Validity and Reliability of the Revised Skin Management Needs Assessment Checklist: A Methodological Study

Seda Şahan, PhD, Günay Elif İsmailoğlu, PhD, Eda Ergin, PhD, and Emine Korkmaz, PhD

ABSTRACT

OBJECTIVE: This study was conducted to adapt the revised Skin Management Needs Assessment Checklist (SMnac) into Turkish and determine the reliability and validity by using the Rasch model.

METHODS: Data were collected between February and July 2023 from a total of 201 patients using a demographics and clinical history form, Braden Scale, and the revised SMnac. This methodological study used forward translation, expert opinion, back translation, pilot test, and finalization for the language adaptation of the instrument. The feasibility of the questionnaire for the Turkish population with pressure injury was assessed through the Rasch measurement model. Internal consistency reliability with Rasch analysis was calculated with the Person Reliability Index and Item Reliability Index. For content validity, the first Turkish version was evaluated by seven experts.

RESULTS: The Content Validity Index of the Turkish version of the revised SMnac was determined to be 0.87. In the Rasch analysis, the person reliability coefficient was detected as 0.87 and the item reliability coefficient as 0.94. In accordance with the results of the adaptation and reliability validity analyses of the original scale, three items were excluded from the scale.

CONCLUSIONS: According to the results of the study, the revised SMnac scale was determined to be valid and reliable in Turkish.

KEYWORDS: patient, pressure injury, skin management, Rasch analyses, reliability, validity

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INTRODUCTION

Pressure injuries (PI) are defined as "a localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear."[1] Pressure injuries significantly reduce patients' quality of life and lead to pain and prolonged hospitalization; they also increase health care costs.[2–5] Pressure injuries also remain a significant problem worldwide.[6] A systematic review and meta-analysis revealed that the global prevalence of PIs in hospitalized adult patients is 12.8%, with an incidence rate of 5.4 per 10,000 patient-days.[7]

Risk assessments and appropriate and individualized care are required to prevent PI. Pressure injuries can be prevented with skin examination, risk assessment, evaluation of support surfaces such as mattress and chairs, positioning, mobilization, and nutrition support.[8] The risk assessment step is the most important stage of PI prevention. In the risk assessment step, it is essential to employ a valid and reliable assessment tool to identify patients at risk for PI and to conduct appropriate interventions.[8,9]

One of the common self-management support strategies in PI prevention programs is PI education. Pressure injury education contributes to PI prevention by informing patients and staff about PI.[10–12] However, instruments are required to determine not only the impact of PI education on the knowledge level of patients, but also the impact on self-administered assessment and prevention measures.[13,14]

There are 4 PI-specific tools in the literature that assess patients' knowledge of PI: Skin Management Needs Assessment Checklist (SMnac),[15] Patient Participation in Pressure Injury Prevention (PPPIP),[16] Knowledge of Pressure Ulcer Prevention (KPUP),[17] and the revised Skin Management Needs Assessment Checklist (revised SMnac).[18] The revised SMnac, which assesses self-assessed skin needs, consists of "skin control," "prevent skin injury," and "prevent wound formation" subgroups. This measurement tool was developed by Gélis et al.[18] The National Pressure Injury Advisory Panel also listed the utilization of the revised SMnac to measure the knowledge and assessment of patients regarding PI in its 2019 guidelines on PI.[1]

This study was conducted to adapt the revised SMnac into Turkish and to determine the reliability and validity on patients with PI. By utilizing a self-administered measurement tool specific to patients with PI, the PI risk (position, friction, pressure control, nutrition) and skin assessments of the patients are provided as a way to determine PI prevention measures. In this way, the authors hypothesized that PI would be prevented and detected by the patients and that the rate of PI development would decrease. The authors also aimed to utilize the revised SMnac not only in Türkiye but also in Turkish-speaking communities. This study will contribute to patient-centered PI care.

METHODS

Study Design

A descriptive, cross-sectional design was utilized to test the validity and reliability of the revised SMnac. The feasibility of the questionnaire for the Turkish population with PI was assessed through the Rasch measurement model. Data were obtained between February and July 2023.

