

The Psychometric Properties of the International Trauma Questionnaire in Taiwan

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ABSTRACT

Background: Complex post-traumatic stress disorder was often present after chronic traumatic events. The diagnostic criteria of complex post-traumatic disorder consisted of both post-traumatic stress disorder and disturbance in self-organization. People with complex post-traumatic disorder often exposed to chronic stress. It might not be as significant as the major traumatic event as survivors with post-traumatic stress disorder had experienced. Therefore, the impact of complex post-traumatic stress disorder was often ignored. It is critical to identify the at-risk individuals with complex post-traumatic disorder in community. We planned to investigate the psychometrics of the International Trauma Questionnaire for assessing complex post-traumatic stress disorder symptoms in Taiwan.

Methods: One hundred twenty-one individuals were enrolled and they completed 8 self-report scales, including International Trauma Questionnaire, Childhood Trauma Questionnaire Short Form, Beck Depression Inventory-II, Beck Anxiety Inventory, the Chinese version of the Post-traumatic Stress Disorder Checklist for DSM-5, Difficulties in Emotional Regulation Scale, Rosenberg Self-Esteem Scale, and the Interpersonal Relationship Scale. The psychometric of International Trauma Questionnaire was examined by bivariate correlation analysis, independent *t*-test, and factor analysis.

Results: The study showed International Trauma Questionnaire had good reliability and validity and corresponded with previous studies. The result of confirmatory factor analysis supported the structure of complex post-traumatic stress disorder criteria in International Classification of Diseases-11. The 2-factor second-order model was the best-fitting model. The 6 symptom domains of complex post-traumatic stress disorder were also significantly correlated with depressive and anxiety symptoms.

Conclusion: It suggests that the Chinese version of International Trauma Questionnaire could be used for screening at-risk groups and future works for mental public health in Taiwan.

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INTRODUCTION

The International Classification of Diseases-11 Diagnosis of Complex Post-traumatic Stress Disorder

The World Health Organization (WHO) published the eleventh edition of the International Classification of Diseases (ICD-11) in 2018, in which complex post-traumatic stress disorder (CPTSD) is presented separately from post-traumatic stress disorder (PTSD).^{1,2} Complex post-traumatic stress disorder is a disorder that may develop following exposure to chronic or a series of maltreatments in which escape is difficult or impossible. In addition to all diagnostic requirements for PTSD, CPTSD is defined by severe and persistent (1) problems in affect regulation; (2) beliefs about oneself as diminished, defeated, or worthless, accompanied by feelings of shame, guilt, or failure related to the traumatic event; and (3) difficulties in sustaining relationships and in feeling close to others.

These symptoms cause significant impairment in personal, family, social, educational, occupational, or other important areas of functioning.²

The Comparison of Diagnostic Criteria of Post-traumatic Stress Disorder between International Classification of Diseases-11 and International Classification of Diseases-10/DSM-5-TR

The diagnostic criteria of ICD and DSM are slightly different in the diagnosis of PTSD. The same features include intrusive symptoms, avoidance (AV) behaviors, and hypervigilance or startle reactions. The difference is that the intrusive symptoms of ICD-11 are more likely to emphasize the presence of dissociative responses. Recollections or thoughts related to traumatic events that do not result in a disconnection from reality do not

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meet the diagnostic criteria of ICD-11, which are more stringent than ICD-10 and DSM-5.³ Also, ICD-11 emphasizes the criteria of hyperarousal, without paying attention to reckless behaviors and sleep difficulties mentioned in ICD-10 and DSM-5.⁴ International Classification of Diseases-11 also deleted the domain “negative emotional and cognitive changes,”^{1,2} which is still retained as a diagnostic criterion in the DSM-5, including negative beliefs about the outside world, inability to feel positive emotions, persistent symptoms of negative emotions, blaming yourself or others, and feeling alienated from others.

The Introduction of Disturbance in Self-Organization Criteria in International Classification of Diseases-11 Complex Post-traumatic Stress Disorder Diagnosis

In addition to the symptoms of PTSD, the chronic trauma symptoms such as disturbance in self-organization (DSO) caused by the prolonged traumatic events in which escape was difficult or impossible are emphasized in the new CPTSD diagnosis of ICD-11. For DSO, the diagnostic criteria requirements include 3 domains: “affective dysregulation (AD),” “negative self-concept (NSC),” and “disturbance in relationship (DR).” Previous research has shown that survivors of CPTSD are exposed to prolonged and more complex traumatic experiences, which have a more significant impact on subsequent overall brain function impairment and are less effective in treatment.⁵

The Epidemiology and Comorbidity of Complex Post-traumatic Stress Symptoms

According to previous studies, the prevalence of PTSD in community is 5.3%, for CPTSD is 12.9%.⁶ Previous studies have shown that CPTSD is often comorbid with major depressive disorder, anxiety disorder, borderline personality disorder, dissociative symptoms, and suicide ideation.⁷ The comorbid symptoms were more severe among the patients with CPTSD than those with PTSD. The rate of comorbidity with major depressive disorder was 69.2% in the patients with CPTSD, which was higher in those with PTSD (58.5%). The rate of suicidal ideation and the attempt were also higher.⁸

International Trauma Questionnaire

The International Trauma Questionnaire (ITQ) is currently the only questionnaire used to assess CPTSD. It was

developed by Cloitre et al⁵ and originally designed with 28 items. Later, certain items were deleted according to the result of factor analysis. Finally, it was published by Cloitre et al⁶ in 2018 with 12 items. The ITQ has been translated into 29 languages and is currently the most widely used questionnaire of the ITQ.⁶ The ITQ contains 2 subscales of PTSD and DSO symptoms. Each subscale includes 3 dimensions, and each size contains 2 items. The PTSD subscale consists of re-experience (RE; P1 and P2), AV (P3 and P4), and sense of current threat (TH; P5 and P6); the DSO subscales include AD (C1 and C2), NSC (C3, and C4), and DR (C5 and C6). At the same time, both dimensions must assess whether the above symptoms cause impairment of social functioning, including 3 aspects of interpersonal social interaction, family, and daily life. The ITQ is scored using a 5-point Likert scale ranging from “not at all” to “extremely.” According to the definition of the cut-off points of the scale, when an item reaches ≥ 2 (moderate) or above, indicating the symptom is currently affecting the subject.

