



Confirmatory Factor Analysis of the PTSD Checklist for DSM-5 in Psychiatric Outpatients With PTSD

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Objective Accumulating evidence suggests that the latent structure of post-traumatic stress disorder (PTSD) symptoms may be more differentiated than the four-factor model proposed in Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5). While expanded factor models have been supported in trauma-exposed and community samples, their applicability in clinically diagnosed psychiatric outpatient populations remains unexplored. This study aimed to evaluate and compare competing DSM-5-based PTSD factor models in a general adult psychiatric outpatient sample using the Korean version of the PTSD Checklist for DSM-5 (K-PCL-5).

Methods Psychological data were obtained from 229 adults who were first-visit psychiatric outpatients diagnosed with PTSD or probable PTSD at a university hospital in South Korea. PTSD symptoms were assessed using the K-PCL-5. Confirmatory factor analyses (CFA) were conducted to compare eight competing PTSD models, including one- and two-factor models, the DSM-5 four-factor model, and alternative multidimensional models (dysphoria, dysphoric arousal, externalizing behavior, anhedonia, and hybrid). Models were estimated using the weighted least squares mean- and variance-adjusted estimator for ordinal data. Model fit was evaluated using multiple fit indices.

Results The DSM-5 four-factor model demonstrated a borderline fit. All alternative multidimensional models showed improved fit relative to the DSM-5 model. Among them, the seven-factor hybrid model provided the best overall fit, followed by the six-factor anhedonia and externalizing behavior models. One- and two-factor models demonstrated poor fit.

Conclusion PTSD symptoms in Korean adult psychiatric outpatients are better represented by expanded multidimensional factor models than by the DSM-5 four-factor model. These findings support the clinical applicability of post-DSM-5 expanded PTSD models and highlight the need for further validation across diverse clinical populations.

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Keywords Post-traumatic stress disorder; PTSD Checklist for DSM-5; Confirmatory factor analysis; Factor structure; Psychometrics; DSM-5.

INTRODUCTION

Post-traumatic stress disorder (PTSD) is diagnosed according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) when an individual has been exposed to a traumatic stressor and subsequently exhibits four distinct symptom clusters that persist for more than 1 month.¹

PTSD is not a rare condition; the average lifetime prevalence across 26 international population-based surveys was 3.9%.² In South Korea, comparable prevalence rates have been reported in two large-scale epidemiological studies (1.7% and 4.7%, respectively).^{3,4} The persistence of PTSD symptoms also warrants attention, as a substantial proportion of individuals continue to experience disabling symptoms once the disorder develops. World survey data indicate that the mean duration of PTSD symptoms is approximately 6 years (ranging from 1 to 13 years, depending on the type of trauma).² Another large-scale survey conducted in Australia reported that although 92% of PTSD cases eventually remit, a median of 14 years was required to achieve recovery.⁵ Taken together, these findings underscore the importance of early detection and tailored interventions for individuals who have experienced

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potentially traumatic events.

Among the self-report measures developed to screen for PTSD and assess symptom severity, the PTSD Checklist for DSM-5 (PCL-5) stands out as one of the most extensively psychometrically validated instruments and is widely used in both clinical and research settings worldwide.^{6,7} Systematic reviews have demonstrated sound internal consistency, test-retest reliability, and construct validity for both total and subscale scores, as well as sensitivity to clinically meaningful symptom changes.⁷

The latent factor structure of PTSD symptoms has been extensively examined using confirmatory factor analysis (CFA).⁸ Early models conceptualized PTSD symptoms as a three-factor structure under Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, whereas subsequent empirical findings informed the revision of PTSD diagnostic criteria to a four-factor structure in DSM-5.^{1,9} Despite the adoption of a four-factor framework in the DSM-5, accumulating evidence suggests that PTSD symptoms may be better represented by more differentiated multidimensional models, including six- and seven-factor structures.¹⁰

Multiple alternative models extending the DSM-5 four-factor framework have been proposed, including a five-factor model separating dysphoric arousal,^{11,12} a six-factor externalizing behavior model,¹³ and a six-factor anhedonia model.¹⁴ In addition, a seven-factor hybrid model integrating features of the externalizing behaviors and anhedonia models has been proposed, with subsequent studies reporting improved model fit relative to other DSM-5-based models.^{15,16} At the same time, methodological concerns have been raised regarding the interpretation of improved model fit in increasingly complex PTSD factor models, underscoring the importance of replication across diverse samples.¹⁷

