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A validation study of the Dutch Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5) after the loss of a loved one in a traffic accident

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Abstract

Introduction: Posttraumatic stress disorder (PTSD) is a mental disorder that can develop after exposure to a traumatic event or situation. The aim of this study was to examine the psychometric properties of a Dutch self-report measure, the 20-item Posttraumatic Stress Disorder Checklist (PCL-5), in bereaved people who experienced a loss of a loved one as a result of a road traffic accident.

Methods: We examined the: i) internal consistency, ii) convergent validity, iii) known-groups validity, and iv) optimal clinical cut-off scores for detecting probable PTSD cases in a sample of 273 Dutch adults who lost a loved one in a road traffic accident. In particular, Cronbach's alpha, Pearson's correlation analysis, t-tests and receiver operating curve analyses were performed to evaluate the reliability and validity of the Dutch PCL-5.

Results: The PCL-5 items of the total as well as the subscales demonstrated good internal consistency (α's > .80). Positive, strong, and significant associations between posttraumatic stress scores and symptom levels of prolonged grief (r = .81) and depression (r = .63) supported convergent validity. Associations between sociodemographic/loss-related variables including gender, educational level, time since loss as well as kinship and posttraumatic stress symptoms supported known-groups validity. The optimal cut-off score for the PCL-5 total scale was ≥ 27 (sensitivity = .97, specificity = .84) for probable caseness of DSM-5 PTSD.

Conclusion: Overall, preliminary validation of the Dutch PCL-5 was proven to be a psychometrically sound instrument for measuring PTSD symptom severity in a sample of bereaved people who experienced the loss due to a road traffic accident. Future research should examine the factor structure for the Dutch PCL-5 and conduct other validation studies in diverse bereaved samples. Implications for use of the PCL-5 might benefit researchers and clinicians in a variety of assessment contexts and are discussed.

Keywords: PTSD, validation, PCL-5, loss, grief

Introduction

Posttraumatic stress disorder (PTSD) is a mental disorder that can arise in some people after exposure to a potentially traumatic event that is beyond a typical stressor. The lifetime prevalence of PTSD is reported to be as high as 7.8% in trauma-exposed individuals (Kessler, 1995). It is found in people who have experienced traumatizing circumstances and major negative events in their lives such as natural or man-made disasters (Boelen et al., 2019; Djelantik et al., 2020; Javidi & Yadollahie, 2012; Komischke-Konnerup et al., 2021). The death of a loved one is another stressful event that may result in PTSD (Lenferink et al., 2022). In some cases after loss, individuals experience emotional reactions such as fear, or helplessness and behavioural symptoms that may be prominent (American Psychiatric Association, 2013). Other individuals tend to feel constantly on-edge, uneasy, or easily startled; symptoms that are disabling and cause persistent suffering for a prolonged period of time (Komischke-Konnerup et al., 2021; Lenferink, van den Munckhof, et al., 2021). When the event is traumatizing may lead to long-lasting PTSD complaints, especially in the case of a violent and sudden loss of a loved one, such as a family member, a friend, or a spouse.

Traumatic losses include any loss in the context of potentially traumatizing circumstances such as traffic accidents (Boelen et al., 2019; Djelantik et al., 2020; Javidi & Yadollahie, 2012; Komischke-Konnerup et al., 2021). About one-half of all adults will experience at least one traumatic event in their lives, but most do not develop PTSD. Research shows that millions of traffic accidents occur every year across the world (World Health Organization [WHO], 2022). And according to the World Health Organization (WHO, 2020), road traffic accidents (RTAs) are the leading cause of an unnatural death.

The most commonly used self-report measure to assess PTSD symptoms per Diagnostic and Statistical Manual of Mental Disorders (DSM-5) is the Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5) (Blevins et al., 2015). The PCL-5 is used to screen symptoms of

PTSD in clinical and research contexts (Van Praag et al., 2020). The original version of the PCL was developed in 1990 at the National Centre for PTSD and comprised 17 items based on the criteria of the fourth edition of the DSM (DSM-IV) (American Psychiatric Association, 1994). The symptoms of PTSD in DSM-IV were categorized into three clusters; Intrusive recollections, Avoidance or Numbing, and Arousal (American Psychiatric Association, 1994). However, in the fifth edition of the DSM, the diagnostic criteria for PTSD were revised. PTSD in DSM-5 includes the following four symptom clusters; Intrusion, Avoidance, Negative alterations in mood and cognitions, and Arousal (American Psychiatric Association, 2013). PCL-5 is a revised version of the PCL that underwent some changes, comprising 20 items each of which corresponds to one of the PTSD symptoms in the DSM-5 (American Psychiatric Association, 2013; Van Praag et al., 2020; Weathers et al., 2013). Based on the DSM-5 guidelines, a provisional PTSD diagnosis may be obtained from the PCL-5 by considering items rated 2 (= "Moderately") or more, and then following the DSM-5 diagnostic scoring rule; at least one reexperiencing symptom, one avoidance symptom, two symptoms of negative alterations in mood and cognition, and two symptoms of marked alterations in arousal and reactivity present.

