Assessing the Predictive Validity of Early Post-injury CAPS-5 for Later Posttraumatic Stress Disorder Diagnosis

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Abstract

Objective: The Clinician-Administered PTSD Scale for *DSM-5* (CAPS-5) is a widely recognized tool with exceptional reliability and validity in evaluating and diagnosing PTSD. This study aimed to determine the predictive values of CAPS-5 assessed early postinjury for subsequent development of PTSD during a 2-year follow-up period.

Methods: Patients with moderate to severe physical injuries were recruited from a trauma center at a university hospital in South Korea between June 2015 and January 2021. At baseline, 1,142 patients underwent evaluations using CAPS-5 for the diagnosis of acute stress disorder (ASD) along with total scores. They were followed up for PTSD using the CAPS-5 evaluations at 3, 6, 12, and 24 months post-baseline. Area under receiver operating curve (AUROC) analyses were conducted to identify predictive values of the CAPS-5 for later PTSD development.

Results: CAPS-5 diagnosis of ASD at baseline displayed fair to failed performance (AUROCs: 0.555–0.722) for predicting follow-up PTSD. However, CAPS-5 scores of ≥15 exhibited good to fair predictive accuracy (AUROCs: 0.767–0.854) for later PTSD development. Notably, for patients with intentional injuries or a history of previous trauma, a higher CAPS-5 score of ≥16 showed improved predictive accuracy.

Conclusion: A CAPS-5 score of ≥15 would be an effective and practical cutoff for early prediction of PTSD following physical injuries. In cases of intentional injuries or a documented trauma history, a cutoff of ≥16 may offer enhanced predictive precision. Future research in diverse settings and populations is needed to confirm the generalizability of our findings.

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Posttraumatic stress disorder (PTSD) often develops following traumatic events. Among these, traumatic physical injuries resulting from accidents, acts of violence, or other distressing incidents rank prominently as triggers for PTSD development. Such injuries frequently lead to impaired functioning and a reduced quality of life.[1] Consequently, early prediction of PTSD is crucial for both prevention and effective management in physically injured patients. Therefore, understanding the predictors of PTSD is critical, with numerous studies investigating a wide range of potential risk factors, including sociodemographic variables (eg, age, gender, education, and socioeconomic status), preexisting health conditions (eg, prior mental or physical disorders, past trauma, childhood adversities, substance abuse, and personality traits), trauma-related attributes (eg, injury severity and dissociation), and peritrauma states (eg, psychological distress, cognitive symptoms, and physiological indicators such as heart rate).[2–4] Despite these extensive investigations, as highlighted by a comprehensive systematic review of 44 studies on road traffic accident survivors, findings regarding PTSD predictors post-physical injuries have been markedly inconsistent, with conflicting outcomes across almost all variables examined.[5] This discrepancy may be partly due to many studies assessing PTSD at a single time point, which ranges from 1 month to 2 years post-event,[6,7] failing to account for the dynamic nature of PTSD symptomatology and its predictors over time.[8]

The Clinician-Administered PTSD Scale for *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition (*DSM-5*) (CAPS-5),[3] is a widely recognized tool for evaluating PTSD, traditionally utilized 1 month posttrauma. Additionally, its application extends to the early acute phase following traumatic injuries, between 5 and 10 days post-event, where it has demonstrated

Clinical Points

- The predictive validity of the Clinician-Administered PTSD Scale for *DSM-5* (CAPS-5) for PTSD development immediately after a traumatic injury is not fully understood.
- A CAPS-5 score of ≥15 provides very good to good predictive accuracy for subsequent PTSD development in the general injured population.
- For individuals with intentional injuries or a previous trauma history, a CAPS-5 score of ≥16 offers improved predictive accuracy.

good reliability and validity.[9–11] It is a structured clinical interview that has demonstrated exceptional reliability and validity in evaluating and diagnosing PTSD across various populations,[12] including physically injured patients.[13,14] Despite its extensive use, the predictive validity of CAPS-5 when administered shortly after traumatic events for later PTSD development remains inadequately understood. An international study did report that initial CAPS total scores were significantly associated with follow-up PTSD.[15] However, this study did not propose an optimal cutoff value, which would be highly beneficial for health care professionals working with trauma patients during the early stages.