The Korean version of the PCL-5 (K-PCL-5) has been translated and validated across diverse Korean samples, including psychiatric outpatients,¹⁸ Korean Vietnam War veterans,^{19,20} survivors of natural disasters,²¹ and the general population.^{22,23} Across these studies, the K-PCL-5 has consistently demonstrated strong psychometric properties. In addition, several Korean studies have applied CFA to examine the latent structure of PTSD symptoms assessed using the PCL-5. In a sample of Korean Vietnam War veterans, comparative CFA of competing models identified the seven-factor hybrid model as providing the best overall fit.¹⁹ Similarly, in Korean adults exposed to natural disasters, both the six-factor anhedonia model and the seven-factor hybrid model demonstrated excellent model fit, supporting a more differentiated, multidimensional representation of PTSD symptoms.²¹ Moreover, a recent longitudinal study further supported the validity of the expanded factor structures of PTSD over time.²²

Taken together, these Korean CFA studies suggest that PTSD symptoms in Korean samples may be more appropriately conceptualized within an expanded multidimensional framework beyond the DSM-5 four-factor structure. However, prior Korean and international studies have primarily examined the PTSD factor structure in selected trauma-exposed groups or community-based samples, which may not fully reflect the heterogeneity and diagnostic complexity of patients encountered in routine psychiatric outpatient settings. In particular, first-visit psychiatric outpatients are clinically important because they present at an early stage of assessment, often with diverse trauma histories, mixed symptom profiles, and frequent psychiatric comorbidities that complicate the differential diagnosis. Examining the latent structure of PTSD symptoms in this population may therefore have added clinical value by testing whether expanded PTSD factor models retain structural validity in real-world settings, where screening, diagnostic clarification, and initial treatment planning occur. Accordingly, the present study applied CFA to the K-PCL-5 in a sample of first-visit adult psychiatric outpatients to determine whether expanded PTSD factor models provide a better representation of PTSD symptoms than the DSM-5 four-factor model.

METHODS

Participants and procedures

We analyzed psychological data collected at the psychiatric outpatient clinic of Hanyang University Guri Hospital, consecutively on a first-come basis between March 2017 and February 2020. The eligibility criteria included being a first-visit outpatient aged 18–70 years, fluent in Korean, and diagnosed with current PTSD or acute stress disorder using the Structured Clinical Interview for DSM-5 Disorders²⁴ by psychiatrists or clinical psychologists. We also included data from patients with other diagnoses who reported a traumatic event and PCL-5 scores above 33.¹⁸ Approximately half of this sample overlapped with the dataset used in two previous studies.^{25,26} Exclusion criteria included intellectual disability, neurocognitive disorders, current psychotic disorders, and severe medical problems. The Research Ethics Board of Hanyang University Guri Hospital approved the study protocol and informed consent procedures (IRB No. 2023-03-103).

Psychometric data from 262 individuals were initially assessed; 22 (8.4%) refused to provide informed consent for the use of their data for research, and 11 (4.2%) were excluded due to incomplete questionnaires. A total of 229 participants were included in the final analysis (Table 1).

More than half of the participants were female (57.6%), unmarried (58.1%), and employed or students (55.9%). Most participants had completed high school or higher levels of edu-

Table 1. Baseline characteristics of participants (N=229)

