


ORIGINAL ARTICLE

Validity and reliability of the Secondary Traumatic Stress Scale-Japanese version

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Abstract

Aim: This study assessed the validity and reliability of the Secondary Traumatic Stress Scale-Japanese Version.

Methods: The original Secondary Traumatic Stress Scale was translated into Japanese, and Japanese items were back-translated to English to confirm the accuracy of the translation. A total of 870 public health nurses from the Tohoku region in Japan completed the Secondary Traumatic Stress Scale-Japanese Version. An exploratory factor analysis was conducted to identify the number of components. Moreover, 351 public health nurses from the Saitama prefecture in Japan also completed the scale. A confirmatory factor analysis was performed with the factor structure identified in the exploratory factor analysis.

Results: The exploratory factor analysis identified two components: one associated with client-related distress and the other with trauma-related distress. The confirmatory factor analysis confirmed the two-factor structure. The two-factor structure model was better than the three-factor model presented in the original validation study for the English version of the scale. The two-factor model had good internal consistency for the overall product and the subscales. Pearson correlations showed that this model had good convergent validity against the Maslach Burnout Inventory, a psychological measure similar to the Secondary Traumatic Stress Scale. Finally, the two-factor model had good discriminant validity against the Maslach Burnout Inventory.

Conclusion: This study identified two components of the Secondary Traumatic Stress Scale-Japanese Version that differ from the three components found in the original English version. The differences in the factor structure might indicate that the factor structure was culturally influenced.

KEYWORDS

natural disaster, public health nurse, scale reliability, scale validity, secondary traumatic stress

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1 | INTRODUCTION

Secondary traumatic stress (STS) refers to stress responses similar to those of posttraumatic stress disorder (PTSD; ie, having intrusive thoughts about the traumatic event, avoiding trauma triggers, and increasing physiological arousal) that result from indirect traumatic exposure. Indirect traumatic exposure occurs when people experience a traumatic event by hearing or watching someone else's traumatic experience. Human service workers are vulnerable to STS because they are often exposed to indirect trauma through their work.¹ STS symptoms are prevalent among social workers (15.2%),² substance abuse counselors (19%),³ emergency nurses (32.8%),⁴ and juvenile justice education workers (39%).⁵

In Japan, indirect exposure to traumatic experiences is prevalent among human service workers. For example, 90.3% of nurses reported having experienced indirect trauma.⁶ Social workers who worked with disaster survivors after the Great East Japan Earthquake had greater STS than those who did not work with the survivors.⁷ Disaster workers had greater STS symptoms when they were exposed to corpses or had more exposure to disaster victims than those who did not have these experiences.⁸

With an increase in the frequency and severity of natural disasters, indirect exposure to traumatic experiences has become increasingly common among human service workers.⁹ This suggests that measuring STS with a validated tool is essential to capture the nature of the issue related to indirect trauma exposure and provide those who suffer from trauma-related disorders with early medical intervention to prevent the development of such disorders. Although interventions for STS have been developed and tested in other countries,^{10,11} to our knowledge, there has not been an empirically tested intervention for STS in Japan. Validating a measure for STS is a cornerstone to building such an intervention in the country.

If unrecognized or untreated, STS is associated with insomnia, exhaustion, and other mental health complaints.¹² Furthermore, STS is strongly associated with burnout. A meta-analysis showed a strong effect size (weighted $r = .69$) between STS and burnout among workers who are regularly exposed to indirect traumatic experiences, such as healthcare workers and social workers.¹³ Burnout may relate to future STS, although STS may not predict future burnout. Notably, these previous studies indicate that burnout is a similar yet different construct from STS.¹⁴ Because of this feature, the present study included burnout as a variable to test convergent and discriminant validity against a Japanese version of the STS Scale (STSS-J).

The STSS is a widely used, self-rated scale to measure STS.^{1,15} Previous studies have validated the STSS in other languages such as Italian and French.^{16,17} Setti and Argentero showed that a two-factor model comprising arousal and intrusion had the best model-data fit, and the original three-factor model proposed by Bride et al was partially confirmed.¹ Jacobs et al found that the five-factor dysphoria model proposed by Simms, Watson, and Doebbeling was the

best-fitted model for the STSS-French version.^{17,18} They additionally reported that a two-factor model comprising a pooled avoidance-arousal factor and the intrusion factor was as acceptable as the original three-factor model proposed by Bride et al.¹ These studies showed that different-language versions of the STSS or responses from the different cultural backgrounds might display different factor structures.