To address this knowledge gap, the primary objective of our study is to determine the optimal cutoff scores for CAPS-5 when evaluated shortly after physical injuries, with the aim of predicting the development of PTSD during a 2-year follow-up period.

METHODS

Study Overview and Participants

This analysis was conducted as a part of the Biomarker-based diagnostic algorithm for Post-Traumatic Syndrome study, aimed at developing accurate models for diagnosing and predicting PTSD. A detailed study protocol has been previously published.[16] Participants were prospectively recruited from patients who had recently been hospitalized for physical injuries between June 2015 and January 2021 at the Department of Trauma Center of Chonnam National University Hospital (CNUH) in Gwangju, South Korea. Inclusion criteria were as follows: (1) individuals aged 18 years or older at the index injury, (2) patients hospitalized for more than 24 hours after sustaining a moderate to severe physical injury measured by the Injury Severity Score (ISS) ≥9,[17] and (3) individuals sufficiently proficient in the Korean language to comprehend the study protocol. Exclusion criteria were as follows: (1) moderate or severe brain injury measured by the Glasgow Coma Scale (GCS) <10[18]; (2) physical injuries resulting from suicide attempts; (3) conditions hindering comprehensive psychiatric evaluation due to severe physical ailments; (4) prior history of psychiatric disorders including psychotic disorder, bipolar disorder, or alcohol or substance use disorders other than depressive and anxiety disorders; (5) significant cognitive impairments due to organic mental or neurocognitive disorders; and (6) preexisting convulsive disorders or a history of anticonvulsant use. Patients underwent baseline psychiatric assessments including CAPS-5 within 1 month of their hospitalization, conducted in person. The mean (SD) time from physical injuries to baseline assessments was 8.8 (5.3) days. Assessments were conducted within a range of 3–27 days postinjury, a timeframe determined by the practical necessity of conducting these assessments before patients' discharge from the hospital and the feasibility of psychiatric interviews during this acute period. This required an adaptation of the standard CAPS-5 timeframe to accommodate the logistical constraints of clinical settings and ensure timely evaluation of PTSD symptoms. Subsequent follow-up evaluations using CAPS-5 were conducted via telephone interviews at 3, 6, 12, and 24 months later. The CAPS-5 was administered by 2 research nurses, who were specifically trained and supervised by experienced research psychiatrists to ensure adherence to the standardized administration protocol. This training included detailed review sessions of the CAPS-5 manual, role-playing exercises, and observation of administered assessments until proficiency was established. Ethical clearance for this study was obtained from the CNUH Institutional Review Board (CNUH 2015-148). All participants carefully reviewed the consent form, and written informed consent was duly acquired.

Baseline CAPS-5 Evaluations

Symptom severity and diagnoses of acute stress disorder (ASD) were assessed by the CAPS-5. Symptom severity for each *DSM-5* ASD symptom was determined by summing the frequency (ranging from 0 to 4) and the intensity (ranging from 0 to 4) of the assessed symptoms, with the total score representing the overall severity. The diagnosis of ASD was established by employing the CAPS-5 assessment method, evaluation symptoms from Cluster B of the *DSM-5* criteria. A diagnosis was established if the individual met 9 or more of the 14 symptoms from Cluster B.[19]

Other Baseline Characteristics

Sociodemographic characteristics included age, sex, duration of education, marital status (currently married or not), cohabitation status (living alone or not), religion (religious observance or not), occupational state (current employed or not), and monthly income (above or below 3,000 USD). Participants' experiences of previous lifetime traumatic events were assessed using the Life

Events Checklist,[9] with the occurrence of at least 1 type of event categorized as present for analysis purposes. For trauma-related characteristics, type of accidental injury was evaluated utilizing the Life Events Checklist,[9] which aided in identifying the specific type of traumatic event that participants had experienced. Recognizing that PTSD prevalence and symptom patterns often significantly differ between unintentional (eg, accidents) and intentional (eg, violent and interpersonal) traumas,[20] injury types were categorized into these 2 distinct groups. Injury severity was evaluated with the ISS and GCS as detailed in the eligibility criteria section of the Methods, with higher scores on ISS and lower scores on GCS indicating more pronounced symptomatology. The occurrence of surgical procedures related to the injury was documented.