Variables	N (%)
Sex	
Male	97 (42.4)
Female	132 (57.6)
Marital status	
Married	96 (41.9)
Not married	133 (58.1)
Education	
Below high school	33 (14.3)
High school graduate	91 (39.7)
Some college	43 (18.8)
University or more	62 (27.1)
Occupation	
Employed	95 (41.5)
Unemployed	57 (24.9)
Housewives	37 (16.2)
Students	33 (14.4)
No answer	7 (3.1)
Index trauma	
Motor vehicle accidents	74 (32.3)
Childhood abuse	39 (17.0)
Physical assaults	27 (11.8)
Traumatic loss	27 (11.8)
Intimate partner violence	20 (8.7)
Accidents	17 (7.4)
Sexual assaults	14 (6.1)
Witnessing death	7 (3.1)
Others	4 (1.7)
Psychiatric diagnosis	
Post-traumatic stress disorder	171 (74.7)
Acute stress disorder	17 (7.4)
Panic disorder	16 (7.0)
Generalized anxiety disorder	10 (4.4)
Adjustment disorder	7 (3.1)
Major depressive disorder	6 (2.6)
Others	2 (0.9)

cation (85.7%). The average age of participants was 37.0 years (95% confidence interval=35.1–38.9). The most common diagnosis was PTSD (74.7%), followed by acute stress disorder (7.4%). The other probable PTSD group (17.9%) included index diagnoses of panic disorder (7.0%), generalized anxiety disorder (4.4%), adjustment disorder (3.1%), major depressive disorder (2.6%), and other disorders (0.9%). The most common index trauma was motor vehicle accidents (32.3%), followed by childhood abuse (17.0%), physical assaults (11.8%), traumatic loss (11.8%), intimate partner violence (8.7%), accidents (7.4%), sexual assaults (6.1%), witnessing death (3.1%), and others (1.7%).

Measurement

PCL-5

The PCL-5 consists of 20 items that align with the DSM-5 diagnostic criteria for PTSD. Participants were asked to rate their distress levels over the past month, specifically symptoms related to past traumatic events, on a scale of 0 (not at all) to 4 (extremely).⁶

The K-PCL-5 has demonstrated robust psychometric properties in various populations: high internal consistency (Cronbach's α =0.91–0.97), excellent test-retest reliability (r =0.90–0.97), and significant correlations (i.e., concurrent validity) with other measures of PTSD (such as the Impact of Events Scale–Revised), depression, and anxiety symptoms.^{18–23} In the current study, Cronbach's α was 0.90.

Data analysis

To evaluate the factor structure of DSM-5 PTSD symptoms, CFA were conducted on eight competing factor models specified a priori based on the diagnostic criteria and prior empirical literature. The tested models comprised a one-factor model, a two-factor model, the DSM-5 four-factor model, and alternative multidimensional models (dysphoria, dysphoric arousal, externalizing behavior, anhedonia, and hybrid). The item-to-factor specifications for each model are listed in Table 2.

Eight CFAs were conducted using LISREL 8.80 (Scientific Software International, Inc.). The 20 items of the PCL-5 were treated as ordinal, and model parameters were estimated using the weighted least squares mean- and variance-adjusted estimator, which is appropriate for ordinal data.²⁷ Model fit was evaluated using multiple indices, including the chi-square statistic (χ^2), root mean square residual (RMR), root mean square error of approximation (RMSEA), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), non-normed fit index (NNFI), normed fit index (NFI), comparative fit index (CFI), incremental fit index (IFI), and relative fit index (RFI). GFI, AGFI, NNFI, NFI, CFI, IFI, and RFI values ≥ 0.90 , RMR ≤ 0.08 , and RMSEA ≤ 0.10 indicate acceptable fit.²⁸ Statistical significance was set at $\alpha=0.05$ (two-tailed).

RESULTS

The fit indices for all models are summarized in Table 3. The χ^2 test was statistically significant for all models ($p<0.001$); however, given the known sensitivity of this statistic to sample size and distributional assumptions, model evaluation focused on the overall pattern of fit indices rather than the χ^2 test alone.