Hypothesis and Study Aim

However, the development of CPTSD symptoms is often ignored by the victims. Some survivors are unaware of being affected by the impact of previous trauma and may not seek medical help. In addition, they paid attention to the suffering from the emotional problems, such as depression and anxiety, or somatic symptoms such as insomnia, when seeking medical treatment. The clinician often missed the symptoms of CPTSD, and it may significantly impact treatment effectiveness. If CPTSD symptoms can be detected early, it would bring the best benefit to the survivors. Therefore, it is essential to develop a questionnaire to screen out CPTSD in order to identify these at-risk individuals. Our study hypothesized that ITQ could be utilized for screening the individuals at-risk of CPTSD in community. We also planned to investigate the characteristics of subgroups of CPTSD. The relationship between CPTSD symptoms and depression/anxiety severity was also analyzed. This study aimed to examine the psychometrics of the Chinese version of the ITQ in Taiwan.

MATERIAL AND METHODS

Study Population

This prospective instrument validation study aimed to examine the reliability and validity of the ITQ in Taiwan and to understand the relationship between childhood adversities and the symptoms of anxiety, depression, and trauma in adulthood among young adults. We recruited subjects from the community in convenience sampling. Informed consent forms were signed after the process of our study was explained. They were provided payment 100 NTD (about 3 USD) after filling out the questionnaires.

MAIN POINTS

- The validity and reliability of the Chinese version of International Trauma Questionnaire were examined with Taiwan community.
- Confirmatory factor analysis shows the 2-factor second-order model was the fittest and in line with the diagnostic criteria of complex post-traumatic stress disorder.
- The International Trauma Questionnaire may be used in community and health centers to screen at-risk individuals.

Ethical Considerations

The study protocol was approved by the Ethics Committee of National Defense Medical Center Tri-Service General Hospital (approval number: B202205006) on January 26, 2022. All included participants provided signed informed consent.

Study Tools

This study used 8 self-reported scales as research tools, including the ITQ, Childhood Trauma Questionnaire Short Form (CTQ-SF), Beck Depression Inventory (BDI-II), Beck Anxiety Inventory (BAI), the Chinese version of the PTSD Checklist for DSM-5 (PCL-5), Difficulties in Emotional Regulation Scale (DERS), Rosenberg Self-Esteem Scale (RSES), and the Interpersonal Relationship Scale. All of the above research questionnaires were used with the original author's permission. They are described individually as follows.

International Trauma Questionnaire: The ITQ was developed by Cloitre et al.⁶ with a 12-item self-reported questionnaire divided into PTSD and DSO. PTSD includes 3 domains: RE, AV, and TH. Disturbance in self-organization includes AD, NSC, and DR. There are additional 3 items to assess the extent to which functions are affected by symptoms including the roles in social, occupational, and living functions.⁶ Ho⁹ from Hong Kong compiled the Chinese version of the questionnaire. The study used both Chinese and English versions for reliability and validity comparison. The kappa value between the above two versions, the PTSD subscale was from 0.42 to 0.75, and the CPTSD subscale was 0.51 or more. Each domain's subscale also reaches from moderate to high correlation ($r^2=0.51-0.94$).⁹

CTQ-SF: The CTQ-SF was developed by Bernstein¹⁰ with a 28-item self-reported questionnaire. The questionnaire is divided into 5 subscales (including physical abuse, emotional abuse, sex abuse, emotional neglect, and physical neglect) and 3 validity items. The internal consistency of the Chinese version of the questionnaire was above 0.71, except for physical neglect ($\alpha=0.57$), and the test-retest reliability was $r=0.67-0.85$.¹¹

Beck Depression Inventory-II: Beck Depression Inventory-II is a 21-item self-reported scale developed by Beck¹², which evaluates the severity of depression on a scale of 0-3. It selects the most suitable option according to the description of each item. The Chinese version of the questionnaire had an internal consistency of 0.94, split-half reliability of 0.91, and a correlation comparison with the Chinese Health Questionnaire, $r=0.69$ ($P < .001$).¹³

Beck Anxiety Inventory: The BAI is a 21-item self-reported scale developed by Beck¹⁴ to assess the severity of anxiety on a scale of 0-3. The Chinese version of the questionnaire has an internal $\alpha=0.95$, split-half reliability of 0.91, and an inter-rater kappa consistency of 1.0, which correlates with the Hamilton depression rating scale (HAM-D) ($r=0.72$; $P < .001$).¹⁵

Post-traumatic Stress Disorder Checklist for DSM-5: The PCL-5 is a 20-item self-reported scale developed by Blevins. The Chinese version has an internal consistency of $\alpha=0.95$. Correlation analysis was performed with the questionnaire PC-PTSD-5 and reached $r=0.44$ ($P < .001$). The comparison between the mean scores of the clinical and control groups was analyzed by t -test, $t=3.09$ ($P=.003$), indicating that the questionnaire has good reliability and validity.¹⁶

Difficulties in Emotional Regulation Scale: Difficulties in Emotional Regulation Scale was developed by Gratz and Roemer¹⁷ with a 36-item self-reported scale, which is divided into 6 subscales, including “nonacceptance of emotional responses; nonacceptance,” “difficulties engaging in goal-directed; goals,” “impulse control difficulties; impulse,” “lack of emotional awareness; awareness,” “limited access to emotion regulation strategies; strategies,” and “clarity”. The internal consistency of the Chinese version reached $\alpha=0.92$, and the subscales were all greater than 0.78. To prevent subjects from being influenced by the title of the questionnaire, the “emotional response scale” was renamed when the test was administered.¹⁸

