-5- and ICD-11-based symptom cluster scores (i.e. summation of 0–3 rated items of each cluster) and the summed score of all DSM-5 and ICD-11 items on dichotomized cause (natural vs. unnatural [i.e., deaths to accidents,

suicide, or homicide]), gender, age, dichotomized education (other than college/university vs. college/university), number of months passed since the loss, and kinship to the deceased entered simultaneously, in a series of regression analyses. A maximum of 1.7 % of the PTSD item-scores were missing. Missing data on these items were missing completely at random (Little's MCAR test, Chi square = 497.04, df = 484, p = .33) and estimated using the expectation maximization algorithm.

3. Results

3.1. Descriptive data

Table 1 summarizes characteristics of the total sample (N = 1064) and the two subsamples confronted with natural deaths (n = 921) and unnatural deaths (n = 143). The two subsamples did not differ in terms of gender and education, but did differ in terms of age (the natural loss sample was older), time (the natural loss sample experienced loss more recently), and kinship (in the natural loss sample, less participants experienced the death of a child).

3.2. Latent structure of PTSD symptomatology

Model fit statistics are shown in Table 2. For the DSM-5-based models, the four-factor model fit the data better than did the one-factor model. This was true when comparing the models that were based on items scored on the 0–3 rating scale (denoted by superscript a in the table) and also when comparing the models that were based on the dichotomized item scores (denoted by superscript b in the table). Similarly, for the ICD-11-based models, thee-factor solutions fit the data better than one-factor solutions.

Table 1
Descriptive characteristics of the entire sample, non-sudden, natural loss subsample, and sudden, unnatural loss subsample and statistical tests examining differences between subsamples.

	Entire sample (N = 1064)	Non-sudden, natural loss subsample (n = 921)	Sudden, unnatural loss subsample (n = 143)	Tests for differences
Sex[a] (N (%))				
Female	916 (86.6)	130 (14.1)	13 (9.1)	χ^2 (df = 1) = 2.75, p = .097
Male	143 (13.4)	130 (85.3)	130 (90.9)	
Age (M (SD))	52.13 (13.55)	52.75 (13.58)	47.96 (12.69)	t(1062) = 3.98, p < .001
Education (N (%))				
College/ university	603 (56.7)	515 (55.9)	55 (38.5)	χ^2 (df = 1) = 1.59, p = .207
Other education	461 (43.4)	406 (44.1)	88 (61.5)	
Months since loss (M (SD))	57.88 (104.78)	55.01 (101.66)	76.33 (121.84)	t(174.04) [b] = −1.98, p = .024
Kinship (N (%))				
Deceased is partner	452 (42.4)	399 (43.4)	52 (36.4)	χ^2 (df = 2) = 40.69, p < .001
Deceased is child	95 (8.9)	62 (6.7)	33 (23.1)	
Deceased is other person	518 (48.7)	460 (49.9)	58 (40.6)	
Cause of death (N (%))				
Non-sudden, natural (e.g., illness)	921 (86.6)	921 (100)	0	Not assessed
Sudden, unnatural (e.g., accident, suicide, homicide)	143 (13.4)	0	143 (100)	

Note.
[a] There were five missing values for gender. [b] Equal variance not assumed.

3.3. Diagnostic agreement between probable PTSD caseness as per DSM-5 and ICD-11

Percentages of participants meeting and not meeting criteria for probable PTSD caseness as per both systems are shown in Table 3. For the whole sample, rates of probable PTSD as per DSM-5 and ICD-11 were 9.6 % and 6.4 % respectively. McNemar's test indicated that a significant greater proportion of participants met criteria for DSM-5 (p < .001). Results of patterns of agreement and disagreement between DSM-5 and ICD-11 showed that n = 64 (5.9 %) met one but not the other set of criteria, yielding a Kappa of 0.59. For the subsample confronted with natural loss, rates of PTSD according to DSM-5 and ICD-11 were 8.7 % and 5.6 % respectively and were significantly higher for DSM-5-based caseness (McNemar's test, p < .001). Fifty-two (5.6 %) participants met criteria for probable PTSD caseness based on one, but not the other set of criteria, yielding a Kappa of 0.58. For the participants experiencing unnatural loss, rates were 15.4 % for DSM-5 and 11.2 % for ICD-11 criteria; percentages did not differ significantly (McNemar's, p = .15). Twelve participants within this subsample (8.4 %) met criteria for one but not the other set, yielding a Kappa of 0.64.