Follow-Up Evaluations

From 1 month after the incident and throughout the follow-up period, the diagnosis of PTSD was made using the CAPS-5 evaluation and *DSM-5* criteria. This involved identifying at least 1 symptom from Cluster B, 1 from Cluster C, 2 from Cluster D, and 1 from Cluster E and meeting the criteria in Clusters F and G.[19] Stressful life events (SLEs) experienced during the follow-up period were assessed using the Life Experiences Survey questionnaire.[21] Responses were summarized to calculate a score, with participants subsequently categorized based on the presence or absence of SLEs. Additionally, any PTSD treatment received during the follow-up period was documented based on patient reports.

Statistical Analysis

Descriptive data at baseline and at follow-up were presented, and comparisons were made between patients who completed the 24-month follow-up and those who did not using *t* tests or χ^2 tests. Predictabilities of baseline diagnoses of ASD for PTSD at each follow-up point were estimated using area under receiver operating curve (AUROC) analyses. Optimal cutoff scores were selected to maximize both sensitivities and specificities. Additionally, optimal cutoff scores for baseline CAPS-5 total scores along with associated sensitivities, specificities, positive predictive value (PPV), and negative predictive value (NPV) were calculated for predicting follow-up PTSD using AUROC analyses. Additional analyses were conducted to assess whether the findings differed between unintentional vs intentional injury types and in the context of absent vs present previous trauma. The AUROC is often categorized based on the following general guidelines: 0.90–1.00 as excellent, 0.80–0.90 as good, 0.70–0.80 as fair, 0.60–0.70 as poor, and 0.50–0.60 as fail.[10] Statistical analyses were performed using the SPSS 21.0 software. Statistical significance was set at a threshold of $P < .05$.

RESULTS

Recruitment and Data at Baseline and During Follow-Up

The recruitment process from the baseline assessment to the 24-month follow-up and the prevalence of ASD and PTSD are illustrated in Figure 1. Of 1,142 patients evaluated at baseline, 918 (80.4%) were successfully followed up at the 24-month last follow-up. The mean time from physical injuries to the 24-month follow-up was 24.5 months (SD = 0.6), with a range of 23.4–25.2 months. Table 1 summarizes the baseline and follow-up data for all patients, including a comparison of those who did and did not complete the 24-month follow-up. Incomplete follow-up was significantly associated with several baseline characteristics, including female sex, unemployment, lower monthly income, and higher baseline CAPS-5 scores (all *P* values < .05). Additionally, among the follow-up data, incomplete follow-up showed significant associations with fewer SLEs and less PTSD treatment received (all *P* values < .05).

Baseline ASD and Follow-Up PTSD Probabilities

The predictabilities of the baseline diagnosis of ASD using the CAPS-5 for subsequent PTSD diagnoses are detailed in Table 2. AUROCs for 3-month PTSD were found to be fair, while for 6-, 12-, and 24-month PTSD, the AUROCs were found to be failed. While the specificities and NPVs were very high, the sensitivities and PPVs were notably low.

