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The Japanese version of the perceived service quality scale for community pharmacies: translation, cultural adaptation, and validation

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Abstract

Background Delivering person-centred care is a core responsibility of community pharmacies. However, no validated Japanese scale currently exists to evaluate community pharmacy services from the perspective of patient experience. This study aimed to translate, culturally adapt, and validate the Perceived Service Quality Scale (pSQS) and its short-form (pSQS-SF6), originally developed to assess patient experiences in community pharmacies, into Japanese (pSQS-J and pSQS-J-SF6).

Methods Following the established process, the pSQS-J was translated and culturally adapted from the original English version. The pSQS-J-SF6 was created by selecting one item from each domain. A survey was conducted among pharmacy users in Wakayama City, and descriptive statistics were reported. Confirmatory factor analyses (CFA) were performed to explore psychometric properties.

Results The pSQS-J was systematically translated and culturally adapted through a rigorous process. An online survey including the 19 pSQS-J items, along with demographic and related characteristics, was completed by 231 participants across nine pharmacies. After minor modifications (i.e., deleting one item and re-specifying another to a different factor), a six-factor correlated CFA model demonstrated acceptable fit and provided evidence of convergent and discriminant validity. A six-factor bifactor model demonstrated improved fit, and inspection of reliability indices reinforced the multidimensionality of the pSQS-J. However, the CFA results for pSQS-J-SF6 indicated insufficient evidence of convergent validity.

Conclusion The pSQS-J is a valid and reliable instrument for evaluating patient experience in Japanese community pharmacies and may facilitate the advancement of person-centred care.

Keywords Community pharmacy, Cultural adaptation, Patient experience, Person-centred care, Primary healthcare

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Background

As primary healthcare providers, community pharmacies are expected to deliver person-centred care in response to increasing social and cultural diversity [1, 2]. Person-centred care emphasizes respect for patients' values, preferences and needs, and pharmacists are expected to incorporate this principle into their practice as contributors to primary healthcare [3]. In recent years, the role of pharmacists has expanded beyond dispensing medication to include health promotion, patient education, and chronic disease management. This expanding scope of practice highlights the need for systematic evaluation from the patient's perspective.

Various patient-reported outcome measures (PROMs) have been developed to assess healthcare services, including those provided by pharmacies. Traditionally, patient satisfaction has been the primary outcome of interest [4]. However, patient satisfaction is inherently subjective and limited in its ability to identify areas for improvement. In contrast, patient-reported experience measures (PREMs) are increasingly recognised as valuable tools for assessing care processes from the patient's perspective and identifying opportunities to enhance services [5–7].

Internationally, research on PREMs in pharmacy practice has advanced [8], particularly in Australia [9, 10] and the United States [11]. Among these efforts, the Perceived Service Quality Scale (pSQS), developed at The University of Sydney, has emerged as a valid and reliable instrument for evaluating community pharmacy services. The pSQS has demonstrated predictive validity for outcomes such as medication adherence, and a shortened version, the pSQS Short-Form (pSQS-SF6), has also been developed [12, 13]. In Japan, however, research on patient experience has focused primarily on hospitals and clinics [14–17], and no PREMs are currently available to evaluate patient experience in community pharmacies.

Introducing PREMs into Japanese community pharmacies presents an opportunity to enhance service evaluation and promote person-centred care. The 2015 "Pharmacy Vision for Patients" issued by the Ministry of Health, Labour and Welfare emphasised a shift from product-centred to patient-centred services, strengthening interpersonal care and regional collaboration. The policy also introduced the family pharmacist/pharmacy function, Health Support Pharmacies, and Certified Pharmacies, enabling patients to select pharmacies with defined service capabilities [18]. Japan also faces challenges from a rapidly aging population and increasing diversity among pharmacy consumers, further highlighting the need to improve accessibility and adaptability [19–21]. With over 60,000 pharmacies and one of the world's highest pharmacist-to-population ratios [22], Japanese community pharmacies have substantial potential to support primary healthcare. Implementing PREMs could provide a practical way to assess service quality, demonstrate value, and facilitate continuous improvement.

Therefore, the aim of this study was to translate, culturally adapt, and validate the pSQS Japanese Version (pSQS-J) and the pSQS-J Short-Form (pSQS-J-SF6) for use in community pharmacies in Japan.

Methods

Translation and cultural adaptation

The pSQS-J was translated and culturally adapted following internationally established procedures for PROMs, utilising a systematic translation and adaptation process [23, 24]:

(1) **Preparation**: The researcher (SS) obtained permission from the original authors (SRC and CRS) to translate the pSQS.
(2) **Forward Translation**: Two translators (SS and HO), native Japanese speakers with experience in pharmacy practice in Japan, independently translated the pSQS into Japanese.
(3) **Reconciliation**: The two translations were compared and merged into a single version. Discussions with medical and public health experts (YN) helped identify and correct mistranslations and adjust the translation style to minimise bias. Feedback from two regular members of a citizens' group, The Association for Promoting "Simple Japanese (established in 2020, Kyoto, Japan), was also incorporated to improve readability.
(4) **Back Translation**: A translator not involved in the forward translation rendered the reconciled Japanese version back into English.
(5) **Back Translation Review**: The original authors (SRC and CRS) reviewed the back-translated version for equivalence with the original. Deviations were discussed via e-mail and corrected by the translator (SS).
(6) **Harmonisation**: As no other translations of the pSQS were available, this step was not applicable.
(7) **Cognitive Debriefing**: A pilot survey was conducted with 15 native Japanese speakers aged 20–70 years, including both men and women, all of whom had prior pharmacy usage experience in Japan. Participants completed the translated scale and provided feedback on the clarity, cultural relevance, and comprehensibility of the items.
(8) **Review of Cognitive Debriefing Results and Finalisation**: Based on feedback, revisions were made by the researchers (SS, HO and YN) to improve clarity and consistency. Revised sections

were back-translated and reviewed by the original authors (SRC and CRS).