Rosenberg Self-Esteem Scale: The RSES was developed by Rosenberg¹⁹ (1965) with a 10-item self-reported scale, of which 5 were reverse items, divided into 2 subscales, self-liking, and self-competence, with an internal consistency α of 0.84. Scale total scores correlated with subscales at $r=0.95$ and 0.93 ($P < .001$) and were associated with other self-esteem scales above $r=0.74$ ($P < .001$).¹⁹

Interpersonal Relationship Scale: The Interpersonal Relationship Scale was revised; internal consistency of the first part of the questionnaire was 0.93, and the subscale $\alpha=0.79-0.89$. The internal consistency of the second part was 0.87, of which the subscales $\alpha=0.81-0.86$. The factor loading of the first part is between 0.42 and 0.73, and the second part is between 0.41 and 0.72. It indicated that this scale has good internal consistency, reliability, and construct validity.²⁰

Statistical Analysis

We utilized Statistical Package for Social Sciences (SPSS) version 20.0 (IBM SPSS Corp.; Armonk, NY, USA) and SPSS Amos 21 for the data analysis in this study. After data recovery, descriptive statistics were used to analyze subjects' characteristics, including gender, age, and trauma experience, and the scores of each scale were analyzed to understand the average status of the subjects. Cronbach's α , Pearson correlation coefficient, and kappa analysis were used to test reliability and validity. Exploratory factor analysis (EFA) was used to understand the potential component domains of ITQ. Confirmatory factor analysis (CFA) was used to examine the fitness of the questionnaire. We set the statistical significance as $P < .05$.

Subjects were divided into groups according to the scores of the 2 subscales of the ITQ. If both the subscores of PTSD and DSO subscales meet the criteria by above the cut-off point, they were classified into the CPTSD group; if they met the PTSD but not DSO, they were classified into the PTSD group; if they met DSO but not PTSD, they were classified into the DSO group. Symptom distribution of these 3 groups was statistically analyzed and line charts were depicted. The criteria for classification into CPTSD group, PTSD, or DSO group are listed as follows: The criteria of the PTSD group were one of the items for each symptom corresponding to PTSD symptoms had a score of 2 or more (RE=P1, P2, AV=P3, P4, TH=P5, P6), and each item from C1 to C6 corresponding to the DSO symptom did not score more than 2 points as well as anyone of the impaired function items from P7, P8, or P9 scored 2 or more points. The criteria of DSO group were the items corresponding to the DSO symptom (AD=C1, C2, NSC=C3, C4, DR=C5, C6), one of the items for each symptom had a score of 2 or more, and each symptom of P1-P6 had less than 2 points as well as anyone of the impaired function items from C7, C8, and C9 scored 2 or more points. The criteria of CPTSD group were meeting the above 2 symptoms simultaneously. On the other hand, the control group was defined as not meeting any one of the above criteria. Analysis of variance was used to analyze the mean differences between the above four subgroups of CPTSD, and Fisher's Least Significant Difference (LSD) test was used for post hoc testing.

According to the results of ITQ development in previous research,^{9,21} 5 models were depicted for CFA; Model 1 was the single-factor model, and a latent variable (CPTSD) linked 12 items including intrusive dreams and thoughts, avoid internal and external reminders, hypervigilance, startle reactions, difficult to calm down, numb, feeling failed and worthless, alienated and staying close to others, were used to verify the latent variable of CPTSD directly. Model 2 is a six-factor first-order model. The domain factors include RE, AV, sense of threat, AD, NSC, and DR. Items verify the 6 latent domains, and the correlation between latent domains was analyzed. Model 3 is a two-factor, first-order model, which directly verifies the latent dimensions including PTSD and DSO with items, and explores the relationship between the 2 latent dimensions. Model 4 is a 2-factor second-order model, the second order is PTSD and DSO dimension, and the first order includes RE, AV, sense of threat, AD, NSC, and DR domains. This model uses the items to verify the 6 latent domains in the first order. It then uses the first-order domains to verify the second-order latent dimensions including PTSD and DSO. Model 5 is a single-factor second-order model. The second order is CPTSD, and the first order is 6 domains. This model verified the latent domains by the items first, then uses the first-order domains to verify the latent variable of CPTSD directly (Figure 1).

To test model fit, the criteria of competing models fit, absolute fit, relative fit, and parsimonious fit were reviewed respectively to select the best model fit and to determine whether the model structure was good. In comparing model fit, the model was selected according to the Akaike information criterion (AIC). The criteria of the model fitness can reflect the accuracy and simplicity of the model; AIC is one of the indicators commonly used to select models in researches and is defined as good when AIC value is small. Absolute model fitness includes the chi-square value (absolute fit is defined as good when chi-square (χ^2) is small and $P > .05$), the root mean residual (RMR < 0.05 as good), the standard root mean residual (SRMR < 0.05 as good), and the root mean square error of approximation (RMSEA > 0.05 is a good fit). The relative fit indicators included normed fit index (NFI), Tucker-Lewis index (TLI), comparative fit index (CFI), and incremental fit index (IFI). The relative fit was classified as acceptable when all the above values show greater than 0.9 and as excellent when they are greater than 0.95. The parsimonious fit included the chi-square divided by the degrees of freedom (χ^2/df), the parsimonious normed fit index (PNFI), and parsimonious comparative fit index (PCFI). The value of χ^2/df less than 3 and more than 1 indicates a good fit. Also, PNFI and PCFI indicate the model is simple and uncomplicated when the value is greater than 0.5.