The Intrusion PTSD cluster includes repeated upsetting dreams or nightmares related to the event, flashbacks, persistent and intense distress as well as bodily reactions after reminders of the event (American Psychiatric Association, 2013). The Avoidance cluster refers to people who tend to avoid places, activities, objects, and people that bring up memories of the traumatic event. In the Negative alterations in mood and cognitions cluster, individuals may experience a pervasive negative emotional state such as sadness, anger, or fear regarding the event. This category also includes feeling detached from others, inability to remember an important aspect of the traumatic event, negative evaluations about oneself, others or the world in general and the inability to experience positive emotions. The Arousal cluster involves

symptoms of feeling constantly in danger which is known as hypervigilance. In this cluster of changes in arousal and reactivity, other symptoms can be difficulty in concentration, aggressive behaviours, irritability, and sleep disturbance.

An initial psychometric evaluation of the PCL-5 demonstrated strong reliability and validity in a trauma-exposed college students sample (Blevins et al., 2015). Similar results with high internal consistency of the questionnaire were found in a trauma-exposed clinical German sample (Krüger-Gottschalk et al., 2017), and a non-clinical French and English sample of undergraduate students as well (Ashbaugh et al., 2016). Concerning the convergent validity of PCL-5, previous studies in the trauma-exposed German sample revealed a high correlation with CAPS-5, which is a structured interview for PTSD assessment (Krüger-Gottschalk et al., 2017). Both the English and French versions of PCL-5 among undergraduate students showed a strong convergent validity with IES-R, which is a self-report measure of PTSD symptom severity (Ashbaugh et al., 2016). A relative study on a trauma-exposed clinical Japanese sample also demonstrated similar results with related constructs such as IES-R or PHQ-9, which is an assessment of depression (Ito et al., 2019). Concerning the known-groups validity of PCL-5, a previous study showed that the total score of PCL-5 was significantly higher in women than men, and in participants who lost a child rather than another family member, in a sample of adults who have lost a relative or spouse due to a traffic accident (Vaitsi, 2020). Moreover, a study investigating a sample of veterans from the United States, showed that cut-off scores of 31 to 33 on the PCL-5 had the best diagnostic utility in predicting probable PTSD cases with high sensitivity and specificity (Bovin et al., 2016).

While PCL-5 has been used in national and international research in different languages and samples, the psychometric properties of the Dutch translation for people who have lost a loved one after a traffic accident remains to be studied. To date, there is only one validation study of the Dutch PCL-5 available (Van Praag et al., 2020). Specifically, this study evaluated

the psychometric properties of the Dutch PCL-5 on a civilian population after a traumatic brain injury (Van Praag et al., 2020). This study indicated that the Dutch PCL-5 has excellent internal consistency and high criterion validity (Van Praag et al., 2020). In order to examine the criterion validity of the PCL-5, van Praag et al. (2020) reported the correlations of the PCL-5 instrument with two related instruments; Generalized anxiety disorder (GAD-7) and Patient health questionnaire (PHQ-9). The Dutch PCL-5 proved to be psychometrically sound and appropriate to be used for clinical and research purposes in people who experienced a brain injury (Van Praag et al., 2020).

Most validation studies did not include bereaved people. To date, there is a paucity of studies assessing the psychometric properties of the Dutch PCL-5 for people after the loss of a loved one in an RTA. The objective of the present study was first to assess the psychometric quality of the Dutch PCL-5, and second, to elucidate whether this instrument is valid and reliable to measure PTSD severity in order to be used for research in RTA traumatically bereaved people. The internal consistency, convergent validity, known-groups validity and clinical cut-off scores of the Dutch PCL-5 were subject to examination. Examining the psychometric properties of the Dutch PCL-5 in people confronted with a loss of a loved one after an RTA was needed to ensure the utility of this instrument for people who are at risk for PTSD in order to enhance the diagnostics in clinical settings and benefit the researchers in future similar studies.

Psychometric properties of the PCL-5 were evaluated for the sample of RTA bereaved Dutch adults by examining the: i) internal consistency, ii) convergent validity, iii) known-groups validity, and iv) optimal clinical cut-off scores. A good internal consistency for the four subscales as well as a strong internal consistency value for the total scale (Cronbach's alpha (α) ≥ 0.7) was expected (Blevins et al., 2015). To test convergent validity, we examined the association of DSM-5 PTSD levels with neighboring syndromes of depression and grief. We

expected that posttraumatic stress scores would be strongly positively associated with depression severity and grief levels ($r > 0.50$) (Heeke et al., 2017; Komischke-Konnerup et al., 2021). For known-groups validity, we expected higher PTSD symptoms in women than men, in those without a university degree, and we hypothesized that more recently bereaved people who lost a child or spouse would report higher symptom levels of PTSD than another type of relationship with the deceased (Vaitsi, 2020). Moreover, we determined the optimal clinical cut-off scores in order to distinguish between individuals meeting and not meeting the criteria for probable PTSD cases.