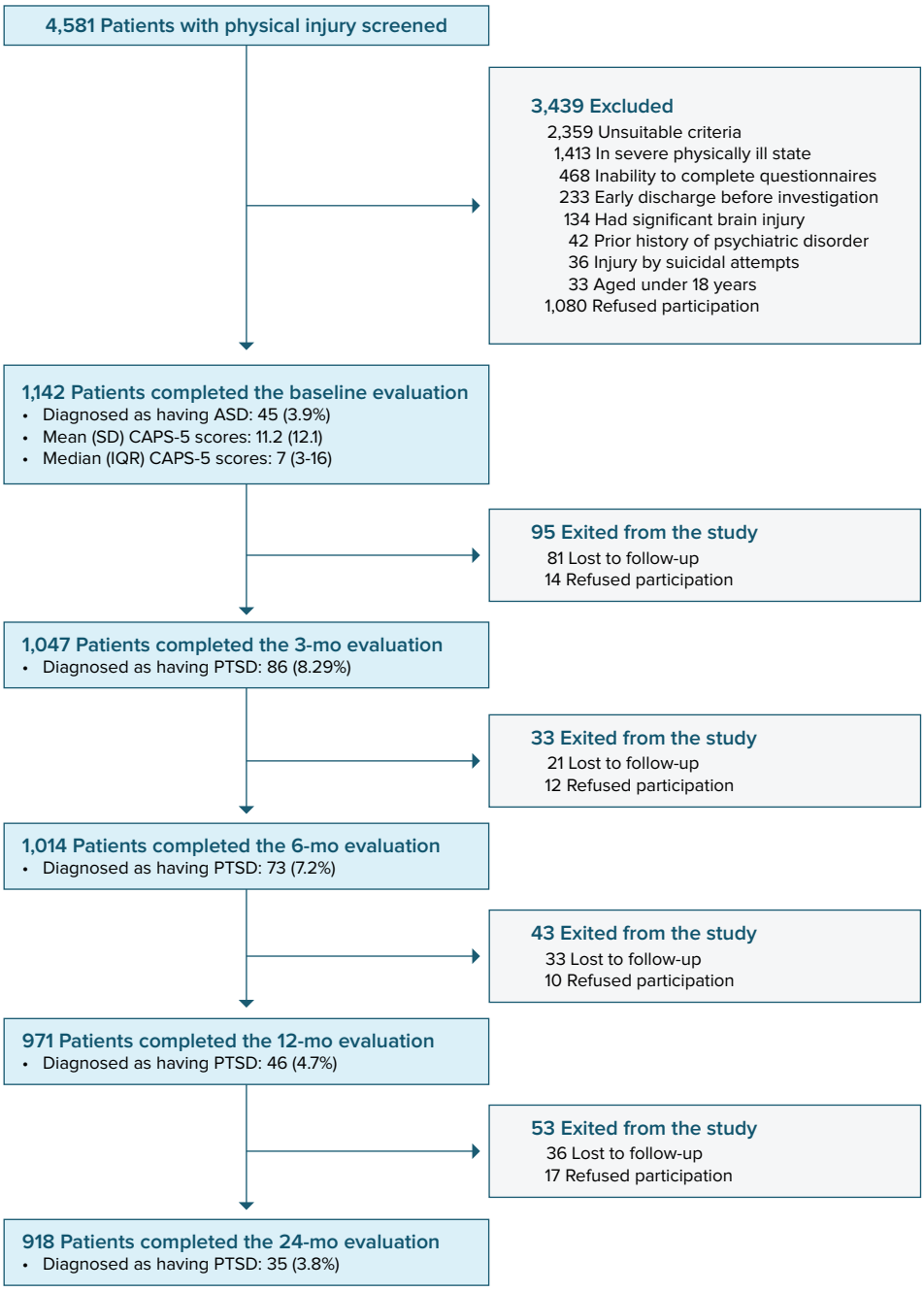
Baseline Optimal CAPS-5 Cutoff Scores for Follow-Up PTSD

Considering both sensitivity and specificity, optimal CAPS-5 cutoff scores for follow-up PTSD were identified. Scores of 14–16 were found to be optimal, with scores ≥15 yielding the highest sensitivity and specificity, as detailed in Supplementary Table 1. AUROCs were good for 3-month PTSD and fair for 6-, 12-, and 24-month PTSD, indicating a reasonable performance in predicting follow-up PTSD, as summarized in Table 3 with associated sensitivities 72.9%–80.2%, specificities 76.7%–77.3%, PPVs 70.1%–76.0%, and NPVs 70.5%–78.9% for all follow-up PTSD assessments.

Baseline Optimal CAPS-5 Cutoff Scores for Follow-Up PTSD by Injury Type and Previous Trauma History

The results of the AUROC analyses differentiated by injury type and previous trauma history are presented in Supplementary Tables 2 and 3, respectively. For patients with unintentional injuries, the optimal CAPS-5 scores of ≥15, which demonstrated the highest sensitivity and specificity, were consistent with the findings across all participants. However, for patients

Figure 1.
Patient Flow and Prevalence of ASD and PTSD by Using the CAPS-5



Abbreviations: ASD = acute stress disorder, CAPS = Clinician-Administered PTSD Scale for *DSM-5*, IQR = interquartile range, PTSD = posttraumatic stress disorder.

with intentional injuries, a CAPS-5 score of ≥16 was identified as the optimal cutoff, achieving the highest sensitivity and specificity. Similarly, patients without previous trauma were optimally assessed with a CAPS-5 score of ≥15, whereas those with a prior trauma history necessitated a higher cutoff of ≥16 for optimal assessment.

DISCUSSION

The primary finding from this 2-year longitudinal study is that CAPS-5 scores of ≥15, assessed shortly after physical injuries, offer very good to good predictive accuracy for subsequent PTSD development. This threshold proves to be a reliable indicator for the majority

Table 1.