The average variance extracted (AVE) value is used to calculate the mean of the square of the latent variable loadings by the observed variables. The AVE represents the percentage of the latent variable that can be explained by the observed variable. The higher the explanatory variable, the larger the AVE value. Generally, the AVE should be greater than 0.5, which means that the scale has higher convergent validity. The composite reliability (CR) value is an indicator for reliability analysis of latent variable. When the CR value is higher than 0.6, it is considered high reliability. When the AVE value is not greater than 0.5 the CR values greater than 0.6 can still be considered good convergence validity. At the same time, when the square root of the AVE value of the facet is greater than the correlation coefficient with the latent variable, it also means that the scale has good discriminatory validity. The AVE and CR values were calculated through a good model fit to test the scale's reliability and validity.

RESULTS

A total of 119 valid questionnaires (2 questionnaires were considered invalid due to all the scoring answers to 0 or all answers to the most severity) were analyzed. Subjects' average age was 26.35 ± 3.43 , including 53 male and 66 female participants. The majority of them have a college degree, are non-professional, and are in middle socioeconomic status. The results showed that 84 (70.6%)

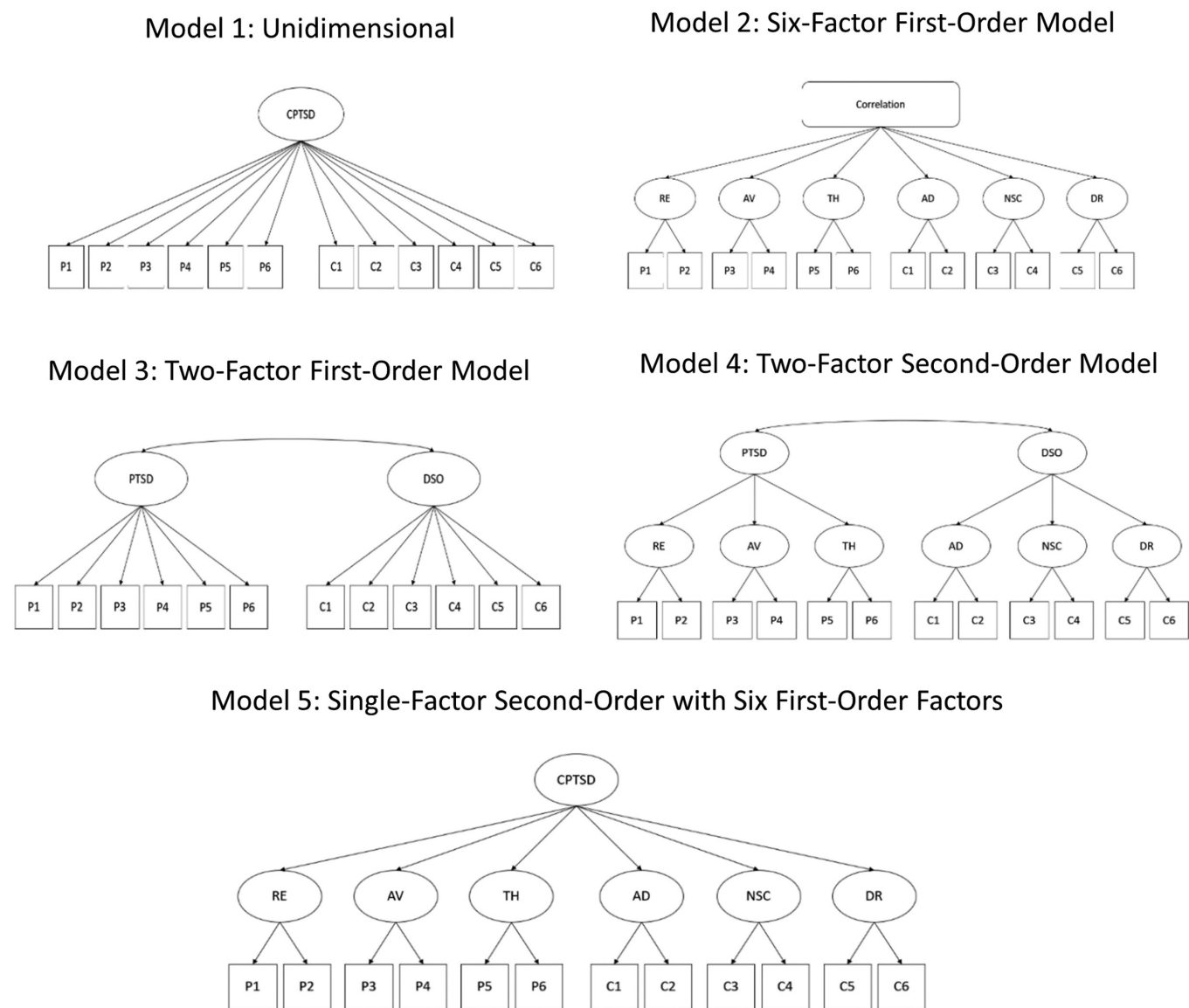


Figure 1. Loading patterns of models in confirmatory factor analysis. PTSD, post-traumatic stress disorder; DSO, disturbance in self-organization; CPTSD, complex PTSD; RE, re-experience; AV, avoidance; TH, sense of current threat; AD, affective dysregulation; NSC, negative self-concept; DR, disturbance in relationships.

subjects had received maltreatment, among which emotional neglect was the most common ($n=62$, 52.1%); 44 (37%) subjects met the criteria for mild depression in BDI (≥ 12). A total of 26 (22%) participants met mild anxiety in BAI (≥ 12). According to the results of the ITQ questionnaire, 4 (3%) subjects were classified in PTSD group, 6 (5%) in CPTSD group, and 8 (7%) in DSO group.

A total of 86 subjects completed the ITQ again 3 to 4 weeks later after the baseline evaluation as the test-retest reliability analysis; their average age was 26.62 ± 3.6 , and 51 (59.3%) were female. The correlation coefficient between the two tests was above 0.8, indicating that the scale had good test-retest reliability. However, the measurement of test-retest reliability by the results of kappa values showed that ITQ total score was 0.46

($P < .001$), 0.37 for DSO subscale ($P < .001$), and 0.18 for PTSD subscale ($P = .093$) (Table 1).