Methods

Participants and procedure

Participants were Dutch-speaking adult people who lost loved ones in an RTA. Data were collected from the "TrafVic Project" examining the consequences of the loss of a loved one(s) in a road traffic accident (Boelen et al., 2017; Lenferink et al., 2020; Lenferink, Keijser, et al., 2021). The recruitment of participants took place between December 2018 and April 2020. Dutch-speaking adults who lost a friend, spouse, or a family member due to a road traffic accident at least 12 months earlier were included in this study. Two-hundred-seventy-three people completed the online survey via Qualtrics online survey tool.

The recruitment of participants was conducted using various strategies. In particular, the majority (n = 221, 81%) were recruited via Victim Support (a Dutch non-governmental organization offering judicial, practical and emotional support to victims after exposure to traumatic events), 22 (8%) via social media (e.g., Facebook), 21 participants (7.7%) were recruited via a family member or a friend who pointed them to this study and another 1 participant (0.4%) was recruited via a fellow sufferer/peer. The remaining eight participants (3%) were recruited via other ways. The survey's duration was approximately thirty minutes,

and a written informed consent was obtained from all participants before participation in the study. The current study was approved by the ethics committee of the University of Groningen.

Measures

Posttraumatic Stress Disorder Checklist (PCL-5)

The PCL-5 is a 20-item self-report instrument to assess and screen the symptoms of PTSD to determine the severity of symptoms of PTSD, as well as monitor symptom change after treatment or to construct a provisional diagnosis (van Praag et al., 2020; Weathers et al., 2013). The PCL-5 contains four subscales corresponding to the four symptom clusters; re-experiencing, avoidance, negative alterations in cognition and mood, and increase arousal and reactivity. The 20 items of the PCL-5 reflect the DSM-5 criteria for PTSD and presented in Appendix A (Weathers et al., 2013). Participants were asked how much they have been bothered by each item over the past month. Items of the questionnaire were scored on a 5-point Likert scale ranging from 0 (not at all) to 4 (extremely), where higher scores indicate more pronounced symptoms of PTSD. The sum scores of the PCL-5 range from 0 to 80. For each item, a score of 2 (which represents “Moderately”) or above is regarded as clinically relevant. Based on the DSM-5 guidelines, participants can be accorded a tentative PTSD diagnosis if they indicate at least one re-experiencing symptom, one avoidance symptom, two symptoms of negative alterations, and two arousal symptoms (Ashbaugh et al., 2016). The PCL-5 has demonstrated excellent reliability and validity in trauma-exposed college students as well as strong test-retest reliability (Blevins et al., 2015). Furthermore, PCL-5 has shown strong internal consistency and convergent and discriminant validity in a sample of firefighters, medical technicians, and police officers seeking treatment for PTSD (Morrison et al., 2021).

Traumatic Grief Inventory-Self Report Plus (TGI-SR+)

TGI-SR+ is a 22-item measure to assess prolonged grief disorder (PGD) as defined in the International Classification of Diseases (ICD-11) and DSM-5-TR and persistent complex

bereavement disorder (PCBD) as defined in DSM-5 (see Appendix B) (Lenferink et al., 2022). Participants rated to what extent they experienced each symptom during the past month, in response to the death of their loved one, on a 5-point Likert scale ranging from 1 (= "never") through 5 (= "always"). Based on prior research, when a participant rated "frequently" or "always", then the symptom was considered endorsed. To meet the criteria of PGD, the scoring rule that was used was the following: at least one symptom of Criterion B and at least three of the eight Criterion C symptoms, and the symptom of Criterion D should be endorsed. The TGI-SR+ has demonstrated good internal consistency, test-retest reliability, and convergent validity (Lenferink et al., 2022). Therefore, TGI-SR+ proved to be a reliable and valid measure in diverse bereaved individuals and the high area under the curve index indicated the appropriateness of TGI-SR+ in detecting probable diagnoses of PCBD and PGD (Lenferink et al., 2022). Cronbach's alpha of TGI-SR+ in the current sample was 0.95.

Hospital Anxiety and Depression Scale (HADS)

The depression subscale of the Hospital Anxiety and Depression Scale (HADS-D) consists of seven items (e.g., "I feel cheerful" or "I still enjoy the things I used to enjoy"). The participants were asked to rate their reactions that were closest to how they have been feeling over the past week (see Appendix C). Seven items of the questionnaire were scored on a 4-point scale ranging from 0 (e.g., "Not at all") through 3 (e.g., "Most of the time"). The Depression subscale of HADS has been shown as a valid and reliable measure to assess the severity of depression in different age groups of Dutch people as well as in family caregivers caring for a patient dying due to cancer (Gough & Hudson, 2009; Spinhoven et al., 1997; Zigmond & Snaith, 1983). Cronbach's alpha of HADS in the current study was 0.31.