Sample Group and Inclusion Criteria of the Study

The sample size for Likert-type scales is calculated as 5–10 participants per 19, and because the revised SMnac is a 19-item scale, at least 95–190 participants were needed. It was planned to test the original scale to at least 190 individuals. In this context, 201 people who agreed to participate in the study were reached. After the data were gathered, post-power analysis was

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Seda Şahan, PhD, is Assistant Professor, Nursing Department, Health Sciences Faculty, Izmir Bakircay University, İzmir, Türkiye. Elif Günay İsmailoğlu, PhD, is Associate Professor, Nursing Department, Health Sciences Faculty, Izmir Bakircay University, Izmir, Türkiye. Eda Ergin, PhD, is Associate Professor, Nursing Department, Health Sciences Faculty, Izmir Bakircay University, İzmir, Türkiye. Emine Korkmaz, PhD, is Assistant Professor, Nursing Department, Kırsehir Ahi Evran University, Health Sciences Faculty, Kırşehir, Türkiye.

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Address correspondence to: Seda Şahan, PhD, Izmir Bakircay University, Faculty of Health Sciences, 35100, Menemen/Izmir/Turkey. Email: seda.sahan@bakircay.edu.tr.

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implemented. Based on the G*Power analysis, the study was finalized with 96% power. Patients who were 18 years of age or older, had a PI, and were literate and conscious were included in the study.

Data Collection Tools

Demographics and Clinical History Form

The demographics and clinical history form was designed by the researchers to determine the demographic characteristics and PI history of the participants. The form consisted of 5 questions about sex, age, chronic disease status, current PI status, and knowledge regarding PI.[6,8,18,19]

Revised SMnac

Permission was obtained from the author of the scale. It is a 19-item self-administered questionnaire spread out over three categories (skin check, preventing PI, and preventing wounds) with 4, 11, and 4 items, respectively. Each item is scored from 0 to 3 (0 = completely dependent, 3 = completely independent). A higher score indicates a high level of self-reported PI knowledge and prevention practice. The total score is expressed as a percentage.[18]

Braden Scale

The Braden Scale is a standard tool for predicting PI risk. The Braden score for each participant was calculated based on the sum of scores obtained from the variables of sensory perception, moisture, activity, mobility, nutrition, friction, and shear. Each of these factors was rated from 1 (worst case) to 3 or 4 (best condition) according to the patient's condition; therefore, the minimum score could be 6 and the maximum 23. A score above 18 indicated a risk-free status for PI, 18–15 mild risk, 12–14 moderate risk, 9–12 high risk, and less than 9 indicated a severe risk.[20] The Braden Scale scoring was evaluated by a researcher who collected the data.

Language Adaptation and Translation of the Revised SMnac

The language adaptation of the scale was carried out in accordance with the guidelines of the World Health Organization.[21] This guideline includes forward translation, expert opinion, back translation, pilot test, and finalization steps. First, the revised SMnac scale was translated into Turkish by 3 language experts. The translated scale was evaluated by 2 linguists who speak Turkish and French to assess the grammar and comprehensibility of the scale items. At the same time, expert opinions were obtained from 3 clinicians and 4 academician nurses. The expert opinions were discussed and evaluated together with the experts and the researchers, and minor corrections were performed. The Turkish version of the scale was translated back into French by an expert translator. A pilot study was conducted with 10 patients to evaluate the comprehensibility of the scale. No changes were introduced to the items of the scale after the pilot study. Patients who underwent the pilot study were not included in the sample group of the study.

Data Collection

The study's data were collected in a city hospital in Türkiye between February and July 2023. After informing the patients about the purpose of the study and the questionnaire, the researchers obtained written and verbal consent forms from the patients. The questionnaires were collected by face-to-face interviews with the patients. The questionnaire lasted an average of 10–15 minutes for patients to complete.