Cronbach's alpha greater than 0.7 and CR greater than 0.6 demonstrate good internal consistency reliability.

Table 1. The Correlation of Total Score of ITQ and Subscale of PTSD, DSO Between Baseline and Re-test Measurements

n=86	Initial Test	Re-test	<i>r</i>	Kappa
PTSD	6.02 ± 5.74	5.47 ± 6.09	0.83***	0.18
DSO	6.29 ± 5.29	5.49 ± 5.32	0.80***	0.37**
ITQ	12.31 ± 10.11	10.95 ± 10.88	0.88***	0.46***

*** $P < .01$, **** $P < .001$.

DSO: disturbance of self-organization; ITQ, International Trauma Questionnaire; PTSD, post-traumatic stress disorder.

Table 2. Model Fit Statistics for Alternative Models of ICD-11 CPTSD Using the ITQ

Model (N=119)	χ^2	df	P	CFI	TLI	RMSEA (90% CI)	AIC
1	60.65	41	<u>.025</u>	0.98	0.97	0.06 (0.02-0.10)	158.65
2	31.49	33	<u>.542</u>	1.00	1.00	0.000 (0.000-0.06)	121.49
3	41.25	40	<u>.416</u>	1.00	1.00	0.02 (0.000-0.07)	141.25
4	30.38	38	<u>.806</u>	1.00	1.01	0.000 (0.000-0.04)	110.38
5	32.44	38	<u>.724</u>	1.00	1.01	0.000 (0.000-0.05)	136.44

AIC, Akaike information criterion; CFI, comparative fit index; χ^2 , chi-square; df, degrees of freedom; ICD-11, International Classification of Diseases-11; ITQ, International Trauma Questionnaire; RMSEA, Root mean square error of approximation; TLI, Tucker-Lewis index.

It shows that alpha values of the subscales were all above 0.9, the overall alpha value was 0.94, and the CR value of each domain was 0.75. At the same time, according to Pearson correlation coefficient analysis, the correlation between the PTSD subscales and their corresponding items was $r=0.43-0.86$, and the DSO subscales and their corresponding items was $r=0.41-0.88$. The total scores of the subscales and ITQ both reached a significant correlation ($r > 0.9$, $P < .001$), demonstrating that the ITQ has good internal consistency reliability.

In the subscale scores and the total score of the ITQ, the high-scoring group (the first 25% of subjects) and the lower group (the last 25% of subjects) were compared. The t values ranged from -19.93 to -31.23 ($P < .001$). A significant difference was found between the 2 groups, indicating that the questionnaire has good discrimination.

Kaiser-Meyer-Olkin (KMO) value was 0.86 and the value of Bartlett's test was 1803.48 ($P < .001$). Exploratory factor analysis selected 3 components, and the cumulative explained variance was 69.98%. It showed that factor loadings of each item ranged from 0.53 to 0.87. The 3 main components were identified. The first component was PTSD symptoms, and the explained variance was 11.03%; the second was DSO symptoms, which accounted for 7.71% of the functional impairment caused by CPTSD, and the explained variance was 51.24%; the second factor was PTSD symptoms, which accounts for 11.03% of the variance; and the third factor was DSO symptoms, accounting for 7.71% of the variance. Affective dysregulation symptom domain correlated with both PTSD and DSO dimension ($r=0.64-0.85$, $P < .01$) (Supplementary Table 1 and Supplementary Figure 1). Confirmatory factor analysis of ITQ was done. First of all, the most fitness of different model was chosen by the lowest of the AIC values. The AIC of model 4 was 110.38, which is the lowest value among the 5 models, indicating that model 4 is the most fitness (Table 2). The χ^2 is 30.38 ($P=.806$) indicating excellent absolute fit. The RMR < 0.04, SRMR < 0.03, and RMSEA < 0.05 (90% CI 0.000-0.042) are under acceptable range. All of the values of relative fit index, including NFI, TLI, CFI, and IFI, were greater than 0.95, and the parsimonious fit index, including χ^2/df (< 3), PNFI (> 0.5), and PCFI (> 0.5), was acceptable, which showed the ITQ could distinguish the differences between PTSD and DSO

dimensions effectively (Supplementary Table 2). Model 2 also had a good model fit, and the relationship between the 6 domains of CPTSD was explainable via model 2.

The AVE values above 0.5 are regarded as having convergent validity. In model 4, all of the AVE values were above 0.7. In model 2, except for AD, all of the CR values were above 0.7. Though the AVE value of AD was less than 0.5, its CR value was above 0.6, which means the convergent validity was also acceptable. Table 3 shows that the ITQ has good convergent validity.

Discriminant validity means that the latent variables had a low correlation with each other. To observe the effects of ITQ in distinguishing disorder dimensions and various symptom domains, the discriminant validity of model 2 and model 4 was analyzed. In model 4 (Supplementary Table 3a), the correlation coefficient of the 2 latent variables was 0.79, which was smaller than the square root of the AVE values

(PTSD=0.84, DSO=0.92) of the 2 dimensions, indicating that ITQ has good discriminant validity in distinguishing PTSD and DSO; in model 2 (Supplementary Table 3b), the correlation coefficients between latent variables are smaller than the square root of the AVE value (RE = 0.84, AV = 0.89, TH = 0.90, NSC = 0.92, and DR = 0.86), except for AD (0.69, CC = 0.69-0.84) domain showed a poor discrimination effect. However, it still showed that the other 5 domains of ITQ have acceptable discriminant validity.

Table 3. Convergent Validity and CR of the Best 2 Fitness Models

Model	Factor	AVE Value	CR Value
4	PTSD	0.70	0.75
	DSO	0.85	0.75
2	RE	0.71	0.66
	AV	0.79	0.67
	TH	0.81	0.67
	AD	0.48	0.67
	NSC	0.85	0.67
	DR	0.74	0.67

The best fitness model: model 4; the second fitness model: model 2. AD, affective dysregulation; AV, avoidance; AVE, average variance extracted; CR, composite reliability; DR, disturbance in relationship; DSO, disturbance of self-organization; NSC, negative self-concept; PTSD, post-traumatic stress disorder; RE, re-experience; TH, sense of current threat.