Sociodemographic and Loss-Related Information

Participants reported their gender (1= male, 2= female), date and country of birth, and highest completed level of education (1= primary education, 2= VMBO, MAVO, LBO,

MULO, 3= MB0 (MEAO, MTS), 4= HAVO, VWO (HBS, MMS), 5= HBO, WO, university (HTS, HEAO)). In addition, the kinship between the participant and the deceased loved one (1= partner, 2= child, 3= father/mother, 4= brother/sister, 5= none of the above, namely my …) was assessed in the introductory questions. Participants were also asked about the date of death, indicating the day, month, and the exact year. Finally, the time since the loss of their loved ones in years was also calculated based on the time of the survey's completion and the date of death.

Statistical Analyses

Statistical analyses were performed using IBM SPSS, version 28.0 (IBM Corp., Armonk, N.Y., USA). We used a frequency table to present demographical characteristics. PTSD, PGD, and depression levels were presented as mean (*M*), standard deviation (*SD*), and range (min-max). In order to evaluate the validity and reliability of the Dutch PCL-5, its psychometric properties including i) internal consistency, ii) convergent validity, iii) known-groups validity, and iv) optimal clinical cut-off scores were examined.

Reliability

Cronbach's alpha (α) was used to measure the internal consistency (reliability) of the 20-item total scale and its subscales representing DSM-5 PTSD symptom clusters (American Psychiatric Association, 2013). Cronbach's α values ≥ 0.7 indicate an acceptable level of reliability, ≥ 0.8 indicating a very good level of reliability, and ≥ 0.9 indicating an excellent level of reliability (Cicchetti, 1994; Taber, 2017).

Validity

Convergent validity was reported by calculating Pearson's (r) correlations to examine the associations of the summed scores among the 20 items representing DSM-5 PTSD symptoms (PCL-5) with grief reactions (TGI-SR+) and depression levels (HADS). Pearson's correlation coefficient can range between −1.0 and 1.0. A correlation of 1.0 indicates a perfect

positive correlation and a correlation of −1.0 shows a perfect negative correlation, as well as the correlation coefficient of 0, indicates no relationship between the measures. In general, a value of $r > 0.50$ is considered a strong correlation while a value of $r = 0.30$ indicates a moderate correlation (Cohen, 1988).

Furthermore, known-groups validity index was examined. T-tests and correlation analysis (for the time since loss in years variable) were conducted to examine the associations between severity levels of DSM-5 PTSD and background/loss-related variables. In detail, the variables that were used included the participants' gender (1 = male, 2 = female), their educational level (0 = low educational level, 1 = high educational level), time since loss as well as the relationship (0 = other than spouse/child, 1 = spouse/child) with the deceased.

Optimal Clinical Cut-off Scores

To estimate the clinical cut-off scores, the sensitivity, specificity, as well as positive and negative predictive values of the total scale scores were computed (Habibzadeh et al., 2016; Manea et al., 2011). Receiver Operating Characteristic (ROC) analyses were computed to determine and visualize the optimal clinical cut-off score of the PCL-5 for the identification of probable cases of DSM-5 PTSD by determining the maximum of the area under the curve (AUC) using the diagnostic scoring rule of the PCL-5 (Ibrahim et al., 2018). In a ROC curve, the true positive rate (TPR) is plotted against the false positive rate (FPR) for each possible cut-off score (Chan, 2020). This means that the ROC curve showed the trade-off between sensitivity (TPR) and specificity (1-FPR) (Chan, 2020). The AUC between 0.70 and 0.80 is considered fair, between 0.80 and 0.90 is considered good, and between 0.90 and 0 is considered excellent. An area below 0.70 indicates a poor accuracy of the score for distinguishing between probable caseness and non-caseness (Ferraris, 2019). The Youden index can also be used to determine the optimal cut-off point for a score that optimizes the combination of sensitivity and specificity. A Youden's Index [sensitivity – (1-specificity)]

below 0.70 indicates a poor score accuracy for distinguishing between probable caseness and non-caseness (Ferraris, 2019).

Results

Sample Characteristics

Table 1 shows the characteristics of the sample used in this study. The sample consisted of 206 females and 67 males. They were middle-aged on average and about half of the sample had a university degree. The most common type of loss due to a traffic accident was the loss of a child. On average, the loss took place approximately five years earlier.

Table 1

Characteristics of Dutch participants who lost loved ones in a traffic accident (N=273).