3.4. Differences in PTSD total and cluster scores between subsamples confronted with natural vs. unnatural losses

Table 4 shows summed scores of the items included in the DSM-5- and ICD-11-based symptom clusters and for all DSM-5 and ICD-11 PTSD items, for the total sample and subsamples divided by cause of death. Participants confronted with unnatural losses scored significantly higher on all PTSD total and cluster scores, with the exception of both the DSM-5-based and ICD-11-based reexperiencing clusters. Effect sizes were low (d's ≤ 0.26).

3.5. Differences in prevalence rates of probable PTSD between subsamples confronted with natural vs. unnatural losses

Table 5 shows percentages of participants meeting criteria for probable PTSD caseness in the natural and unnatural loss subsamples, as per DSM-5 and ICD-11. Considering the DSM-5 criteria, in the unnatural loss sample, 15.4 % met criteria for probable PTSD (vs. 8.4 % following natural loss). Considering the ICD-11 criteria, in the unnatural loss sample, 11.2 % met criteria for probable PTSD (vs. 5.6 % following natural loss). Percentages were significantly higher in the unnatural loss subsample.

3.6. The role of cause as a correlate of PTSD scores, considering other loss-related and sociodemographic characteristics

Table 6 summarizes the regression analyses with dichotomized cause of death and other variables considered as correlates of DSM-5- and ICD-11-based PTSD cluster scores and total scores. Across all regression analyses, confrontation with unnatural loss did not explain a unique proportion of the variance in the PTSD cluster and total scores, above and beyond the other variables considered.

4. Discussion

This study sought to increase knowledge about the nature and prevalence of bereavement-related PTSD symptomatology in people

Table 2
Model fit statistic for DSM-5-based and ICD-11-based factor structure for posttraumatic stress disorder symptoms.

	χ^2	df	CFI	TLI	RMSEA (90 % CI) SRMR AIC	SRMR	AIC	BIC
DSM-5 one factor model [a]	1280.10*	119	0.842	0.819	0.096 (0.091 – 0.101)	0.060	40,796.97	40,938.94
DSM-5 one factor model [b]	417.36*	119	0.983	0.981	0.049 (0.044 – 0.054)	0.079	–	–
DSM-5 four factor model [a]	736.05*	113	0.915	0.898	0.072 (0.067 – 0.077)	0.049	40,237.92	40,436.71
DSM-5 four factor model [b]	234.41*	113	0.993	0.992	0.032 (0.026 – 0.038)	0.062	–	–
ICD-11 one factor model [a]	213.12*	9	0.860	0.766	0.152 (0.136 – 0.170)	0.066	13,893.38	13,953.01
ICD-11 one factor model [b]	54.50*	9	0.969	0.949	0.069 (0.052 – 0.087)	0.081	–	–
ICD-11 three factor model [a]	0.589	6	1.000	1.009	0.000 (0.000 – 0.000)	0.003	13,668.85	13,743.40
ICD-11 three factor model [b]	4.721	6	1.000	1.002	0.000 (0.000 – 0.035)	0.027	–	–

Note.
[a] Model based on items rated on 0–3 scale.
[b] Model based on items rated as 0, 1. AIC = Akaike information criterion. BIC = Bayesian information criterion. CFI = Comparative Fit Index. RMSEA (90 % CI) = root-mean-square error of approximation with 90 % confidence intervals. SRMR, standardized square root mean residual. TLI = Tucker Lewis Index.
* $p < .001$.

Table 3
Patterns of agreement and disagreement between DSM-5 and ICD-11-based diagnoses for probable PTSD in the total sample and subsamples.