Table 4. Correlation Between ITQ Symptom Domains and Depression/Anxiety Severity

ITQ Symptom Domains	BDI-II	BAI
RE	0.53***	0.44***
AV	0.53***	0.44***
TH	0.56***	0.65***
AD	0.60***	0.57***
NSC	0.71***	0.71***
DR	0.67***	0.63***
PTSD	0.59***	0.58***
DSO	0.75***	0.72***

*** $P < .001$.

AD, affective dysregulation; AV, avoidance; BAI, Beck Anxiety Inventory; BDI-II, Beck Depression Inventory; DR, disturbance in relationship; DSO, disturbance of self-organization; NSC, negative self-concept; PTSD, post-traumatic stress disorder; RE, re-experience; TH, sense of current threat.

In the present study, we examined the concurrent validity by analyzing the correlation between ITQ and the severity of depression and anxiety. Six symptom domains correlated positively with anxiety and depression (Table 4).

In Figure 2, the 6 symptom domains scores of the ITQ of CPTSD group were significantly higher than those in the control group ($P < .001$). Re-experience and hyperarousal of the PTSD group were considerably higher than those in the control group ($P < .05$). The symptoms of RE in the CPTSD group were significantly higher than those in the DSO group ($P < 0.001$). Also, RE domain of DSO only group was not significantly different from the control group ($P = .310$), but the other 5 symptom domains were significantly different between 2 groups ($P < .01$); the CPTSD group had significantly higher scores for NSC and DR than the PTSD group ($P < 0.05$). Significant differences were found between PTSD and DSO groups in RE, AF, and low self-esteem ($P < .05$) (Supplementary Table 4).

DISCUSSION

The ITQ had been used to screen the symptoms of CPTSD in Western countries and some of Asian countries.^{4,9} The present study recruited nonclinical participants from community to verify the reliability and validity of the Chinese version of the ITQ in Taiwan.

The test-retest reliability of the Chinese version of the ITQ is exceptionally acceptable. The correlation coefficient of the total ITQ symptom score and the subscores of the PTSD and DSO was above 0.8. The kappa value of the total score of ITQ showed significantly correlated between first and second assessments were above 0.4. However, the kappa value of PTSD and DSO subscale has a lower consistency between test-retest measures, which may be because the subject of the PTSD subscale asks the participants to recall the “previous specific trauma exposure-related feeling.” In addition, people with DSO symptoms including emotional or cognitive symptoms might pay poor attention to questions and did not answer consistently stable between the 2 tests.²²

In the result of CFA, the 2-factor, second-order model (model 4) was the most suitable, which is consistent with previous original development scale studies.⁴ However, the study results of the Hong Kong version showed that the 6-factor first-order model (model 2) was the most suitable model.⁹ The difference in model fitness AIC between model 2 and model 4 in Hong Kong study is small. Although model 2 in this study was not the most appropriate as model 4, it was our second priority of choice. We speculated that Hong Kong study was conducted in a university to facilitate sampling, and the sample source was too single so that the 6 domains could not be differentiated into PTSD and DSO dimensions, which were associated with each other but difficult to determine precisely. Though the present study and the original developmental study both presented

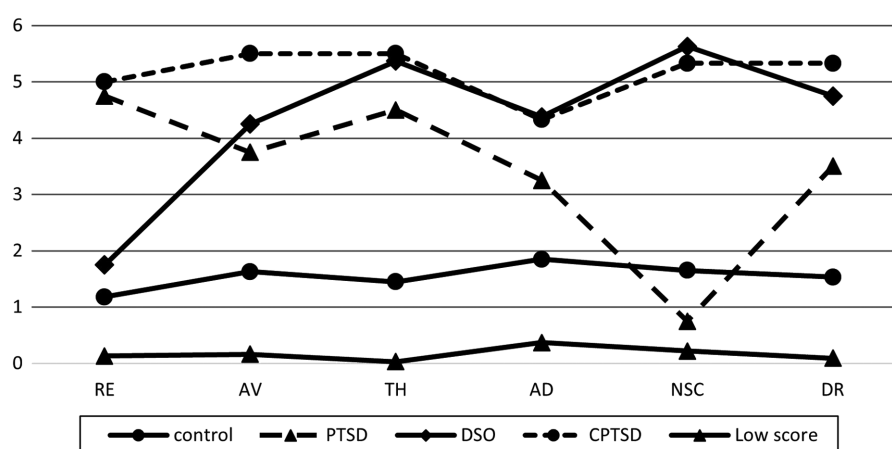


Figure 2. Grouping of potential CPTSD symptoms and diagnoses in a community sample. RE, re-experience; AV, avoidance; TH, sense of current threat; AD, affective dysregulation; NSC, negative self-concept; DR, disturbance in relationships.

6 symptom groups and differentiated them into PTSD and DSO dimensions as the most suitable model (model 4), in the most recent meta-analysis study,²³ a CFA of ITQ in almost all East Asian countries, has presented results consistent with the results of Hong Kong.^{9,24,25} Therefore, the results of the present study show that ITQ can be used to screen at-risk groups in Asian communities, and its symptom scores will match the diagnostic requirements of 2-factor second-order model in ICD, which can be used as an essential tool in future epidemiological studies.