(9) **Proofreading**: The final Japanese version underwent proofreading by the researcher (SS) to correct typographical and grammatical errors.

Validation

Study design and setting

To evaluate the validity and reliability of the pSQS-J, a cross-sectional study was conducted from July to August 2024 at nine pharmacies in Wakayama City, Japan. Wakayama City was primarily selected for practical reasons, as the research team is based in the region and has established connections with local pharmacist associations and community pharmacies, facilitating efficient recruitment and study implementation. Pharmacies were recruited using a convenience sampling approach through local pharmacist associations and health-related professional events, including two private and seven chain pharmacies.

Participants and data collection

Participants were recruited using the intercept method, where individuals were approached at the pharmacy counter during their visits to submit prescriptions. The eligibility criteria included: (1) aged 18 years or older, (2) ability to communicate in Japanese, and (3) prior experience using the pharmacy to purchase prescription or non-prescription medications.

Data collection visits were scheduled collaboratively by the researcher (SS) and participating pharmacists. Surveys were administered in pharmacy waiting rooms via tablet PC, with the researcher (SS) providing assistance as needed. All responses were collected anonymously using Qualtrics XM® (Qualtrics International Inc., Provo, Utah, and Seattle, Washington, U.S.). Responses with missing data were excluded from analysis. As an incentive, each participant received a beverage worth 200 JPY.

Questionnaire

The questionnaire consisted of three Sects [9, 10, 12]:

(1) The pSQS-J: This section contained 19 items across six domains of service quality: Health and Medicines Advice (HMA), Relationship Quality (REL), Technical Quality (TQ), Environmental Quality (ENV), Non-Prescription Service (NPS), and Health Outcome (HO). Item order was randomised, and responses were rated on a seven-point Likert-type scale (1 = strongly disagree, 7 = strongly agree), with the "don't know" option treated as missing data [25].

(2) Background Information: This section gathered demographic and socioeconomic data, including gender, age, education, employment, income, residential area, distance to the pharmacy, frequency of pharmacy visits, and medication usage.

(3) Additional Comments: An open-ended section allowed participants to provide qualitative feedback on their experiences with pharmacy services.

Statistical analysis

Sample size calculation was based on the requirement for conducting confirmatory factor analyses (CFA) using the method of Kelly and Lai [26]. In the previously published validation study where a bifactor model was used to the pSQS, the root mean square error of approximation (RMSEA) in two separate samples were 0.044 and 0.064 [10]. It was estimated, therefore, that to obtain a population RMSEA of 0.06 with a 95% confidence interval (CI) of 0.04 and 133 degrees of freedom (df), an adequate sample size would be approximately 230 participants.

CFA

Full information maximum likelihood - robust (FIMLr) estimation was utilised because the data was ordinal, had seven-point response categories [27], and with some expected missingness [28]. Model fit was evaluated using the recommendations of Schreiber [29]. The target RMSEA was < 0.06 [30], although < 0.08 represents acceptable fit [29, 31]. The target cut-off value was ≥ 0.95 for both the comparative fit index (CFI) and Tucker-Lewis index (TLI) [29, 31]; however, models with higher complexity (higher df) and particularly those with high intercorrelations may not reach this threshold [32, 33]. The Akaike information criterion (AIC) was also reported, where a lower value is an indication of superior fit.

Convergent validity was demonstrated if all factor loadings were >0.5, composite reliability (CR) ≥ 0.7 and average variance extracted (AVE) ≥ 0.5 [32]. Discriminant validity between pSQS-J dimensions was assessed according to the recommendations of Carter [34] using the correlated CFA model specifications (as below). Evidence of a lack of discriminant validity is considered if the observed correlation coefficients between factors exceeds 0.85. If that occurs, the nested modelling test was used [35]. A difference in the χ^2 ($p < 0.05$) provides some evidence for discriminant validity [36]. Finally, if the nested modelling test showed $p < 0.05$, the AVE test was performed. Evidence for discriminant validity with the AVE test is demonstrated if the variance-extracted estimates of both factors are greater than the squared correlation [36].

Model specification

Since the psychometric properties of pSQS-J have not been explored, a range of model specifications tested, as

recommended by Schreiber [31]. These included a six-factor correlated model, a five-factor correlated model, with and without HMA and TQ combined into one factor, higher-order models with five and six sub-factors and bifactor models with a general factor plus five or six factors [10, 12, 13].