Japanese researchers have translated the STSS and used it for the Japanese population.¹⁹ A previous study has used the original three-factor model proposed by Bride et al, showing that the STSS-J had good internal consistency for all three subscales among Japanese midwives (range = 0.82-0.86).^{1,19} However, to our knowledge, the factor structure of the STSS-J has not been validated. To fill this gap, this study examined the factor structure of the STSS-J and tested its validity and reliability in two samples of public health nurses.

2 | METHODS

2.1 | Participants

Participants comprised two samples of public health nurses from the Tohoku region of Japan (Fukushima, Miyagi, and Iwate prefectures), which was severely hit by the 2011 Great East Japan Earthquake, and the Saitama prefecture, a neighboring prefecture of Tokyo. The role of public health nurses in times of peace is that of community nurse specialists engaging in public health activities in Japan. Public health nurses working for local governments, in particular, provide health-related advice and guidance to local residents in times of both peace and disaster.²⁰ In the aftermath of the Great East Japan Earthquake, public health nurses worked in the evacuation center and visited evacuees' homes to provide community-based services ranging from health management (including consultation) to operational support for disaster victims. As a result, there is a high likelihood of exposure to indirect trauma by interacting with the disaster survivors.

A total of 889 public health nurses returned their survey responses in the Tohoku sample. Among them, 99 did not fill out any of the items of the STSS-J or Maslach Burnout Inventory (MBI), resulting in 790 participants. In the Saitama sample, 370 public health nurses returned the survey responses. Among them, 19 did not fill out any of the items for the STSS-J or MBI, resulting in 351 participants.

2.2 | Measures

2.2.1 | Secondary traumatic stress

Secondary traumatic stress was assessed using the STSS-J. The original STSS is a 17-item, self-rated measure that assesses the frequency of STS symptoms over the last 7 days.¹ Bride et al found that



there were three components (intrusion, avoidance, arousal) in the measure. Respondents evaluated the frequency of each symptom in relation to their work with trauma-exposed clients using a 5-point scale ranging from 1 (never) to 5 (very often). In the present study, the original STSS was translated into Japanese and subsequently back-translated into English. The author of the original STSS was then consulted to ascertain whether the translated version of the STSS was acceptable. The STSS-J is shown in Figure S1. The original STSS showed good internal consistency, test-retest reliability, and criterion validity.¹

2.2.2 | Burnout

Burnout was assessed using the Maslach Burnout Inventory-General Survey-Japanese version (MBI-J).^{21,22} The MBI-J measures three basic symptoms of burnout: exhaustion, cynicism, and professional efficacy. Respondents rated the frequency of each item on a 7-point scale ranging from 1 (never) to 7 (every day). The MBI-J demonstrated good internal consistency (α range = 0.86-0.88), concurrent validity, and discriminant validity. Cronbach's alpha coefficients were 0.91 for exhaustion, 0.84 for cynicism, and 0.88 for professional efficacy for this study.

2.3 | Procedures

All procedures in this study complied with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2013. Approval to perform this research was obtained from the Ethics Committee of the National Defense Medical College, Tokorozawa, Japan (Approval No. 2276). Since this study was conducted as an anonymous survey, written informed consent was not obtained from the participants. Instead, the study objectives were disclosed and they were provided with the option to refuse participation.

This study was a part of a larger study examining the well-being of public health nurses working in the Tohoku region or Saitama prefecture. Potential participants of this study were 2085 public health nurses working in three prefectures that were severely affected by the 2011 Great East Japan Earthquake (Fukushima, Miyagi, and Iwate prefectures). Moreover, potential participants included 1019 public health nurses working in the Saitama prefecture as a comparison group. Between July 27, 2015, and August 31, 2015, a paper-pencil version of the survey was distributed to all potential participants through the Japanese Nursing Association, the nursing associations in these four prefectures, and the Japanese Association of Public Health Nurses. When potential participants agreed to take part in the study, they completed the survey and mailed the survey packet back to the researchers. In total, 1259 participants returned the survey packet, resulting in a 40.6% (Tohoku [42.5%], Saitama [36.3%]) return rate.