Data Analysis

The psychometric properties of the items were tested through Winsteps software. Data were analyzed by employing the Joint Maximum Likelihood Estimation method to estimate Rasch parameters.[22] In the Joint Maximum Likelihood Estimation formula, the Rasch parameter is estimated when the observed raw score for the parameter matches the expected raw score. Data model fit is estimated with discordant and fit mean-square values to identify discordant and fit items. When a person or an item is considered to be a misfit, it means that the intended person or item is not behaving as predicted by the Rasch model.[23] Internal consistency reliability with Rasch analysis was calculated with the Person Reliability Index (PRI) and Item Reliability Index (IRI). Person Reliability Index and IRI values were interpreted in a similar way to Cronbach α; a value >0.7 indicates acceptable model fit. At the same time, person separation statistics (PSI) and item separation statistics (ISI) were estimated by Rasch analysis. A PSI value below 1 is considered low, a PSI value ≥ 3 is considered excellent, and a PSI value between 1.5 and 2 is considered acceptable. In another source, it is stated that the minimum acceptable criterion for PSI and ISI is 1.5.[24] Model fit is expressed in terms of mean squared (MNSQ) and z standardized (ZSTD) statistics. In simple terms, MNSQ measures the magnitude of deviation from the prediction of the model, whereas ZSTD indicates the statistical significance of this deviation. χ^2 fit statistics were used to examine how well each of the SMnac items contributed to the subscale to which the item is assigned. The most common χ^2 (goodness-of-fit) tests are known as Infit (weighted mean square), and Outfit (unweighted mean square) are reported as mean-squares (MNSQ). Mean-squares is the χ^2 statistic divided by the degrees of freedom. It may range from 0 to infinity, with an expected value of 1, and is useful to compare the data with predictions from the Rasch model.[25] The Infit (information-weighted fit statistics) is reported for each ISI item, and it is an information-weighted sum in which each squared residual is weighted by its variance.[26] Thus, the Infit is sensitive to residuals close to the estimated person abilities and the Outfit statistic is sensitive to anomalous outliers for either person or item parameter.[27] Taylor and McPherson[28] represented that fit of the observed data to the Rasch model is assessed by Infit or Outfit.

According to Rasch analysis, if the MNSQ values of the scale items are outside the range of 0.5–1.5 and the corresponding ZSTD is less than −1.96 or greater than 1.96, it is considered as not fitting the Rasch model (ie, incompatible).[29]

For content validity, the first Turkish version was evaluated by 7 experts. This study adopted Waltz and Bausell's Content Validity Index (CVI), a Likert-type ordinal instrument in which 4 possible responses are scored for each item: 1 = irrelevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = very relevant.[30]

Ethics

Permission was obtained from the authors of the scale for the utilization of the revised SMnac scale. Ethics committee approval was obtained from Izmir Bakırçay University Non-interventional Research Ethics Committee (895/875). Written permission was granted from the hospital where the study was conducted (February 27, 2023). After informing the patients about the purpose of the study and the questionnaire, written and verbal consent forms were obtained.

TABLE 1. ITEM-RELIABILITY ANALYSIS OF INDIVIDUALS

				Infit		Outfit	
	Raw Score	Measurement	Model Error	MNSQ	ZSTD	MNSQ	ZSTD
Mean	24.3	0.64	0.43	0.99	−0.41	0.95	−0.47
SD	5.3	1.28	0.14	0.86	1.93	0.88	1.86
Max	37.0	3.81	0.77	3.81	4.89	4.27	4.96
Min	20.0	−0.18	0.36	0.18	−2.76	0.19	−2.72
RMSE (Logit): 0.45		Adjusted SD: 1.19		PSI: 3.84		Reliability Coefficient (PRI): 0.87	

Abbreviations: MNSQ, mean squared; PRI, Person Reliability Index; PSI, person separation statistics; RMSE, root mean square standard error; ZSTD, Z standardized.

RESULTS

Demographic Characteristics of the Patients

It was determined that 50.2% of the patients were female, the mean age was 63.72 ± 12.41, 91.1% had chronic diseases, and 69.5% lacked knowledge about PI assessment. The mean Braden risk assessment score of the patients was 15.62 ± 2.16, and the most common PI was encountered in the sacral region (76.4).

Content Validity

The CVI of the Turkish version of the revised SMnac was detected to be 0.87.

Rasch Analysis

Table 1 provides a detailed report on the responses of the participants to the scale. Rasch person reliability and separation indexes were examined. In Table 1, the standard error (RMSE, root mean square standard error) value of the logit values was determined as 0.45, and this is below the critical value of 1.[23] In Rasch analysis, the reliability coefficient of the individual is 0.87. According to Table 1, the averages of in-fit (INFIT MNSQ) and out-of-fit (OUTFIT MNSQ) statistics were determined as 0.99 and 0.95, respectively. Rasch item reliabilities and discrimination indexes were analyzed. According to Table 2, the separation ratio for the item surface is 2.64 and the reliability is 0.94. According to Table 2, the means of the in-fit (INFIT MNSQ) and out-of-fit (OUTFIT MNSQ) statistics were 0.97 and 0.95, respectively (Table 2). The standard error (RMSE) value of the logit values in the table was 0.17.

The fact that the item-fit residual values were between 0.5 and 1.5 for the MNSQ and between −1.96 and 1.96 for the ZSTD reveals that this scale demonstrated a good fit to the Rasch model.[25] In this study, when in-fit and out-fit values are analyzed, it was observed that 16 items fit the scale. The 3 items that did not comply were removed from the scale (PPI8, PPI9, PPI11) (Table 3).

Final Revised SMnac Turkish Version

In the final version of the scale, the revised SMnac scale has become unidimensional. In the original 19-item scale, three items were determined to be incompatible according to Rasch analysis and were excluded from the scale. The scale was finalized as a 1-dimensional scale with 16 items. The scale is a 4-point Likert-type scale, and items are scored from 0 to 3 (0 = completely dependent, 3 = completely independent). A higher score indicates a high level of self-reported PI knowledge and prevention practice. The total score obtained from the scale is expressed as a percentage.

In Figure 1, the red curve is the anticipated item characteristic curve. The fact that the values do not diverge around the red line indicates a good fit.

Values are of equal height, cross equal thresholds, and have equal spacing between them (Figure 2).

DISCUSSION

The SMnac, a self-administered questionnaire, was designed to assess the patient's knowledge of PI and practices for prevention.[13] This study aimed to translate and adapt the revised SMnac and to establish the Turkish validity and reliability. The translated version of the revised SMnac demonstrated good validity and reliability in a Turkish-speaking population. Waltz and Bausell's[31] CVI analysis was conducted to determine the content validity of the scale. A CVI value above 0.80 indicates content validity. In the Turkish version of the revised SMnac scale, the CVI value was determined to be 0.87. This may be because the scale translation and back-translation process was carried out by bilingual language experts to ensure cross-cultural compatibility of

TABLE 2. ITEM-RELIABILITY ANALYSIS OF ITEMS

				Infit		Outfit	
	Raw Score	Measurement	Model SE	MNSQ	ZSTD	MNSQ	ZSTD
Mean	140.4	0.00	0.17	0.97	−0.15	0.95	−0.27
SD	24.5	0.71	0.02	0.22	1.40	0.29	1.63
Max	177.0	1.04	0.21	1.19	1.49	1.47	2.42
Min	98.0	−1.19	0.14	0.57	−2.87	0.51	−3.21
RMSE (Logit): 0.17		Adjusted SD: 0.66		ISI: 2.64		Reliability Coefficient (IRI): 0.94	
Average for a person SE: 0.26							

Abbreviations: IRI, item reliability index; ISI, item separation statistics; MNSQ, mean squared; SE, standard error; RMSE, root mean square standard error; ZSTD, Z standardized.

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TABLE 3. ITEM FIT STATISTICS OF THE SCALE

					Infit		Outfit	
Entry Number	**Total Score**	**Total Count**	**Measure**	**Model SE**	**MNSQ**	**ZSTD**	**MNSQ**	**ZSTD**
SK1	134	75	0.42	0.15	1.07	0.45	1.12	1.65
SK2	135	75	0.24	0.16	1.08	0.50	1.17	1.63
SK3	131	75	0.33	0.15	1.04	0.33	1.19	1.27
PPI1	141	75	0.54	0.15	1.15	1.12	1.04	0.32
PPI2	116	75	0.67	0.15	1.16	1.20	1.06	0.46
PPI3	144	75	0.08	0.16	1.14	0.96	1.03	0.07
PPI4	143	75	0.03	0.17	1.16	0.87	1.00	0.08
PPI5	172	75	0.21	0.21	0.91	−0.39	0.80	−0.77
PPI6	177	75	0.27	0.21	0.68	1.47	0.63	−1.21
PPI7	123	75	0.52	0.15	1.19	1.30	1.09	0.66
PPI10	98	75	1.04	0.14	0.86	−1.34	0.81	−1.77
PPI12	138	75	0.16	0.16	0.67	−1.87	0.61	−1.23
PW1	114	75	0.71	0.14	1.19	1.49	1.09	0.70
PW2	172	75	0.98	0.21	0.91	−0.39	0.80	−0.77
PW3	156	75	0.37	0.18	1.12	0.61	0.98	0.00
PW4	150	75	0.18	0.18	0.84	−0.78	0.74	−1.26

Abbreviations: MNSQ, mean squared; PPI, preventing pressure injury; PW, preventing wounds; SE, standard error; RMSE, root mean square standard error; SK, skin check; ZSTD, Z standardized.

the scale. During the translation and adaptation process, the authors evaluated the scale items in cooperation with the language experts. As a result of the evaluations, adjustments were introduced to the scale items. After the forward-backward translation, the scale was evaluated by experts and necessary changes (word mistakes) were carried out in the scale again. The comprehensibility of the scale was evaluated by the patients through the pilot study, which is the last stage of the World Health Organization guideline.[21] The scale items were reorganized in line with patient feedback. Therefore, the authors can state that the CVI value is high because the scale was evaluated and edited by experts, linguists, and patients until it was finalized.