Entire sample ($N = 1064$)			
	DSM-5		
ICD-11	Negative	Positive	Total
Negative	947 (89.0)	49 (4.6)	996 (93.6)
Positive	15 (1.4)	53 (5.0)	68 (6.4)
Total	962 (90.4)	102 (9.6)	1064 (100)
Non-sudden, natural loss subsample ($n = 921$)			
	DSM-5		
ICD-11	Negative	Positive	Total
Negative	829 (90.0)	40 (4.3)	869 (94.4)
Positive	12 (1.3)	40 (4.3)	52 (5.6)
Total	841 (91.3)	80 (8.7)	921 (100)
Sudden, unnatural loss subsample ($n = 143$)			
	DSM-5		
ICD-11	Negative	Positive	Total
Negative	118 (82.5)	9 (6.3)	127 (88.8)
Positive	3 (2.1)	13 (9.1)	16 (11.2)
Total	121 (84.6)	22 (15.4)	143 (100)

Note. DSM-5 = Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition. ICD-11 = International Classification of Diseases 11th Revision. PTSD = Posttraumatic stress disorder. Numbers in front of each cell are the number of participants; numbers in parentheses are percentages of total.

Table 4
PTSD total scores and symptom cluster scores based on DSM-5 and ICD-11 for the total sample and the subsamples and statistical tests examining differences between subsamples.

	Entire sample ($N = 1064$)	Non-sudden, natural loss subsample ($n = 921$)	Sudden, unnatural loss subsample ($n = 143$)		
DSM-5-based	M (SD)	M (SD)	M (SD)	t	Cohen's d
Reexperiencing	4.23 (3.42)	4.18 (3.41)	4.61 (3.50)	1.37	0.12
Avoidance	0.98 (1.38)	0.94 (1.36)	1.24 (1.54)	2.21*	0.22
NACM	3.93 (3.46)	3.82 (3.39)	4.65 (3.82)	2.45*	0.24
Hyperarousal	4.78 (3.23)	4.68 (3.21)	5.44 (3.31)	2.62**	0.24
Total PTSD	30.94 (9.75)	30.62 (9.60)	32.94 (10.51)	2.65**	0.24
ICD-11-based					
Reexperiencing	1.37 (1.35)	1.36 (1.34)	1.37 (1.37)	0.05	0.004
Avoidance	0.98 (1.38)	0.94 (1.36)	1.24 (1.53)	2.21*	0.22
Heightened current threat	1.35 (1.47)	1.30 (1.45)	1.67 (1.60)	2.85**	0.26
Total PTSD	3.70 (3.30)	3.61 (3.24)	4.29 (3.67)	2.30*	0.21

Note. DSM-5 = Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition. ICD-11 = International Classification of Diseases 11th Revision. NACM = Negative alterations in cognitions and mood. PTSD = Posttraumatic stress disorder.
* $p < .05$.
** $p < .01$.

confronted with a non-sudden, natural loss (due to e.g. illness) and people confronted with a sudden, unnatural loss (caused by suicide, homicide or accident). In so doing, we considered both DSM-5-based and ICD-11-based criteria for PTSD.

A first main finding was that both the DSM-5-based structure (distinguishing four clusters of reexperiencing, avoidance, NACM, and hyperarousal) and the ICD-11-based structure (distinguishing clusters of reexperiencing, avoidance, and a sense of threat) fit the data of our sample. For both systems, these models with multiple symptom clusters fit better than unitary models with all symptoms loading on a single dimension. As for DSM-5-based PTSD, our findings contrast with prior research among bereaved people in which the DSM-5 structure was not supported (Hansen et al., 2015; Lenferink et al., 2021). Our finding that the ICD-11-based structure fit our data is consistent with the study by Hansen et al. (2015) who also found the ICD-11-based structure to yield adequate fit in a bereaved sample.

A second main finding was that, in the total sample, prevalence rates based on DSM-5 were higher than those based on ICD-11. This is largely consistent with most earlier studies which have examined differences in prevalence rates between DSM-5 and ICD-11, in different traumatized samples (e.g., Hansen et al., 2015; Hyland et al., 2016; O'Donnel et al., 2014; Shevlin et al., 2018). Prevalence rates were also significantly higher for DSM-5-based criteria in the subsample confronted with natural loss. This was not so in the subsample confronted with unnatural loss. However, considering that rates for DSM-5-based caseness were numerically higher, the lack of a significant difference may be due to the small size of that subsample. In the full sample, the diagnostic agreement between the diagnostic systems was moderate; 5.9 % ($n = 64$) met criteria for caseness according to one but not the other system. This finding endorses other researchers' calls for harmonization of the criteria of the two systems (e.g., Hafstad et al., 2017; Hyland et al., 2016) considering that the existence of different descriptions of the same disorder make it challenging to identify underlying risk-factors and targets for treatment.