Patients' Data by Completers and Noncompleters of the 24-Mo Follow-Up

	All participants (N = 1142)	24-mo follow-up		
		Completer (N = 918)	Noncompleter (N = 224)	*P* value[a]
Sociodemographic characteristics				
Age, mean (SD), y	56.8 (17.2)	56.5 (16.9)	58.0 (18.5)	.261
Sex, N (%) female	359 (31.4)	267 (29.1)	92 (41.1)	<.001
Education, mean (SD), y	10.7 (4.1)	10.8 (4.0)	10.3 (4.5)	.134
Marital status, N (%) unmarried	382 (33.5)	304 (33.1)	78 (34.8)	.628
Living alone, N (%)	177 (15.5)	136 (14.8)	41 (18.3)	.196
Religious observance, N (%)	344 (40.0)	373 (40.6)	102 (45.5)	.182
Unemployed status, N (%)	220 (19.3)	154 (16.8)	66 (29.5)	<.001
Monthly income, N (%) <3,000 USD	666 (58.3)	514 (56.0)	152 (67.9)	.001
Preinjury lifetime traumatic events, N (%) present	47 (4.1)	40 (4.4)	7 (3.1)	.405
Trauma-related characteristics				
Time from physical injury to baseline evaluation, mean (SD) days	8.8 (5.3)	8.8 (5.2)	8.9 (5.4)	.929
Injury type, N (%) intentional	98 (8.6)	84 (9.2)	14 (6.3)	.165
ISS, mean (SD) score	14.6 (5.8)	14.7 (5.8)	14.1 (5.7)	.213
GCS, mean (SD) score	14.8 (0.7)	14.8 (0.7)	14.9 (0.7)	.751
Had surgery for the injury, N (%)	603 (52.8)	487 (53.1)	116 (51.8)	.734
CAPS-5, mean (SD) score	11.2 (12.1)	10.7 (11.7)	13.2 (13.1)	.010
Posttrauma characteristics				
SLEs, N (%) present	245 (21.5)	209 (22.8)	36 (16.1)	.029
Received any PTSD treatment, N (%)	34 (3.0)	33 (3.6)	1 (0.4)	.013

[a]*t* Tests or χ^2 tests, as appropriate between patients with and without 24-mo follow-up evaluation.
Abbreviations: CAPS = Clinician-Administered PTSD Scale for *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition (*DSM-5*), GCS = Glasgow Coma Scale, ISS = Injury Severity Score, PTSD = posttraumatic stress disorder, SLE = stressful life event.

of injury types. Interestingly, for patients who sustained intentional injuries or had a previous trauma history, a higher CAPS-5 score of ≥16 emerged as a more appropriate cutoff.

Before drawing a conclusion, several important considerations should be addressed. First, it is noteworthy that the baseline CAPS-5 scores in our study were relatively low, with a mean of 11.2, compared to previous studies with similar patient cohorts where means ranged from 16.9 to 21.6.[8,22] This discrepancy raises the possibility that the lower mean baseline CAPS-5 scores may have influenced the determination of the optimal cutoff. It is essential to recognize that, to our knowledge, no prior studies have proposed optimal cutoff points for CAPS-5, making direct comparisons challenging. Second, the rationale behind selecting the CAPS-5 for baseline evaluations during the acute phase post-physical injury should be considered. As stated in the Introduction, the CAPS-5 has been demonstrated to be both reliable and valid shortly after traumatic events.[9–11] Despite the availability of other well-validated and less resource-intensive measures, such as the self-report PTSD Checklist for *DSM-5*,[23] we opted for the CAPS-5 due to its comprehensive assessment capabilities. Patients with moderate to severe physical injuries often find it challenging to complete self-report measures in the acute phase. The CAPS-5, being rater-administered, not only accommodates these patients more effectively but

Table 2.

Baseline Diagnoses of ASD by Using the CAPS-5 and Probabilities of PTSD at Follow-Up

Evaluation points	N	% PTSD	AUROC	Sensitivity	Specificity	PPV	NPV
3 mo	1047	8.2	0.708	14.0%	98.4%	44.4%	92.7%
6 mo	1014	7.2	0.555	5.5%	97.7%	15.4%	93.0%
12 mo	971	4.7	0.565	8.7%	97.7%	16.0%	95.6%
24 mo	918	3.8	0.592	14.3%	98.0%	21.7%	96.6%

Abbreviations: ASD = acute stress disorder, AUROC = area under receiver operating curve, CAPS-5 = Clinician-Administered PTSD Scale for *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition (*DSM-5*), NPV = negative predictive value, PPV = positive predictive value, PTSD = posttraumatic stress disorder.

