Journal of
Ageing and Longevity

MDPI

Article

Evaluation of Psychometric Properties of the Simplified Medication Adherence Questionnaire (SMAQ) in Albanian Older Adults with Complex Chronic Conditions

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Abstract

Background: Medication adherence is essential for effective management of chronic conditions, particularly among older adults with complex chronic conditions (CCCs). The Simplified Medication Adherence Questionnaire (SMAQ) is a brief self-report instrument widely used to assess adherence; however, its psychometric properties have not been evaluated in Albanian older populations. Objective: To assess the psychometric properties of the SMAQ in Albanian older adults with CCCs. Methods: A multicenter, cross-sectional study was conducted among 727 adults aged ≥65 years with two or more chronic conditions recruited from primary healthcare centers in southern Albania. Internal consistency was assessed using Cronbach's alpha and McDonald's ω. Construct validity was evaluated through exploratory and confirmatory factor analyses and correlations with clinical and behavioral variables. Discriminative validity was examined using known-group approach and independent samples t-tests, and criterion validity was assessed using Spearman correlations. Results: The SMAQ demonstrated good internal consistency (α = 0.799, ω = 0.821). Factor analyses supported a unidimensional structure, with all items loading significantly onto a single factor. Model fit indices indicated acceptable fit (CFI = 0.921; SRMR = 0.051), although RMSEA suggested some misfit (0.116). Non-adherent participants had significantly higher SMAQ scores than adherent participants ($p < 0.001$), indicating strong discriminative validity. Conclusions: The SMAQ is a reliable and valid tool for assessing medication adherence among Albanian older adults with CCCs, supporting its use in primary healthcare and research settings.

Keywords: medication adherence; AL-SMAQ; psychometric properties; older adults; multimorbidity; Albania

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Academic Editors: Weida Lyu and Shangjun Liu

Received: 1 March 2026
Revised: 11 April 2026
Accepted: 17 April 2026
Published: 28 April 2026

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1. Introduction

Medication adherence is essential for the effective management of chronic conditions, particularly among older adults with complex chronic conditions (CCCs). It is defined as the extent to which patients take medications as prescribed with respect to dosage, timing, and frequency [1,2]. Older adults often face complex medication regimens due to polypharmacy, which is associated with an increased risk of non-adherence [3]. Additional

age-related factors, such as cognitive impairment, physical limitations, and reduced health literacy, further complicate adherence behaviors and may hinder accurate self-reporting [4]. Achieving optimal medication adherence is essential for improving therapeutic outcomes, preventing disease progression, and reducing complications [5,6]. Despite its clinical importance, non-adherence remains a persistent global challenge [2], with adherence rates averaging approximately 50% among individuals with chronic conditions in high-income countries and potentially lower in low- and middle-income settings [7]. Non-adherent behavior of patients can be influenced by a series of predictive factors, intentional or not, such as beliefs, disease status, forgetfulness, limited health literacy, and socio-economic factors [8]. Non-adherence has consistently been associated with adverse clinical outcomes, increased hospitalizations, higher healthcare costs, and compromised patient safety [1,7]. Since individuals with chronic diseases are responsible for managing their treatment regimens daily [9], accurate assessment of adherence is essential for effective care planning and targeted interventions [10].

However, measuring medication adherence remains challenging. Objective methods, such as pill counts, pharmacy refill records, and electronic monitoring systems, are considered reliable but are often resource-intensive and impractical for routine clinical use [8]. Consequently, self-report measures are widely used in both research and clinical practice due to their feasibility, cost-effectiveness, and ease of administration [8,11]. Although self-report instruments may overestimate adherence and are inherently subjective, they provide valuable insight into patients' experiences, beliefs, and behavioral barriers, information that objective methods cannot capture [12]. Several self-reported questionnaires have been developed, including the Medication Adherence Rating Scale (MARS), the Adherence to Refills and Medications Scale (ARMS), the Morisky Scale, the Hill-Bone Scale, Probabilistic Medication Adherence Scale (ProMAS), and the Simplified Medication Adherence Questionnaire (SMAQ) [13]. However, many of these instruments are disease-specific, lengthy, or context-restricted, limiting their applicability in community and low-resource settings [2].