Table 1 Characteristics of study participants ($n = 231$)

Characteristic	*n* (%)
Gender	
Women	147 (63.6)
Age group (years)	
18–24	9 (3.9)
25–34	15 (6.5)
35–44	23 (10.0)
45–54	26 (11.3)
55–64	55 (23.8)
65–74	51 (22.1)
75 or older	50 (21.6)
Prefer not to say	2 (0.9)
Education level	
Junior high school	22 (9.5)
High school	91 (39.4)
Vocational school	27 (11.7)
University	71 (30.7)
Other	3 (1.3)
Prefer not to say	17 (7.4)
Employment status	
Student	3 (1.3)
Home duties	58 (25.1)
Employed	100 (43.3)
Not employed	27 (11.7)
Retired	37 (16.0)
Other	1 (0.4)
Prefer not to say	5 (2.2)
Approximate yearly income	
¥0–2,500,000	101 (43.7)
¥2,500,000–4,999,999	38 (16.5)
¥5,000,000–7,499,999	15 (6.5)
¥7,500,000–9,999,999	7 (3.0)
¥10,000,000 and up	3 (1.3)
Prefer not to say	67 (29.0)
Frequency of pharmacy visit	
Daily	1 (0.4)
Weekly	11 (4.8)
Monthly	179 (77.5)
Semi-annually	33 (14.3)
Yearly	7 (3.0)
Frequency of medication usage	
Daily	184 (79.7)
Weekly	15 (6.5)
Monthly	21 (9.1)
Semi-annually	9 (3.9)
Yearly	2 (0.9)
Distance from home to the pharmacy	
0–499 m	41 (17.7)
500 m–1.9 km	112 (48.5)
2–4.9 km	53 (22.9)
More than 5 km	25 (10.8)

To determine the extent to which patients' responses to the pSQS-J are multidimensional or essentially unidimensional, bifactor statistical indices were examined [37]. The following statistics were calculated: explained common variance (ECV) of the "general" factor; the percentage of uncontaminated correlations (PUCs), and the Omega hierarchical (OmegaH). Evidence for unidimensionality is provided if the OmegaH of the "general" factor is >0.80 [38]. When both ECV and PUC are >0.70, common variance can be regarded as essentially unidimensional [37].

Results

Translation and cultural adaptation of the pSQS-J

The original English version was successfully translated and culturally adapted into Japanese.

During the Back Translation Review (Step 5), several linguistic and conceptual issues were identified and resolved in consultation with the original authors. These included refining Japanese expressions for Likert-type scale choices, clarifying distinctions such as "and" vs. "or" (e.g. HMA2), adjusting translations for terms such as "available" (HMA3, NPS2) and "competently" (TQ1), distinguishing between "feel" and "atmosphere" (ENV3), and clarifying the term "nonprescription drugs" (NPS1, NPS2, NPS3).

During the Review of Cognitive Debriefing Results and Finalisation (Step 8), further refinements were made, including clarifying grammatical structures (e.g. subject-particle relationships), standardising expressions for frequency, and harmonising terminology across all items.

These iterative processes ensured that the pSQS-J was both linguistically and culturally appropriate for Japanese pharmacy users.

Validity evaluation

Participant characteristics

The survey was conducted at nine pharmacies in Wakayama City between 26 July and 24 August 2024. Of the 289 consumers approached, 231 participated, yielding a response rate of 79.9% (Table 1). Data from the pilot survey were not included in the main analysis. Reasons for declining to participate included "no time to answer the survey" (34.5%), "first-time visit to the pharmacy" (27.6%), "lack of interest" (36.2%), and "language or literacy barriers" (1.7%) (Fig. 1).

Participants required an average of 497 s (standard deviation: SD = 64) to complete the survey. The demographic characteristics were diverse, with the largest age cohort being 55–64 years (23.8%). Approximately 40% of participants had completed high school, 43% were employed, and about 80% reported visiting the pharmacy at least once a month. A similar proportion indicated daily medication use.

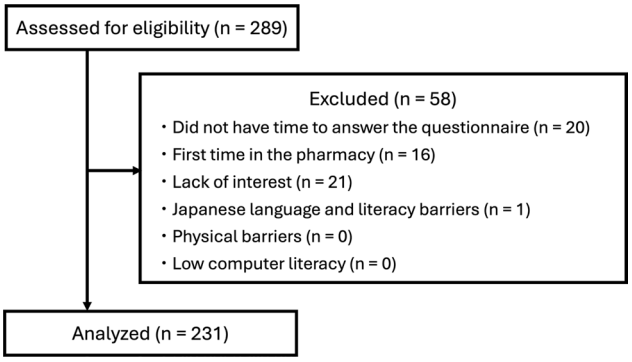

Fig. 1 Number of participants and reasons for non-participation

Table 2 Descriptive statistics of service quality measures ($n = 231$)

Item label	*n*	Median (IQR)	Mean (SD)
Health and Medicines Advice			
HMA1	231	6.0 (4.0–6.0)	5.40 (1.02)
HMA2	231	6.0 (5.0–6.0)	5.61 (1.09)
HMA3	231	6.0 (5.0–6.0)	5.55 (1.06)
Relationship Quality			
REL1	230	4.0 (3.0–4.0)	3.74 (1.44)
REL2	231	4.0 (2.0–4.0)	3.55 (1.45)
REL3	230	4.0 (4.0–5.0)	4.13 (1.45)
Technical Quality			
TQ1	230	6.0 (6.0–6.0)	5.85 (0.84)
TQ2	230	6.0 (6.0–6.0)	5.77 (0.88)
TQ3	231	6.0 (5.0–6.0)	5.54 (1.01)
TQ4	229	4.0 (4.0–6.0)	4.75 (1.09)
Environmental Quality			
ENV1	230	5.0 (4.0–6.0)	5.07 (1.13)
ENV2	229	4.0 (4.0–5.0)	4.61 (0.97)
ENV3	231	6.0 (5.0–6.0)	5.48 (1.04)
Non-Prescription Service			
NPS1	229	4.0 (4.0–5.0)	4.53 (1.05)
NPS2	231	4.0 (4.0–6.0)	4.76 (1.08)
NPS3	230	4.0 (4.0–5.0)	4.58 (1.04)
Health Outcome			
HO1	228	4.0 (4.0–6.0)	4.75 (1.10)
HO2	231	5.0 (4.0–6.0)	5.01 (1.14)
HO3	231	4.0 (4.0–5.0)	4.52 (1.15)

IQR: Interquartile Range, SD: Standard Deviation, HMA: Health and Medicines Advice, REL: Relationship Quality, TQ: Technical Quality, ENV: Environmental Quality, NPS: Non-Prescription Service, HO: Health Outcome

Service quality measures

Descriptive statistics for each pSQS-J item, including response counts, median, interquartile range (IQR), mean, and SD, are summarised in Table 2.