2.4 | Data analysis

First, an exploratory factor analysis (EFA) with oblique rotation and the polychoric estimator was conducted to find correlations among the variables for the STSS-J items in the Tohoku sample, to establish a basic understanding of the factor structure, using the R packages "psych" and "GPArotation."^{23,24} The polychoric estimation provides a more accurate measurement model for ordinal data compared to the Pearson estimation.²⁵ The number of factors was determined by a Velicer's minimum average partial test before performing the EFA using the R package "EFA.dimensions."²⁶⁻²⁸

With the components and factor loadings identified in the EFA in the Tohoku sample, a confirmatory factor analysis was performed for the STSS-J items in the Saitama sample to test whether the same factor structure would be supported, using the R package "lavaan."²⁹ The weighted least squares mean- and variance-adjusted (WLSMV) estimator was used for the correction of the ordinary endogenous variables. A confirmatory factor analysis was also conducted for the STSS-J in the Tohoku sample. The factor structure of the standardized three-factor model identified by Bride et al was also tested with a confirmatory factor analysis in both samples.¹ The following fit indices were used to evaluate the model-data fit: comparative fit index (CFI; cutoff ≥ 0.90),³⁰ root-mean-square error of approximation (RMSEA; cutoff < 0.06),³⁰ standardized root mean residual (SRMR; cutoff < 0.08),³⁰ the ratio between χ^2 and df (χ^2/df ; cutoff ≤ 2)³¹ (see Hooper et al for descriptions of these fit indices).³²

Next, a factor invariance test was conducted to examine whether the model structure identified in this study was consistent between the Tohoku and Saitama samples, using R packages "semTools" and "lavaan."^{29,33} This test uses a series of progressively restrictive models to identify a noninvariant element between two samples.³⁴ The first factor invariance test examined whether the model without any constraints (model 1) was different from the model with thresholds constrained to be equal (model 2) between the two samples. If the omnibus chi-squared test was significant, indicating that two samples are noninvariant, univariate difference score tests were performed to identify which parameters (eg, thresholds) should be unconstrained to be partial invariance, and those parameters were freed. As in the confirmatory factor analysis, the WLSMV was used as an estimator. Additionally, the method suggested by Wu and Estabrook was used to identify variances and intercepts of latent item responses underlying ordered variables.³⁵ The next factor invariance test examined whether model 2 differed from the model with factor loadings and thresholds constrained (model 3) to be equal between the two samples. A third factor invariance test compared model 3 and the model with residuals, factor loadings, and thresholds constrained to be equal between the two samples.

Finally, the internal consistency, convergent validity, and discriminant validity of the STSS-J were examined. Internal consistency was tested with McDonald's omega coefficients using the R package "semTools."³³ Pearson's correlations were calculated for the STSS-J and other conceptually related measures to test convergent validity. Finally, a principal component analysis (PCA) with polychoric

estimation and oblique rotation was conducted for the STSS-J and MBI items. The MBI items were used because burnout is a closely related concept to STS. If a PCA distinguished components with the STSS-J items and those with the MBI items, the model identified in this study would demonstrate good discriminant validity (Data S1 include R codes for the analyses).

2.5 | Missing data

After excluding respondents who did not complete all items of the study measures, 31 responses (0.12%) in the Tohoku sample and 17 responses (0.15%) in the Saitama sample were considered as missing data. Because the percentages of the missing data were negligible, these missing data were imputed with a random forest imputation algorithm using the R package "missForest."³⁶

3 | RESULTS

3.1 | Demographics

Table 1 displays the demographics of both samples. In the Tohoku sample (97.2% female), 32.3% were over 50 years old, and about

TABLE 1 Demographics of the Tohoku and Saitama samples

Variable	Tohoku (N = 790)	Saitama (N = 351)
Age		
<30 y old	19.21%	18.10%
30-39 y old	23.03%	27.59%
40-49 y old	25.45%	36.78%
≥50 y old	32.32%	17.53%
Gender		
Female	97.22%	97.72%
Male	2.78%	2.28%
Worked in an area affected by the Great East Japan Earthquake		
<5 y	19.26%	19.37%
5-10 y	10.52%	14.24%
10-15 y	10.01%	16.81%
15-20 y	12.55%	17.66%
20-25 y	12.55%	13.96%
25-30 y	13.05%	11.68%
≥30 y	22.05%	6.27%
Marital status		
Married	71.41%	67.14%
Single	28.59%	32.86%
Worked in an area affected by the Great East Japan Earthquake		
Yes	37.52%	NA
No	62.48%	NA

one-third of them worked in the areas affected by the 2011 Great East Japan Earthquake. The years of experience as a public health nurse varied, and 71.4% were married.