Our third aim was to compare PTSD cluster scores and total scores (as per DSM-5 and ICD-11) between participants confronted with natural vs. unnatural deaths. In both systems, scores were significantly higher in the

Table 5
Numbers of participants meeting and not meeting criteria for probable PTSD as per DSM-5 and ICD-11.

DSM-5 based probable caseness	Non-sudden, natural loss	Sudden, unnatural loss	Total sample	Chi square	p-value
Negative	841 (79.0)	121 (11.1)	962 (90.4)	6.41	.011
Positive	80 (7.5)	22 (2.1)	102 (9.6)		
Total	921 (86.6)	143 (13.4)	1064 (100)		
ICD-11 based probable caseness					
Negative	869 (81.7)	127 (11.9)	996 (93.6)	6.36	.012
Positive	52 (4.9)	16 (1.5)	68 (6.4)		
Total	921 (86.6)	143 (13.4)	1064 (100)		

Note. DSM-5 = Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition. ICD-11 = International Classification of Diseases 11th Revision. PTSD = Posttraumatic stress disorder. Numbers in front of each cell are the number of participants; numbers in parentheses are percentages of total.

latter group, except for scores on the re-experiencing cluster. Thus, symptoms of avoidance, NACM, and hyperarousal as distinguished in DSM-5 and symptoms of avoidance and heightened current threat, as distinguished in ICD-11 were more severe among those confronted with deaths to suicide, accidents or homicide. This is what was anticipated based on prior evidence that unnatural loss is associated with relatively more severe symptoms, including PTSD symptoms (cf. Burke and Neimeyer, 2013; Djelantik et al., 2020; Kristensen et al., 2012). That reexperiencing symptoms did not differ between the subsamples is unexpected. Trauma theories propose that re-experiencing of traumatic events stems from data-driven processing of sensory information about the events overshadowing meaning-based processes (e.g., Ehlers and Clark, 2000). Because the circumstances of sudden, unnatural deaths usually include more intense and meaningful sensory information, we would expect such deaths to bring about more severe re-experiencing symptoms. Apparently, however, while such losses indeed lead to more intense PTSD, this is not due to its impact on re-experiencing phenomena.

Our fourth aim was to compare prevalence rates of probable PTSD caseness between people confronted with natural vs. unnatural deaths. As anticipated, rates of DSM-5-based and ICD-11-based probable PTSD were higher among participants confronted with unnatural losses. On top of the finding that sudden loss was associated with higher scores on most PTSD symptom clusters, this is a further indication that sudden losses make people more vulnerable to substantial traumatic stress. Rates of probable PTSD as per DSM-5 (15.4 %) and ICD-11 (11.2 %) that we found were higher than the 5.2 % reported by Atwoli et al. (2017) based on summarized data from different countries. Difference may be due to the fact that we used a self-selected sample (with a possible overrepresentation of people with relatively more problems) whereas Atwoli et al. relied on probability sampling. Moreover, Atwoli et al.'s samples also included people confronted with sudden natural deaths (due to medical causes) which may yield lower PTSD rates than deaths to unnatural causes, studied in this study.

Findings regarding our fifth aim were unexpected. Across all regressions with DSM-5- and ICD-11-based PTSD cluster and total scores included as dependent variables, whether the loss was natural or unnatural did not explain variance. Lower age, education, and time since loss plus death of a partner or child were associated with elevated PTSD cluster scores but, beyond these variables, dichotomized cause was not. When we consider that effect sizes for differences in continuous scores were small (Table 4) and also considering some prior evidence that expected and unexpected deaths may yield similar levels of PTSD (Mol et al., 2005), then it is possible that the impact of circumstances of the loss on PTSD symptoms is more modest than is sometimes assumed. The reasons for this warrant further scrutiny; it is possible that some deaths categorized as "natural" do, in fact, constitute traumatizing elements such as when illness trajectories get protracted or when people have to witness the consequences of disturbing medical treatments and the suffering of the person who is ill (cf. Kaplow et al., 2014). At the same time, there is quite some evidence that sudden deaths cause substantially higher levels of prolonged grief symptoms (Djelantik et al., 2020). Future research should continue to investigate the extent to which circumstances of losses (in terms of their objective characteristics as well as subjectively experienced unexpectedness) are associated with different outcomes after loss, including PTSD and prolonged grief symptomatology.

There are several limitations to this study. A first limitation is that we used a measure of DSM-IV-based PTSD symptoms. This measure represents most but not all DSM-5 symptoms (Rosellini et al., 2015) and its items do not precisely correspond to the ICD-11 symptoms (WHO,

Table 6
Summary of regression analyses with sociodemographic and loss-related characteristics as independent variables and PTSD cluster and total scores as dependent variables.

	DSM-5					ICD-11			
	Reex-periencing	Avoidance	NACM	Hyper-arousal	Total	Reex-periencing	Avoidance	Heightened threat	Total
	β	β	β	β	β	β	β	β	β
Gender	.04	.02	<0.01	.15***	.06*	.04	.02	.07*	.05
Age	−0.14***	−0.17***	−0.28***	−0.26***	−0.26***	−0.12***	−0.17***	−0.22***	−0.22***
College/university (vs. other)	−0.13***	−0.07*	−0.09**	−0.14***	−0.13***	−0.14***	−0.07*	−0.10***	−0.13***
Months since loss	−0.20***	−0.08*	−0.08**	−0.06*	−0.13***	−0.14***	−0.08*	.03	−0.08*
Partner died (vs. others)	.18***	.04	.30***	.17***	.23***	.09*	.04	.06	.08*
Child died (vs. others)	.11***	.05	.13***	.08**	.12***	.06	.05	.04	.06
Sudden, unnatural (vs.non-sudden, unnatural) loss	.03	.05	.05	.04	.05	−0.01	.05	.06	.04
F	18.81	6.61	24.35	21.75	24.03	9.52	6.61	10.26	11.86
DF	7, 1058	7, 1058	7, 1058	7, 1058	7, 1058	7, 1058	7, 1058	7, 1058	7, 1058
P	< 0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Adjusted R^2	.105	.036	.134	.121	.132	.053	.036	.058	.067

Note. DSM-5 = Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition. ICD-11 = International Classification of Diseases 11th Revision. NACM = Negative alterations in cognitions and mood.

2019). Moreover, that we assessed symptoms of DSM-5 and ICD-11 with the same instrument may have inflated associations between both systems. Thus, the current findings are tentative, pending replication in studies using distinct measures of DSM-5 and ICD-11-based symptoms. Second, assessment of PTSD symptoms were all based on self-report and, moreover, we did not assess functional impairment caused by these symptoms. Although we were careful to refer to *probable* (rather than actual) PTSD caseness, future work with clinical interviews is needed to determine the true PTSD rates, based on the DSM-5- and ICD-11-systems, as well as their overlap. Third, we categorized participants into two broad groups of people confronted with natural deaths (mostly due to illnesses) and unnatural deaths (due to accidents, suicide, or homicide). It is possible that some findings would be different in more specifically defined groups. Fourth, this study was limited by the utilization of a convenience sample. Caution should be applied in generalization of the findings, pending further studies with representative samples.

Notwithstanding these limitations, the present study contributes to the limited literature about the dimensionality and severity of PTSD symptomatology associated with losses of close persons occurring under different circumstances. In addition, our findings add to the growing evidence base that DSM-5-based and ICD-11-based criteria perform differently in assessing PTSD severity and prevalence rates. From a clinical perspective, the findings confirm that people facing unnatural losses may be more prone to develop PTSD symptomatology and, therefore, should be watched extra closely by caregivers providing bereavement care. At the same time, that the impact of dichotomized cause seemed limited, suggests that other variables, including sociodemographic characteristics and subjective perspectives on traumatizing elements of the death, are important in identifying people at risk for bereavement-related PTSD. From a research perspective, our finding that cause of loss seemed to have a limited impact on PTSD underlines the importance of more research into the extent to which different circumstances of loss, in different groups of people, lead to different emotional problems.

Author contribution

PB is the only author and designed the study, collected the data, performed the statistical analyses, and wrote the manuscript.

Declaration of Competing Interest

The author declares to have no conflicts of interest.

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