The Simplified Medication Adherence Questionnaire (SMAQ) is a brief, six-item self-report instrument originally developed to assess adherence among people living with HIV [14]. It evaluates various aspects of adherence, including missed doses (intentional or unintentional), timing irregularities, dosage modifications, recent non-adherence, and subjective compliance assessment [15,16]. The SMAQ has demonstrated good reliability and strong criterion validity, with favorable sensitivity and specificity compared with electronic monitoring methods [14,17]. Importantly, the SMAQ is a freely available instrument in the public domain, enhancing its accessibility and feasibility for use in routine clinical practice and resource-limited settings. Evidence from validation studies indicates that freely available versions of the SMAQ have been successfully adapted and applied in different populations, supporting its practical use as an accessible adherence measure [8,14]. These characteristics make it particularly suitable for community-based and primary healthcare contexts, where low-cost, easy-to-administer tools are essential for routine patient assessment [5,8]. Since its development, the SMAQ has been psychometrically evaluated across diverse populations and healthcare contexts, including patients with hypertension, diabetes, and tuberculosis [18], demonstrating acceptable internal consistency and construct validity [7,8]. The SMAQ has also been validated in different pathologies, medical conditions, and chronic diseases, such as hypertension, diabetes, and tuberculosis.

Psychometric properties refer to characteristics of a measurement instrument that determine its reliability, validity, and overall measurement quality [19]. Reliability reflects the consistency and stability of the instrument, including internal consistency, test–retest reliability, and inter-item correlations. Validity refers to the extent to which an instrument measures what it is intended to measure, encompassing construct validity, criterion va-

lidity, and discriminative (known-group) validity. Evaluating psychometric properties ensures that an instrument produce accurate, meaningful, and generalizable results in the target population.

Despite its widespread use, the psychometric performance of adherence instruments can vary across populations, cultural contexts, and disease profiles. Older adults with complex chronic conditions (CCCs) represent a particularly vulnerable group, as polypharmacy, functional decline, and cognitive challenges may influence response patterns and affect the reliability and validity of self-report measures. Although the SMAQ has been translated and validated in several countries, it has not yet been cross-culturally adapted or psychometrically evaluated in the Albanian language. Therefore, the present study aims to assess the psychometric properties of the SMAQ among Albanian older adults with CCCs, providing a practical and valid instrument for routine clinical application in this population.

2. Materials and Methods

2.1. Study Design and Setting

The multicenter, cross-sectional study aimed to evaluate the psychometric properties of the Albanian version of the Simplified Medication Adherence Questionnaire (SMAQ) among older adults. A cross-sectional design was considered appropriate for assessing reliability and validity at a single time point. Data were collected in a sample of older adults, between March and December 2024 in multiple primary healthcare centers located in the municipalities of Vlora and Orikum.

2.2. Participants

Participants were community-dwelling older adults aged ≥65 years with at least two diagnosed chronic conditions, including cardiovascular, metabolic and endocrine, respiratory, musculoskeletal, neurological or mental health, renal, and other chronic diseases, and who were prescribed one or more long-term medications.

Exclusion criteria included having only one chronic condition; the presence of significant visual or hearing impairments; and documented cognitive impairment or a diagnosis of dementia, as determined from medical records and clinical judgment, that could interfere with study participation. A convenience sampling approach was used due to feasibility in primary care settings. The final sample comprised 727 participants. The sample size was considered adequate for factor analysis and psychometric evaluation. Participants were stratified into three age groups: youngest-old (65–74 years), middle-old (75–84 years), and oldest-old (≥85 years).

2.3. Instrument

Medication adherence was assessed using the Simplified Medication Adherence Questionnaire (SMAQ), a brief six-item self-report instrument that evaluates medication-taking behaviors, including forgetfulness, missed doses, and treatment interruptions. The questionnaire includes both dichotomous (yes/no) and frequency-based items and assesses adherence across multiple time frames (previous day, week, weekend, and past 3 months).

According to the original scoring criteria, participants are classified as adherent or non-adherent. Any response indicative of non-adherence, such as missing more than two doses within a specified period (past week) or discontinuing medication for more than two consecutive days during the past three months, results in classification as non-adherent.