Table 3.

Baseline CAPS-5 Cutoff Scores of ≥15 and Probabilities of PTSD at Follow-Up

Evaluation points	N	% PTSD	AUROC	Sensitivity	Specificity	PPV	NPV
3 mo	1047	8.2	0.854	80.2%	77.3%	76.0%	78.9%
6 mo	1014	7.2	0.791	75.6%	77.0%	74.3%	73.8%
12 mo	971	4.7	0.779	73.9%	76.9%	72.5%	70.5%
24 mo	918	3.8	0.767	72.9%	76.7%	70.1%	70.7%

Abbreviations: AUROC = area under receiver operating curve, CAPS-5 = Clinician-Administered PTSD Scale for *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition (*DSM-V*), NPV = negative predictive value, PPV = positive predictive value, PTSD = posttraumatic stress disorder.

also provides a thorough evaluation of traumatic impact, including socio-occupational functioning and overall psychological assessment. Third, it is essential to emphasize the significance of context in determining the "optimal" CAPS-5 cutoff scores for PTSD diagnosis. Given the variation in settings, from acute inpatient to broad primary care environments, a one-size-fits-all approach to cutoff scores is not feasible. Our findings suggest that survivors of intentional injuries and individuals with a history of trauma may necessitate distinct cutoff scores, highlighting the imperative for contextually tailored assessments. This approach not only accommodates the diversity of trauma experiences but also strives to mitigate disparities in PTSD care, advocating for a judicious application of cutoff scores. Last, we observed a significant association between incomplete follow-up and unfavorable baseline factors such as unemployment, lower monthly income, and higher baseline CAPS-5 scores. This attrition could potentially bias our results toward better outcomes. This suggests that the predictive validity of the CAPS-5 for subsequent PTSD development might be overestimated in our sample. In a related observation, incomplete follow-ups were also significantly associated with reports of fewer SLEs and less PTSD treatment received. This latter association may not be considered as a bias but rather reflects the natural limitations encountered by participants with shorter follow-up durations. Their reduced time in the study inherently limited their opportunities to report SLEs or engage in PTSD treatment.

Notwithstanding these considerations, our findings have significant implications. With respect to clinical implications, the identification of a specific cutoff score on the CAPS-5 has practical implications for health care professionals working with trauma patients. The initial contact with trauma survivors at acute trauma centers provides a crucial opportunity for early intervention. Early assessment using CAPS-5 with a threshold of ≥15 can help identify individuals who are at a higher risk of developing PTSD in the future. This allows for early intervention and targeted support for those most in need. From a research perspective, this study adds to the growing body of research focused on the early prediction of PTSD. The fluctuating nature of PTSD symptoms, with some individuals experiencing delayed expression symptoms, has posed a challenge for accurate prediction. By establishing a specific cutoff score on the CAPS-5, our findings contribute to a more nuanced understanding of early PTSD diagnosis.

The observation that a CAPS-5 score of ≥16 emerged as a more appropriate cutoff for patients who sustained intentional injuries or had previous trauma warrants further exploration. Intentional injuries, such as assaults or violence, are associated with a complex psychological aftermath, including personal violation and additional burdens of fear, betrayal, and stigmatization.[24] These traumas are likely to provoke stronger feelings of helplessness, anger, and prolonged stress, potentially leading to more severe or persistent PTSD symptoms compared to unintentional injuries.[20] Similarly, individuals with a history of trauma may experience a heightened stress response or more severe PTSD symptoms upon re-exposure, a phenomenon known as trauma sensitization.[25] This cumulative psychological effect from past traumas can amplify the impact of new traumatic incidents, possibly resulting in a more complex clinical presentation that necessitates a higher symptom severity level for PTSD diagnosis. This increase in the cutoff score implies that individuals exposed to intentional trauma or those with previous trauma histories require a higher symptom severity threshold to be considered at comparable risk for developing PTSD. Such an insight underscores the critical need to account for both the context and history of trauma when assessing PTSD risks, highlighting the CAPS-5's capability to distinguish between different trauma types and histories in clinical settings. However, given the small sample size of patients with intentional injuries and previous trauma in our study, further research is required to validate and generalize these findings. Expanding upon our findings, subsequent studies are encouraged to explore how additional sociocultural factors affect PTSD risk assessments, potentially offering richer insights that could refine PTSD screening and intervention strategies, ensuring they are more aptly tailored to meet the diverse needs of patient populations.