As depicted in Figure 2 in the present study, the 6 symptom domains of ITQ in the CPTSD group were significantly different from those in the control group, indicating that the symptoms of the CPTSD group were widely distributed and had a comprehensive impact. Re-experience and TH domains of PTSD-only group are significantly different from control group, showing that PTSD-only group is associated with major trauma and the feeling of being hurt. The more often presence of RE symptoms between CPTSD and/or PTSD but not DSO groups showed that RE symptoms were unique to PTSD and/or CPTSD groups. In contrast, the DSO-only group showed no different presence of RE domain compared to the control group, even though significant differences were shown in the other 5 symptom domains. As we known, acute stress symptoms include numbness, loss of self-awareness, loss of sense of reality, and other symptoms, which are called acute stress disorder in the DSM-5 system. After a period of time, patients often begin to have RE after stressful events. It occurs in images or nightmares, causing the traumatized person to return to the traumatic event, temporarily disconnecting from reality, and resulting in a lack of attention, trance, and/or inability to execute real things. Patients often feel troubled by this phenomenon because the symptoms cannot be controlled.²⁶ Therefore, it was considered that RE appears to be an essential predictor of PTSD, and more associated with the diagnostic concept of PTSD and less associated with DSO.²⁶⁻²⁸ Our result also showed that the comparison between the CPTSD and PTSD groups revealed differences in low self-esteem and interpersonal relationships. It suggested that the CPTSD group was significantly affected in terms of self-confidence and interaction with others, which was manifested in the concept of self and social relationships.²⁹

Previous studies reported that emotion regulation is an important factor in judging DSO,³⁰ and negative changes in emotion had been included in the diagnostic criteria for PTSD in the DSM-5 and ICD-10; however, this description has been removed from the ICD-11, which includes only a note on symptoms, and it was moved into the diagnosis of CPTSD as AD and NSC. In the present study, the 5-axis distribution map showed that AD domain scores of the DSO group in the ITQ were higher than those in the PTSD subscale, and the CPTSD group showed a greater trend in the severity of AD than the PTSD group. Previous research

also showed that individuals with traumatic experiences often have emotional problems, which might be associated with the difficulty for environmental adaptation and interpersonal skills.^{30,31} In turn, this may affect the development of self-esteem. At the same time, the ability of people with emotional problems and low self-esteem to maintain interpersonal relationships will also be affected. In Figure 2, people who met DSO only and CPTSD but not PTSD only criteria were more significantly associated with the more presence of NSC symptom domains, which could distinguish from other 5 symptom domains. In other words, if a patient with low self-esteem is seen in the clinic, the treatment plan should also assess and include childhood trauma experience. In the treatment plan for them, when dealing with emotional or cognitive problems, helping with low self-esteem and traumatic experiences should be incorporated into treatment considerations. A study of the impact of past childhood trauma experiences found that traumatized children may not develop effective thinking and coping strategies, so children's trauma will be directly reflected in emotions,³⁰ and may only find years later that the traumatic experience affects their self-esteem, possibly not until adulthood. Our study results suggested that although the AD symptom domain of the CPTSD group was higher than those of other groups, the symptoms of low self-esteem had larger differences between the CPTSD group and other groups. It might imply that chronic maltreatment or childhood adversity-associated CPTSD has a more significant long-term negative impact on self-esteem.

Our results showed that post-traumatic stress symptoms were associated with depression/anxiety. Previous study results found that dissociation symptoms might mediate the relationship between PTSD symptoms and depression or suicide.³² In addition, previous study findings also suggested that individuals with acute stress disorder symptoms having RE symptoms were at risk for PTSD.²⁶ It therefore indicated that early identification of the early signs might be critical for providing treatment of at-risk group of CPTD in the community to reduce the possible sequelae such as depression/anxiety or suicidality.

The present study has several limitations to the interpretation of results. The number of samples in this study is small, and due to the convenience sampling, it was impossible to control for background, socioeconomic class, age, and gender in the groups. All data collected were self-administered and accuracy cannot be assured; no diagnostic interview was conducted to confirm the reliability of the data. Also, the influence of different traumas, the time point of exposure to trauma and many interfering factors, such as comorbidity with mental illness, and subjects' recall bias cannot be ruled out. Larger-scale prospective research is warranted to verify.

The results of this study have demonstrated that the Chinese version of the ITQ is a reliable and valid

measurement tool that can be used in Taiwan communities to screen at-risk groups who have experienced trauma. In the future, follow-up studies are still needed to observe the prognosis of this group after trauma and monitor changes in symptom severity before and after treatment.

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Informed Consent: Informed consent was obtained from all participants who participated in this study.

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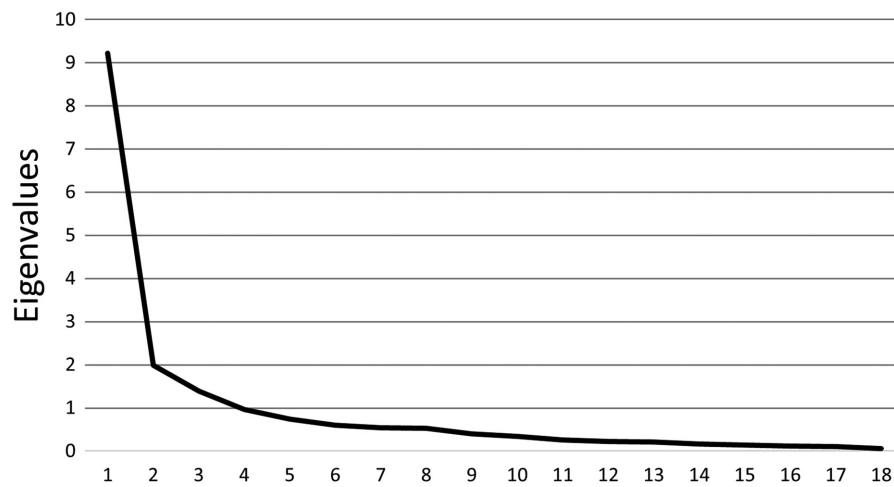
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Supplementary Files



Supplementary Figure 1. Scree plot of ITQ.