Responses on the seven-point Likert-type scale demonstrated a broad range of perceptions regarding service quality. High scores in the HMA and TQ domains reflected strong performance in these areas by Japanese pharmacies, whereas lower scores in the REL domain indicated potential areas for improvement.

CFA

Multicollinearity was not viewed as problematic as the item correlation matrix showed no relationships >0.70 [29]. The goodness of fit indices for the 19-item, five-factor bifactor model could not be computed because of Heywood cases, which indicates a poor fit for the data. The five-factor correlated model also indicated poor fit (Satorra-Bentler Scaled Chi-Square: χ^2 = 407, df = 142, CFI = 0.837, TLI = 0.804, RMSEA = 0.090, AIC = 11703). A range of alternative models demonstrated poor fit for the data (Table 3). An inspection of the residuals and modification indices from the five-factor and six-factor correlated models showed that item TQ4 regarding stock availability ("The pharmacy always carries the products that I am looking for") had low loadings (< 0.5), many cross-loadings and correlated error terms.

TQ4 was then deleted, and the full range of alternative models were tested, and the results are summarised in Table 3. While the five-factor bifactor model was able to be computed, it had marginal fit for the data ($\chi^2 = 270$, df = 117, CFI = 0.900, TLI = 0.869, RMSEA = 0.075, AIC = 11031), and no other tested model had acceptable fit. In both the five-and six-factor correlated models, the modification indices showed that ENV2 ("It is very easy to what I am looking for at this pharmacy") positively cross-loaded onto the NPS factor. This was interpreted as the more that participants felt assisted with support for non-prescription medicines, the more they believed that finding items they were looking for was easy, which was plausible. Therefore, a full range of models were specified with items TQ4 deleted and ENV2 loading only onto the NPS factor, beginning with the first-order correlated models. While the five-factor bifactor model had acceptable fit, the fit was marginally better for the six-factor correlated model ($\chi^2 = 238$, df = 121, CFI = 0.924, TLI = 0.903, RMSEA = 0.065, AIC = 11001). In that model, the correlation between HMA and TQ was very high (0.852, 95% CI = 0.065, $p < 0.001$) and the 95% CI did not cross 1. While the most stringent AVE test did not support discriminant validity, the nested modelling test ($p < 0.001$) indicated evidence for discriminant validity. Given the magnitude of the correlation and the results of the nested modelling test, there is sufficient evidence to support that a six-factor model is required rather than a five-factor model and that the six-factor bifactor model is the best representation of pSQS-J.

Table 4 presents the standardised regression weights (SRWs) and unstandardised regression weights (URWs) with robust standard errors (SEs), CR and AVE values derived from the six-factor correlated model. There is good evidence for convergent validity since all SRW are above 0.5, CR of each of the factors approach or exceed 0.7 and AVEs approach or exceed 50%. As expected, the six-factor bifactor model had superior fit to the data,

Table 3 Confirmatory factor analyses for pSQS-J ($n = 231$)

Model	χ^2	df	χ^2 / df	CFI	TLI	RMSEA	AIC
Correlated six-factor	398	137	2.91	0.840	0.800	0.091	11,708
Higher-order six-factor	417	146	2.86	0.834	0.805	0.090	11,719
Bifactor six-factor	360	133	2.71	0.861	0.821	0.086	11,676
Correlated five-factor	407	142	2.87	0.837	0.804	0.090	11,703
Higher-order five-factor	421	147	2.86	0.832	0.805	0.090.	11,724
Bifactor five-factors	Not interpretable						
Correlated six-factor*	296	120	2.47	0.884	0.853	0.080	11,056
Higher-order six-factor*	317	129	2.46	0.887	0.854	0.079	11,068
Bifactor six-factor*	264	117	2.26	0.904	0.874	0.074	11,034
Correlated five-factor*	310	125	2.48	0.879	0.852	0.080	11,063
Higher Order five-factor*	323	130	2.48	0.873	0.851	0.080	11,073
Bifactor five-factor*	270	117	2.31	0.900	0.869	0.075	11,031
Correlated six-factor**	238	121	1.97	0.924	0.903	0.065	11,001
Higher-order six-factor**	260	130	2.00	0.915	0.900	0.066	11,008
Bifactor six-factor**	206	118	1.75	0.942	0.925	0.057	10,973
Correlated five-factor**	252	126	2.00	0.917	0.899	0.066	11,009
Higher Order five-factor**	266	131	2.03	0.911	0.897	0.067	11,013
Bifactor five-factor**	211	118	1.79	0.939	0.921	0.058	10,969

χ^2: Satorra-Bentler Scaled Chi-Square, df: Degrees of Freedom, CFI: Comparative Fit Index, TLI: Tucker-Lewis Index, RMSEA: Root Mean Square Error of Approximation, AIC: Akaike Information Criterion,

* Item TQ4 was deleted, leaving 18 items, ** Item ENV2 was re-specified to load only onto NPS factor

Table 4 Detailed statistics for the six-factor correlated model ($n = 231$)