In the Saitama sample (97.7% female), 36.8% were between 40 and 49 years of age. The distribution of years of experience as a public health nurse indicated that the nurses in the Saitama sample had fewer years of experience compared to those in the Tohoku sample, and 67.1% were married.

3.2 | Exploratory factor analysis

Velicer's MAP test revealed two components among the Tohoku sample (N = 790). An EFA with polychoric estimation and oblique rotation was conducted. The number of components was specified as two based on the results of Velicer's MAP test. Component 1 comprised the items that were not related to clients; thus, it was labeled "trauma-related distress." The variance accounted for was 0.35 for component 1, and the eigenvalue was 5.95. Component 2 consisted of the items related to clients; thus, it was labeled "client-related distress." The variance accounted for was 0.33 for component 2, and the eigenvalue was 5.53. Table 2 displays the factor loadings of the STSS-J items.

3.3 | Confirmatory factor analysis

3.3.1 | Testing the two-factor model

To examine the factor structure of the STSS-J, a confirmatory factor analysis was conducted based on the two components identified in the EFA in the Saitama sample (N = 351). The results showed that the two-factor model had acceptable goodness-of-fit, robust CFI = 0.978, SRMR = 0.044, $\chi^2/df = 2.94$, except for robust RMSEA (0.075; 90% confidence intervals = 0.066-0.084), which was still acceptable based on the cutoff point of 0.08 (see Figure 1 for factor loadings).³⁷ In the Tohoku sample (N = 790), the results of the two-factor model showed acceptable goodness-of-fit, robust CFI = 0.978, robust RMSEA = 0.066 (90% confidence intervals = 0.060-0.072), SRMR = 0.036, $\chi^2/df = 4.41$.

3.3.2 | Testing the three-factor model

Next, a confirmatory factor analysis was conducted for the standardized three-factor model (ie, intrusion, avoidance, arousal) in the Tohoku sample. The results showed that this model did not have adequate model-data fit: robust CFI = 0.952, robust RMSEA = 0.098 (90% confidence intervals = 0.092-0.104), SRMR = 0.055, $\chi^2/df = 6.56$. Finally, a confirmatory factor analysis for the standardized three-factor model was run for the Saitama sample. Results showed that the model-data fit

TABLE 2 Factors loadings of the Japanese version of the Secondary Traumatic Stress Scale items for the Tohoku and Saitama samples

Item	Trauma-related distress	Client-related distress
Item 1	0.54	0.21
Item 2	0.16	0.65
Item 3	0.17	0.58
Item 4	0.83	-0.12
Item 5	0.80	0.04
Item 6	0.09	0.75
Item 7	0.76	0.08
Item 8	0.74	0.14
Item 9	0.90	-0.07
Item 10	0.10	0.74
Item 11	0.85	-0.01
Item 12	0.11	0.79
Item 13	0.02	0.83
Item 14	-0.14	1.00
Item 15	0.79	0.02
Item 16	0.65	0.25
Item 17	0.00	0.82

Note: Trauma-related distress (component 1) comprised items 1, 4, 5, 7, 8, 9, 11, 15, and 16 (in bold). Client-related distress (component 2) comprised items 2, 3, 6, 10, 12, 13, 14, and 17.

was adequate based on the fit indices: robust CFI = 0.966, robust RMSEA = 0.094 (90% confidence intervals = 0.085-0.103), SRMR = 0.052, $\chi^2/df = 4.09$.

3.4 | Factor invariance test

To test the consistency of the two-factor model between the Tohoku and Saitama samples, the multigroup invariance test was performed. Table 3 displays the fit indices for the unconstrained model (model 1) and the constrained models. The results showed that the model with thresholds constrained to be equal (model 2) was not significantly different from the unconstrained model, $\chi^2(34) = 38.00, P = .292$. Furthermore, model 2 and the model with factor loadings and thresholds constrained to be equal (model 3) were compared. The results showed that these two models were invariant: $\chi^2(15) = 13.13, P = .592$. Next, the multigroup invariance test was conducted between model 3 and the model with residuals, factor loadings, and thresholds constrained to be equal (model 4). The results showed that models 3 and 4 were noninvariant: $\chi^2(17) = 38.32, P = .002$. Univariate score tests indicated that freeing the factor loadings between the latent variable “trauma-related distress” and item 4, $\chi^2(1) = 36.54, P < .001$, and the latent variable “client-related distress” and item 17, $\chi^2(1) = 29.81, P < .001$, would benefit the model. Results of the multigroup invariance test showed that model 3 and model 4 without these parameters constrained (model 4a) were invariant: $\chi^2(15) = 20.93, P = .139$.

In summary, multigroup invariance tests were conducted to compare the two-factor models with incrementally more restrictive constraints between the Tohoku and Saitama samples. The thresholds and factor loadings of the model were consistent between the two samples. Additionally, the results showed that two-factor loadings for items 4 and 17 were inconsistent between the two samples only in the model with the strictest constraints. These results suggested that the most basic part of the model structure was mostly consistent between the two samples.

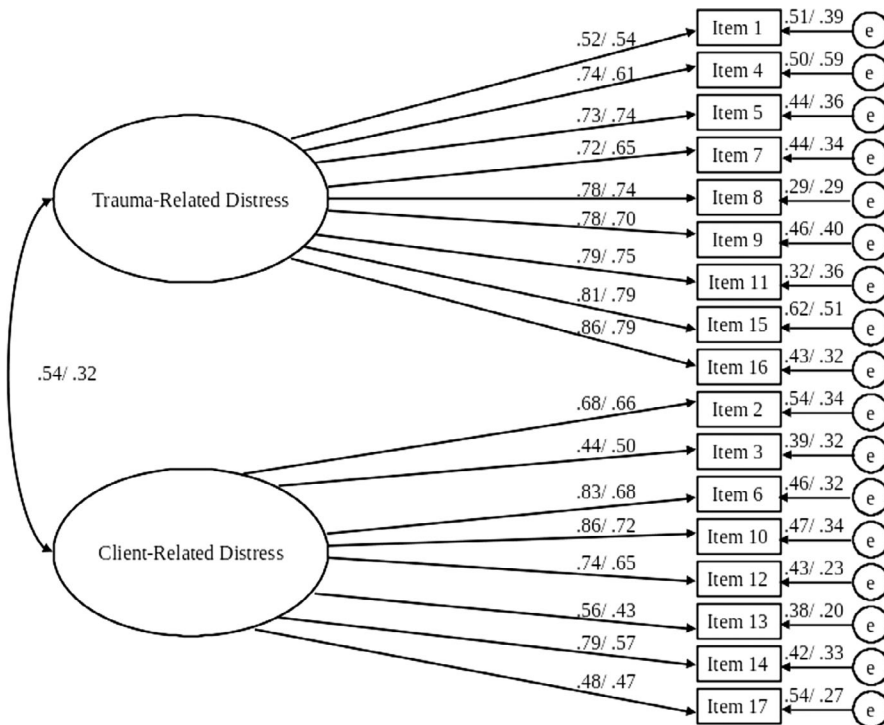


FIGURE 1 Standardized coefficients, variances, and covariances for the confirmatory factor analysis in the Tohoku and Saitama samples. Values before the slash indicate the values for the Saitama sample, and values after the slash indicate the values for the Tohoku sample. The values for the relationship between two latent variables indicate the covariances

TABLE 3 Goodness-of-fit indices for factor invariance tests

Model	χ^2	χ^2/df	RMSEA	CFI	TLI	SRMR
Model 1: unconstrained model	441.66	1.87	0.068	0.979	0.976	0.039
Model 2: thresholds constrained	460.97	1.71	0.063	0.979	0.979	0.039
Model 3: factor loadings and thresholds constrained	474.52	1.66	0.058	0.982	0.982	0.039
Model 4: residuals, factor loadings, and thresholds constrained	600.66	1.99	0.051	0.985	0.986	0.044
Model 4a: model 4 without factor loadings for items 4 and 17 constrained	534.33	1.78	0.049	0.986	0.987	0.041

Note: Abbreviations: CFI, robust comparative fit index; *df*, degrees of freedom; RMSEA, robust root-mean-square error of approximation; SRMR, robust standardized root-mean-square residual; TLI, robust Tucker–Lewis Index.

TABLE 4 Means and standard deviations for the study variables

Variable	Tohoku		Saitama	
	Mean	SD	Mean	SD
STS total	27.44	10.74	31.62	12.08
STS trauma-related distress	15.46	6.58	17.03	7.02
STS client-related distress	11.97	4.95	14.58	5.71
Burnout exhaustion	3.99	1.44	4.19	1.48
Burnout cynicism	2.78	1.24	2.92	1.37
Burnout professional efficacy	2.94	1.06	2.99	1.10
STS intrusion	7.71	3.22	9.37	3.68
STS avoidance	10.89	4.41	12.56	4.98
STS arousal	8.83	3.97	9.69	4.22

Note: Abbreviations: SD, standard deviation; STS, secondary traumatic stress.

3.5 | Reliability and validity

3.5.1 | Internal consistency

Internal consistency of the two-factor model indicated good reliability in the Tohoku sample: McDonald's = 0.92 for the trauma-related distress subscale and 0.90 for the client-related subscale. Internal consistency was good in the Saitama sample: McDonald's = 0.92 for the trauma-related distress subscale and 0.88 for the client-related subscale.

3.5.2 | Convergent validity

To examine convergent validity, Pearson's correlations were computed between the total STS scores for both the overall scale and the two subscales and MBI scores in the Tohoku sample. The relationships between the overall STS score and the MBI exhaustion score ($r = .41$) and the MBI cynicism score ($r = .41$) were positive, with medium effect sizes. There was a relationship between the overall STS score and MBI professional efficacy score ($r = -.05$). The relationship between the STS trauma-related distress score and the exhaustion score ($r = .45$) and the cynicism score ($r = .43$) had a

medium effect size, and the STS trauma-related distress score and the MBI professional efficacy score had a negative association, with a small effect size ($r = -.08$). Finally, the STS client-related distress had a positive relationship with the MBI exhaustion score ($r = .29$), a positive association with the MBI cynicism score ($r = .32$), and a negative relationship with the MBI professional efficacy score ($r = -.02$).

To obtain a basic understanding of STS scores, means and standard deviations were calculated for the total score and the scores for the two subscales (Table 4) and for Bride et al's¹ three-factor model, to qualitatively compare with studies using this three-factor model. The STS levels in the Tohoku sample were comparable to those in midwives working in perinatal wards, but the STS levels in the Saitama sample were higher than those in midwives. The STS levels in the Saitama sample were comparable to those in midwives working in Swiss perinatal wards.¹ Both samples had lower STS levels compared to emergency nurses (mean range = 37.4–45.9) and pediatric nurses (mean = 34.23), and the Saitama sample had comparable STS levels with neonatal intensive care unit nurses (mean = 30.77).^{4,38–40}

3.5.3 | Discriminant validity

A PCA with oblique rotation was conducted for the STSS-J and MBI items to test discriminant validity in the Tohoku sample. The number



of components was set at five, with two subscales from the STSS-J and three subscales from the MBI. Results showed that the five components accounted for 66.48% of the variance (eigenvalue = 21.94). Two components consisted of the STSS-J items (32.35% of variance), and the other three components consisted of the MBI items (34.13% of variance).

An exploratory PCA was also conducted for the STSS-J and MBI items in the Saitama sample. The number of components was set at five. The results showed that the five components accounted for 62.23% of the variance (eigenvalue = 20.54). The STSS-J items loaded on two components (28.58% of variance), and the MBI items loaded on three components (33.72% of variance). These findings indicated good discriminant validity of the two-factor model of the STSS-J.

4 | DISCUSSION

The findings from this study demonstrated that the two-factor model has the best model–data fit for both the Tohoku and Saitama samples. One of these two factors “client-related distress” consists of items associated with the relationship with clients (eg, reminders of my work with clients upset me, I wanted to avoid working with some clients). These items are consistent with the intrusion subscale and two items from the avoidance subscale of the original three-factor model. The other “trauma-related distress” factor mainly consists of items from the arousal and avoidance subscales of the original three-factor model (eg, I felt emotionally numb, I was less active than usual). In comparison with Brides et al's¹ original three-factor model, the findings of this study suggest that the two-factor model is better in both samples, although the three-factor model also has an acceptable model–data fit in the Saitama sample.

The present findings are similar to Jacobs et al's, demonstrating that a two-factor model with the avoidance–arousal factor and the intrusion factor had a good fit in the STSS French version.¹⁷ However, the findings of this study suggest that the two factors emerge around whether the items are related to clients. This factor structure differs from other validation studies for the STSS foreign language versions reporting factor structures constructed around the symptoms.^{16,17} These differences might be attributable to cultural differences. As opposed to people in individualistic cultures such as France, people in collectivist cultures such as Japan, where interpersonal stressors most often come from efforts to avoid explicit interpersonal conflicts, might have unique sets of stress management strategies.⁴¹ These coping strategies involve indirect methods to resolve conflicts, such as changing one's feelings and adjusting to the objective environment.³⁹ These unique coping styles might be associated with the classification of the STSS items based on whether they are related to clients.

Furthermore, the factor invariance test indicates that the factor structure differs when the strictest restraints are imposed with residuals, factor loadings, and thresholds. At the most fundamental

threshold and factor structure levels, the Tohoku and Saitama samples did not differ. Further research is needed to test the factor invariance of the STSS-J among other samples, to test the stability of the two-factor model.

This study shows that the STSS-J demonstrates good convergent validity with a similar construct related to work stress. The STSS-J subscales moderately relate to the MBI exhaustion and cynicism subscales, although they are weakly related to the MBI professional efficacy subscale. Other studies offer the convergent validity of the STSS. For example, STS total scores relate to PTSD scores ($r = .68$) and depression/anxiety ($r = .50$).¹⁷ Another study on STS in mental health professionals reported that STSS scores were associated with affective distress ($r = .61$) and burnout ($r = .62$).⁴² The findings of this study are consistent with these previous studies. However, it is important to note that future studies need to confirm the convergent validity of the two unique STS factors found in this study.

Importantly, the two-factor model of the STSS-J demonstrated good discriminant validity against the MBI items. The STSS-J items are loaded on the two factors found in this study, and the MBI items are loaded on three other factors. These findings are meaningful because they are similar constructs that indicate work-related negative consequences and are still distinctively loaded on different factors. Although the original validation study for the English version reported discriminant validity against demographic variables such as age, ethnicity, and income using Pearson's correlations, it did not show discriminant validity against a similar construct.¹ To our knowledge, no previous study has presented the discriminant validity of the STSS. The present study provides valuable information about the discriminant validity of the STSS against a similar construct related to work stress.

4.1 | Limitations

This study has some limitations. It was a cross-sectional study; thus, test–retest reliability could not be examined. A future longitudinal study is needed to investigate the test–retest reliability of the STSS-J. Furthermore, participants may have underestimated and underreported their STS levels and other negative consequences of working with clients because of the sociocultural pressure and stigma attached to mental health problems.⁴³ This type of response bias is common when using self-reported measures in studies on behavioral and mental health, such as obstructive sleep apnea,⁴⁴ depression,⁴⁵ and substance use.⁴⁶ People often respond to these health-related questions in a socially desirable way. Lastly, the samples in this study only included public health nurses. Samples with other occupations might display different factor structures due to different job demands; future studies are required to investigate the factor structure of the STSS-J in other populations. Validating that the STSS-J is psychometrically sound for a variety of occupations interacting with trauma-exposed clients is an essential first step toward understanding the mechanism of developing STS.

5 | CONCLUSIONS

The present study is the first to investigate the validity and reliability of the STSS-J. The study demonstrated that the two-factor model has the best model–data fit and is superior to the original three-factor model proposed by Bride et al.¹ The two-factor model of the STSS-J shows good internal consistency, convergent validity, and discriminant validity. Future studies need to confirm these findings for the reliability and validity of the two factors found in this study. Although the study has some limitations, the findings are robust with two samples of large sizes.

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CONFLICT OF INTEREST

The authors declare that they have no competing interests.

AUTHOR CONTRIBUTIONS

IN, SS, ST, and MN conceived the study concept and study design. IN, SS, ST, and MN participated in data collection. MK, KS, and MN performed the statistical analyses. MK and KS wrote the initial draft of the manuscript. All authors contributed to the critical revision of the manuscript.

APPROVAL OF THE RESEARCH PROTOCOL BY AN INSTITUTIONAL REVIEWER BOARD

Approval to perform this research was obtained from the Ethics Committee of the National Defense Medical College, Tokorozawa, Japan (Approval No. 2276).

INFORMED CONSENT

Since this study was conducted as an anonymous survey, written informed consent was not obtained from the participants. Instead, we disclosed the study objectives and provided them with the option to refuse participation.

DATA AVAILABILITY STATEMENT

The raw data belonging to the present study cannot be made publicly available, because the disclosure of personal data was not included in the research protocol of the present study. However, the data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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