Neuropsychiatric Disease and Treatment

Dovepress
Taylor & Francis Group

Open Access Full Text Article

ORIGINAL RESEARCH

Psychometric Evaluation and Cultural Adaptation of the Indonesian Version of the Knowledge About Schizophrenia Test (KAST) in Family Caregivers

Tuti Kurnianingsih[1], Jin Young Chang[1], Irvan Afriandi[2], Veranita Pandia[1], Meita Dhamayanti[3,4]

[1]Department of Psychiatry, Faculty of Medicine, Universitas Padjadjaran, Bandung, West Java, Indonesia; [2]Department of Public Health, Faculty of Medicine, Universitas Padjadjaran, Bandung, West Java, Indonesia; [3]Department of Child Health, Faculty of Medicine, Universitas Padjadjaran, Bandung, West Java, Indonesia; [4]Center for the Study of Health Systems and Education Innovation for Health Workers, Universitas Padjadjaran, Bandung, West Java, Indonesia

Correspondence: Meita Dhamayanti, Faculty of Medicine, Universitas Padjadjaran, Jalan Ir. Soekarno No.KM. 21, Hegarmanah, Jatinangor, Sumedang Regency, Bandung, West Java, 45363, Indonesia, Email meita.dhamayanti@unpad.ac.id

Purpose: The Knowledge about Schizophrenia Test (KAST) is a widely used instrument for assessing knowledge about schizophrenia. However, its applicability in diverse cultural contexts, such as Indonesia, necessitates validation due to potential variations in cultural beliefs and caregiving practices. This study aimed to evaluate the psychometric properties and conduct a cultural adaptation of the Indonesian version of the KAST among family caregivers of individuals with schizophrenia in Indonesia.

Methods: A cross-sectional study was conducted involving 94 family caregivers of schizophrenia patients from community settings. Item analysis, construct validity (using known-group comparison and confirmatory factor analysis (CFA)), and internal consistency reliability were assessed.

Results: Item analysis indicated acceptable discriminant power for most items, with Pearson correlation coefficients ≥0.3, except for item 17 (0.237). Known-group validity, assessed via the Mann–Whitney *U*-test, demonstrated significantly higher KAST scores in primary caregivers compared to other family members across all three domains ($p < 0.0001$), indicating strong construct validity. CFA yielded favorable fit indices: $\chi 2 = 7.5$, $df = 7$, $p = 0.379$, GFI = 0.99, CFI = 1.00, NNFI = 0.99, RMSEA = 0.02, and SRMR = 0.03. The Kuder-Richardson Reliability Coefficient was 0.872, confirming high internal consistency.

Conclusion: The culturally adapted Indonesian version of the KAST demonstrated robust psychometric properties, making it a reliable and valid instrument for assessing schizophrenia knowledge among family caregivers in Indonesia.

Keywords: schizophrenia, knowledge, family, caregiver, psychometric evaluation, cultural adaptation, scale validation

Introduction

Schizophrenia represents a profound and enduring psychiatric condition characterized by a constellation of symptoms that substantially compromise an individual's cognitive, emotional, and behavioral capacities, leading to marked impairment in their daily functioning and overall quality of life.[1,2] Per the World Health Organization, approximately 24 million individuals, constituting approximately 1 in 300 individuals worldwide, are afflicted with schizophrenia.[3] The Basic Health Research (Riset Kesehatan Dasar, Riskesdas), administered by the Indonesian Ministry of Health in 2018, revealed that within Indonesia, 6.7 individuals per 1000 families exhibited symptoms indicative of a psychotic disorder, inclusive of schizophrenia.[4]

In Indonesia, individuals diagnosed with schizophrenia are commonly supported by family members who assume the role of caregivers. Unfortunately, many primary caregivers of patients with schizophrenia in Indonesia still lack sufficient knowledge about the condition. Prior studies revealed that a significant percentage, between around 27% and 57.9%, of these families exhibited a poor understanding of facts about schizophrenia.[5,6] The insufficient knowledge of caregivers about schizophrenia can lead to several negative impacts. The lack of knowledge about schizophrenia is associated with the caregiver's burden,[7–11] lead to physical and mental problems such as depression and anxiety.[12–14] Lack of knowledge about

Received: 6 January 2025
Accepted: 26 July 2025
Published: 8 August 2025

schizophrenia is further associated with stigma affiliation among the primary family caregivers,[15,16] a self-stigma that develops due to close relationships with individuals with schizophrenia. Low levels of knowledge regarding schizophrenia are significantly correlated with increased affiliation stigma of the family.[7] Stigma affiliation exerts detrimental effects on the family and on the therapeutic outcomes for the patient.[17–19] A lack of a thorough understanding of schizophrenia might also cause family misunderstandings and ambiguity about the disorder's future trajectory. Family members may experience emotional suffering as a result of this uncertainty. Previous studies indicate that primary caregivers of people with schizophrenia who are adequately informed about the condition typically report feeling less distressed emotionally.[18] The other important negative impact regarding lack of knowledge about schizophrenia is the practice of pasung. In Indonesia, a significant proportion, specifically 14% of families with a member diagnosed with schizophrenia, resort to the practice of confining or restraining their affected relatives, commonly referred to as pasung.[4] Which is often driven by the misconception that individuals with schizophrenia are inherently dangerous, reflecting deeper issues in public understanding and stigma.[20]

Given the significant negative impacts of limited knowledge about schizophrenia, there is a pressing need for a valid scale that assesses the knowledge regarding schizophrenia among family caregivers in Indonesia, so mental health professionals can implement a necessary family education intervention to prevent that detrimental effect and increase the mental health wellness of the caregivers and the treatment outcome of the schizophrenia patients. Currently, there is no culturally validated instrument in Indonesia that measures this knowledge reliably, underscoring the urgency of developing such a tool.

One scale utilized for assessing schizophrenia worldwide is the Knowledge About Schizophrenia Test (KAST), devised by Professor Michael T. Compton et al. This instrument comprises multiple-choice questions featuring five response alternatives, covering topics such as diagnosis, symptoms, etiology, medication, course, prognosis, and management strategies related to schizophrenia.[21,22] Numerous adaptations and psychometric evaluations of the KAST have been conducted worldwide, encompassing diverse cultural contexts such as China and Portugal.[22,23] However, cultural beliefs and caregiving practices may influence how KAST items are interpreted, necessitating cross-cultural adaptation and validation before use in Indonesia.

This study aims to contribute to improving family psychoeducation interventions by providing a culturally validated instrument to assess schizophrenia knowledge among caregivers in Indonesia. Importantly, this study was designed to assess the baseline knowledge of caregivers without any prior educational intervention. Establishing this knowledge baseline is crucial in identifying gaps that culturally adapted psychoeducational programs could address in the future. By understanding the specific knowledge gaps and strengths within this population, mental health professionals can design more effective educational programs tailored to local needs, ultimately enhancing caregiver well-being and patient outcomes. This effort aligns with the broader goal of reducing stigma and caregiver burden in schizophrenia management.[11,24] Construct validity, including known group comparisons and confirmatory factor analysis (CFA), will be a primary focus in this validation process to ensure the instrument truly measures what it intends to assess.

Materials and Methods

This cross-sectional study obtained authorization from its original developer, Prof. Michael Compton, to validate the Knowledge About Schizophrenia Test (KAST) in Indonesia. Ethical clearance was acquired from the Universitas Padjadjaran Research Ethics Committee, documented under letter 1359/UN6.KEP/EC/2022. All participants provided written informed consent after receiving a clear explanation of the study's objectives and procedures. This study was conducted in accordance with the ethical principles of the Declaration of Helsinki.

Measures

The Knowledge About Schizophrenia Test (KAST) is a multiple-choice assessment tool featuring five response options, comprising four distractors and one correct answer. It comprises 18 items categorized into six domains: diagnosis, etiology, symptoms, management, medication, and course and prognosis. The total score ranges from 0 to 18. Although the KAST instrument comprises items organized conceptually across six knowledge domains—diagnosis, etiology, symptoms, treatment, course and prognosis, and management—this adaptation process maintained the original item structure. Given the preservation of the core format, we did not re-map each item into domains in the present manuscript. However, the conceptual alignment remains consistent with the original instrument developed by Compton et al, and this structure informed our validity

assessments.[21] No formal psychoeducation or training was provided to participants prior to the administration of the KAST. This ensured the assessment truly reflected their baseline understanding of schizophrenia.

Translation and Cross-Cultural Adaptation

The translation and cross-cultural adaptation of the KAST into Indonesian adhered to the "Guidelines for the Process of Cross-Cultural Adaptation of Self-Report Measures"[25] and the International Test Commission (ITC) Guidelines for Translating and Adapting Tests.[26] The process followed five key steps: (1) Forward Translation: The initial stage involved two independent forward translations from English to Indonesian, conducted by native Indonesian-speaking medical doctors and an English translation expert. (2) Synthesis of Translations: These translations were then synthesized by the translators in collaboration with a bilingual medical doctor to produce a consolidated version. (3) Backward Translation: The synthesized Indonesian version was back-translated into English by native English-speaking translators who were blinded to the original version. (4) Expert Committee Review: A panel consisting of translators and psychiatrists reviewed the original, forward, and backward versions to produce a pre-final instrument. Each item was assessed for relevance using a 1–4 Likert-type scale. (5) Pre-test: The pre-final version was tested on 30 family members and caregivers of individuals with schizophrenia. Cognitive interviews were conducted using a semi-structured interview guide to explore participants' understanding of each item. Responses were audio-recorded and analyzed thematically. All participants reported good comprehension of the Indonesian version, and no further modifications were required. Figure 1 conceptually summarizes the five-stage adaptation process: forward translation, synthesis, backward translation, expert review, and pre-testing via cognitive interviews.

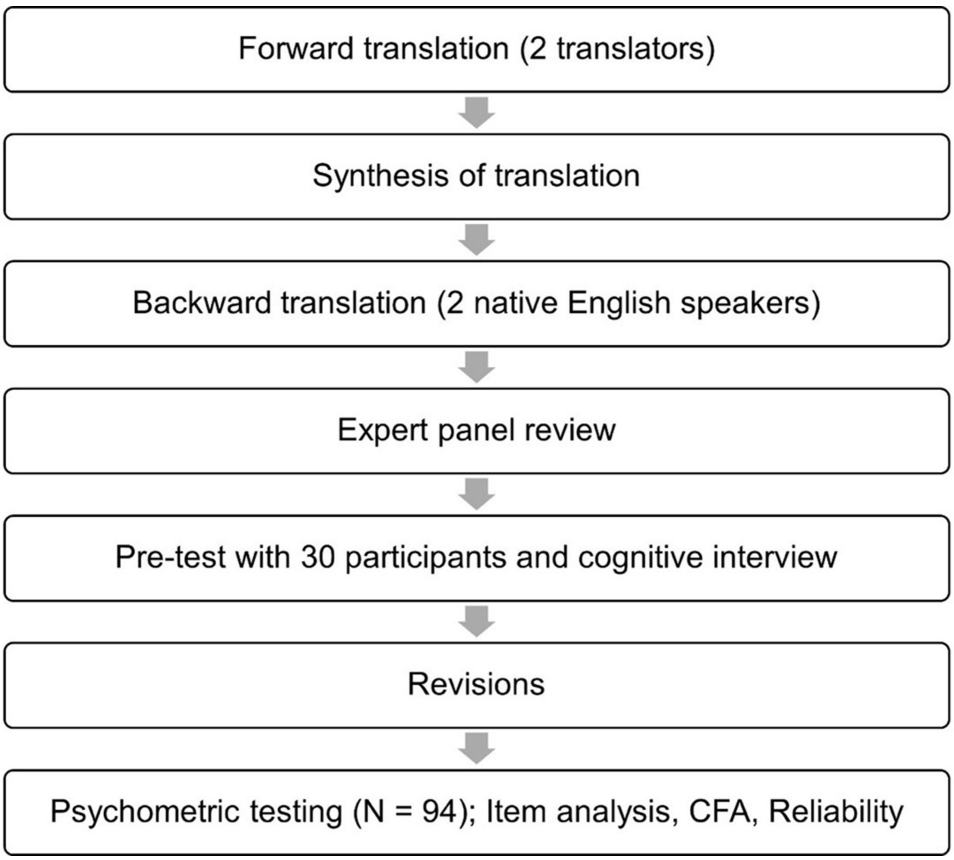

Figure 1 KAST Adaptation Process.

https://doi.org/10.2147/NDT.S515911

Validity and Reliability Evaluation

Following the completion of the aforementioned five steps, the psychometric properties of the Indonesian version of KAST were evaluated. The sample-to-item ratio was employed to determine the sample size, calculated based on the total number of test items. It is imperative that this ratio does not fall below 5-to-1.[27] Based on this, a minimum of 85 participants was required, calculated from the 17 items of the KAST. To improve generalizability and account for potential non-respondents, a total of 94 participants were recruited. Participants were selected through purposive sampling to ensure the inclusion of individuals meeting specific criteria, including both active and limited caregiving roles. This approach aimed to capture a broad range of experiences and perspectives. The sample was divided into two groups: 94 family members serving as primary caregivers for individuals with schizophrenia, and another 94 with minimal caregiving involvement. Inclusion criteria for the primary caregiver group comprised individuals aged 18 years or older, actively involved in patient care, proficient in the Indonesian language, and without mental illness. Conversely, participants in the comparison group were aged 18 years or older, with minimal involvement in patient care, proficient in the Indonesian language, and without mental illness. All participants provided informed consent and completed the Indonesian version of KAST.

Item Analysis

The item analysis conducted in this study scrutinized the responses of participants to individual test items, with the objective of evaluating the quality of each item and the overall test. Item discrimination was employed to ascertain the ability of each question to differentiate respondents based on their comprehension of schizophrenia. Point-biserial correlation coefficients were used to measure the discriminatory capacity of each item, reflecting its ability to distinguish between individuals with higher and lower knowledge.[28,29]

Construct Validity

In this study, construct validity was assessed through known-group validity. This method evaluates whether a questionnaire can effectively distinguish between two groups that are expected to differ in the construct being measured.[30] The groups selected were primary caregivers and other family members of individuals with schizophrenia, based on the assumption that primary caregivers possess superior knowledge. In addition to known-group validity, confirmatory factor analysis (CFA) was performed to further assess construct validity.

The confirmatory factor analysis (CFA) was conducted using a single-factor model consistent with the original theoretical structure proposed by Compton et al.[21] The model treats each domain as contributing to an overarching construct of schizophrenia knowledge. Similar validation studies in Portugal (Daltio et al, 2015) and China (Wang et al, 2023) employed comparable unidimensional or domain-based models and did not report item-level cross-loadings, supporting our methodological choice.[22,23]

The Factorial Validity

CFA was conducted using JASP 0.17.2.1 to examine the fit of a single-factor model, which included six items corresponding to the six knowledge domains: etiology, symptoms, diagnosis, treatment, course and prognosis, and management. The total score of each group was used as an observed variable. Model fit was assessed using the Chi-squared value, degrees of freedom (df), and the associated p-value, with a p-value greater than 0.05 indicating acceptable fit. Additional fit indices were also used, including the goodness-of-fit index (GFI), non-normed fit index (NNFI), comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR). Indices such as AGFI, CFI, and NNFI range from 0 to 1.0, with values >0.9 reflecting good fit, while values <0.10 for RMSEA and SRMR indicate better model fit.[31]

Reliability

In this study, internal consistency was employed to assess reliability, as only a single psychometric scale was used. This approach evaluates the extent to which all items in a scale measure the same construct. The Kuder-Richardson Reliability Coefficient (KR-20) was used, which is particularly appropriate for dichotomous items such as those in the KAST. A KR-20 value of 0.7 or higher was considered acceptable, indicating that the items consistently measure knowledge about schizophrenia.[30]

Results

The socio-demographic characteristics of the families of schizophrenia patients are presented in Table 1.

Table 1 presents the mean age and years of education among family caregivers, indicating values of 47.29 ± 13.19 and 7.28 ± 2.49, respectively. Conversely, for other family members, the mean age is 40.44 ± 13.18 years, with a mean education duration of 9.25±2.66 years. Additionally, the predominant ethnic group among respondents in both groups is Sundanese.

The Socio-Demographic Characteristics of Schizophrenia Patients are presented in Table 2.

Table 2 presents the demographic characteristics of schizophrenia patients, revealing a mean age of 38.47 ± 11.416 years and an educational attainment of 9.32 ± 2.82 years. The majority of male respondents are unemployed, while the distribution of marital status is nearly evenly split between married and unmarried individuals. Additionally, the mean duration of illness is reported as 121.85 ± 96.97 months, with an average of 0.66 ± 1.052 hospitalizations. This

Table 1 Socio-Demographic Characteristics of the Family

Demographic Characteristics	Primary Family Caregivers n=94	Other Family Members n=94
Age	47.29 ± 13.19*	40.44 ± 13.18*
Years of Education	7.28 ± 2.49*	9.25± 2.66*
Gender		
Male	9 (9.6%)	42 (44.7%)
Female	85 (90.4%)	52 (55.3%)
Employment		
Employee	11 (11.7%)	43 (45.8%)
Unemployed	83 (88.3%)	51 (54.2%)
Marital status		
Married	85 (90.4%)	71 (75.5%)
Unmarried	9 (9.6%)	23 (24.5%)
Ethnicity		
Sundanese	92 (97.8%)	90 (95.7%)
Other than Sundanese	2 (2.2%)	4 (4.3%)

Note: *Mean ± SD.

Table 2 Socio-Demographic Characteristics of Schizophrenia Patients

	Schizophrenia Patients
Age	38.47 ± 11.416*
Years of Education	9.32 ± 2.82*
Gender	
Male	62 (66.0%)
Female	32 (34.0%)
Employment	
Employee	9 (9.6%)
Unemployed	85 (90.4%)
Marital status	
Married	49 (52.1%)
Unmarried	45 (47.9%)
Duration of Illness (month)	121.85 ± 96.97*
Number of Hospitalization	0.66 ± 1.052*

Note: *Mean ± SD.

information, though not directly analyzed, provide critical context for understanding the caregiving environment. Variables such as illness duration and unemployment status may indirectly affect caregiver stress and knowledge needs.

Item Analysis

Among the 17 items evaluated, 16 demonstrated strong discriminant power (≥0.300), as shown in Table 3. However, one item in the disease course and prognosis domain exhibited a lower discriminant power (0.237), falling below the recommended threshold. This suggests that single item does not effectively differentiate between participants with high versus low knowledge and warrants further consideration.

Construct Validity

The Mann–Whitney *U*-test was employed for data analysis due to the non-normal distribution of the results.[32] Table 4 indicates that for the domains of diagnosis, etiology, symptoms, management, and treatment, the Mann–Whitney *U*-test yielded a p-value less than 0.05, signifying a statistically significant difference between the domain scores of the primary caregiver group and the other group. Specifically, the scores for these domains were significantly higher among primary caregivers. In contrast, for the disease course and prognosis domain, although the scores of primary caregivers were slightly elevated, no significant difference was observed, as indicated by $p > 0.05$. While item-level cross-loading analysis was not conducted due to technical constraints, our CFA approach aligns with prior studies that similarly emphasized domain-level structures. The model fit indices suggest an acceptable structure for the adapted Indonesian version, although further analysis with larger samples may explore potential multidimensional configurations.

The Factorial Validity

The results indicate that the factor model of the KAST demonstrates a satisfactory fit, as evidenced by $\chi 2 = 7.5$, df = 7, and p-value = 0.379. Furthermore, other goodness-of-fit indices support this conclusion, with GFI = 0.99, CFI = 0.00, NNFI = 0.99, RMSEA = 0.02, and SRMR = 0.03 indicating a favorable fit for the factor model of the KAST. All loading factors of observed variables are statistically significant at the 5% level, ranging from 0.32 to 0.78. While the fit indices were excellent, such high values may indicate possible overfitting, which is further discussed in the limitations. The path diagram illustrating the KAST factor model is presented in Figure 2.

Table 3 Item Discrimination Analysis of the Indonesian KAST

Domain	Item	Correlation Coefficient
Diagnosis	3	0.744
	10	0.670
Etiology	1	0.647
	8	0.341
	14	0.662
Symptoms	2	0.848
	9	0.579
Management	6	0.474
	7	0.822
	13	0.566
Medication	5	0.806
	12	0.668
	17	0.668

Note: Coefficients ≥0.30 indicate acceptable; ≥.50 indicate good discriminative ability.

Table 4 Domain Scores of the Indonesian KAST Among Other Family Members and Primary Caregivers

Domain	Other Family Members (n = 94)	Primary Caregivers (n = 94)	p-value
Diagnosis			0.0001
Mean±Std	1.44±0.614	1.80±0.430	
Median	1.50	2.00	
Range (min-max)	0.00–2.00	0.00–2.00	
Etiology			0.002
Mean±Std	0.81±0.766	1.16±0.723	
Median	1.00	1.00	
Range (min-max)	0.00–2.00	0.00–3.00	
Symptoms			0.005
Mean±Std	0.54±0.599	0.79±0.602	
Median	0.00	1.00	
Range (min-max)	0.00–2.00	0.00–2.00	
Management			0.0001
Mean±Std	1.67±0.860	2.36±0.746	
Median	1.00	3.00	
Range (min-max)	0.00–3.00	1.00–3.00	
Medication			0.001
Mean±Std	1.14±0.863	1.55±0.798	
Median	1.00	2.00	
Range (min-max)	0.00–3.00	0.00–3.00	
Course and prognosis			0.222
Mean±Std	2.49±0.877	2.71±0.812	
Median	3.00	3.00	
Range (min-max)	0.00–4.00	1.00–4.00	
Total Score			0.0001
Mean±Std	8.09±2.703	10.37±2.523	
Median	7.50	10.00	
Range (min-max)	4.00–14.00	5.00–16.00	

Reliability

The internal consistency of the KAST, shown in Table 5, as assessed by the Kuder-Richardson 20 (KR-20) coefficient, yielded a value of 0.872, denoting a high level of reliability.[29]

Discussion

This study focused on the adaptation and validation of the Knowledge About Schizophrenia Test (KAST) in the Indonesian language, targeting family caregivers and other family members of individuals with schizophrenia. During the expert committee review, item 17 was excluded from the Indonesian version of KAST. This particular item inquired about the best source of information and support for family members of individuals with schizophrenia, with the correct answer being the National Alliance for the Mentally Ill (NAMI). This decision was based on cultural and contextual differences between Indonesia and the United States, where mental health support organizations differ significantly in their roles and structures, rendering item 17 inapplicable. Consequently, the original 18-item KAST was reduced to 17 items in the Indonesian version. Nonetheless, all original domains were retained. This adjustment is consistent with exclusions made in prior adaptations, such as those in Portugal and China.[22,23]

The results highlight the unique caregiving context in Indonesia, where cultural norms often assign significant caregiving responsibilities to family members, particularly women. The KAST, adapted for this context, provides valuable insights into how knowledge gaps influence caregiving practices, such as stigma and the use of outdated

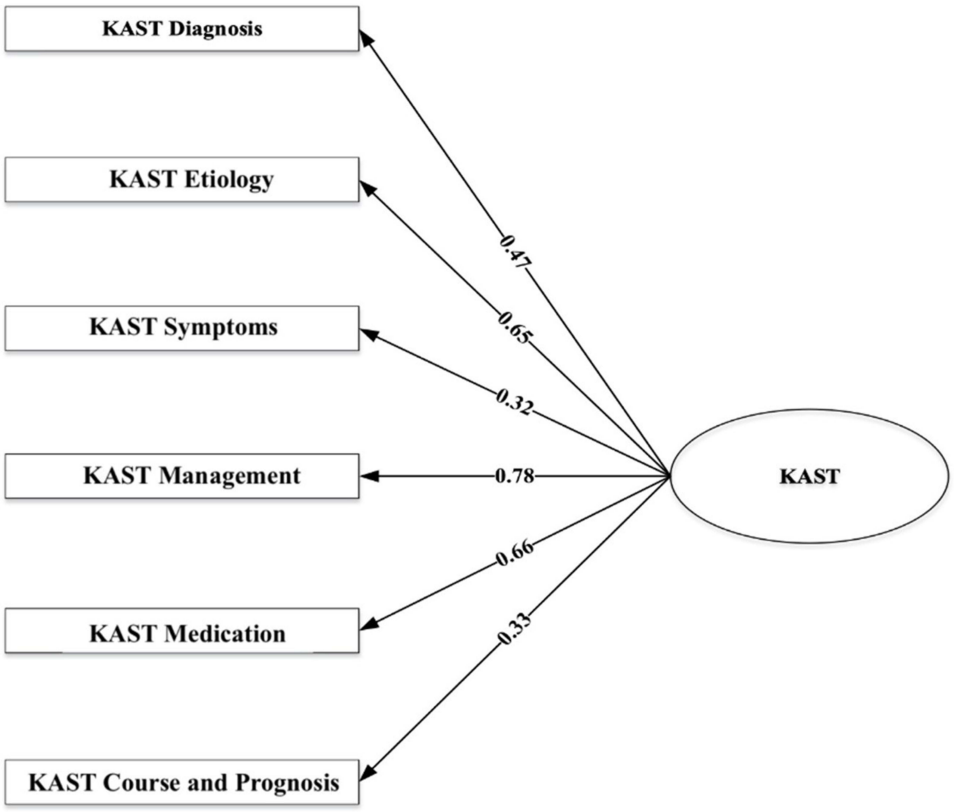

Figure 2 KAST Factor Model.

practices like pasung. Although psychoeducation is widely acknowledged as essential, it is rarely delivered in a structured and standardized manner within Indonesia's mental health care system. Programs are often ad hoc, and lack standardization in content delivery or evaluation. This study addresses that gap by introducing the first culturally validated tool to objectively assess caregivers' knowledge of schizophrenia, enabling more targeted, data-driven educational interventions as part of routine mental health services. Addressing these gaps through targeted psychoeducation could mitigate stigma and foster more supportive caregiving environments.[33,34] Despite rigorous methodological procedures, the study acknowledges potential biases, including selection bias due to the non-random sampling method and social desirability bias, which could affect participant responses. Future studies should employ random sampling and include objective behavioral assessments to enhance the robustness and reliability of findings.[35,36]

Item Analysis

"Item quality plays a crucial role in determining a psychometric scale's reliability. In this study, item quality was evaluated through statistical item analysis.[30] Discriminatory power, a key component of item analysis, played a crucial role in this evaluation. It quantified the extent to which items could differentiate between measured attributes among individuals or groups.[37] Discriminant power was examined using point-biserial correlation coefficients, revealing that 16 items in the Indonesian KAST demonstrated strong discriminant power. In contrast, 1 item, originally part of the disease

Table 5 Internal Consistency of the KAST

Population	Kuder-Richardson Reliability Coefficient	Items	Conclusion
The Family of schizophrenia patients (N=188)	0.872	17	Reliable

course and prognosis domain, showed lower discriminant power (0.237), suggesting it was less effective in distinguishing between participants with high versus low knowledge. As discussed previously, this item was also culturally irrelevant. Due to documentation limitations, a detailed domain-level remapping of items was not included in this version. However, the domain framework was preserved based on the theoretical grounding of the original KAST and was used in both the cognitive interview phase and construct validity analysis.

Construct Validity

Construct validity, which pertains to an instrument's ability to precisely measure its intended attribute, was evaluated in this study through the known group method.[21,30] The findings revealed that the Indonesian version of KAST effectively distinguished between levels of knowledge regarding schizophrenia across domains such as diagnosis, etiology, symptoms, management, and treatment among primary family caregivers and other family members. Moreover, primary family caregivers demonstrated significantly higher scores compared to the other group in these domains. However, in the disease course and prognosis domain, while the primary family caregiver group had higher scores, the difference was not statistically significant when compared to other family members.

The Factorial Validity

Confirmatory Factor Analysis (CFA) assesses the goodness-of-fit of a proposed theory or model to observed data. Unlike exploratory techniques, CFA is theory or model-driven, aiming to confirm or refute predetermined hypotheses regarding the underlying structure of the data.[38] The findings demonstrated that the KAST factor model exhibited a favorable fit, supported by loading factors ranging from 0.32 to 0.78. All factor loadings were statistically significant at the 5% alpha level, with high model fit indices (GFI = 0.99, CFI = 1.00, NNFI = 0.99, RMSEA = 0.02, SRMR = 0.03), indicating a strong fit. However, the unusually high CFI value may suggest potential model overfitting, which warrants further discussion as a limitation. Thus, the Indonesian version of the KAST emerges as a valid scale for assessing knowledge about schizophrenia among the families of individuals diagnosed with the disorder.

In general, the findings of this study align with prior research. Previous investigations, such as the study by Compton et al on the original KAST in English, also employed the known group validity process. This involved comparing various groups, including caregivers of schizophrenia patients, the lay population, police officers trained for emergencies, and mental health professionals. Consistent with the present study, the results indicated that the KAST effectively differentiated between these groups as expected, based on their respective scores.[21] Similarly, studies conducted in Portugal and China using comparable known-group methods have also confirmed the instrument's validity.[22] Although an item-level CFA was considered, technical and sample size limitations led us to retain domain-level scores as observed variables in this analysis. This choice follows the methodological precedent in prior validations where domain-level factors provided sufficient construct clarity.

Reliability

Several methods are available to assess reliability, including test-retest reliability (across time), internal consistency (between items), and inter-rater reliability (among different researchers).[29] In this study, internal consistency analysis showed that the Indonesian version of the KAST demonstrated high reliability (KR-20 = 0.872). This result is consistent with the original English KAST and validation studies in China, which also reported acceptable reliability. However, due to the cross-sectional design of this study, test-retest reliability was not conducted, which is a limitation. In the original study of the KAST, the 18-item version demonstrated a KR-20 reliability coefficient of 0.82 for the total sample, encompassing all four types of respondents. Moreover, all 18 items in the KAST exhibited point-biserial correlations exceeding 0.15 in the entire sample, with an average of 0.42 for the 18 correlations.[21] Additionally, the reliability of the KAST has been confirmed by other studies, including those conducted in Portugal and China. In the Chinese study, reliability was evaluated using the KR-20 reliability coefficient, which yielded a value of 0.702. This result suggests that the internal consistency of the scale was acceptable.[23] Furthermore, a study conducted in Portugal evaluated reliability using the test-retest method, revealing an intraclass correlation coefficient of 0.592 ($p<0.01$).[22] Consequently, the findings

of this study, along with those from previous investigations in other countries utilizing various methods, collectively affirm the validity and reliability of the KAST as a measurement tool for assessing knowledge about schizophrenia.

Implications and Limitations

The generalizability of this study may be limited by the cultural homogeneity of the sample and the non-random sampling method. Future research should use more diverse and randomly selected samples. The exclusion of item 17, though culturally necessary, may affect the coverage of the disease course and prognosis domain. Additionally, the absence of test-retest reliability limits assessment of stability over time, and convergent validity with other instruments was not evaluated. The adaptation process, particularly the interview stage, lacked documentation on procedures such as cognitive interviewing, raising concerns about methodological transparency.

Although factor loadings ranged from 0.32 to 0.78, item-level data and cross-loading analysis were not reported due to technical constraints, representing another limitation. The absence of a detailed before-and-after item-domain blueprint also limits interpretability, as factor rotation obscured clear domain alignment. "Future research should enhance structural validation by incorporating convergent and test-retest analyses and mapping item-domain relationships more clearly. Exploratory Factor Analysis (EFA) was not conducted in this study due to the predefined theoretical structure of the original KAST and sample size considerations. Future studies could explore EFA to uncover potential cultural shifts in factor configuration.

Conclusion

In conclusion, the Indonesian version of the KAST has been demonstrated to be valid and reliable for use among family caregivers of schizophrenia patients. The validated Indonesian version of the KAST not only fills a critical gap in assessment tools but also provides a foundation for developing targeted educational interventions. Mental health practitioners can utilize this tool to evaluate the effectiveness of psychoeducation programs, ensuring cultural relevance and impact. Additionally, it can serve as a benchmark for designing targeted interventions aimed at reducing caregiver burden and improving patient outcomes in Indonesia. However, several limitations warrant consideration. The relatively homogeneous ethnic background of the participants may limit the generalizability of the findings to the broader Indonesian population. The cross-sectional design precluded test-retest reliability assessment, and convergent validity with other relevant instruments was not explored. Moreover, the cultural adaptation process, especially the interview stage, was not sufficiently documented, leaving gaps in methodological transparency. Future research should address these issues by including more diverse samples, examining test-retest and convergent validity, and thoroughly documenting the adaptation process to strengthen the tool's applicability and credibility.

Acknowledgments

The authors express their sincere gratitude to the families of schizophrenia patients who generously participated in this study. Special thanks are also owed to the head and staff of the Margahayu Community Health Centre, as well as the dedicated health cadres whose invaluable assistance made this study achievable. Furthermore, the authors express their gratitude to Lynna Lidyana and Lucky Saputra for their invaluable contributions to the adaptation process and their critical review of the study proposal during the expert review meeting. Their insights significantly enriched the quality of this research endeavor.

The authors also extend their deepest appreciation to Abdullah Ichsan for his significant contributions to data analysis and manuscript revision. His expertise in refining the statistical interpretations and strengthening the analytical framework was instrumental in improving the quality of this work. While he is not listed as an author, his intellectual input is sincerely acknowledged. The support and contributions of all individuals and institutions involved were essential to the successful completion of this study.

Funding

This work was supported by the Universitas Padjadjaran under Grant No 1549/UN6.3.1/PT.00/2023.

Disclosure

The authors report no conflicts of interest in this work.

References

1. McCutcheon RA, Reis Marques T, Howes OD. Schizophrenia - an overview. *JAMA Psychiatry*. 2020;77:201–210. doi:10.1001/jamapsychiatry.2019.3360
2. Kharawala S, Hastedt C, Podhorna J, Shukla H, Kappelhoff B, Harvey P. The relationship between cognition and functioning in schizophrenia: a semi-systematic review. *Schizophr Res Cogn*. 2022;27:100217. doi:10.1016/j.scog.2021.100217
3. World Health Organization. *Schizophrenia*. World Health Organization; 2022.
4. Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan. Riset kesehatan dasar Indonesia 2018. Kementerian Kesehatan Republik Indonesia; 2018.
5. Rahayuningrum DC, Patricia H. The relationship between knowledge and family support with family compliance in controlling the client's medication with schizophrenia. In: Proceeding International Conference Syedza Saintika. 2020.
6. Suryani S, Ningsih EW, Nur'aeni A. Knowledge, perception, and burden of family in treating patients with schizophrenia who experience relapse. *Belitung Nurs J*. 2019;5(4):162–168. doi:10.33546/bnj.683
7. Ebrahim OS, Al-Attar GST, Gabra RH, Osman DMM. Stigma and burden of mental illness and their correlates among family caregivers of mentally ill patients. *J Egypt Public Health Assoc*. 2020;95(1). doi:10.1186/s42506-020-00059-6
8. Nurmalisyah FF. Pengaruh Psikoedukasi Keluarga terhadap Beban dan Dukungan Keluarga dalam Merawat Penderita Skizofrenia di rumah. Universitas Airlangga. 2018. 1–193.
9. Chow JYA, Yeo YTT, Goh YS. Effects of psychoeducation on caregivers of individuals experiencing schizophrenia: a systematic review and meta-analysis. *Int J Ment Health Nurs*. 2024;33(6):1962–1987. doi:10.1111/inm.13421
10. Nurmaela N, Suryani S, Rafiyah I. The relationship of family resilience with relapse in the schizophrenia patients at psychiatric unit. *J Nurs Journal*. 2018;6(April):18–24.
11. Tessier A, Roger K, Gregoire A, Desnavailles P, Misdrahi D. Family psychoeducation to improve outcome in caregivers and patients with schizophrenia: a randomized clinical trial. *Front Psychiatry*. 2023;14:1171661.
12. Tamizi Z, Fallahi-Khoshknab M, Dalvandi A, Mohammadi-Shahboulaghi F, Mohammadi E, Bakhshi E. Defining the concept of family caregiver burden in patients with schizophrenia: a systematic review protocol. *Syst Rev*. 2019;8(1):6–11. doi:10.1186/s13643-019-1182-6
13. Derajew H, Tolessa D, Feyissa GT, Addisu F, Soboka M. Prevalence of depression and its associated factors among primary caregivers of patients with severe mental illness in southwest, Ethiopia. *BMC Psychiatry*. 2017;17(1):1–8. doi:10.1186/s12888-017-1249-7
14. Wan KF, Wong MMC. Stress and burden faced by family caregivers of people with schizophrenia and early psychosis in Hong Kong. *Intern Med J*. 2019;49:9–15. doi:10.1111/imj.14166
15. Gibbons B, Birks M. Is it time to re-visit stigma? A critical review of Goffman 50 years on. *Br J Ment Heal Nurs*. 2016;5(4):185–189. doi:10.12968/bjmh.2016.5.4.185
16. Goffman E. *Erving Goffman Stigma*. 1963.
17. Wang L, Chen Y, Hu C, Qin H. Influence of family dynamics on stigma experienced by patients with schizophrenia: mediating effect of quality of life. *Front Psychiatry*. 2021;12:645075.
18. Zhou Z, Wang Y, Feng P, et al. Associations of caregiving knowledge and skills with caregiver burden, psychological well-being, and coping styles among primary family caregivers of people living with schizophrenia in China. *Front Psychiatry*. 2021;12:631420.
19. Agustina N, Jannah SR, Mawarpury M, Fithria F. Relationship between family burden, stigma, stress, social support, family acceptance, and family's ability in caregivers of patients with schizophrenia. *Int J Curr Sci Res Rev*. 2022;05(12):4526–4532. doi:10.47191/ijcsrr/V5-i12-17
20. Ilmy SK, Noorhamdani WH, Windarwati HD. Factors associated with pasung (Seclusion and Restraint) in Indonesia: a systematic review. *Int J Sci Soc*. 2020;2(3):248–258. doi:10.54783/ijsoc.v2i3.167
21. Compton MT, Quintero L, Esterberg ML. Assessing knowledge of schizophrenia: development and psychometric properties of a brief, multiple-choice knowledge test for use across various samples. *Psychiatry Res*. 2007;151(1–2):87–95. doi:10.1016/j.psychres.2006.05.019
22. Daltio CS, Attux C, Ferraz MB. Knowledge in schizophrenia: the Portuguese version of KAST (Knowledge About Schizophrenia Test) and analysis of social-demographic and clinical factors' influence. *Schizophr Res*. 2015;168(1–2):168–173. doi:10.1016/j.schres.2015.07.009
23. Wang M, Zhao M, Zhang W, et al. Knowledge about schizophrenia test: the Chinese Mandarin version and its sociodemographic and clinical factors. *BMC Psychiatry*. 2023;23(1):535. doi:10.1186/s12888-023-04822-9
24. Okafor AJ, Monahan M. Effectiveness of psychoeducation on burden among family caregivers of adults with schizophrenia: a systematic review and meta-analysis. *Nurs Res Pract*. 2023;2023(1):2167096. doi:10.1155/2023/2167096
25. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine*. 2000;25(24):3186–3191. doi:10.1097/00007632-200012150-00014
26. Bartram D, Berberoglu G, Grégoire J, Hambleton R, Muniz J, van de Vijver F. ITC guidelines for translating and adapting tests (Second Edition). *Int J Test Second*. 2018;18(2):101–134.
27. Memon MA, Ting H, Cheah JH, Thurasamy R, Chuah F, Cham TH. Sample size for survey research: review and recommendations. *J Appl Struct Equ Model*. 2020;4(2):i–xx.
28. Menne JW, Tolsma RJ. A discrimination index for items in instruments using group responses. *J Educ Meas*. 1971;8(1):5–7. doi:10.1111/j.1745-3984.1971.tb00899.x
29. Hajjar ST. Statistical analysis: internal-consistency reliability and construct validity. *Int J Quant Qual Res Method*. 2018;6:27–38.
30. Streiner DL, Norman GR, Cairney J. *Health Measurement Scales: A Practical Guide to Their Development and Use*. Oxford university press; 2024.
31. Kelloway KE. Using LISREL for structural equation modeling: a researcher's guide. In: Lisrel U, editor. *Using LISREL for Structural Equation Modeling: A Researcher's Guide*. Inc: Sage Publications; 1998:160.
32. Rosner B, Grove D. Use of the Mann-Whitney U-test for clustered data. *Stat Med*. 1999;18(11):1387–1400. doi:10.1002/(SICI)1097-0258-(19990615)18:11<1387::AID-SIM126>3.0.CO;2-V

33. Subu MA, Wati DF, Al-Yateem N, et al. 'Family stigma' among family members of people with mental illness in Indonesia: a grounded theory approach. *Int J Ment Health*. 2023;52(2):102–123. doi:10.1080/00207411.2021.1891363
34. Sustrami D, Yusuf A, Fitryasari R, Suhardiningsih AVS, Arifin H. Determinants of burden in family caregivers of individuals with schizophrenia a systematic review. *J Psychosoc Nurs Ment Health Serv*. 2023;61(2):38–43. doi:10.3928/02793695-20220804-02
35. Vázquez AL, Culianos D, Flores CMN, de la Caridad Alvarez M, Barrett TS, