Received: 10 July 2018 | Revised: 23 March 2020 | Accepted: 25 March 2020

DOI: 10.1111/ijn.12839

RESEARCH METHODOLOGY PAPER

INTERNATIONAL JOURNAL of NURSING PRACTICE WILEY

Adaptation and validation of the Compliance with Standard Precautions Scale amongst nurses in Turkey

Menevse Samur MSc, Research Assistant[1] |
Seyda Seren Intepeler BSN, PhD, Professor[1] |
Simon Ching Lam BN (Hons), MSCG, PhD, Assistant Professor[2]

[1]Nursing Management Department, Nursing Faculty, Dokuz Eylul University, Balcova, Izmir, Turkey

[2]School of Nursing, The Hong Kong Polytechnic University, Hong Kong, China

Correspondence
Menevse Samur, Nursing Management Department, Nursing Faculty, Dokuz Eylul University, Balcova, Izmir, Turkey.
Email: menevsesamur@gmail.com

Abstract

Aims: To adapt and psychometrically test the Compliance with Standard Precautions Scale for use by Turkish nurses.

Background: Measurement of standard precautions compliance is important to manage the safety of both patients and health care teams.

Methods: This two-phase methodological study employed a correlational design with repeated measures. In phase one, the scale's adaptation, including translation, semantic equivalence, content and face validity, was implemented. In phase two, internal consistency and stability were used to examine the reliability of the scale. Construct validity was tested using the Rasch rating scale model. This study was conducted by recruiting 411 nurses from three different hospitals between September 2015 and September 2016.

Results: Adaptation results showed that the Turkish version of the Compliance with Standard Precautions Scale (CSPS-T) is adequate for linguistic and content validation. The content validity index and comprehensibility of the scale were similarly satisfactory. The reliability of the CSPS-T was examined by Cronbach's alpha, corrected item-total correlations and intraclass correlation coefficient, and good results were obtained. The Rasch model showed that all items were compatible with the model. Whereas Item 4 was the most difficult, Item 10 was the easiest.

Conclusion: The CSPS-T is a reliable and valid tool for assessing compliance with standard precautions amongst Turkish nurses.

KEYWORDS

adaptation, infection control, nurses, psychometric testing, Rasch, standard precautions

SUMMARY STATEMENT

What is already known about this topic?

- Standard precautions are an indispensable part of nursing practice and care.
- The Compliance with Standard Precautions Scale (CSPS) was developed on the basis of the recommendations of internationally recognized organizations.
- The target instrument has been translated and validated in several developing and developed countries with satisfactory reliability and validity, but not in Turkey.

What is already known about this topic?

- This study provides a reliable, valid and comparable tool for assessing compliance with standard precautions amongst Turkish nurses.

- This study provides sufficient evidence to ensure the reliability and validity of the CSPS-T.
- This study reveals that the CSPS-T generally consists of easy items, presents a good fit with the model and is composed of a unidimensional scale.

The implications of this paper:

- The implications of this study could be useful for globally improving infection control practices.
- The CSPS can be used to assess self-compliance with standard precautions and evaluate the efficacy of interventional programmes in compliance with standard precautions.
- This work may be an example for health researchers who may not be familiar with Rasch measurement methods.

1 | INTRODUCTION

Standard precautions (SPs) are the measures taken by all health care personnel against microorganisms transmitted through the blood and body fluids, secretions, excreta and skin and mucosa, regardless of the presence of a known or suspected infection in the hospital (Gebresilassie, Kumei, & Yemane, 2014; Ghanbary et al., 2015; Kim & Oh, 2015; Siegel, Rhinehart, Jackson, & Chiarello, 2007). These precautions aim to reduce the infection risk by protecting patients, health care personnel and other individuals from coexisting infections whilst providing health care (Ghanbary et al., 2015). SPs are based on the following parameters: hand hygiene, personal protective equipment (PPE), decontaminating waste and appropriate waste disposal and preventing cross-infections (Gebresilassie et al., 2014; Holla et al., 2014; Kim & Oh, 2015; Usluer et al., 2006).

Nurses are health care professionals providing 24-h care; they are amongst the risk groups most often exposed to microorganisms when patients sneeze, cough, cry, speak, splash, scatter or misuse sharps (Efstathiou, Papastavrou, Raftopoulos, & Merkouris, 2013; Kim & Oh, 2015). The infection control protocols of various countries consistently suggest that nurses should protect themselves against bloodborne microorganisms, hepatitis B/C and HIV by complying with SPs (Efstathiou, Papastavrou, Raftopoulos, & Merkouris, 2011; Gebresilassie et al., 2014; Holla et al., 2014; Kim & Oh, 2015; Powers, Armellino, Dolansky, & Fitzpatrick, 2016; Siegel et al., 2007). However, nurses often adopt such precautions selectively, inadequately and/or incompletely (Efstathiou et al., 2011; Goudra, Singh, & Galvin, 2014; Holla et al., 2014; Lam, 2011; Maharaj, Lawton, & Garrett, 2012).

Nurses pay inadequate attention to hand-washing, wearing of masks, glasses and gloves, handling of sharp articles and the appropriate use of aprons before moving from one patient to another (Efstathiou et al., 2011; Lam, 2011; Powers et al., 2016). The literature also indicated some factors affecting the compliance with SPs amongst nurses, namely, competencies of the nurses (knowledge, perception attitude, skills, training and experience), unsafe working conditions (workload, emergency situations where urgent action is required, lack of the materials and time, nursing personnel and managers support), the perceived risk of infection, the availability of PPE and negative effects of PPEs on nurses (Donati, Biagioli, Cianfrocca, Marano, et al., 2019; Efstathiou et al., 2011; Haile, Engeda, & Abdo, 2017; Lam, 2014; Quan et al., 2015; Samur & Seren Intepeler, 2019). Moreover, the SP compliance rates of nurses are diverse, ranging from 4–78% (Felix, Victor, Malagutti, & Gir, 2013; Garcia-Zapata et al., 2010; Gebresilassie et al., 2014; Kermode, Jolley, Langkham, Thomas, Holmes, & Gifford, 2005; Luo, He, Zhou, & Luo, 2010; Maharaj et al., 2012; Pereira, Lam, Chan, Malaguti-Toffano, & Gir, 2015; Reda, Fisseha, Mengistie, & Vandeweerd, 2010).

Recent reviews show that, amongst studies measuring compliance with SP rates and knowledge and behaviour regarding these standards, only 66.6% were performed using structured or semistructured survey forms and only 58.3% used reliable and valid measurement tools (de Carvalho Nagliate, Nogueira, de Godoy, & Mendes, 2013). Valim, Marziale, Richart-Martínez, and Sanjuan-Quiles (2014) revealed that in the majority of studies investigating SPs, researchers did not provide the comprehensive psychometric properties (i.e., reliability and validity) of the instruments they used. Thus, the reliability and validity of these instruments (mostly self-developed and once use only) were questionable.

Few reviewed SP instruments have been published with explicit development processes and clear justifications on the definition of compliance. In addition, considering language restrictions, the majority of these instruments are only applicable in particular regions. Therefore, cross-cultural studies on compliance with SPs are limited. In 2012, the Compliance with Standard Precautions Scale (CSPS) was developed on the basis of the international preventive measures of the Center for Disease Control and Prevention and the World Health Organization to measure SPs. This scale provided an explicit description and clear justification for each developed item (Lam, 2011). 'Compliance' was also defined, and this information facilitated the adaptation of CSPS into different cultures and countries. Further studies conducted by the developer, including validation and cross-cultural pilot testing, showed that the CSPS is reliable and valid in measuring compliance with SPs and should be applicable in most developed and developing regions (Lam, 2014). The CSPS has been translated into several languages and adopted in several countries (Cruz et al., 2016; Donati, Biagioli, Cianfrocca, De Marinis, & Tartaglini, 2019; Lam, Pereira, et al., 2017; Mersal & Keshk, 2016; Pereira et al., 2015; Pereira, Lam, & Gir, 2017; Xiong, Zhang, Wang, Wu, & Hall, 2017).

Measurement of SP compliance is important to manage the safety of both patients (Hessels & Larson, 2016; Pittet et al., 2000) and health care teams (Kermode, Jolley, Langkham, Thomas, & Crofts, 2005). Determination of the risky behaviours of health care workers is essential to protect themselves, their families and their patients from disease transmission and occupational hazards/dangers/infections (Goudra et al., 2014; Lam, 2011; Mersal & Keshk, 2016; Valim et al., 2014). Studies outside Turkey have

evaluated health care personnel compliance with SPs, examined the causes of noncompliance and searched for solutions to improve compliance (Efstathiou et al., 2011; Holla et al., 2014; Kim & Oh, 2015; Luo et al., 2010). Before using the CSPS to measure SP compliance in Turkey, translation and validation are essential. Adaptation of the CSPS with satisfactory psychometric properties is essential to provide a reliable and valid measurement tool, determine compliance levels and plan protective measures in Turkey.

Item response theory is the most important psychometric method of validating scales because it describes the relationships amongst a latent trait, the item properties of the scale and the responses to individual items (Dickens, Rudd, Hallett, Ion, & Hardie, 2017). This theory can distinguish item function differences better than classical test models because it involves nonlinear logistic relationships, particularly appropriate for validating a 'checklist' or unidimensional scale (Streiner, Norman, & Cairney, 2015). CSPS is described as a 'checklist' by the scale developer (Lam, 2011), and its unidimensionality has been confirmed in Italian samples (Donati, Biagioli, Cianfrocca, Marano, et al., 2019). In the Rasch model, person or scale estimations are performed independently of each other, making it more advantageous than classical test theory. In addition, in the classical test theory, there is one standard error for an entire test, whereas the standard errors of measurement can be calculated for each level of the construct in Rasch models. The Rasch model assumes a hypothetical unidimensional line in which people and items are placed according to degree of their ability and difficulty. If the items align close enough to the hypothetical line, it means these items contribute to the measurement of the single dimension indicated in the construct theory (Baghaei, 2008; Wright & Masters, 1982). Rasch analysis holds the item discrimination parameter constant to ensure that the item characteristic curves are free from culture-specific response tendencies. The Rasch model provides a good methodology for the validity of measurement tools including items to measure practice. Besides, recommending Rasch analysis in assessing the psychometric properties of the CSPS is also important to conduct this study (Cruz et al., 2016). This study evaluates the reliability and validity of the CSPS for Turkish nurses by using conventional psychometric testing methods and the Rasch measurement model.

2 | METHODS

Several recent and recognized adaptation and validation methods were adopted to guide this methodological research (Chigavazira, Fernandez, Mackay, & Lapkin, 2018; Lam, Chan, Chong, Wong, & Ye, 2018; Lam, Yeung, et al., 2017). We also considered the guidelines from the study of Beaton, Bombardier, Guillemin, and Ferraz (2000) and Wild et al. (2005) for cross-cultural adaptation and used publications in the official Rasch website (https://www.rasch.org/ accessed 2018), such as the study of Baker (2001), for psychometric measurements. The study of Polit and Beck (2006) was used as a reference for content validity.

This two-phase methodological study employed a correlational design with repeated measures. In phase one, the scale's adaptation, including translation, semantic equivalence, content and face validity, was implemented. In phase two, internal consistency and stability were used to examine the reliability of the scale. Construct validity was tested using Rasch rating scale model.

2.1 | Aim

The purpose of the study was to adapt and test the psychometric properties of the CSPS for Turkish nurses.

2.2 | Design

This methodological study employed two phases—*Phase 1: CSPS Adaptation* and *Phase 2: Psychometric Testing of the CSPS—Turkish Version* (*CSPS-T*). Figure 1 presents the flow of this study.

2.3 | Phase 1: CSPS adaptation

The scale was analysed for linguistic and content validity on the basis of the guidelines for cultural adaptation studies (Beaton et al., 2000; Wild et al., 2005). Phase one was conducted between September 2014 and April 2015.

2.3.1 | Translation and back translation

The CSPS was forward-translated from English into Turkish by the researcher and two linguists with a sound understanding of both languages and cultures and whose native language is Turkish. Then, the most appropriate expressions were selected and synthesized, and the scale was sent to another linguist for back-translation. Although the third linguist's native language was English, they were skilled in both languages. The linguist lived abroad and had not seen the study instrument (e.g., CSPS English version) prior to this research. The back-translated CSPS items were compared with those of the original scale, and their linguistic applicability, cultural relevance and clarity were discussed considering the instrument developer and expert opinions. After obtaining the maximum agreement between the original and target scales, the preliminary CSPS-T was established.

2.3.2 | Expert committee review for semantic equivalence and content validation

The semantic and conceptual equivalence of the translated scale was examined by a panel of 11 experts, including five academic experts on infection control working at a Dokuz Eylul University

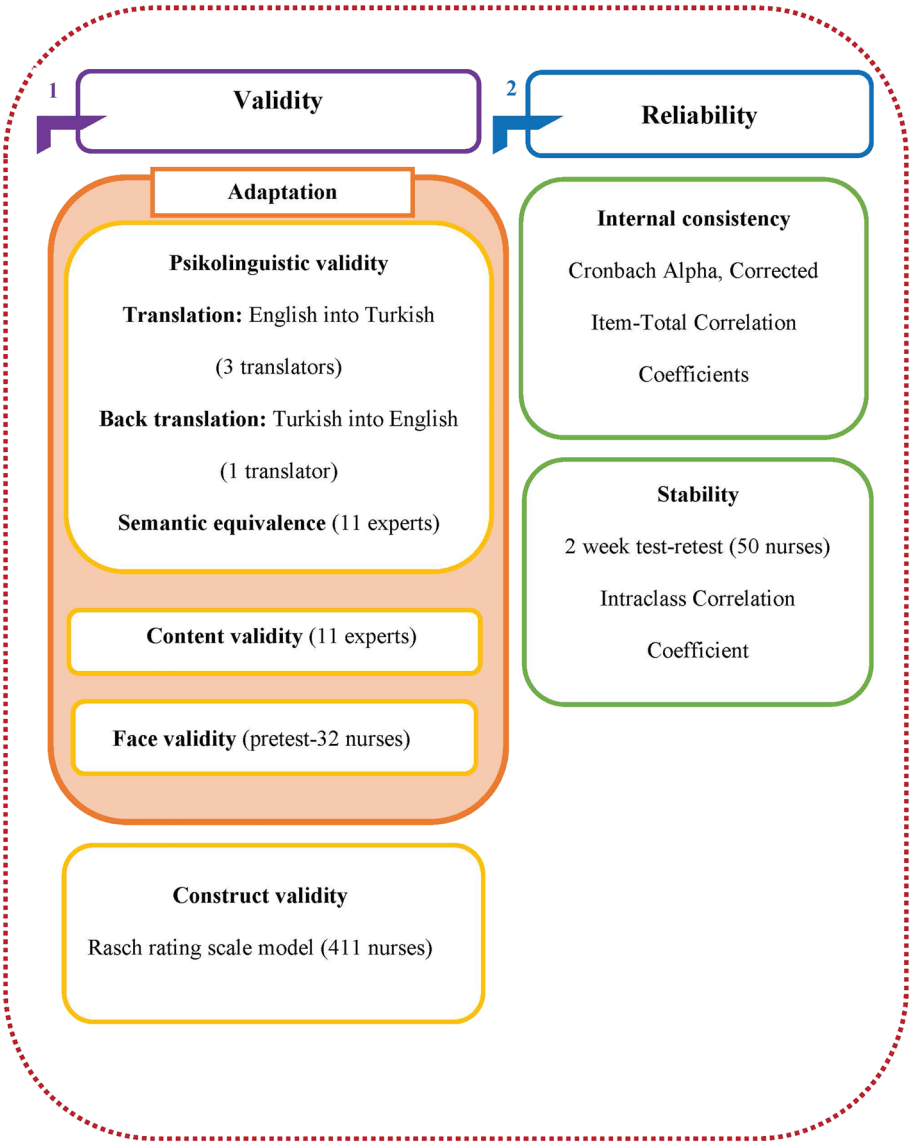

FIGURE 1 CSPS-T's validity and reliability processes. CSPS-T, Turkish version of the Compliance with Standard Precautions Scale

and six infection-control nurses working at the university hospital. For semantic equivalence, the panel was asked to rate each item for its applicability in Turkish culture and the measurement purpose (4-point rating scale: never applicable = 1, not applicable = 2, applicable = 3 and very applicable = 4) and provide recommendations if item revision was needed. Items rated as inappropriate by >20% of the respondents were re-examined by the language experts for the appropriateness of translation. The content validity index (CVI) of the CSPS-T was calculated using the Lynn technique. In this technique, each item in the CSPS-T was rated by the same experts for the relevance of its content using a 4-point scale (1 = not relevant, 2 = somewhat relevant, 3 = quite relevant and 4 = highly relevant). The item-level CVI was computed for every item, wherein expert ratings of 3 or 4 were divided by the total number of experts. Items with CVI > 0.8 indicated good content validity. Finally, the scale-level CVI was calculated as the average of all items (Polit & Beck, 2006). Afterwards, the prefinal version of CSPS-T was prepared.

2.3.3 | Pretesting for face validation

The CSPS-T was pretested to detect misinterpretations and improve the items. A quota sample of 32 nurses composed of one or two staff from respective clinics (a total of 30 clinics in the University hospital; 28 clinics rated as small-scale and two rated as large-scale clinics) was invited to respond to the CSPS-T. The nurses who voluntarily participated into the pretest of this study were not eligible to join Phase 2 of the study. The participants were asked to evaluate items as 'acceptable' or 'not acceptable' and give suggestions for clarity and comprehensibility. The nurses examined, reviewed and rephrased each item and suggested the rewriting of some words

when needed (Lam, 2015). Then, the translated CSPS was considered completed.

2.4 | Phase 2: Psychometric testing of CSPS-T

The second phase aimed to examine the reliability and validity of the CSPS-T using various psychometric testing methods. The Phase 2 study was conducted between April 2015 and September 2016.

2.4.1 | Reliability

The internal consistency of the CSPS-T was assessed using Cronbach's alpha (Cronbach, 1951; Michell, 2014; Sijtsma, 2009), and values of >0.70 were considered to indicate a satisfactory result (Bland & Altman, 1997). In addition, corrected item-total correlation coefficients were calculated, and values of >0.30 were accepted as 'discriminating' and adequate (Field, 2005).

The reliability of a measurement tool can be tested by its re-administration to the same people at an interval of at least 2 weeks (Sijtsma, 2009). Hence, to ensure stability, test–retest reliability was checked after 2 weeks using intraclass correlation coefficients. Intraclass correlation coefficients of 0.70 were considered satisfactory (Fleiss & Cohen, 1973; Lam, Yeung, et al., 2017), and the minimum sample size for test–retest was 50 (Souza, Alexandre, & Guirardello, 2017). The duration of retest, statistics used for test–retest and sample size requirement were based on standard psychometric testing (Fleiss & Cohen, 1973; Sijtsma, 2009; Souza et al., 2017) and the latest validation studies (Chigavazira et al., 2018; Lam et al., 2018; Lam, Yeung, et al., 2017).

2.4.2 | Validity

The Rasch measurement model is a powerful tool for evaluating the construct validity of measurement tools for sets of behaviours, such as competencies, achievements and attitudes (Baghaei, 2008; Linacre, 2004). The rating scale version was used to analyse the construct validity of the CSPS-T (Andrich, 1978). When selecting the Rasch model, the characteristics of the scale/data were taken into consideration. These data are not dichotomous, and CSPS is not a measurement tool with partial scoring. All items on the CSPS scale have the same rating scale structure. Because the measurement tool was in the form of a grading scale, the analysis was performed with the rating scale model (Linacre, 2000). The unidimensionality, item difficulty (location) and item fit of the assumptions were tested during Rash analysis, and polyserial correlation coefficients (p) were used to determine the level of hidden relationships between continuous and categorical variables (e.g., item responses). The variables must have a normal distribution. The polyserial correlation coefficients were classified as follows: $p < 0.25$, low-level correlation; $0.25 \leq p < 0.50$, medium-level correlation; and $p \geq 0.50$, high-level correlation (Olsson, Drasgow, & Dorans, 1982). The slopes were constant, and a value of 1.0 was regarded as moderate. The ability scale (usually called a theta scale), which typically ranges from −4.0 to +4.0 (with 0 as the mean) contained a point called item difficulty, where the probability of a correct response is 0.5. To estimate item–model fit, the chi-square test was used (Natarajan, 2009).

2.5 | Sample/participants

The CSPS is contextually relevant to the practice of clinical nurses (Lam, 2011). Thus, this study involved nurses in a university, a public hospital and a private hospital (N = ~1,402). On the basis of conventional sample size estimation, at least 400 participants are necessary to conduct psychometric testing with various methods (Sencan, 2005). Pretesting involved 32 nurses (Beaton et al., 2000). As suggested, to determine test–retest reliability, 50 nurses were invited to respond to the scale 2 weeks after initial testing (Souza et al., 2017). Pre-post test data were not included in the final sample.

2.6 | Data collection

Consent forms for this study were distributed to all potential participants. Informed consent (by checking the boxes) was obtained prior to data collection. Participants' signatures were not required to ensure anonymity. Once the signed consent form was received, data collection sheets (marked with the date) were distributed in sealed envelopes by the researchers to potential participants between August 2015 and June 2016, and the participants returned these within the next few days. The names of the participants were not recorded to ensure confidentiality. The researchers made the necessary explanations and invited randomly selected participants (marked by code and phone numbers) for the retest. Reminder calls were made to participants a day before the retest. Data collection took place over 4 months. The data collection form was a questionnaire including three parts: cover letter (consent form, research aim and invitation letter), demographic data sheet (age, gender, education level and work unit) and the CSPS-T.

2.7 | Instrument

The CSPS was developed by Lam (2011) on the basis of the international preventive measures of the Center for Disease Control and Prevention and the World Health Organization. This 20-item scale adopted a four-point adjectival scale (never, seldom, sometimes and always). Four items (C2, C4, C6 and C15) were negatively worded. The scores were calculated according to the following point system: positively worded items, 1 = 'always', 0 = 'for others'; negatively worded items, 1 = 'never' and 0 = 'for others. The total score ranged from 0 to 20. High scores indicate that the nurses comply with SPs, whereas low scores mean they do not. The CSPS has been translated

into several languages (Lam, 2011), and cross-cultural pilot testing has been performed to increase its applicability to most developed and developing regions (Lam, 2014). The psychometric properties of the original English version, which included internal consistency, 2-week and 3-month stability, face, content and concurrent and construct validity (Lam, 2011, 2014), were satisfactory.

2.8 | Data analysis

The linguistic and content validity of the CSPS was determined. Construct validity was tested using the Rasch measurement model and the program Parscale 4.0, which evaluates two-parameter logistic models by using a rating scale model (Wright, Douglas, & No, 1986). Reliability analysis and demographic data were presented using descriptive statistics by SPSS 20.0 software in terms of Cronbach's alpha, corrected item-total correlation coefficients, frequency, percentage and standard deviation. These analyses are considered appropriate methods for psychometric testing.

2.9 | Ethical considerations

Written ethical approval was obtained from the Non-Interventional Studies Ethics Committee (Ref. 1897-GOA). Approval for the reproduction of the CSPS and access permission were obtained by the scale developer (Ref. B100D48−-201,508) and the hospital.

3 | RESULTS

3.1 | Phase 1 results

The CSPS was translated from English into Turkish, and the semantic equivalence of the two versions was examined. During this examination, some items were revised to reduce ambiguity. For example, the forward translation of item 12, that is, 'I decontaminate my hands immediately after removal of gloves', was replaced with 'As soon as I take off my gloves, I clean my hands appropriately' on the basis of the opinions of researchers and language experts, who discussed discrepancies related to the general use of the word 'decontamination'. Decontamination, in Turkey, is commonly used in medical devices. Hence, its use for hands may be confusing for nurses. To prevent confusion, the item was changed. After translation, back-translation resembled the original scale. By comparing the back-translated and original versions, no major discrepancy in meaning was found.

In the expert committee review, a panel of experts discussed all items in detail in terms of relevance. Item 8 ('I take a shower in case of extensive splashing …') compelled the experts to discuss the applicability and relevance of the item to the general hospital environment because only a few hospitals in Turkey are equipped with bathing facilities. The consensus was to retain the item because of the ongoing transformation of hospitals. In Turkey, many hospitals have been transformed into city hospitals, and several new hospitals are currently being established. These hospitals are mandated by the government to be equipped with a shower room for staff for infection control. The experts found all other remaining items to be relevant. The item and expert CVI of the CSPS were both 0.99, which indicates satisfactory validity. After the panel discussion, the experts found that all items were relevant to the content with an agreement rate of above 90%. The agreement rate amongst experts for all items is indicated in Table 1.

In this phase of face validation, the demographic data of 32 nurses were collected. The mean age of these nurses was 33.31 (SD = 8.01), and 97% were female. Amongst these nurses, 47% had a bachelor's degree, 28.8% worked in medical units, 37.5% worked in surgical units and 33.8% worked in intensive care units. The nurses commented that the items in the pretest were understandable. Table 1 shows the Turkish and English versions of the CSPS.

3.2 | Phase 2 results

A total of 162 nurses from a university hospital, 108 from a public hospital and 141 from a private hospital (N = 411) participated in this study. The mean age of these nurses was 31.49 (SD = 8.28), 89.1% were female and 55% had a bachelor's degree. Amongst the participants, 35.8% worked in medical units, 29.9% in surgical units and 34.3% in intensive care units.

For reliability, internal consistency was satisfactory (Cronbach's α = 0.71). The corrected item-total correlation coefficients ranged from 0.18 to 0.55 ($p < 0.01$) (Table 1). The intraclass correlation coefficient of the 2-week test–retest was 0.84 (95% confidence interval = 0.77–0.90), which indicates satisfactory stability.

For validity, construct validation was tested by Rasch analysis. Table 2 shows the polyserial correlation coefficients, item difficulty levels and item–model compliance.

The polyserial correlation coefficients were moderate for items 2, 3, 4, 6, 7, 8, 11, 15, 17 and 20 ($0.25 \leq p < 0.50$) and high for items 1, 5, 9, 10, 12, 13, 14, 16, 18 and 19 ($p \geq 0.50$). Item–test correlations were positive and acceptable. The item discrimination level of the Rasch model was 1, whereas item difficulty levels ranged from −0.260 to −2.923. Item 4 was the most difficult, whereas item 10 was the easiest. Twenty items were classified as generally easy, six items were classified as easy (5, 10, 12, 14, 18 and 19), seven items were classified as moderate (1, 7, 8, 9, 11, 17 and 20) and seven items were classified as difficult (2, 3, 4, 6, 13, 15 and 16). Thus, the items were homogeneously distributed. Theta values showed the nurses' ability score to be 0.042 (SD = 0.586). The model compliance statistics shows each item's chi-square value. The items were highly compatible with the model ($p > 0.01$). Considering that all items were compatible with the entire test, the scale measured a unidimensional construct (Table 2).

The item information function obtained through Rasch measurement showed that only Item 10 contributed poorly to the test reliability by yielding inadequate information about the test. Even

TABLE 1 CSPS original and Turkish versions and corrected item-total statistics (n = 411)

Items	Agreement rate	Corrected item-total correlation	Cronbach's alpha if item deleted	
	%	*r*	*p*	*α*
I wash my hands between patient contacts. *Hastadan hastaya geçişte ellerimi yıkarım.*	100	.44	<0.001	.70
2. I only use water for hand washing. *El yıkarken sadece su kullanırım.*	90.9	.19	<0.001	.71
3. I use alcoholic hand rubs as an alternative if my hands are not visibly soiled. *Ellerimde gözle görülür kirlenme yoksa, yıkamaya alternatif olarak alkollü el dezenfektanı/temizleme sıvısı kullanırım.*	100	.25	<0.001	.70
4. I recap used needles after giving an injection. *Enjeksiyon yaptıktan sonra kullandığım iğnenin kapağını kapatırım.*	100	.39	<0.001	.70
5. I put used sharp articles into sharps boxes. *Kesici delici özellikteki malzemeleri kullandıktan sonra kesici delici alet kutusuna atarım.*	100	.18	<0.001	.71
6. I put used sharp articles into sharps boxes. *Kesici delici alet kutusu sadece tam dolduğunda atılır.*	90.9	.39	<0.001	.70
7. I remove personal protective equipment (PPE) in a designated area. *Kişisel Koruyucu Ekipmanı (gözlük, maske, bone, önlük vb.) özel olarak ayrılmış/belirlenmiş alanda çıkarırım.*	100	.36	<0.001	.70
8. I take a shower in case of extensive splashing even after I have put on personal protective equipment (PPE). *Aşırı miktarda bir sıçramaya maruz kaldığımda Kişisel Koruyucu Ekipman (gözlük, maske, bone, önlük vb.) kullanmış olsam da, normalden daha uzun süren bir duş alırım.*	100	.30	<0.001	.70
9. I cover my wound(s) or lesion(s) with waterproof dressing before patient contacts. *Yara (larım), lezyon (larım) varsa, hastaya temas etmeden önce su geçirmez pansuman ile kapatırım.*	90.9	.45	<0.001	.69
10. I wear gloves when I am exposed to body fluids, blood products, and any excretion of patients. *Hastaların vücut sıvıları, kan ürünleri veya herhangi bir salgısına maruz kalmadan önce eldiven giyerim.*	100	.38	<0.001	.70
11. I change gloves between patient contacts. *Hastadan hastaya geçişte eldivenlerimi değiştiririm.*	100	.40	<0.001	.70
12. I decontaminate my hands immediately after removal of gloves. *Eldivenlerimi çıkarır çıkarmaz ellerimi uygun bir şekilde temizlerim.*	100	.46	<0.001	.70
13. I wear a surgical mask alone or in combination with goggles, face shield and apron whenever there is a possibility of a splash or splatter. *Sıçrama, saçılma olasılığına karşı sadece yüz/cerrahi maske ya da maske ile birlikte gözlük, yüz koruyucu, önlük kullanırım.*	100	.55	<0.001	.69
14. My mouth and nose are covered when I wear a mask. *Maske taktığımda ağzım ve burnum kapalı olur.*	100	.34	<0.001	.70
15. I reuse a surgical mask or disposable personal protective equipment (PPE). *Bir cerrahi maskeyi ya da tek kullanımlık Kişisel Koruyucu Ekipmanı tekrar kullanırım.*	100	.37	<0.001	.70
16. I wear a gown or apron when exposed to blood, body fluids or any patient excretions. *Kan ve vücut sıvıları veya hastanın diğer salgılarına salgısına maruz kalmadan önce önlük ya da yüz koruyucu takarım.*	100	.54	<0.001	.69

(Continues)

TABLE 1 (Continued)

Items	Agreement rate %	Corrected item-total correlation r	Cronbach's alpha if item deleted p	α
17. Waste contaminated with blood, body fluids, secretion and excretion is placed in red plastic bags irrespective of the patient's infection status. *Kan, vücut sıvıları, sekresyon ve salgı ile kontamine atıklar, hastanın enfeksiyon durumuna bakılmaksızın kırmızı atık torbalarına atılır.*	100	.20	<0.001	.71
18. I decontaminate surfaces and equipment after use. *Malzemeleri ve çalışma alanını kullandıktan sonra temizlerim.*	100	.45	<0.001	.70
19. I wear gloves to decontaminate used equipment with visible soils. *Kullandıktan sonra gözle görülür biçimde kirlenen malzemeleri temizlerken eldiven giyerim.*	100	.32	<0.001	.71
20. I clean up spillage of blood or other body fluids immediately with disinfectants. *Saçılan, dökülen kan ve kan ürünlerini veya diğer vücut sıvılarını hemen dezenfektanla temizlerim.*	100	.31	<0.001	.70

Note: Original English version of the items can be found from Lam (2011).
Abbreviation: CSPS, Compliance with Standard Precautions Scale.

TABLE 2 Polyserial correlations, locations and items fit statistics (n = 411)

Item	Polyserial correlation	Slope	S.E.	Location	S.E.	Items fit statistics Chi-square	D.F.	Probability
1	0.611	1.000	0.000	−1.227	0.109	4.839	3	0.182
2	0.372	1.000	0.000	−0.789	0.120	3.382	3	0.336
3	0.247	1.000	0.000	−0.302	0.116	7.796	3	0.050
4	0.445	1.000	0.000	−0.260	0.109	7.201	3	0.065
5	0.509	1.000	0.000	−2.354	0.174	2.938	2	0.228
6	0.454	1.000	0.000	−0.509	0.109	4.825	3	0.183
7	0.469	1.000	0.000	−1.164	0.115	6.130	3	0.104
8	0.372	1.000	0.000	−1.094	0.117	4.122	3	0.247
9	0.593	1.000	0.000	−1.066	0.106	5.944	3	0.113
10	0.724	1.000	0.000	−2.923	0.152	3.687	1	0.052
11	0.464	1.000	0.000	−1.802	0.127	6.560	3	0.086
12	0.717	1.000	0.000	−2.281	0.129	4.709	2	0.093
13	0.641	1.000	0.000	−0.899	0.109	8.055	3	0.044
14	0.676	1.000	0.000	−2.223	0.141	4.413	2	0.108
15	0.459	1.000	0.000	−0.950	0.112	6.208	3	0.100
16	0.582	1.000	0.000	−0.897	0.112	8.658	3	0.034
17	0.442	1.000	0.000	−1.756	0.141	5.391	2	0.066
18	0.662	1.000	0.000	−2.335	0.126	5.270	2	0.070
19	0.535	1.000	0.000	−2.439	0.159	3.630	1	0.054
20	0.324	1.000	0.000	−1.432	0.125	6.696	3	0.081
Total	-	**Mean Theta (θ) = .042 (standard deviation = .586)**				110.465	51.	0.000

Abbreviations: D.F., degrees of freedom; S.E., standard error.

participants with poor ability levels could achieve a very applicable response level.

All new findings on the psychometric properties of the CSPS-T were compared with those of the developer (Lam, 2011, 2014) and are shown in Table 3.

4 | DISCUSSION

CSPS adaptation was carefully conducted to ensure equivalence between the English and Turkish versions. The panel of experts considered the CSPS-T to be conceptually and culturally relevant to measure the SP compliance of nurses in Turkey. We conducted content validation by using the Lynn technique to determine experts' ratings on the relevance of each item. Ideally, the item CVI should be at least 0.78, whereas the scale CVI should be at least 0.80 (Beaton et al., 2000; Polit & Beck, 2006; Wild et al., 2005). The CVIs of the CSPS-T items and scale were 0.99, indicating high coherence amongst experts and that each item suited the scale and its purpose on relevance. Cruz et al. (2016) found that the CVIs of the Arabic and original versions of the CSPS are 1.00 and 0.90, respectively (Lam, 2014). All values consistently indicated good content validity of the CSPS across different cultures. The scale was finalized by inviting 30–40 members of the target population (Beaton et al., 2000) to test its clarity and implement revisions based on gathered recommendations. Pretesting of the CSPS-T was conducted with 32 nurses. Cruz et al. (2016) administered the CSPS-T to 40 participants and met the pretesting criteria. Lam's (2014) pilot test included 24 participants. These pretests yielded good results and helped ensure the comprehensibility of the items for all versions.

Analysis of the CSPS-T revealed a satisfactory Cronbach's alpha, and most of the corrected item–total correlation coefficients obtained were adequate; these results indicate high reliability and internal consistency. The Cronbach's alpha of the CSPS was 0.71, which is comparable with the developer's results (0.73) (Lam, 2011). However, some studies, such as that of Cruz et al. (2016) reported higher alpha values (0.89) because the homogeneity of the participants in the represented sample was high. Similarly, the heterogeneous samples of Pereira et al. (2015) obtained a relatively low alpha (0.61) because the participants represented many diverse working units, working hours and previously attended infection control courses.

The corrected item–total correlation coefficients of the CSPS-T ranged from 0.18 to 0.55 ($p < 0.01$) and were less than 0.30 for items 2, 3, 5 and 17. Upon examination of these items, deletion did not increase the reliability coefficients (Cronbach's alpha) of the CSPS-T. Moreover, smaller correlation coefficients are acceptable with increasing sample size (Field, 2005). Hence, the items were retained because their assessment of some areas of infection control is comparable with that of the original CSPS. Cruz et al. (2016) found the item–total correlations to be 0.33–0.73 because of the homogeneity of a student sample. Thus, the items' contribution to test reliability was adequate. The CSPS-T's internal consistency was satisfactory, and the items measured the intended features consistently.