Our findings align with a previous systematic review of 22 studies that suggested ASD diagnosis alone inadequately identifies the majority of individuals who eventually develop PTSD.[26] This implies that considering a broader range of symptoms based on CAPS-5 cutoff scores may prove more useful for predicting later PTSD than solely relying on the ASD diagnosis. While this binary cutoff score approach could offer a clear threshold for clinical utility, it may not fully capture the spectrum of traumatic stress responses that exist between subsyndromal and diagnosable levels of PTSD distress. Therefore, future research employing dimensional analysis to explore the CAPS-5's predictive performance across multiple severity increments could significantly enrich our understanding of the scale's sensitivity and specificity across the PTSD symptom continuum.

A significant limitation of this study was that participants were recruited exclusively from a single trauma center, which may constrain the generalizability of our findings to broader populations and settings. It is imperative for future research to validate and broaden these findings across multiple trauma centers and diverse populations. Our study focused on patients hospitalized for moderate to severe physical injuries, potentially overlooking individuals with minor physical injuries. Moreover, by recruiting only individuals who suffered physical injuries, our findings' generalizability to those who have experienced other types of traumatic events, including interpersonal or psychological trauma, is limited. Although traumatic physical injuries are recognized as significant triggers for PTSD development,[1] the predictive validity of CAPS-5 scores for PTSD may differ across various trauma types. Future research is needed to explore the CAPS-5's predictive validity across a broader spectrum of traumatic events, enhancing the generalizability of the current findings. In addition, a formal interrater reliability assessment was absent in this study. While the CAPS-5 has demonstrated high interrater reliability in previous validation studies,[27] the lack of this measure within our own study represents a missed opportunity to directly confirm the consistency of PTSD diagnoses across administrators. Our study did not specifically assess treatment for prior traumatic injuries before the index injury, a factor that could potentially influence PTSD symptom profiles and trajectories. While our follow-up evaluations were conducted via telephone interviews, it is worth noting that this method has been shown to be as valid as face-to-face interviews.[28]

In conclusion, our study provides valuable insights into early PTSD prediction following physical injuries, highlighting the effectiveness of a CAPS-5 score of ≥15 with reasonable predictive accuracy for later PTSD development in the general injured population. Importantly, for those with intentional injuries or a trauma history, a CAPS-5 score of ≥16 shows improved predictive accuracy. Our findings carry significant clinical implications for refining screening practices in health care settings to better facilitate access to evidence-based PTSD care. By establishing distinct cutoff scores for survivors of intentional injuries and those with a history of trauma, it can be suggested for a more comprehensive screening approach. This strategy enables the precise identification of individuals at heightened risk for PTSD, ensuring they receive timely and appropriate referrals for care. Particularly in acute hospital settings, where patients arrive with a broad spectrum of injuries, the application of injury and trauma history-specific cutoff scores is crucial for the early detection of PTSD. Implementing such differentiated screening practices is essential for achieving accurate and equitable PTSD risk assessment across varied clinical environments, ultimately leading to more personalized treatment approaches. Future research in this area should explore avenues to enhance the sensitivity of early PTSD prediction while maintaining high specificity. Moreover, studies conducted in diverse clinical settings and with larger, more diverse patient populations would help validate the generalizability of the observed cutoff scores.

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Author Contributions: J.M. Kim and Shin designed the study. Kang and J.W. Kim constructed and performed study methodology. Lee, J.C. Kim, and S.W. Kim contributed to project administration. J.M. Kim, Kang, J.W. Kim, Jang, and J.C. Kim acquired data and curated data. J.M. Kim, Kang, J.W. Kim, Jang, and J.C. Kim contributed to formal analysis. J.M. Kim and J.W. Kim contributed to writing of the original draft. J.M. Kim, Kang, Jang, and J.C. Kim contributed to reviewing and editing of the draft.

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