The DSM-5 four-factor model demonstrated a borderline fit

Table 2. Item-factor assignments across eight competing PTSD symptom models

DSM-5 symptoms	One-factor	Two-factor	DSM-5	Dysphoria	Dysphoric arousal	Externalizing behavior	Anhedonia	Hybrid
1. Intrusive thoughts	PTS	PTS	Re	Re	Re	Re	Re	Re
2. Nightmares	PTS	PTS	Re	Re	Re	Re	Re	Re
3. Flashbacks	PTS	PTS	Re	Re	Re	Re	Re	Re
4. Emotional cue reactivity	PTS	PTS	Re	Re	Re	Re	Re	Re
5. Physiological cue reactivity	PTS	PTS	Re	Re	Re	Re	Re	Re
6. Avoidance of thoughts	PTS	PTS	Av	Av	Av	Av	Av	Av
7. Avoidance of reminders	PTS	PTS	Av	Av	Av	Av	Av	Av
8. Trauma-related amnesia	PTS	Dys	NACM	Dys	NACM	NACM	NACM	NA
9. Negative beliefs	PTS	Dys	NACM	Dys	NACM	NACM	NACM	NA
10. Blame of self or others	PTS	Dys	NACM	Dys	NACM	NACM	NACM	NA
11. Negative trauma-related emotions	PTS	Dys	NACM	Dys	NACM	NACM	NACM	NA
12. Loss of interest	PTS	Dys	NACM	Dys	NACM	NACM	An	An
13. Social withdrawal	PTS	Dys	NACM	Dys	NACM	NACM	An	An
14. Restricted positive affect	PTS	Dys	NACM	Dys	NACM	NACM	An	An
15. Irritability/anger	PTS	Dys	Hy	Dys	DA	Ex	DA	Ex
16. Self-destructive/reckless behavior	PTS	Dys	Hy	Hy	DA	Ex	DA	Ex
17. Hypervigilance	PTS	Dys	Hy	Hy	AA	AA	AA	AA
18. Exaggerated startle response	PTS	Dys	Hy	Hy	AA	AA	AA	AA
19. Difficulty concentrating	PTS	Dys	Hy	Dys	DA	DA	DA	DA
20. Sleep disturbance	PTS	Dys	Hy	Dys	DA	DA	DA	DA

PTSD, post-traumatic stress disorder; DSM-5, Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition; PTS, post-traumatic stress; Dys, dysphoria; Re, reexperiencing; Av, avoidance; NACM, negative alterations in cognition and mood; Hy, hyperarousal; AA, anxious arousal; DA, dysphoric arousal; Ex, externalizing behavior; An, anhedonia; NA, negative affect.

Table 3. Fit indices for confirmatory factor analysis of eight competing PTSD symptom models

	χ^2 goodness of fit test			RMR	RMSEA	GFI	AGFI	NNFI	NFI	CFI	IFI	RFI
	χ^2	p	χ^2/df									
One factor	920.287	<0.001	5.413	0.085	0.139	0.712	0.645	0.895	0.884	0.906	0.907	0.870
Two factor	631.937	<0.001	3.739	0.073	0.110	0.783	0.730	0.923	0.908	0.932	0.932	0.897
DSM-5	551.814	<0.001	3.365	0.069	0.102	0.805	0.750	0.935	0.921	0.944	0.944	0.909
Dysphoria	522.078	<0.001	3.183	0.075	0.098	0.814	0.761	0.936	0.922	0.945	0.945	0.910
Dysphoric arousal	473.709	<0.001	2.961	0.066	0.093	0.828	0.774	0.944	0.930	0.953	0.953	0.917
Externalizing behavior	437.554	<0.001	2.823	0.060	0.089	0.839	0.782	0.948	0.935	0.957	0.957	0.921
Anhedonia	407.581	<0.001	2.630	0.060	0.085	0.848	0.795	0.953	0.940	0.962	0.962	0.926
Hybrid	357.584	<0.001	2.400	0.053	0.078	0.864	0.809	0.959	0.946	0.968	0.968	0.932

PTSD, post-traumatic stress disorder; RMR, root mean square residual; RMSEA, root mean square error of approximation; GFI, goodness-of-fit index; AGFI, adjusted goodness-of-fit index; NNFI, non-normed fit index (Tucker–Lewis index); NFI, normed fit index; CFI, comparative fit index; IFI, incremental fit index; RFI, relative fit index; DSM-5, Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition.