Dimension	Item	SRW	URW	Robust SE of URW	CR	AVE (%)
HMA	HMA1	0.722	1.000	-	0.750	50.1%
	HMA2	0.740	1.090	0.123		
	HMA3	0.659	0.945	0.111		
REL	REL1	0.815	1.000	-	0.805	58.1%
	REL2	0.659	0.813	0.080		
	REL3	0.803	0.995	0.100		
TQ	TQ1	0.675	1.000	-	0.741	48.9%
	TQ2	0.675	1.052	0.202		
	TQ3	0.745	1.325	0.150		
ENV*	ENV1	0.675	1.000	-	0.690	52.7%
	ENV3	0.774	1.000	-		
NPS	NPS1	0.827	1.000	-	0.845	57.8%
	NPS2	0.722	0.897	0.075		
	NPS3	0.825	0.987	0.082		
	ENV2	0.654	0.729	0.076		
HO	HO1	0.683	1.000	-	0.744	49.6%
	HO2	0.814	1.232	0.156		
	HO3	0.600	0.922	0.111		

SRW: Standardised Regression Weight, URW: Unstandardised Regression Weight, SE: Standard Error, CR: Composite Reliability, AVE: Average Variance Extracted, HMA: Health and Medicines Advice, TQ: Technical Quality, REL: Relationship Quality, ENV: Environmental Quality, NPS: Non-Prescription Service, HO: Health Outcome

*The ENV factor has only two indicators, which require that both indicators have fixed indicators

compared with correlated and higher-order models. The fit statistics for the final six-factor bifactor model were acceptable ($\chi^2 = 206$, df = 118, CFI = 0.942, TLI = 0.925, RMSEA = 0.057, AIC = 10973). A diagram depicting the final CFA model with six-factor bifactor specification is presented in Fig. 2.

Reliability of the bifactor model scales

From the final six-factor 18-item bifactor model, PUC = 0.88 and OmegaH = 0.82, which exceeded the recommended cut-offs (0.7 and 0.8, respectively). The OmegaH for each of the subscales varied between 0.75 (REL factor) and 0.94 (HMA factor). However, the ECV of the "general" factor = 0.53, which was below the target of > 0.7. Overall, unlike the English version of pSQS,

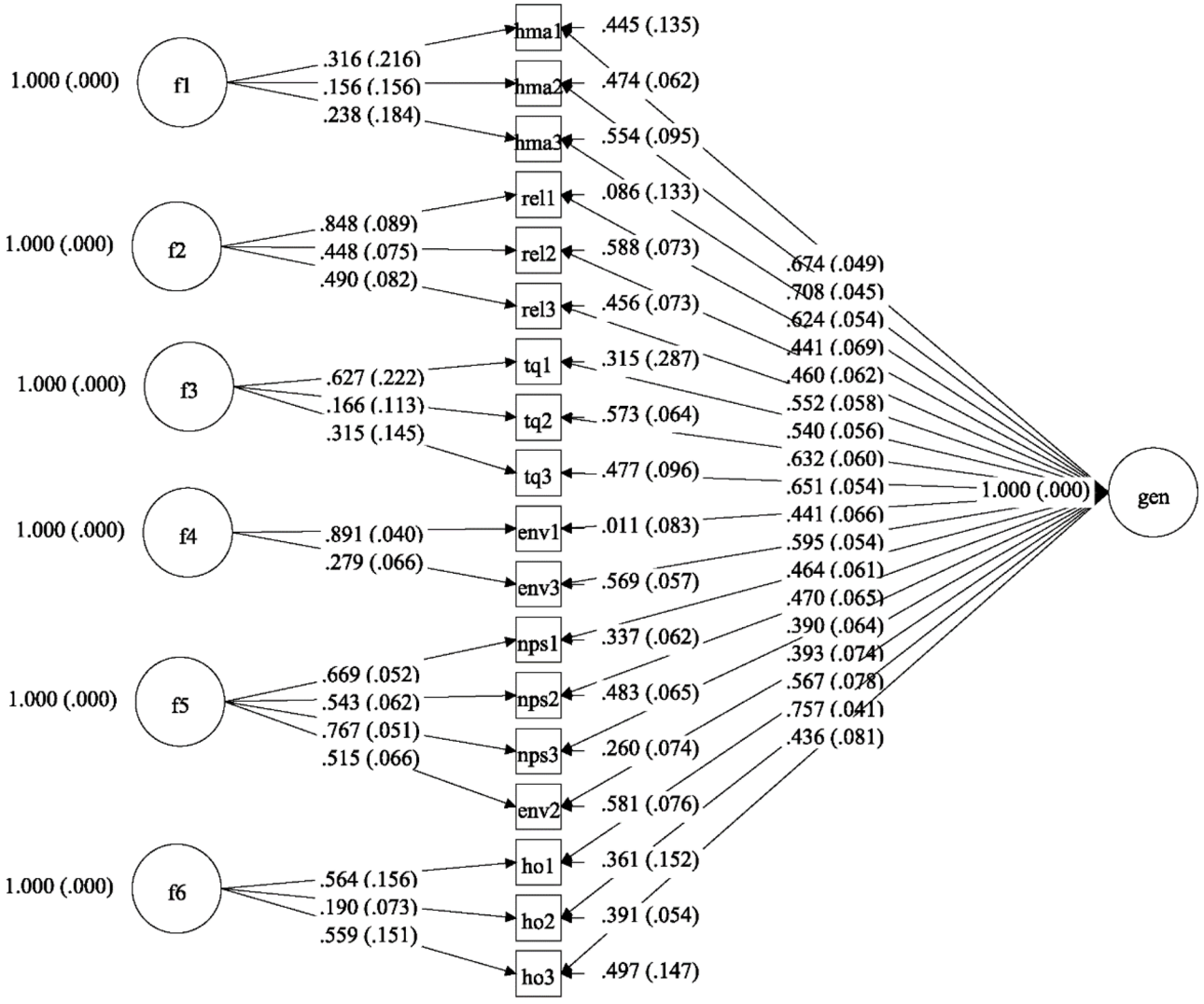

Fig. 2 6-factor bifactor model of pSQS-J

Table 5 Confirmatory factor analysis of the short-form pSQS-J-SF6 ($n = 231$)

Item	SRW	URW	Robust SE of URW	CR	AVE (%)
HMA3	0.568	1.000	-	0.74	32.8%
REL3	0.575	1.385	0.217		
TQ3	0.621	1.037	0.167		
ENV3	0.654	1.130	0.171		
NPS3	0.380	0.654	0.143		
HO1	0.600	1.094	0.184		

SRW: Standardized Regression Weight, URW: Unstandardized Regression Weight, SE: Standard Error, CR: Composite Reliability, AVE: Average Variance Extracted, HMA: Health and Medicines Advice, TQ: Technical Quality, REL: Relationship Quality, ENV: Environmental Quality, NPS: Non-Prescription Service, HO: Health Outcome

there is insufficient evidence that a factor score created from the "general" factor explains a sufficient amount of the variance of the pSQS-J for it to be considered essentially unidimensional.

Short-form pSQS-J-SF6

The scale reliability of pSQS-J-SF6 resulted in an OmegaH = 0.82, indicating good internal consistency. CFA was performed for the single latent construct pSQS-J-SF6. The fit statistics did not meet the thresholds for acceptability, although it is noted that a high value of RMSEA is expected with few estimated parameters [39] (χ^2 = 21.4, df = 9, CFI = 0.944, TLI = 0.906, RMSEA = 0.077). The summary statistics for CFA are presented in Table 5. There is insufficient evidence for convergent validity since all the SRWs were not above 0.5 (NPS3 = 0.380). CR (0.74) exceeded the 0.7 threshold for acceptability, but the AVE (32.8%) was below the 50% threshold. While model fit could be improved through item NPS3 deletion, AVE could not be improved. Further attempts at re-specification and item substitution did not result in improved AVE.

Discussion

In this study, the pSQS, a PREM for community pharmacies, was translated, culturally adapted, and validated for use in Japan. The pSQS-J was developed in collaboration with the original authors and in accordance with internationally established procedures [23, 24]. It represents the first cross-cultural adaptation of the pSQS and provides a framework for future adaptations into other languages. Systematic evaluation of patient experiences is important for advancing person-centred care. The pSQS-J enables the assessment of pharmacy service quality, supporting interpharmacy and regional comparisons, evaluation of certified pharmacies, monitoring of service delivery over time, and identification of areas for improvement.

Several context-specific factors emerged from the study in Japan. First, regarding participant characteristics, although the income categories were based on previous research conducted in Australia [9, 10], average incomes in Japan are approximately 70% of those in Australia [40]. Japan also has a higher proportion of older adults [41], and in this study, many participants were aged 65 years or older (43.7%), homemakers (25.1%), or retirees without personal income (11.7%). Consequently, the observed income distribution likely reflects the demographic characteristics of Japanese pharmacy users, suggesting that the results may be more representative of lower-income groups. These demographic characteristics should be considered when interpreting the findings.

Pharmacy workflows in Japan also influenced survey completion. As patients often wait in pharmacies while their medication is prepared, there is an opportunity to complete surveys. This may explain the higher response rate and lower proportion of missing data compared with studies conducted in Australia. Japanese respondents are also known to avoid extreme ratings [42], which can result in more moderate responses and affect score distributions and factor structures. Cross-national differences in pharmacy services, including Japan's ageing population, high pharmacist density, and excellent geographical accessibility [22, 43], may further shape response patterns. Cultural norms may also influence survey participation and response styles. Together, these structural and cultural factors highlight the need for nuanced interpretation of the results and further analyses as the survey expands nationwide.

Linguistic and cultural considerations were central to the translation process. The Japanese language employs multiple writing systems (Hiragana, Katakana, and Kanji), each affecting readability and comprehension. Additionally, the growing immigrant population of Japan, particularly from other Asian countries, has increased the need to accommodate non-native Japanese speakers. For these individuals, the use of Yasashii-Nihongo (plain Japanese) is recommended [44]. In this study, guidance from the Association for Promoting "Simple Japanese" was incorporated to avoid complex expressions and ensure that the pSQS-J is accessible to patients with limited Japanese proficiency. These considerations will become increasingly important for research involving diverse populations in the context of Japan's ongoing internationalisation.

This study has several limitations. First, the data were collected from a single area over a short period using a convenience sampling approach, which may limit the generalisability of the findings to other regions of Japan. Nevertheless, the selected area represents a typical mid-sized Japanese urban setting, which may partially support the applicability of the results to similar contexts. Second, collecting responses directly within pharmacies and providing beverages as incentives may have introduced response bias, potentially encouraging participants to provide more favourable responses. Third, the applicability of the pSQS-J to patients with limited Japanese proficiency or to multicultural populations has not been tested, and future research should adapt and validate the scale for these groups. Additionally, longitudinal studies using for example test-retest correlations are needed to assess sensitivity to changes in service quality over time. Finally, while the short-form version, pSQS-J-SF6, reduces respondent burden, its psychometric limitations require further refinement before widespread application. Addressing these limitations will enhance the utility of the scale and support its use as a practical tool for improving pharmacy service quality and promoting person-centred care.

Conclusions

This study translated, culturally adapted, and validated the pSQS, a PREM, for use in Japan, resulting in the pSQS-J. The pSQS-J is a valid and reliable instrument for evaluating patient experience in Japanese community pharmacies. Incorporating it in routine practice could help assess and improve service quality, thereby promoting person-centred care. Further refinement and validation across broader settings would enhance its applicability.

Abbreviations

PROM	Patient-Reported Outcome Measure
PREM	Patient-Reported Experience Measure
pSQS	Perceived Service Quality Scale
pSQS-SF6	Perceived Service Quality Scale Short-Form
pSQS-J	Perceived Service Quality Scale Japanese Version
pSQS-J-SF6	Perceived Service Quality Scale Japanese Version Short-Form
HMA	Health and Medicines Advice
REL	Relationship Quality
TQ	Technical Quality
ENV	Environmental Quality
NPS	Non-Prescription Service
HO	Health Outcome
CFA	Confirmatory Factor Analysis
RMSEA	Root Mean Square Error of Approximation

CI	Confidence Interval
df	Degrees of freedom
FIMLr	Full Information Maximum Likelihood - robust
CFI	Comparative Fit Index
TLI	Tucker-Lewis Index
AIC	Akaike Information Criterion
CR	Composite Reliability
AVE	Average Variance Extracted
ECV	Explained Common Variance
PUC	Percentage of Uncontaminated Correlation
OmegaH	Omega Hierarchical
SD	Standard Deviation
IQR	Interquartile Range
χ^2	Satorra-Bentler Scaled Chi-Square
SRW	Standardised Regression Weight
URW	Unstandardised Regression Weight
SE	Standard Error

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Author contributions
SS contributed to conceptualization, data curation, funding acquisition, investigation, methodology, project administration, validation, and writing of the original draft. SS also participated in writing, reviewing, and editing the manuscript. YN contributed to conceptualization, investigation, and writing, reviewing, and editing the manuscript. SRC contributed to formal analysis, investigation, methodology, supervision, validation, and writing of the original draft, as well as writing, reviewing, and editing the manuscript. CRS contributed to investigation, methodology, supervision, validation, and writing, reviewing, and editing the manuscript. YT contributed to conceptualization, methodology, and writing, reviewing, and editing the manuscript. TN contributed to conceptualization, methodology, supervision, and writing, reviewing, and editing the manuscript. HO contributed to conceptualization, investigation, and writing, reviewing, and editing the manuscript. All authors read and approved the final manuscript.

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Data availability
The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
The study adhered to the principles of the Declaration of Helsinki and the applicable Ethical Guidelines for Medical and Biological Research Involving Human Subjects. The study protocol was approved by the Ethics Committee of Wakayama Medical University (approval no. 4112). Only pharmacies with pharmacists who provided informed consent were included. Participants provided electronic consent through a tablet and had the option to withdraw.

Consent for publication
Not applicable.

Competing interests
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References

1. Tsuyuki RT, Beahm NP, Okada H, Al Hamarneh YN. Pharmacists as accessible primary health care providers: review of the evidence. Can Pharm J (Ott). 2018;151:4–5.
2. Watson KE, Tsuyuki RT, Dixon DL, Liu S, Al Hamarneh YN. Accessibility reality check. Can Pharm J (Ott). 2024;157:155–60.
3. NEJM Catalyst. What is patient-centered care? NEJM Catal Innov Care Deliv. (2017). https://catalyst.nejm.org/doi/full/10.1056/CAT.17.0559. Accessed 11 October 2025.
4. Kingsley C, Patel S. Patient-reported outcome measures and patient-reported experience measures. BJA Educ. 2017;17:137–44.
5. Cleary PD. Evolving concepts of patient-centered care and the assessment of patient care experiences: optimism and opposition. J Health Polit Policy Law. 2016;41:675–96.
6. Manary MP, Boulding W, Staelin R, Glickman SW. The patient experience and health outcomes. N Engl J Med. 2013;368:201–3.
7. Wolf JA, Niederhauser V, Marshburn D, LaVela SL. Defining patient experience. Patient Experience J. 2014;1:7–19.
8. Kaneko C, Suzuki S, Tanaka I, Hiruma H, Okada H. Patient experience in community pharmacy services: A scoping review. J Gen Fam Med. 2025;00:1–9.
9. Mirzaei A, Carter SR, Chen JY, Rittsteuer C, Schneider CR. Development of a questionnaire to measure consumers' perceptions of service quality in community pharmacies. Res Social Adm Pharm. 2019;15:346–57.
10. Grew B, Schneider CR, Mirzaei A, Carter SR. Validation of a questionnaire for consumers' perception of service quality in community pharmacy. Res Social Adm Pharm. 2019;15:673–81.
11. Carpenter DM, Roberts CA, Farley JF. Measuring patient perspectives on community pharmacy quality: psychometric evaluation of a brief survey. J Manag Care Spec Pharm. 2021;27:105–11.
12. Carter SR, Ng R, El-Den S, Schneider CR. A patient-reported experience measure for community pharmacy including development of a short-form: the perceived service quality scale. Res Social Adm Pharm. 2022;18:3369–78.
13. Carter S, Ng R, El-Den S, Schneider C. Low perceived service quality in community pharmacy is associated with poor medication adherence. Patient Educ Couns. 2021;104:387–94.
14. Aoki T, Inoue M, Nakayama T. Development and validation of the Japanese version of primary care assessment tool. Fam Pract. 2016;33:112–7.
15. Aoki T, Miyashita J, Yamamoto Y, Kise M, Fujinuma Y, Fukuma S, et al. Patient experience of primary care and advance care planning: a multicentre cross-sectional study in Japan. Fam Pract. 2017;34:206–12.
16. Aoki T, Yamamoto Y, Ikenoue T, Kaneko M, Kise M, Fujinuma Y, et al. Effect of patient experience on bypassing a primary care gatekeeper: a multicenter prospective cohort study in Japan. J Gen Intern Med. 2018;33:722–8.
17. Aoki T, Yamamoto Y, Ikenoue T, Urushibara-Miyachi Y, Kise M, Fujinuma Y, et al. Social isolation and patient experience in older adults. Ann Fam Med. 2018;16:393–8.
18. Ministry of Health, Labour and Welfare. Pharmacy Vision for Patients. (2015). http://www.mhlw.go.jp/file/04-Houdouhappyou-11121000-Iyakushokuhinkyoku-Soumuka/vision_1.pdf. Accessed 11 October 2025.