2.4. Translation and Cultural Adaptation

The SMAQ was translated and culturally adapted into Albanian following established guidelines from the Mapi Research Trust. The process included forward translation by two independent bilingual translators, reconciliation into a single version, and blinded back-translation by two additional independent translators. An expert committee reviewed all versions to ensure conceptual equivalence.

Cognitive debriefing was conducted with 165 older adults to assess clarity, comprehension, and cultural relevance. Minor modifications were made accordingly, resulting in the final Albanian version of the SMAQ (AL-SMAQ) (Appendix A).

2.5. Data Collection

Eligible participants were recruited during routine visits to primary healthcare centers. After providing written informed consent, participants completed the AL-SMAQ either independently or with assistance provided by trained research personnel.

Sociodemographic and clinical data were also collected, including age, gender, education level, number of prescribed medications, and chronic conditions status. Chronic conditions were categorized as (1) multiple chronic conditions (MCC; 2–4 conditions) and multimorbidity (MM; $\geq$5 conditions) [20]. The number of chronic conditions was obtained through participant self-report. To minimize reporting bias, structured questioning was used, including prompts about physician-diagnosed conditions and the number of chronic conditions, and responses were cross-checked for consistency with reported medication use.

2.6. Psychometric Evaluation

Internal consistency was assessed using Cronbach's alpha and McDonald's ω coefficients, along with corrected item-total correlations. Values of $\geq$0.70 were considered acceptable.

Construct validity was evaluated using exploratory factor analysis (EFA) with principal axis factoring and oblimin rotation, followed by confirmatory factor analysis (CFA). Sampling adequacy and factorability were assessed using Kaiser–Meyer–Olkin (KMO) measure and Bartlett's test of sphericity. Model fit in CFA was evaluated using standard indices, including the Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SMSR). Construct validity was further examined by assessing associations between SMAQ scores and relevant demographic, clinical, and behavioral variables including number of medications, chronic condition category, and quality of life.

Discriminative validity was assessed using a known-group approach and independent samples t-tests. The known-group approach was applied to evaluate the ability of the AL-SMAQ to differentiate between subgroups of participants expected to vary in medication adherence. Independent samples t-test were conducted to compare adherence scores across subgroups defined by clinically relevant characteristics, including number of medications, chronic condition category, and self-reported health status.

Criterion validity was evaluated using Spearman correlation analyses with adherence-related outcomes.

2.7. Statistical Analysis

Data were analyzed using Jamovi (version 2.3.28). Descriptive statistics were used to summarize participant characteristics. Reliability and validity analyses were conducted using appropriate parametric or non-parametric tests. A p-value < 0.05 was considered statistically significant.

2.8. Ethical Considerations

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Regional Directorate of the Vlora Healthcare Services Operator (Protocol no. 358/1, approved 28 February 2024).

Written informed consent was obtained from all participants prior to enrollment. Each participant received a detailed information sheet explaining the study's purpose, procedures, and benefits, along with a consent form emphasizing voluntary participation and the right to withdraw at any time without consequences. Participant anonymity and confidentiality were strictly maintained throughout the study, and all data were used exclusively for scientific purposes.

3. Results

Data were collected from a sample of older adults (n = 727) across multiple primary healthcare centers located in the municipalities of Vlora and Orikum. Participants were stratified into three age groups: 65–74 years, 75–84 years, and ≥85 years.

The Table 1 shows that the sample consisted predominantly of young-old adults and women. Most participants had secondary or basic education. Clinically, nearly all had multiple chronic conditions (MCCs), and the majority were taking fewer than 5 medications, with approximately one-fifth experiencing polypharmacy (≥5 medications). Overall medication adherence was very high, with 97.2% of participants classified as adherent and only 2.8% as non-adherent according to SMAQ criteria. This highly imbalanced distribution indicates a pronounced ceiling effect and restricted variability in the outcome measure, which should be considered when interpreting associations involving adherence, as it may reduce sensitivity to detect meaningful differences and limit statistical power for comparative analyses. However, this distribution likely reflects the characteristics of the study population rather than a measurement limitation per se, as high adherence has been consistently reported in similar settings. The outcome was analyzed primarily as an observed real-world distribution rather than a normally distributed construct.