Supplementary Table 1. Exploratory factor analysis (EFA)

Item	Component		
	1	2	3
P1		0.78	
P2		0.77	
P3		0.84	
P4		0.73	
P5		0.64	
P6		0.60	0.41
P7	0.66		
P8	0.81		
P9	0.87		
C1		0.42	0.64
C2		0.49	0.53
C3			0.83
C4			0.85
C5			0.73
C6			0.74
C7	0.60		
C8	0.76		
C9	0.85		
Initial Eigenvalues	9.22	1.99	1.39
Explained variation (%)	51.24	11.03	7.71
Cumulative variation (%)	51.24	62.27	69.98

P1 and P2, Re-experience; P3 and P4, Avoidance; P5 and P6, Sense of current Threat; P7, P8 and P9, dysfunction by Posttraumatic Stress Disorder (PTSD) symptoms; C1 and C2, Affective Dysregulation; C3 and C4, Negative Self-Concept; C5 and C6, Disturbance in Relationship; C7, C8 and C9, dysfunction by Disturbance of Self-Organization (DSO) symptoms.

Supplementary Table 2. The model fit test of model 4 (two-factor second-order)

Model fit	Cut-off criteria	Result
Absolute fit		
χ^2	$p > 0.05$ as good	30.38, $p = .806$ was good
GFI	> 0.90 as good	0.96 was excellent
AGFI	> 0.90 as good	0.92 was good
RMR	< 0.05 as good	0.04 was good
SRMR	< 0.05 as good	0.03 was good
RMSEA	< 0.05 as good	0.00 was acceptable
Relative fit		
NFI	> 0.90 as good	0.97 was excellent
TLI	> 0.90 as good	1.0 was excellent
CFI	> 0.90 as good	1.0 was excellent
IFI	> 0.90 as good	1.0 was excellent
Parsimonious fit		
χ^2/df	< 3 as good	0.80 having a good model fit
PNFI	> 0.5 as acceptable	0.56 was acceptable
PCFI	> 0.5 as acceptable	0.58 was acceptable

χ^2 , Chi-Square; GFI, Goodness-of-fit index; AGFI, Adjusted goodness-of-fit; **RMR**, root mean residual; **SRMR**, standard root mean residual; RMSEA, Root mean square error of approximation; NFI, Normed fit index; TLI, Tucker-Lewis index; CFI, Comparative fit index; IFI, Incremental fit index; df, degrees of freedom; PNFI, the Parsimony-adjusted measures index; PCFI, Parsimony comparative fit index.

Supplementary Table 3a. Discriminant validity between PTSD and DSO dimensions (model 4)

	PTSD	DSO
PTSD	(0.84)	
DSO	0.79	(0.92)

PTSD, Posttraumatic Stress Disorder; DSO, Disturbance of Self-Organization.

The value showed above are the correlation coefficients, and () are the square root of the average variance extracted (AVE) values.

Supplementary Table 3b. Discriminant validity among six symptom domains (model 2)

	RE	AV	TH	AD	NSC	DR
RE	(0.84)					
AV	0.71	(0.89)				
TH	0.64	0.75	(0.90)			
AD	0.80	0.69	0.82	(0.69)		
NSC	0.40	0.47	0.63	0.81	(0.92)	
DR	0.63	0.50	0.70	0.84	0.79	(0.86)

RE, Re-experience; AV, Avoidance; TH, Sense of current current Threat; AD, Affective Dysregulation; NSC, Negative Self-Concept; DR, Disturbance in Relationship.

The value showed above are the correlation coefficients, and () are the square root of the average variance extracted (AVE) values.

Supplementary Table 4a. ANOVA analysis of 6 symptom domains by groups

Group	RE	AV	TH	AD	NSC	DR
Control	<u>1.2±1.48</u>	<u>1.6±1.92</u>	<u>1.5±1.72</u>	<u>1.9±1.69</u>	<u>1.8±1.76</u>	<u>1.5±1.62</u>
PTSD	<u>4.5±1.92</u>	<u>3.5±2.38</u>	<u>3.5±2.35</u>	<u>2.3±1.71</u>	<u>0.8±0.96</u>	<u>3.6±1.10</u>
DSO	<u>1.8±1.67</u>	<u>4.3±2.87</u>	<u>5.4±2.20</u>	<u>4.4±0.92</u>	<u>5.6±2.33</u>	<u>4.8±2.38</u>
CPTSD	<u>5.0±2.12</u>	<u>5.8±2.49</u>	<u>5.6±1.52</u>	<u>4.4±1.67</u>	<u>4.8±1.48</u>	<u>5.2±1.64</u>
F	15.43***	11.28***	20.97***	9.07***	17.45***	14.72***

***p < .001. PTSD, Posttraumatic Stress Disorder; DSO, Disturbance of Self-Organization; CPTSD, Complex Posttraumatic Stress Disorder; RE, Re-experience; AV, Avoidance; TH, Sense of current Threat; AD, Affective Dysregulation; NSC, Negative Self-Concept; DR, Disturbance in Relationship.

Supplementary Table 4b. Post-hoc comparison between groups by Fisher's LSD analysis

Group	Group	RE	AV	TH	AD	NSC	DR
control	PTSD	p < .001	p = .069	p = .024	p = .637	p = .321	p = .175
	DSO	p = .310	p = .001	p < .001	p < .001	p < .001	p < .001
	CPTSD	p < .001	p < .001	p < .001	p = .001	p < .001	p < .001
PTSD	DSO	p = .004	p = .542	p = .085	p = .037	p < .001	p = .065
	CPTSD	p = .627	p = .090	p = .078	p = .054	p = .001	p = .040
DSO	CPTSD	p < .001	p = .177	p = .823	p = .979	p = .414	p = .654

PTSD, Posttraumatic Stress Disorder; DSO, Disturbance of Self-Organization; CPTSD, Complex Posttraumatic Stress Disorder; RE, Re-experience; AV, Avoidance; TH, Sense of current Threat; AD, Affective Dysregulation; NSC, Negative Self-Concept; DR, Disturbance in Relationship.