According to the results of this study, the PSI value was 3.84 and the ISI was 2.64. According to this result, the authors can claim that the PSI and ISI values are high and that, accordingly, there is satisfactory item discrimination among individuals and there is good participant discrimination in different items. In the Rasch analysis, the PRI was determined as 0.87 and the item reliability coefficient (IRI) as 0.94. PRI and IRI values above 0.70 indicate that the reliability is high for the individual and item.

Rasch analysis was performed to check the appropriateness of the items. In this study, when in-fit and out-fit values are analyzed, it is observed that 16 items fit the scale. Three items that did not conform were excluded from the scale (PPI8, PPI9, PPI11). In the Malaysian version of the scale, 1 scale item was excluded and 2 scale items were combined. Similarly, in the French version of the scale, it was stated that 3 items had low internal validity but were not removed because they did not deteriorate the general structure of the scale. Therefore, the authors can state that in the adaptations of the scale to different countries, the level of adaptation of different items to the scale varies, and hence, they are excluded.

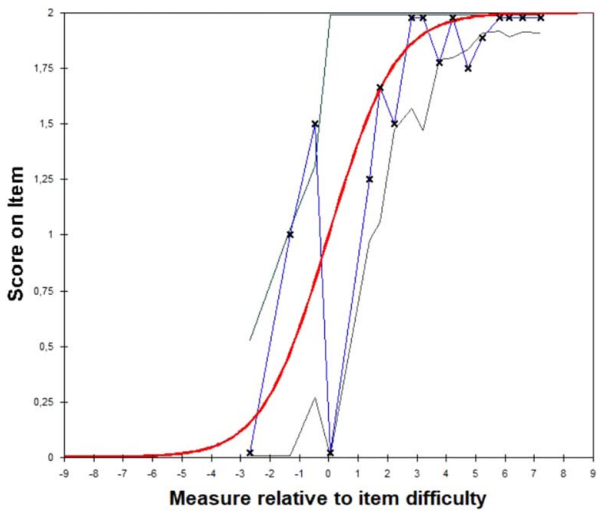

FIGURE 1. ITEM CHARACTERISTIC CURVE

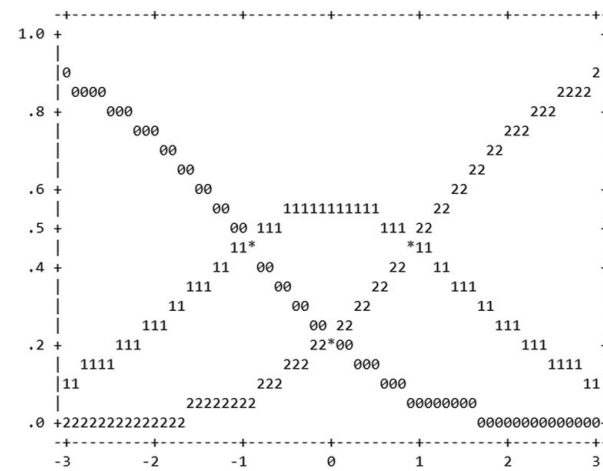

FIGURE 2. ETHICAL AWARENESS CATEGORY CHARACTERISTIC CURVES

Limitations

This was a single-center study, which limits its generalizability. Further, the authors did not evaluate any parallel forms in the current study, which limits the assessment of stability.

CONCLUSIONS

According to the results of the study, the revised SMnac scale was determined to be valid and reliable in Turkish. According to the Rasch analysis, the scale was identified to be unidimensional. In accordance with the results of the adaptation and reliability validity analyses of the original scale, 3 items were excluded from the scale. The final version of the scale has 16 items, 1 dimension, and a 4-point Likert-type scale. The authors can state that the scale is a valid and reliable scale for the self-assessment of PIs. The authors believe that, especially for patients who are at risk, this scale will be effective in the early diagnosis of PIs.

In future studies, the authors suggest reporting the effect of this scale at different levels of PI and the results based on the recovery status of PI.

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