Table 1. Demographic and clinical characteristics of the study sample.

Descriptives		Counts	% of Total
Age	65–74	479	65.9
	75–84	199	27.4
	≥85	49	6.7
Gender	Female	409	56.3
	Male	318	43.7
Education level	Basic education	240	33.0
	Secondary education	331	45.5
	Highest education	156	21.5
Chronic Conditions Category	MCC	700	96.3
	MM	27	3.7
Number of medications	<5 medications	584	80.3
	≥5 medications	143	19.7
Medication adherence	Adherent	707	97.2
	Non-adherent	20	2.8
Quality of life	Very good	58	8.0
	Good	602	82.8
	Fair	67	9.2

Note: MCC—Multiple Chronic Condition; MM—Multimorbidity.

The Table 2 shows that the scale demonstrated good internal consistency, with Cronbach's α of 0.799 and a McDonald's ω 0.821. Both coefficients indicate satisfactory reliability, suggesting that the items consistently measure the same underlying construct.

Table 2. Scale Reliability—Cronbach's α and McDonald's ω.

	Cronbach's α	McDonald's ω
Scale	0.799	0.821

The item-level analysis in Table 3 shows acceptable to strong psychometric performance across all items. Items means ranged from 0.231 (S4) to 1.3337 (S6b), with corresponding standard deviations indicating reasonable variability.

Table 3. Item-Level Reliability.

	Mean	SD	Item-Rest Correlation	Cronbach's α	McDonald's ω
S1	0.382	0.486	0.517	0.781	0.805
S2	0.289	0.454	0.470	0.787	0.813
S3	0.414	0.493	0.333	0.803	0.831
S4	0.231	0.422	0.519	0.784	0.805
S5	0.340	0.669	0.595	0.762	0.796
S6a	1.100	0.843	0.772	0.719	0.766
S6b	1.337	1.230	0.758	0.749	0.763

Item-rest correlations were all positive and moderate to strong, ranging from 0.333 (S3) to 0.772 (S6a), suggesting that each item contributed meaningfully to the overall scale. The strongest correlations were observed for S6a (0.772) and S6b (0.758).

Cronbach's α if item deleted ranged from 0.719 (S6a) to 0.803 (S3), while McDonald ω if item deleted ranged from 0.763 to 0.831. Removal of S6a or S6b would reduce overall reliability the most, indicating their strong contribution to internal consistency. Overall, the findings support good internal consistency and item homogeneity of the scale.

Principal axis factoring with oblimin rotation in Table 4 identified a single dominant factor underlying the scale. All items loaded positively on Factor 1, with loadings ranging from 0.363 (S3) to 0.844 (S6b).

Table 4. EFA factor loadings for each item.

Factor Loadings		
	Factor 1	Uniqueness
S1	0.573	0.672
S2	0.522	0.728
S3	0.363	0.868
S4	0.576	0.669
S5	0.648	0.580
S6a	0.826	0.318
S6b	0.844	0.288

Note. 'Principal axis factoring' extraction method was used in combination with a 'oblimin' rotation.

The strongest loadings were observed for S6b (0.844) and S6a (0.826), indicating that these items contribute most strongly to the underlying construct. Moderate loadings were

found for S5 (0.648), S4 (0.576), S1 (0.573), and S2 (0.522). S3 showed the lowest loading (0.363), suggesting a comparatively weaker association with the factor.

Uniqueness values ranged from 0.288 (S6b) to 0.868 (S3). Lower uniqueness for S6a and S6b indicates that a large proportion of their variance is explained by the common factor, whereas S3's high uniqueness suggests that much of its variance is not accounted for by the factor.

Overall, the results support a primarily unidimensional structure, with some variability in item strength.

Bartlett's Test of Sphericity was statistically significant (χ^2 (21) = 1748, $p < 0.001$), indicating that the correlation matrix is not an identity matrix. This result confirms that there are sufficient correlations among the items to justify conducting factor analysis.

The Kaiser–Meyer–Olkin (KMO) values for individual items ranged from 0.779 to 0.886, indicating good sampling adequacy. These findings support the suitability of the data for factor analysis (Table 5).