19. Suzuki S, Kato ET, Sato K, Konda M, Kuwabara Y, Yasuno S, et al. The effect of the original method at pharmacy to enhance support for health improvement in the limited Japanese proficiency patients visiting local community pharmacy: A randomized controlled trial. Patient Educ Couns. 2022;105:366–74.
20. Suzuki S, Nishikawa Y, Okada H, Nakayama T. Information-seeking behaviour of community pharmacists during the COVID-19 pandemic: an ecological study. BMJ Open. 2023;13:e062465.
21. Suzuki S, Nishikawa Y, Nakayama T, Okada H. Pharmacist accessibility for non-native Japanese speakers: A cross-sectional study in Japan. Can Pharm J (Ott). 2025;158:140–7.
22. OECD. Pharmacists and pharmacies, Health at a Glance 2023, OECD Indicators. (2023). https://www.oecd.org/en/publications/health-at-a-glance-2023_7a7afb35-en/full-report/pharmacists-and-pharmacies_521be7d5.html. Accessed 11 October 2025.
23. Wild D, Grove A, Martin M, Eremenco S, McElroy S, Verjee-Lorenz A, et al. 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 Health. 2005;8:94–104.
24. Sousa VD, Rojjanasrirat W. Translation, adaptation and validation of instruments or scales for use in cross-cultural health care research: a clear and user-friendly guideline. J Eval Clin Pract. 2011;17:268–74.
25. Mirzaei A, Carter SR, Patanwala AE, Schneider CR. Missing data in surveys: key concepts, approaches, and applications. Res Social Adm Pharm. 2022;18:2308–16.
26. Kelley K, Lai K. Accuracy in parameter Estimation for the root mean square error of approximation: sample size planning for narrow confidence intervals. Multivar Behav Res. 2011;46:1–32.
27. Bentler PM. Equation 6 Structural Equations Program Manual. Encino, CA: Multivariate Software Inc; 2006.
28. Schlomer GL, Bauman S, Card NA. Best practices for missing data management in counseling psychology. J Couns Psychol. 2010;57:1–10.
29. Schreiber JB. Core reporting practices in structural equation modeling. Res Social Adm Pharm. 2008;4:83–97.
30. Hooper D, Coughlan J, Mullen M. Structural equation modeling: guidelines for determining model fit. Electron J Bus Res Methods. 2008;6:53–60.
31. Schreiber JB. Update to core reporting practices in structural equation modelling. Res Social Adm Pharm. 2017;13:634–43.
32. Hair JF, Babin BJ, Krey N. Covariance-based structural equation modelling in the *Journal of Advertising*: review and recommendations. J Advert. 2017;46:163–77.
33. Perry JL, Nicholls AR, Clough PJ, Crust L. Assessing model fit: caveats and recommendations for confirmatory factor analysis and exploratory structural equation modellng. Meas Phys Educ Exerc Sci. 2015;19:12–21.
34. Carter SR. Using confirmatory factor analysis to manage discriminant validity issues in social pharmacy research. Int J Clin Pharm. 2016;38:731–7.
35. Anderson JC, Gerbing DW. Structural equation modeling in practice: A review and recommended two-step approach. Psychol Bull. 1988;103:411–23.
36. Fornell C, Larcker DF. Evaluating structural equation models with unobservable variables and measurement error. J Mark Res. 1981;18:39–50.
37. Rodriguez A, Reise SP, Haviland MG. Applying bifactor statistical indices in the evaluation of psychological measures. J Pers Assess. 2016;98:223–37.
38. Reise SP, Bonifay WE, Haviland MG. Scoring and modeling psychological measures in the presence of multidimensionality. J Pers Assess. 2013;95:129–40.
39. Kenny DA, Kaniskan B, McCoach DB. The performance of RMSEA in models with small degrees of freedom. Sociol Methods Res. 2015;44:486–507.
40. OECD. Average annual wages. https://www.oecd.org/en/data/indicators/average-annual-wages.html. Accessed 11 October 2025.
41. United Nations. World Population Ageing 2019: Highlights. (2019). https://www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2019-Highlights.pdf. Accessed 11 October 2025.
42. Zax M, Takahashi S. Cultural influences on response style: comparisons of Japanese and American college students. J Soc Psychol. 1967;71:3–10.
43. Nakagawa S, Kume N. Pharmacy practice in Japan. Can J Hosp Pharm. 2017;70:232–42.
44. Ito H, Tokarev A. From Yasashii Nihongo in non-disaster times towards a plurilingual Language education approach: an outlook from the perspective of reasonable accommodation. F1000Res. 2021;10:52.

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