(RMSEA=0.10, CFI=0.94, $\chi^2/df=3.37$). Relative to the DSM-5 model, all alternative multidimensional models demonstrated improved fit across indices. The hybrid model demonstrated the best overall fit (RMSEA=0.08, CFI=0.97, $\chi^2/df=2.40$), followed by the six-factor anhedonia model (RMSEA=0.09, CFI=0.96, $\chi^2/df=2.63$) and the six-factor externalizing behavior

model (RMSEA=0.09, CFI=0.96, $\chi^2/df=2.82$), with the five-factor dysphoric arousal model also showing improved fit (RMSEA=0.09, CFI=0.95, $\chi^2/df=2.96$). In contrast, the one-factor (RMSEA=0.14, CFI=0.91, $\chi^2/df=5.41$) and two-factor models (RMSEA=0.11, CFI=0.93, $\chi^2/df=3.74$) demonstrated poor fit.

Overall, the DSM-5 four-factor model provided an interpretable baseline representation of PTSD symptom structure. Model fit improved with increasing factorial differentiation, with the hybrid model showing the most adequate fit to the data. These findings indicate that PTSD symptoms in the present sample were more consistently accounted for by a differentiated, multidimensional factor structure.

DISCUSSION

This study examined competing latent factor models of DSM-5 PTSD symptoms by conducting CFA on the K-PCL-5 in a sample of psychiatric outpatients diagnosed with confirmed or probable PTSD. This is the first CFA study of the PCL-5 conducted in a clinically diagnosed outpatient PTSD sample in Korea. The DSM-5 four-factor model demonstrated an acceptable level of model fit, supporting the structural validity of the K-PCL-5 as a measure that adequately reproduces the DSM-5 PTSD symptom structure. However, the multidimensional models with more differentiated factor structures generally demonstrated superior fit indices. Among these, the seven-factor hybrid model showed the best overall fit among the tested models, suggesting that PTSD symptoms in this clinical sample may be more appropriately represented by a differentiated multidimensional structure than by the DSM-5 four-factor framework. Simultaneously, because improvements in global fit indices may partly reflect the greater complexity of models with more differentiated factors, the superiority of the hybrid model should also be interpreted in light of the balance between model fit and parsimony.

These findings are consistent with a growing body of post-DSM-5 research reporting that expanded PTSD factor models demonstrate superior or comparable fit to the DSM-5 model. The hybrid model, which further differentiates the negative alterations in cognition and mood cluster and the arousal cluster of the DSM-5 structure,¹⁶ has been repeatedly supported in diverse community and clinical populations. A recent review noted that of the 34 studies that tested the hybrid model, 28 (82.3%) reported the hybrid model as providing the best or comparable fit, whereas six studies found the anhedonia model performed equally well.⁷ This finding was replicated for psychiatric outpatient samples similar to ours; a nationwide heterogeneous psychiatric outpatient sample in Norway reported good model fit for both the anhedonia and hybrid models.²⁹ Another US study of psychiatric outpatient samples showed that the dysphoria and hybrid models outperformed other models,³⁰ suggesting that expanded PTSD factor structures retain applicability in routine clinical settings.

Consistent with these findings, prior Korean studies conducted in war veterans and other trauma-exposed adult sam-

ples have reported that expanded models—most notably the seven-factor hybrid model and the six-factor anhedonia model—provide a superior or comparable fit relative to the DSM-5 four-factor structure.^{19–21} Similarly, community-based validation studies in Korean adults have demonstrated an acceptable to superior fit for six- and seven-factor models, supporting the robustness of expanded PTSD structures in non-clinical samples.²² Taken together, these studies suggest a consistent pattern favoring expanded multidimensional PTSD models in Korean samples.

In Korea, confirmatory factor analytic studies of the PCL-5 have primarily focused on specific trauma-exposed populations^{19–21} or community samples.^{22,23} Accordingly, systematic comparisons of DSM-5–based competing models in psychiatric outpatient populations, particularly among patients presenting for initial clinical evaluations, have remained limited. The present findings indicate that an expanded multidimensional PTSD structure is not confined to specific trauma groups or non-clinical samples but can also be replicated in PTSD-spectrum patients entering routine psychiatric care. Because this sample comprised patients at an early stage of clinical presentation, the results further suggest that expanded factor structures, including the hybrid model, may retain applicability in real-world clinical settings, where PTSD symptoms frequently co-occur with heterogeneous psychiatric comorbidities. In this regard, the present study contributes to the Korean literature by extending previous findings to a clinically characterized outpatient population.