The CSPS-T had a high intraclass correlation coefficient of 0.84, and the measured construct of infection control was stable for 15 days. Given the same duration of the retest, other studies revealed intraclass correlation coefficients ranging from 0.79 to 0.88 (Cruz et al., 2016; Lam, 2014; Pereira et al., 2017).

Construct validation was performed with using the Rasch measurement model. Item location was estimated by the proximity of an item to the imaginary line created during Rasch analysis to provide information about item difficulty (Munyombwe et al., 2014). Item difficulty values ranged from −3 to +3. A value close to +3 indicates item difficulty, whereas a value close to −3 indicates easiness. As item difficulty increases, the possibility of answering the item correctly falls to less than 0.5. Otherwise, the possibility of answering the item correctly exceeds 0.5. Item discrimination (a) shows the item's ability to discriminate between correct and incorrect responses. The ideal discrimination value is 1.70 (Baker, 2001).

Rasch analysis can estimate qualification levels on the basis of item difficulty levels. The qualification levels ranged from +3 to −3 and indicate the extent to which respondents were qualified to answer an item (Baker, 2001). When the qualification level of the respondents was +3, their probability of answering the item was 0.99; when it was −3, the probability of respondents answering it approached 0 (Munyombwe et al., 2014). The probability of answering Item 4 correctly was lower than 0.5, whereas the probability of answering Item 10 correctly was higher than 0.5. Most of the items were easy and highly discriminative. The SP compliance of nurses was moderate.

During Rasch analysis, evaluation of data that comply with the model is important to determine item quality. If the item quality is poor because a respondent is confused by the response choices, the item can be omitted or rewritten or its location in the measurement tool can be changed. If many items are noncompliant with the model, the construct validity of the measurement tool should be re-examined (Michell, 2014). Item–model compliance levels can be interpreted in terms of chi-square values and the corresponding probabilities (Yu, 2017). The CSPS-T items were highly compliant and unidimensional with the model ($p > 0.01$), and acceptable construct validity was obtained for this instrument. The adaptation process and items revealed good quality for measuring latent traits. Therefore, the items worked well and could assess the same/single variable/construct.

The item information function indicates the amount and level of information that each item provides. This information determined the scale's integrity and the contribution of each item to each feature to be measured (Baker, 2001). Only Item 10 did not yield adequate information, thereby contributing little to the test's integrity and reliability.

4.1 | Limitations and strengths

This study examined the reliability and validity of the CSPS-T for measuring the compliance of nurses with current infection control practices in Turkey. The translation and validation processes complied with the conventional methodological research and Rasch analysis to provide sufficient evidence of the satisfactory psychometric

TABLE 3 Comparisons of reliability and validity of Compliance with Standard Precautions Scale Original with the Turkish version (N = 411)

	The current study			Original study[a]
	Methods	**Statistic methods**	**Results**	**Results**
Reliability				
1. Internal consistency	Cronbach's method	Cronbach's alpha	α = 0.71	α = 0.73
		Corrected item-total correlation coefficients	r = 0.18–0.55, p < 0.001	/
2. Stability	2-week test–retest reliability[b]	Intraclass correlation coefficient	r = 0.84, p < 0.001	r = 0.79, p < 0.001
	3-month test–retest reliability		/	r = 0.74, p < 0.001
Validity				
1. Face validation	Pretested with target population[c]	Frequency & percentage or feedbacks	All items were understandable.	100% interpretability
2. Content validation	Expert committee review	Content validity index	CVI = 0.99	CVI = 0.90
3. Construct validation	Known-group method, checking compliance rate between nursing staff and students	Independent sample t test	/	t = 2.05, p = 0.041
	Hypothesis testing of correlation of clinical experience with compliance rate	Pearson product-moment correlation coefficient	/	r = 0.17, p = 0.006
	Rasch rating scale model	Polyserial correlation	Item-test correlations were positive and acceptable.	/
		Locations	Difficulty levels ranged from −0.260 to −2.923	/
		Item fit statistics (chi-squared statistic)	Items were highly compliant and unidimensional with the model. p < 0.001	/

Abbreviation: CVI, content validity index.
[a]Original study was based on the article from Lam (2011, 2014).
[b]The result is calculated on the basis of 50 nurses.
[c]The result is calculated on the basis of 32 nurses.

properties of CSPS-T. Furthermore, this study recruited sufficient samples for computing reliability coefficients, which enhanced the confidence levels of the obtained results. However, a limitation must be discussed. The CSPS developer focused on the SP compliance of 'clinical nurses', a group made up of both nursing staff and students so long as they provide direct patient care in the clinical setting. The current study did not involve nursing students as participants for psychometric testing in any study phase. Hence, the results only reflect the reliability and validity of the CSPS-T in measuring the SP compliance of nursing staff.

5 | CONCLUSION

To the best of our knowledge, this study is the first effort to evaluate the psychometric characteristic of the CSPS by using the Rasch measurement method. This study is valuable as it provides nurses with a tool for assessing their self-compliance with SPs and evaluating the effects of interventional programmes for compliance problems. Thus, nurses may exert efforts to increase their compliance rate to improve their safety, as well as that of patients and visitors. This study also serves an example for health researchers who may not be familiar with the Rasch measurement method. On the basis of the Rasch measurement scale, the CSPS-T generally consists of easy items, presents a good fit with the model and is composed of a unidimensional scale.

Psycholinguistic and psychometric measurements showed that the CSPS-T is applicable to Turkish nurses and determines a one-dimensional homogeneous construct. The Cronbach's alpha, corrected item-total correlation and intraclass correlation coefficients were high and acceptable. Hence, the CSPS-T is a valid and reliable tool for evaluating relevant nurses' clinical practices in the Turkish health care setting. As a recommendation, the SP behaviour of nurses can be examined per item and person by using the Rasch measurement method and improved at the individual level.

ACKNOWLEDGEMENTS

We thank the hospital's nursing services director, Izmir University Medical Park Hospital's administrations and clinical nurses for their support in all the processes. We also thank Dr. Tuncay Ogretmen for his statistical support.

CONFLICT OF INTEREST

All authors report no conflicts of interest relevant to this article.

AUTHORSHIP STATEMENT

MS and Intepeler conceived the study. SCL was contributed to study design. MS was responsible for data management and analysis. MS, SSI, SCL were drafted the article and revised..

ORCID

Menevse Samur https://orcid.org/0000-0001-6033-6196
Seyda Seren Intepeler https://orcid.org/0000-0001-8615-9765
Simon Ching Lam https://orcid.org/0000-0002-2982-9192

REFERENCES

Andrich, D. (1978). A rating scale formulation for ordered response categories. *Psychometrika*, *43*, 561–573. https://doi.org/10.1007/BF02293814

Baghaei, P. (2008). The Rasch model as a construct validation tool. *Rasch Measurement Transactions*, *22*, 1145–1146.

Baker, F. B. (2001). The basics of item response theory. Retrived from http://echo.edres.org:8080/irt/baker/final.pdf.

Beaton, D. E., Bombardier, C., Guillemin, F., & Ferraz, M. B. (2000). Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine*, *25*, 3186–3191.

Bland, J. M., & Altman, D. G. (1997). Statistics notes: Cronbach's alpha. *BMJ*, *314*(7080), 572.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, *16*, 297–334. https://doi.org/10.1007/BF02310555

Chigavazira, J., Fernandez, R., Mackay, M., & Lapkin, S. (2018). Adaptation and validation of the clinical supervision self-assessment tool among registered nurses. *Nurse education today*, *70*, 28–33. https://doi.org/10.1016/j.nedt.2018.08.008

Cruz, J. P., Colet, P. C., Al-otaibi, J. H., Soriano, S. S., Cacho, G. M., & Cruz, C. P. (2016). Validity and reliability assessment of the Compliance with Standard Precautions Scale Arabic version in Saudi nursing students. *Journal of Infection and Public Health*, *9*, 645–653. https://doi.org/10.1016/j.jiph.2016.01.010

de Carvalho Nagliate, P., Nogueira, P. C., de Godoy, S., & Mendes, I. A. C. (2013). Measures of knowledge about standard precautions: A literature review in nursing. *Nurse Education in Practice*, *13*(4), 244–249. https://doi.org/10.1016/j.nepr.2013.02.011

Dickens, G. L., Rudd, B., Hallett, N., Ion, R. M., & Hardie, S. M. (2017). Factor validation and Rasch analysis of the individual recovery outcomes counter. *Disability and Rehabilitation*, 1–12. https://doi.org/10.1080/09638288.2017.1375030

Donati, D., Biagioli, V., Cianfrocca, C., Marano, T., Tartaglini, D., & De Marinis, M. G. (2019). Experiences of compliance with standard precautions during emergencies: A qualitative study of nurses working in intensive care units. *Applied Nursing Research*, *49*, 35–40.

Donati, D., Biagioli, V., Cianfrocca, C., De Marinis, M. G., & Tartaglini, D. (2019). Compliance with standard precautions among clinical nurses: Validity and reliability of the Italian version of the Compliance with Standard Precautions Scale (CSPS-It). *International Journal of Environmental Research and Public Health*, *16*(1), 121.

Efstathiou, G., Papastavrou, E., Raftopoulos, V., & Merkouris, A. (2011). Factors influencing nurses' compliance with standard precautions in order to avoid occupational exposure to microorganisms: A focus group study. *BMC Nursing*, *10*(1), 1. https://doi.org/10.1186/1472-6955-10-1

Efstathiou, G., Papastavrou, E., Raftopoulos, V., & Merkouris, A. (2013). Prevalence of occupational exposure to pathogens and reporting behaviour among Cypriot nurses. *Int J Caring Sci*, *6*, 420–430.

Felix, A. M. S., Victor, E., Malagutti, S. E. T., & Gir, E. (2013). Individual, work-related and institutional factors associated with adherence to standard precautions. *J Infect Control*, *2*, 106–111.

Field, A. P. (2005). *Discovering statistics using SPSS* (2nd ed.). London: Sage.

Fleiss, J. L., & Cohen, J. (1973). The equivalence of weighted kappa and the intraclass correlation coefficient as measures of reliability. *Educational and Psychological Measurement*, *33*, 613–619. https://doi.org/10.1177/001316447303300309

Garcia-Zapata, M. R. C., e Souza, A. C. S., Guimarães, J. V., Tipple, A. F. V., Prado, M. A., & García-Zapata, M. T. A. (2010). Standard precautions: knowledge and practice among nursing and medical students in a teaching hospital in Brazil. *International Journal of Infection Control*, *6*(1). https://doi.org/10.3396/ijic.V6i1.005.10

Gebresilassie, A., Kumei, A., & Yemane, D. (2014). Standard precautions practice among health care workers in public health facilities of Mekelle special zone, Northern Ethiopia. *J Community Med Health Educ*, *4*(3), 286.

Ghanbary, M. K., Shamsi, M., Khorsandi, M., Farazi, A., Ranjbaran, M., & Eshrati, B. (2015). Effect of training with teaching methods designed based on health belief model on knowledge and self-efficacy in nurses on the disciplines standard precautions in hospitals. *Journal of Human Health*, *1*, 51.

Goudra, B., Singh, P. M., & Galvin, E. (2014). Comparison of compliance of glove use among anesthesia providers: a prospective blinded observational study. *Am Assoc Nurse Anesth J*, *82*, 363–367.

Haile, T. G., Engeda, E. H., & Abdo, A. A. (2017). Compliance with standard precautions and associated factors among healthcare workers in Gondar University Comprehensive Specialized Hospital, Northwest Ethiopia. *Journal of Environmental and Public Health*, 2050635. https://doi.org/10.1155/2017/2050635

Hessels, A. J., & Larson, E. L. (2016). Relationship between patient safety climate and standard precaution adherence: A systematic review of the literature. *Journal of Hospital Infection*, *92*(4), 349–362.

Holla, R., Kanchan, T., Kumar, N., Unnikrishnan, B., Rekha, T., Mithra, P., … Darshan, B. B. (2014). Perception and practices of standard precautions among health care professionals at tertiary care hospitals in coastal South India. *Asian Journal of Pharmaceutical and Clinical Research*, *7*(2), 101–104.

Kermode, M., Jolley, D., Langkham, B., Thomas, M. S., Holmes, W., & Gifford, S. M. (2005). Compliance with Universal/Standard Precautions among health care workers in rural north India. *American Journal of Infection Control*, *33*, 27–33.

Kermode, M., Jolley, D., Langkham, B., Thomas, M. S., & Crofts, N. (2005). Occupational exposure to blood and risk of bloodborne virus infection among health care workers in rural north Indian health care settings. *American Journal of Infection Control*, *33*, 34–41.

Kim, K. M., & Oh, H. (2015). Clinical experiences as related to standard precautions compliance among nursing students: A focus group interview based on the theory of planned behavior. *Asian Nursing Research*, *9*, 109–114. https://doi.org/10.1016/j.anr.2015.01.002

Lam, S. C. (2011). Universal to standard precautions in disease prevention: Preliminary development of compliance scale for clinical nursing. *International Journal of Nursing Studies*, *48*(12), 1533–1539. https://doi.org/10.1016/j.ijnurstu.2011.06.009

Lam, S. C. (2014). Validation and cross-cultural pilot testing of compliance with standard precautions scale: Self-administered instrument for clinical nurses. *Infection Control & Hospital Epidemiology*, *35*, 547–555. https://doi.org/10.1086/675835

Lam, C. (2015). Development and validation of a quality of life instrument for older Chinese people in residential care homes (Doctoral dissertation, The Chinese University of Hong Kong (Hong Kong).

Lam, S. C., Chan, Z. S., Chong, A. C., Wong, W. W., & Ye, J. (2018). Adaptation and validation of Richmond Compulsive Buying Scale in Chinese population. *Journal of Behavioral Addictions*, *7*, 760–769. https://doi.org/10.1556/2006.7.2018.94

Lam, S. C., Pereira, F. M. V., Mersal, F. A., Samur, M., İntepeler, Ş. S., & Gir, E. (2017). Cross-cultural study of compliance with standard precautions among nurses: Insights for the future steps. *American Journal of Infection Control*, *45*, S82–S83.

Lam, S. C., Yeung, C. C. Y., Chan, J. H. M., Lam, D. W. C., Lam, A. H. Y., Annesi-Maesano, I., & Bousquet, J. (2017). Adaptation of the Score for Allergic Rhinitis in the Chinese Population: Psychometric properties and diagnostic accuracy. *International Archives of Allergy and Immunology*, *173*, 213–224. https://doi.org/10.1159/000477727

Linacre, J. M. (2000). Comparing and Choosing between "Partial Credit Models" (PCM) and "Rating Scale Models" (RSM). *Rasch Measurement Transactions*, *14*(3), 768. Retrived from https://www.rasch.org/rmt/rmt143k.htm

Linacre, J. M. (2004). Test validity and Rasch measurement: Construct, content, etc. Retrived from http://www.rasch.org/rmt/rmt181h.htm.

Luo, Y., He, G. P., Zhou, J. W., & Luo, Y. (2010). Factors impacting compliance with standard precautions in nursing, China. *International Journal of Infectious Diseases*, *14*(12), e1106–e1114. https://doi.org/10.1016/j.ijid.2009.03.037

Maharaj, D., Lawton, B., & Garrett, S. (2012). Poor compliance with standard precautions against infections during minor gynaecological procedures. *Australian and New Zealand Journal of Obstetrics and Gynaecology*, *52*, 262–265. https://doi.org/10.1111/j.1479-828X.2012.01433.x

Mersal, F. A., & Keshk, L. I. (2016). Compliance to standard precautions among nurses working in Qassim hopital in KSA. *International Journal of Basic and Applied Sciences*, *5*, 210.

Michell, J. (2014). The Rasch paradox, conjoint measurement, and psychometrics: Response to Humphry and Sijtsma. *Theory & Psychology*, *24*, 111–123. https://doi.org/10.1177/0959354313517524

Munyombwe, T., Höfer, S., Fitzsimons, D., Thompson, D. R., Lane, D., Smith, K., & Astin, F. (2014). An evaluation of the Minnesota Living with Heart Failure Questionnaire using Rasch analysis. *Quality of Life Research*, *23*, 1753–1765. https://doi.org/10.1007/s11136-013-0617-0

Natarajan, V. (2009). Basic principles of IRT and application to practical testing & assessment. Retrived from www.merittracblog.blogspots.com

Olsson, U., Drasgow, F., & Dorans, N. J. (1982). The poly-serial correlation coefficient. *Psychometrika*, *47*, 337–347.

Pereira, F. M. V., Lam, S. C., & Gir, E. (2017). Cultural adaptation and reliability of the Compliance with Standard Precautions Scale (CSPS) for nurses in Brazil. *Revista Latino-Americana de Enfermagem*, *25*. https://doi.org/10.1590/1518-8345.1204.2850

Pereira, F. M. V., Lam, S. C., Chan, J. H. M., Malaguti-Toffano, S. E., & Gir, E. (2015). Difference in compliance with standard precautions by nursing staff in Brazil versus Hong Kong. *American Journal of Infection Control*, *43*, 769–772. https://doi.org/10.1016/j.ajic.2015.03.021

Pittet, D., Hugonnet, S., Harbarth, S., Mourouga, P., Sauvan, V., Touveneau, S., & Perneger, T. V. (2000). Effectiveness of a hospital-wide programme to improve compliance with hand hygiene. *The Lancet*, *356*(9238), 1307–1312.

Polit, D. F., & Beck, C. T. (2006). The content validity index: Are you sure you know what's being reported? Critique and recommendations. *Research in Nursing & Health*, *29*, 489–497.

Powers, D., Armellino, D., Dolansky, M., & Fitzpatrick, J. (2016). Factors influencing nurse compliance with standard precautions. *American Journal of Infection Control*, *44*, 4–7. https://doi.org/10.1016/j.ajic.2015.10.001

Rasch Measurement Transactions Contents. Retrieved May 25, 2018 from Institute for Objective Measurement, Inc. website, https://www.rasch.org/

Reda, A. A., Fisseha, S., Mengistie, B., & Vandeweerd, J. M. (2010). Standard precautions: occupational exposure and behavior of health care workers in Ethiopia. *PLoS One*, *5*(12), e14420. https://doi.org/10.1371/journal.pone.0014420

Samur, M., & Seren Intepeler, S. (2019). Nurses' view of their work environment, health and safety: A qualitative study. *Journal of Nursing Management*, *27*(7), 1400–1408. https://doi.org/10.1111/jonm.12821

Sencan, H. (2005). *Reliability and validity in the cocial and behavioral sciences* (1st ed.). Ankara, Turkey: Seckin Press.

Siegel, J. D., Rhinehart, E., Jackson, M., & Chiarello, L. (2007). 2007 Guideline for isolation precautions: preventing transmission of infectious agents in health care settings. *American Journal of Infection Control*, *35*(10), S65–S164. https://doi.org/10.1016/j.ajic.2007.10.007

Sijtsma, K. (2009). On the use, the misuse, and the very limited usefulness of Cronbach's alpha. *Psychometrika*, *74*, 107. https://doi.org/10.1007/s11336-008-9101-0

Souza, A. C. D., Alexandre, N. M. C., & Guirardello, E. D. B. (2017). Psychometric properties in instruments evaluation of reliability and validity. *Epidemiologia e Serviços de Saúde*, *26*(3), 649–659. https://doi.org/10.5123/S1679-49742017000300022

Streiner, D. L., Norman, G. R., & Cairney, J. (2015). *Health measurement scales: a practical guide to their development and use*. USA: Oxford University Press.

Usluer, G., Esen, S., Dokuzoguz, B., Ural, O., Akan, H., Arcagök, C., and Şahin, H. (2006). Isolation precautions guide. Retrived from file:///C:/Users/msamur/Downloads/Izolasyon-Onlemleri-Kilavuzu.pdf

Valim, M. D., Marziale, M. H. P., Richart-Martínez, M., & Sanjuan-Quiles, Á. (2014). Instruments for evaluating compliance with infection control practices and factors that affect it: An integrative review. *Journal of Clinical Nursing*, *23*(11–12), 1502–1519. https://doi.org/10.1111/jocn.12316

Wild, D., Grove, A., Martin, M., Eremenco, S., McElroy, S., Verjee-Lorenz, A., & Erikson, P. (2005). Principles of good practice for the translation and cultural adaptation process for patient-reported outcomes (PRO) measures: Report of the ISPOR Task Force for Translation and Cultural Adaptation. *Value in Health*, *8*(2), 94–104. https://doi.org/10.1111/j.1524-4733.2005.04054.x

Wright, B. D., Douglas, G. A., & No, M. (1986). The rating scale model for objective measurement. Research Memorandum, 35.

Wright, B. D., & Masters, G. N. (1982). *Rating scale analysis*. Chicago: Mesa Press.

Xiong, P., Zhang, J., Wang, X., Wu, T. L., & Hall, B. J. (2017). Effects of a mixed media education intervention program on increasing knowledge, attitude, and compliance with standard precautions among nursing students: A randomized controlled trial. *American Journal of Infection Control*, *45*(4), 389–395. https://doi.org/10.1016/j.ajic.2016.11.006 Epub 2016 Dec 13

Yu, C. H. (2017). A simple guide to the item response theory (IRT) and rasch modeling. Retrived from http://www.creative-wisdom.com/computer/sas/IRT.pdf

Quan, M., Wang, X., Wu, H., Yuan, X., Lei, D., Jiang, Z., & Li, L. (2015). Influencing factors on use of standard precautions against occupational exposures to blood and body fluids among nurses in China. *International journal of clinical and experimental medicine*, *8*(12), 22450.

How to cite this article: Samur M, Seren Intepeler S, Lam SC. Adaptation and validation of the Compliance with Standard Precautions Scale amongst nurses in Turkey. *Int J Nurs Pract*. 2020;e12839. https://doi.org/10.1111/ijn.12839