Table 5. EFA Sampling Adequacy and Sphericity.

	Value	df	*p*
Bartlett's Test of Sphericity	1748	21	< 0.001
KMO Measure of Sampling Adequacy	0.822	-	-
MSA per item	S1: 0.822, S2: 0.860, S3: 0.886, S4: 0.834, S5: 0.871, S6a: 0.884, S6b: 0.779	-	-

The scree plot in the Figure 1 illustrates the eigenvalues for seven factors extracted from the data.

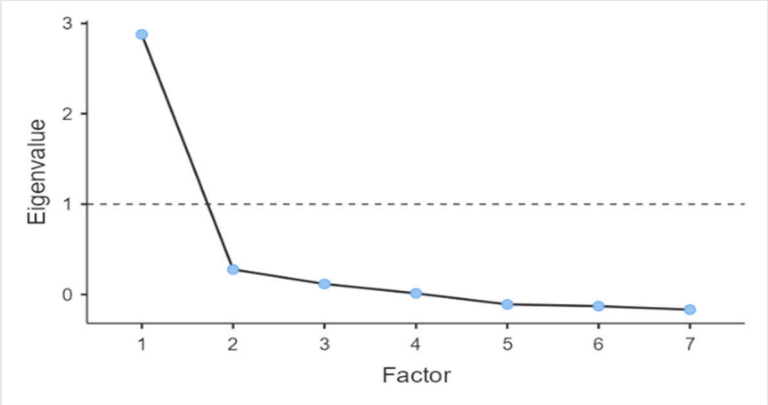


Figure 1. Scree Plot.

The first factor has a high eigenvalue (~2.9), well above the Kaiser criterion cutoff of 1 (indicated by the dashed line).

Subsequent factors all have eigenvalues below 1, indicating they explain less variance than a single variable would.

The steep drop from the first to the second factor and the leveling off afterward suggest that a single-factor solution is most appropriate.

Overall, this supports the conclusion that the scale is primarily unidimensional, with one dominant underlying factor.

The Table 6 presents standardized factor loadings for seven indicators on a single factor, along with their standard errors (SE), 95% confidence intervals (Lower and Upper), Z-values, and *p*-values.

Table 6. CFA Factor Loadings and Fit.

Factor Loadings							
Factor	Indicator	Estimate	SE	Lower	Upper	Z	*p*
Factor 1	S1	0.256	0.0177	0.222	0.291	14.45	< 0.001
	S2	0.219	0.0168	0.186	0.252	13.08	< 0.001
	S3	0.180	0.0187	0.143	0.217	9.61	< 0.001
	S4	0.217	0.0155	0.187	0.248	14.07	< 0.001
	S5	0.437	0.0232	0.392	0.483	18.88	< 0.001
	S6	0.728	0.0261	0.677	0.779	27.88	< 0.001
	S7	1.075	0.0378	1.001	1.150	28.41	< 0.001

All factor loadings are positive and statistically significant ($p < 0.001$), indicating strong relationships between each item and the underlying factor.

Loadings range from 0.180 (S3) to 1.075 (S7), showing varying strengths of association.

The largest loadings are seen for S7 (1.075), S6 (0.728), and S5 (0.437), suggesting these items contribute most strongly to the factor.

Smaller but still significant loadings are observed for S1, S2, S3, and S4 (ranging from 0.180 to 0.256), indicating they are somewhat less strongly related but still meaningful.

Overall, these results confirm a robust one-factor structure with all items significantly loading on the factor.

The Table 7 shows that the model demonstrated a mixed fit profile. While CFI and SRMR indicated acceptable fit, RMSEA and TLI suggested that the model fit could be improved. The chi-square test was significant, $\chi^2(14) = 151$, $p < 0.001$, which is expected given the large sample size ($n = 727$). Although RMSEA value exceeds conventional thresholds, model evaluation should be based on multiple indices rather than a single criterion. In this context, RMSEA is known to be sensitive to model complexity and low degrees of freedom [20] and may overestimate lack of fit in relatively simple models.

Table 7. CFA Fit Indices.

Fit Measures			
RMSEA 90% CI			
CFI	TLI	SRMR	RMSEA
0.921	0.882	0.0510	0.116

Importantly, all factors' loadings were statistically significant, indicating that each item contributes meaningfully to the underlying construct. Taken together, the pattern of fit indices suggests that the one-factor model provides a reasonable and theoretically consistent representation of the data, despite some evidence of model misfit. The elevated RMSEA may reflect minor model misspecification rather than substantial structural inadequacy. Further refinement of the model may improve overall fit, but the current structure remains adequate for interpretation.

The Table 8 shows that the SMAQ scores were not significantly associated with age, gender, or education. However, higher SMAQ scores were significantly correlated with greater number of medications, more complex chronic conditions, and lower quality of life, supporting the scale's construct validity.

Table 8. Spearman correlation matrix of SMAQ total score with demographic, clinical, behavioral variables.

Variable	Spearman's ρ	*p*-Value
Age	−0.019	0.693
Gender	−0.023	0.730
Education	−0.038	0.847
No. of medications	0.156 ***	<0.001
MCC vs. MM	0.086 *	0.010
Quality of life	0.216 ***	<0.001

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, one-tailed.

This Table 9 shows that the non-adherent group had substantially higher Total SMAQ scores, reflecting poorer medication adherence compared to the adherent group.

Table 9. Group Descriptives.

Group Descriptives						
	Group	*n*	Mean	Median	SD	SE
Total_SMAQ	Adherent	707	1.39	1.00	1.41	0.0528
	Non-adherent	20	6.25	6.00	0.444	0.0993

The Table 10 shows that all tests indicate a highly significant and very large difference in Total SMAQ scores between adherent and non-adherent participants. The non-adherent group had substantially higher SMAQ scores (indicating worse adherence). The magnitude of the effect was extremely large, suggesting strong discrimination between the two groups.

Table 10. SMAQ scores by adherence group.

Independent Samples T-Test										
		Statistic	df	*p*	Mean Difference	SE Difference	95% CI			Effect Size
Total SMAQ	Welch's t	−43.2	31.2	<0.001	−4.86	0.113	−5.09	−4.63	Cohen's d	−4.67
	Mann–Whitney U	7.50		<0.001	−5.00		−6.00	−5.00	Rank biserial correlation	0.999

Note. H_a $\mu_{Adherent} \neq \mu_{Non\text{-}adherent}$.

The graph in the Figure 2 illustrates a significant difference in Total SMAQ scores between two groups (adherent and non-adherent).

There is a clear separation between the two categories, with the non-adherent group scoring substantially higher on the Total SMAQ scale than the adherent group.

In clinical context, higher SMAQ scores indicate poorer medication adherence. This chart confirms that the SMAQ scoring system effectively differentiates between patient adherence levels.

The 95% confidence intervals for the two groups do not overlap, indicating that the difference in scores is statistically significant.

The higher scores in the non-adherent group confirm that the Total SMAQ metric is a sensitive indicator for identifying patients who struggle with medication consistency.

The proximity of the mean to the median in both categories suggests a relatively normal distribution of scores within each group, with minimal impact from extreme outliers.

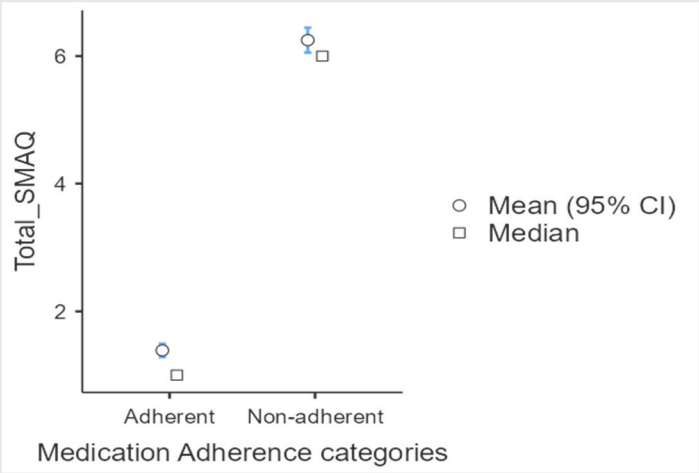


Figure 2. Distribution of Total SMAQ Scores Across Medication Adherence Categories.