From a methodological perspective, as PTSD factor models have become increasingly complex following the introduction of the DSM-5, ongoing debate has questioned whether incremental improvements in global fit indices necessarily reflect substantive advances in understanding the latent structure of PTSD. Several expanded models include factors defined by a limited number of indicators, and prior studies have frequently reported high inter-factor correlations, raising concerns regarding their interpretability and stability. In particular, for higher-dimensional models, such as the hybrid and anhedonia models, information on inter-factor correlations would be helpful in clarifying whether the latent factors represent meaningfully distinct constructs. Because the present study did not include a direct examination of inter-factor correlations, further work is needed to evaluate factor distinctiveness and discriminant validity. Accordingly, future research should move beyond model-fit comparisons alone and incorporate examinations of these relationships, associations with external validators, longitudinal trajectories, and clinical predictive utility to comprehensively assess the theoretical and clinical relevance of expanded PTSD symptom factor models.

This study had several limitations. First, the sample was

drawn from a single institution and consisted exclusively of first-visit psychiatric outpatients, which may limit the generalizability of the findings to diverse PTSD populations. Another limitation of external validity in our sample is the inclusion of probable PTSD (meeting DSM-5 Criterion A+PCL-5 score above 33) and acute stress disorder, accounting for one-fourth of the participants. Although using probable PTSD diagnosis, as in our study, showed adequate diagnostic accuracy compared to an interview-based diagnostic measure³¹ and factor solution for acute stress disorder was similar to latent structure in DSM-5 PTSD,³² this discordance may have potentially influenced factor solution estimation.

Second, the factor analyses were based on PTSD symptoms assessed using a single self-report instrument (PCL-5). The absence of clinician-rated PTSD symptom severity measures (e.g., Clinician-administered PTSD scale for DSM-5) precluded the examination of cross-method convergence and may limit inferences regarding the clinical robustness of the identified factor structure in this study. Third, this study did not evaluate potential differences in the factor structure across trauma types and sex, nor did it test measurement invariance. This represents an important direction for future research because some factors in the expandable models are defined by a relatively small number of items. Fourth, the criteria used to evaluate model fit (e.g., RMSEA ≤ 0.10) are lenient compared to more recent compared to more stringent alternatives.³³ Fifth, recently proposed eight-factor models extending the hybrid framework were not included³⁴; thus, future studies in Korean clinical samples should incorporate these models to further evaluate their replicability and validity.

In summary, the present study demonstrates that PTSD symptoms assessed using the PCL-5 in Korean adult psychiatric outpatients are better accounted for by expanded multidimensional models, particularly the seven-factor hybrid model, than by the DSM-5 four-factor model. These findings indicate that PTSD symptoms in Korean clinical populations may be organized according to a more differentiated latent structure and provide additional support for the applicability of post-DSM-5 expanded factor models in clinical contexts. Future investigations should seek to replicate these results across diverse Korean clinical and community samples, incorporate recently proposed expanded models, and examine associations with external criteria to further refine our understanding of the construct validity and clinical relevance of alternative PTSD factor structures.

Availability of Data and Material

The de-identified data that support the findings of this study are available from the corresponding author upon reasonable request, subject to institutional review board approval and applicable data sharing regulations.

Conflicts of Interest

Daeho Kim, a contributing editor of the *Psychiatry Investigation*, was not involved in the editorial evaluation or decision to publish this article. All remaining authors have declared no conflicts of interest.

Author Contributions

Conceptualization: Daeho Kim, Won-Hyoung Kim, Joo Eon Park. Formal analysis: Soorack Ryu, Daeho Kim, Dayeon Lee. Investigation: Daeho Kim, Won-Hyoung Kim, Joo Eon Park. Methodology: Soorack Ryu, Daeho Kim, Dayeon Lee. Resources: Daeho Kim, Joo Eon Park. Software: Soorack Ryu, Daeho Kim, Dayeon Lee. Supervision: Daeho Kim, Joo Eon Park. Validation: Daeho Kim, Joo Eon Park. Visualization: Soorack Ryu, Dayeon Lee. Writing—original draft: Dayeon Lee. Writing—review & editing: Dayeon Lee, Daeho Kim, Soorack Ryu.

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