Gender, *N (%)*	
Male	67 (24)
Female	206 (76)
Age, *M (SD)*	51.63 (12.72)
Level of education, *N (%)*	
Lower than university	156 (57)
University	117 (43)
Time since loss in years, *M (SD)*	4.73 (6.04)
Number of people that died in a traffic accident, *N (%)*	
1	251 (92)
2	17 (6)
3	2 (1)
4	3 (1)
Deceased relative is my…, *N (%)*	
Partner/spouse	59 (22)
Child	105 (39)
Father/Mother	37 (14)
Brother/Sister	47 (17)
Other	25 (9)

Mean Scores of PTSD, PGD, and Depression

Descriptive statistics for the total scores of questionnaires measuring PTSD, PGD, and depression levels are shown in Table 2. Percentages of people meeting the diagnostic criteria for PTSD, PGD and depression are also displayed. Based on the cut-off score suggested in the literature (Weathers et al., 2013), the mean score (22.79) of the total scale of PTSD was below the optimal clinical cut-off score (≥ 31), which constitutes a subclinical sample. The mean score (63.90) of PGD was also below the cut-off score used in prior research (Lenferink et al., 2022), that is ≥ 71, which provides a subclinical sample. However, the mean score of depression (08.78) was above the optimal clinical cut-off score (≥ 8) suggested in several studies (Olssøn et al., 2005) and therefore, the sample is considered clinical. Furthermore, 25.3% of the participants met the criteria for probable caseness using the diagnostic scoring rule for DSM-5 PTSD and 34.8% met the diagnostic criteria for PGD. No diagnostic scoring rule is available for the depression subscale of the HADS. Based on the cut-off score of ≥ 8, 60.8% of the sample scored above this cut-off.

Table 2

Characteristics of the sample with mean scores and proportion of participants who meet the diagnostic criteria for PTSD, PGD, and Depression (N = 273).

	Min	Max	Mean (SD)	Proportion meeting the diagnostic criteria (%)
PTSD	0.00	63.00	22.79 (15.50)	25.3
PGD	22.00	108.00	63.90 (18.41)	34.8
Depression	03.00	16.00	08.78 (2.76)	60.8

Note. PTSD = Posttraumatic Stress Disorder; PGD = Prolonged grief disorder.

Internal Consistency of PTSD measure

As seen in Table 3, the alpha was 0.93 for PCL-5 for the total scale indicating an excellent internal consistency. Cronbach's alpha values for the four subscales were $\alpha > 0.80$, which showed good internal consistency.

Table 3

Reliability coefficients for the PCL-5 (N = 273)

Scale	Cronbach's alpha
PCL-5	
Intrusion (Items 1-5)	0.87
Avoidance (Items 6-7)	0.83
Cognition/Mood (Items 8-14)	0.82
Arousal (Items 15-20)	0.82
Total score	**0.93**

Note. Posttraumatic Stress Disorder Checklist-5.

Convergent Validity

Table 4 shows the associations of the total scores of the 20 items representing the DSM-5 PTSD symptoms with symptom levels of PGD and depression. Both associations were positive, strong and significant.

Table 4

Pearson Correlations between PTSD and symptom levels of PGD and depression (N = 273).

	PTSD
PGD	0.81***
Depression	0.63***

Note. PTSD = Posttraumatic Stress Disorder; PGD = Prolonged grief disorder.

***. $p < .001$, two-tailed.

Known-groups Validity

Independent sample t-tests and correlation analysis showed that people with low education and those who were more recently bereaved, reported significantly higher summed PTSD scores. No statistically significant differences were found between those who have lost a spouse or child and those other than a spouse or child. PTSD scores did not differ between men and women (t = -.40).

Table 5

Correlations between the PCL-5 and sociodemographic and loss-related variables (N=273).

	DSM-5 PTSD	Test Statistic
Gender, M (SD)		$t(273) = -0.40$
Men	22.13	
	(15.55)	
Women	23.00	
	(15.52)	
Education Level, M (SD)		$t(273) = 2.30$*
Lower than university	24.65	
	(16.22)	
University	20.32	
	(14.18)	
Time since loss (in years)		$r = -.17$**
Kinship with the deceased, M (SD)		$t(273) = -3.29$
Other than spouse/child	19.07	
	(15.30)	
Spouse/child	25.26	
	(15.18)	

Note. DSM-5 = 5th edition of the Diagnostic and Statistical Manual of Mental Disorders; PTSD = Posttraumatic Stress Disorder.

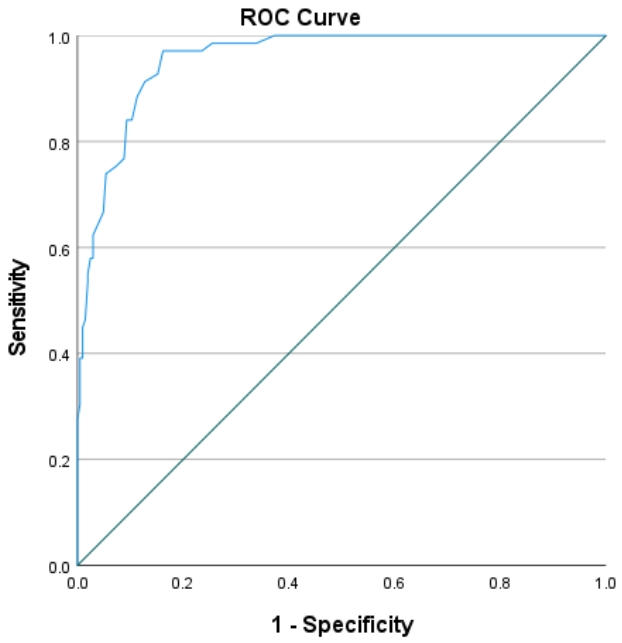
* $p < .05$; ** $p < .01$.

Optimal Clinical Cut-off Scores

As presented in Figure 1 and in Table 6, the optimal cut-off when using the PCL-5 total score was ≥ 27 for DSM-5 PTSD (AUC = 0.955 (95% CI = 0.934-0.977)). With this score, 97% of the PTSD cases were correctly identified and 16% incorrectly identified as a PTSD case. The Youden's index was good J = 0.80.

Figure 1

Receiver operating characteristic curve of the PTSD using the diagnostic scoring rule. AUC value, Standard Error (SE) and statistical significance (p) are shown under the curve.



AUC = .955, SE = .011, $p < .001$

Note. PTSD = Posttraumatic Stress Disorder; AUC = Area Under the Curve.

Table 6

Determining optimal clinical cut-off for DSM-5 PTSD (N= 273).

DSM-5 PTSD caseness			
PTSD score	Sensitivity	1-Specificity	Youden's J index
≤21	.986	.338	.648
22	.986	.294	.692
23	.986	.255	.731
24	.971	.235	.736
25	.971	.221	.750
26	.971	.186	.785
27	**.971**	**.162**	**.809**
28	.928	.152	.776
29	.913	.127	.786
30	.884	.113	.771
31	.841	.103	.738
32	.841	.093	.748
≥33	.768	.088	.680

Note. Bold figures indicate the optimal clinical cut-off score.

Discussion

PTSD is a trauma- and stressor-related disorder that affects people's lives on many different levels and ways. A majority of people experience at least one potentially traumatic event during their life, but most do not develop PTSD. About 6 out of every 100 people (approximately 6%) will develop PTSD after experiencing a traumatic event, such as the sudden loss of a loved one after a traffic accident (Gradus, 2007; Julia, 2022). The most-used questionnaire that assesses the 20 symptoms of PTSD as defined in DSM-5 is the Posttraumatic Stress Disorder Checklist (PCL-5). However, there is only one Dutch validation study available, which does not include a bereaved sample. Therefore, the aim of the current study was to test and examine the psychometric properties of the Dutch PCL-5, a self-report measure

to assess the symptoms of DSM-5 PTSD. The study included a large community sample of Dutch-speaking adults who lost a loved one in a road traffic accident.

A strong internal consistency was found in the total scale and the corresponding subscales of the Dutch PCL-5. This is in agreement with previous research on many different cultures and populations (Ashbaugh et al., 2016; Blevins et al., 2015; Ibrahim et al., 2018; Krüger-Gottschalk et al., 2017; Sveen et al., 2016). These findings show that there is homogeneity among the items of the PCL-5, and all of the 20 scale items correlate with one another measuring the same construct.

With respect to convergent validity of the PCL-5, as expected, significant and strong associations were found between PCL-5 total scores and depression and PGD symptoms. These findings attest to the convergent validity of the PCL-5, and they are largely consistent with prior research (Komischke-Konnerup et al., 2021), including latent class analytic studies indicating that PTSD is distinguishable from the syndromes of PGD and depression (Boelen & Lenferink, 2019; Boelen et al., 2010; Lenferink et al., 2017). The responses of PCL-5 exhibited a strong relationship with responses on concepts related to PTSD, including PGD and depression. Other studies have also reported strong associations between PTSD, PGD and depression (Boelen & Lenferink, 2019; Komischke-Konnerup et al., 2021).

Furthermore, known-groups validity was also demonstrated. As expected, we found that having a lower education level and being more recently bereaved were related to higher levels of PTSD. These findings are in accordance with previous studies (Applebaum & Burns, 1991; Boelen & Lenferink, 2019; Lenferink et al., 2022; van Praag et al., 2020). Contrarily, the loss of a child or spouse was not related to increased PTSD levels. A possible explanation for this result might be that the participants considered the loss of their loved one, either their child and spouse or parents and siblings, of equal importance making them feeling the grief. In addition, we failed to confirm that these scores differed between male and female participants.

It is likely that the small number of male participants in this study prevented us in detecting gender differences consistently.

Moreover, we defined the probable caseness of DSM-5 PTSD using the best possible clinical cut-off score. For determination of caseness of PTSD, the optimal cut-off score when summing up all 20 PCL-5 items was ≥ 27, with high sensitivity and specificity rates. The cut-off score in the present study was lower than the empirically determined cut-off scores found in previous validation studies. For instance, Bovin et al. (2016) determined an optimal clinical cut-off score of ≥ 31 in a sample of veterans. Blevins et al., (2015) evaluated the psychometric properties of the PCL-5 among undergraduate students and found that this measure achieved an appropriate sensitivity, specificity, and overall efficiency at a cut-off score of ≥ 37. Similarly, Krüger-Gottschalk et al. (2017) studied the psychometric properties of the German version of the PCL-5 and determined 33 as the optimal cut-off score, achieving a sensitivity of .86 and a specificity of .68. It should be noted that using the suggested cut-off scores of ≥ 31 and ≥ 33 based on existing literature (Weathers et al., 2013) resulted in low specificity and sensitivity rates. However, Ibrahim et al. (2018) also found a quite low cut-off score of ≥ 23. A possible explanation for the cut-off score that we found in the present study might be that other studies that have detected higher cut-off scores also included other diagnostic measurements such as the CAPS which a highly structured instrument and not only the PCL-5. Another possible explanation for this is that the optimal clinical cut-off score found in this study might be related to the composition of the sample.

The first strength of this study was that it included a large sample of RTA bereaved participants. Another strong point is that this is the first Dutch validation study which includes a bereaved sample as the other preliminary validation of the Dutch version of the PCL-5 was in a civilian population after traumatic brain injury. However, there are some limitations to consider. First, the study included a voluntary response sample resulting in an

overrepresentation of females that typically participate in a research examining the consequences of, and care after, the loss of a loved one in an RTA. The low number of males might have affected the possibility to detect gender differences in PTSD symptoms. Second, the way each participant interprets the questions can influence the results. The method used in this study was not verified against a structured diagnostic interview for PTSD, and thus, it was not able to evaluate the comparability and diagnostic utility of the PCL-5 scores with those based on ratings of clinicians. Third, the factor structure of items representing symptoms of DSM-5 PTSD was not assessed in our study. This warrants further investigation in order to assess the structure of the PCL-5 questionnaire using for instance, the four-factor DSM-5 PTSD model, the six-factor Anhedonia model, or the seven-factor Hybrid model.

The findings of this validation study of the PCL-5 have several implications. Our findings can be seen as preliminary evidence, and replication is required for future research. It also provides a potential foundation for further investigations into mental health and trauma in the Dutch population as well as a tool for the screening of affected individuals by local health services. It offers a time-efficient way for assessing and evaluating all relevant PTSD symptoms derived from current and forthcoming DSM versions. Furthermore, clinicians are likely to benefit from the results of this study as they may find it helpful to use the PCL-5 in order to get a first indication of the levels of PTSD experienced by their clients and enhance the diagnostics in clinical settings. Researchers might benefit from these findings in terms of future similar research using the data from the qualitative methodology for comparisons across studies on different populations with different characteristics. The free availability of the PCL-5 in different languages might help and enable future validation studies, which in turn will facilitate investigations on the characteristics of PTSD across cultures.

In conclusion, to our knowledge, this is the first psychometric evaluation of the PCL-5 in a Dutch-speaking sample who lost a loved one after an RTA. The present study provides

relevant evidence regarding the reliability and validity of the PCL-5 indicating that it is a psychometrically sound self-report measure for the DSM-5 PTSD symptom severity. Specifically, our results support the PCL-5's internal consistency as well as convergent validity and known-groups validity. Based on the findings of this study and that of others in various trauma samples across various languages, PCL-5 has proved to be appropriate for a variety of clinical and research assessment tasks, including quantifying PTSD symptom severity, establishing a provisional PTSD diagnosis, and estimating the prevalence of PTSD (Ashbaugh et al., 2016; Boysan et al., 2017; Ibrahim et al., 2018; Ito et al., 2019; Krüger-Gottschalk et al., 2017). In the long term, we believe that this study will provide an important step towards future research on the characteristics and consequences of PTSD across different cultures and languages.

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Appendix A

PTSD Checklist for DSM-5 (PCL-5)

In the past month, how much were you bothered by:	Not at all	A little bit	Moderately	Quite a bit	Extremely
1. Repeated, disturbing, and unwanted memories of the death of your loved one due to a traffic accident?	0	1	2	3	4
2. Repeated, disturbing dreams of the death of your loved one due to a traffic accident?	0	1	2	3	4
3. Suddenly feeling or acting as if the death of your loved one due to a traffic accident were actually happening again (as if you were actually back there reliving it)?	0	1	2	3	4
4. Feeling very upset when something reminded you of the death of your loved one due to a traffic accident?	0	1	2	3	4
5. Having strong physical reactions when something reminded you of the death of your loved one due to a traffic accident (for example, heart pounding, trouble breathing, sweating)?	0	1	2	3	4

6. Avoiding memories, thoughts, or feelings related to the death of your loved one due to a traffic accident?	0	1	2	3	4
7. Avoiding external reminders of the death of your loved one due to a traffic accident (for example, people, places, conversations, activities, objects, or situations)?	0	1	2	3	4
8. Trouble remembering important parts of the death of your loved one due to a traffic accident?	0	1	2	3	4
9. Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)?	0	1	2	3	4
10. Blaming yourself or someone else for the death of your loved one due to a traffic accident or what happened after it?	0	1	2	3	4
11. Having strong negative feelings such as fear, horror, anger, guilt, or shame?	0	1	2	3	4
12. Loss of interest in activities that you used to enjoy?	0	1	2	3	4

13. Feeling distant or cut off from other people?	0	1	2	3	4
14. Trouble experiencing positive feelings (for example, being unable to feel happiness or have loving feelings for people close to you)?	0	1	2	3	4
15. Irritable behavior, angry outbursts, or acting aggressively?	0	1	2	3	4
16. Taking too many risks or doing things that could cause you harm?	0	1	2	3	4
17. Being “superalert” or watchful or on guard?	0	1	2	3	4
18. Feeling jumpy or easily startled?	0	1	2	3	4
19. Having difficulty concentrating?	0	1	2	3	4
20. Trouble falling or staying asleep?	0	1	2	3	4

Appendix B

Traumatic Grief Inventory – Self Report Plus (TGI-SR+)

Below several grief reactions are listed. Please indicate how often you have experienced each reaction in the past month in response to the death of your loved one due to a traffic accident.

	Never	Rarely	Sometimes	Frequently	Always
1. I had intrusive thoughts or images related to the person who died due to a traffic accident.					
2. I experienced intense emotional pain, sadness, or pangs of grief.					
3. I found myself longing or yearning for the person who died due to a traffic accident.					
4. I experienced confusion about my role in life or a diminished sense of self.					
5. I had trouble accepting the loss.					
6. I avoided places, objects, or thoughts that reminded me that the person I lost has died due to a traffic accident.					
7. It was hard for me to trust others.					
8. I felt bitterness or anger related to his/her death.					
9. I felt that moving on (e.g., making new friends, pursuing new interests) was difficult for me.					
10. I felt emotionally numb.					
11. I felt that life is unfulfilling or meaningless without him/her.					

12. I felt stunned, shocked, or dazed by his/her death due to a traffic accident.
13. I noticed significant reduction in social, occupational, or other important areas of functioning (e.g., domestic responsibilities) as a result of his/her death due to a traffic accident.
14. I had intrusive thoughts and images associated with the circumstances of his/her death due to a traffic accident.
15. I experienced difficulty with positive reminiscing about the lost person.
16. I had negative thoughts about myself in relation to the loss (e.g., thoughts about self-blame) of the loved one due to a traffic accident.
17. I had a desire to die in order to be with the deceased.
18. I felt alone or detached from other individuals.
19. It felt unreal that he/she is dead.
20. I put an intense blame on others because of his/her death.
21. It felt as if a part of me has died along with the deceased.
22. I had difficulties experiencing positive feelings.

Appendix C

Hospital Anxiety and Depression Scale (HADS)

D	A		D	A	
		I feel tense or 'wound up':			**I feel as if am slowed down:**
	3	Most of the time	3		Nearly all the time
	2	A lot of the time	2		Very often
	1	From time to time, occasionally	1		Sometimes
	0	Not at all	0		Not at all
		I still enjoy the things I used to enjoy:			**I get a sort of frightened feeling like 'butterflies' in the stomach:**
0		Definitely as much		0	Not at all
1		Not quite so much		1	Occasionally
2		Only a little		2	Quite often
3		Hardly at all		3	Very often
		I get a sort of frightened feeling as if something awful is about to happen:			**I have lost interest in my appearance:**
	3	Very definitely and quite badly	3		Definitely
	2	Yes, but not too badly	2		I don't take as much care as I should
	1	A little, but it doesn't worry me	1		I may not take quite as much care
	0	Not at all	0		I take just as much care as ever
		I can laugh and see the funny side of things:			**I feel restless as I have to be on the move:**

0		As much as I always could		3	Very much indeed
1		Not quite so much now		2	Quite a lot
2		Definitely not so much now		1	Not very much
3		Not at all		0	Not at all
		Worrying thoughts go through my mind:			**I look forward with enjoyment to things:**
	3	A great deal of the time	0		As much as I ever did
	2	A lot of the time	1		Rather less than I used to
	1	From time to time, but not too often	2		Definitely less than I used to
	0	Only occasionally	3		Hardly at all
		I feel cheerful:			**I get sudden feelings of panic:**
3		Not at all		3	Very often indeed
2		Not often		2	Quite often
1		Sometimes		1	Not very often
0		Most of the time		0	Not at all
		I can sit at ease and feel relaxed:			**I can enjoy a good book or radio or TV program:**
	0	Definitely	0		Often
	1	Usually	1		Sometimes
	2	Not often	2		Not often
	3	Not at all	3		Very seldom