4. Discussion

This study evaluated the psychometric properties of the SMAQ among Albanian older adults with chronic condition complexity. Overall, the findings support the reliability, unidimensional structure, and discriminative validity of the instrument, reinforcing its applicability in primary care settings and extending its use to a culturally distinct and clinically complex population.

The SMAQ demonstrated good internal consistency, with Cronbach's alpha (0.799) and McDonald's omega (0.821) exceeding recommended thresholds for reliability. These results are consistent with previous validation studies, which have reported adequate internal consistency across diverse chronic disease populations, including individuals with HIV and patients in nephrology settings [14,21,22]. The original validation study by Knobel et al. (2002) demonstrated satisfactory reliability and clinical utility in identifying non-adherence in HIV patients, establishing the SMAQ as brief yet robust screening tool [14]. Subsequent applications in nephrology populations confirmed its practical value in chronic disease management settings.

Item-level analysis indicated that items assessing missed doses over the previous three months exhibited the strongest item-total correlations. This suggests that recall-based frequency items may be particularly effective in capturing habitual medication-taking behavior in older adults with multimorbidity. Similar findings have been reported in adherence research, where behavior-frequency items often demonstrate stronger psychometric performance than attitudinal measures.

Exploratory and confirmatory factor analyses supported a unidimensional structure of the AL-SMAQ. Although the RMSEA indicated suboptimal model fit, other indices (CFI, TLI, SRMR) were within acceptable ranges. This discrepancy is consistent with known limitations of RMSEA in models with low degrees of freedom, where it may overestimate model misfit as demonstrated by Kenny et al. (2015) [23]. Therefore, the elevated RMSEA observed in the present analysis may reflect statistical bias associated with model complexity rather than substantive model misspecification. Considering the sensitivity of RMSEA to large samples and non-normal data [18], the overall structural validity of the SMAQ can be considered satisfactory and consistent with prior studies [14]. Taken together, the findings indicate that the structural validity of the AL-SMAQ is acceptable and aligns with previous research supporting the SMAQ as a single-factor measure of medication adherence across different populations. The preservation of its unidimensional structure in this culturally distinct and clinically complex population supports the cross-contextual robustness of the instrument.

Discriminative (known-group) validity was supported by the ability of the AL-SMAQ to differentiate between subgroups defined by clinically relevant characteristics, including number of medications, chronic condition category, and self-reported health status. These findings suggest that the instrument is sensitive to variations in adherence behavior associated with clinical complexity and patient-reported health, supporting its practical utility in identifying at-risk groups in primary care settings.

Total SMAQ scores were not normally distributed and showed ceiling effects, with a high proportion of participants classified as adherent. Such skewed distributions are commonly reported in self-reported adherence measures [24,25]. These findings highlight the inherent constrains of self-report instruments in capturing non-adherence behaviors.

Given these limitations, future research in Albanian older adults should consider combining self-report measures such as the AL-SMAQ with objective adherence indicators, including pharmacy refill records, pill counts, or electronic monitoring systems, to enhance measurement accuracy and provide a more comprehensive assessment of medication adherence.

5. Conclusions

The findings of this study show that the AL-SMAQ demonstrates good reliability and acceptable structural validity in Albanian older adults with MCCs, supporting its use as a practical tool for assessing medication adherence in primary care. The instrument was able to differentiate between clinically relevant subgroups, indicating its potential utility in identifying patients at risk of non-adherence.

6. Clinical Implications

Older adults with CCCs represent a high-risk group for medication non-adherence due to polypharmacy, cognitive burden, and regimen complexity. The availability of a brief, psychometrically sound, and culturally adapted adherence screening tool is therefore clinically valuable in Albanian healthcare settings.

Given its brevity, simplicity, and strong psychometric performance, the SMAQ appears suitable for use in Albanian primary healthcare settings, particularly among older adults with MCCs and MM. Its ability to distinguish adherence levels efficiently makes it valuable for routine clinical screening and targeted adherence interventions.

7. Strengths and Limitations

This study included a large sample size and participants from multiple primary healthcare centers, strengthening the robustness of findings. Both exploratory and confirmatory factor analyses were conducted, providing comprehensive structural validation.

However, several limitations should be acknowledged.

The sample was restricted to urban primary healthcare users, which may limit generalizability. The cross-sectional design prevents assessment of test–retest reliability or predictive validity. Additionally, medication adherence was measured via self-report instrument (AL-SMAQ), which may introduce reporting bias.

8. Future Research

Future research should further evaluate the longitudinal stability of the instrument, including its test–retest reliability over extended time intervals. Additional studies are warranted to assess predictive validity and sensitivity to change in response to clinical or behavioral interventions. Moreover, validation in rural and other underrepresented populations, as well as comparisons with objective adherence indicators (e.g., pharmacy refill records), would provide stronger evidence supporting its broader clinical applicability.

Author Contributions: Writing—original draft, B.S.; Writing—review and editing, B.S., F.K. and E.K. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and was approved by the Regional Directorate of the Vlora Healthcare Services Operator, approved under Protocol Code no. 358/1, approval date 28 February 2024.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study. Written informed consent has been obtained from the patient(s) to publish this paper.

Data Availability Statement: The data presented in this study are available on request from the corresponding author because they are part of an ongoing study and have not yet been fully analyzed.

Acknowledgments: The authors have reviewed and edited the output and take full responsibility for the content of this publication.

Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

The following abbreviations are used in this manuscript:

SMAQ	The Simplified Medication Adherence Questionnaire
MARS	Medication Adherence Rating Scale
ARMS	Adherence to Refills and Medication Scale
ProMAS	Probabilistic Medication Adherence Scale
CCCs	Complex Chronic Conditions
MCCs	Multiple Chronic Conditions
MM	Multimorbidity
EFA	Exploratory Factor Analysis
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
RMSEA	Root Mean Square Error of Approximation
SRMR	Standardized Root Mean Square Residual
TLI	Tucker–Lewis Index

Appendix A. Simplified Medication Adherence Questionnaire (SMAQ) in Albanian

Pyetësor i Thjeshtuar i Respektimit te Terapise Medikamentoze (AL-SMAQ)	
1. A harroni ndonjëherë të merrni ilaçet tuaja?	☐ Po ☐ Jo
2. A i merrni gjithmonë ilaçet në kohën e duhur?	☐ Po ☐ Jo
3. A e ndaloni ndonjëherë marrjen e ilaçeve nëse nuk ndiheni mire apo kur ndiheni keq?	☐ Po ☐ Jo
4. Keni harruar të merrni ilaçin tuaj gjatë fundjavës?	☐ Po ☐ Jo
5. Mendohuni pak për JAVËN E FUNDIT, SA HERË nuk keni marrë ndonjë dozë të ilaçet?	☐a. ASNJË ☐b. 1 në 2 doza ☐c. 3 në 5 doza ☐d. 6 në 10 doza ☐e. Më shumë se 10 doza

Pyetësor i Thjeshtuar i Respektimit te Terapise Medikamentoze (AL-SMAQ)	
6. Mendohuni pak që NGA VIZITA E FUNDIT ose për 3 MUAJT E FUNDIT....	☐ Asnjë ditë ☐ 1 ditë
a. Sa ditë nuk e keni marrë mjekimin/ të gjitha dozat ditore?	☐ 2 ditë ☐ mbi 2 ditë
	☐ Asnjë ditë ☐ 1 ditë
b. Sa ditë keni humbur njërën nga dozat ditore të medikamentit?	☐ 2 ditë ☐ 3 ditë ☐ 4 ditë ☐ mbi 4 ditë
	Një pacient konsiderohet i papajtueshëm nëse përgjigjet në një ose më shumë nga pyetjet cilësore si më poshtë: pyetja 1 po, 2 jo, 3 po, 4 po. Ata konsiderohen gjithashtu të papajtueshëm nëse përgjigjen C, D ose E për pyetjen 5; ose nëse përgjigjen "më shumë se 2 ditë" për pyetjen 6.
Pike totale 7 = jo aderent	Pyetja 5 mund të përdoret si një masë gjysmë-sasiore pasi cakton një përqindje të respektimit terapeutik për secilën përgjigje: A korrespondon me 95–100% respektim; B = 85–94%; C = 65–84%; D = 30–64%; dhe E = më pak se 30%.

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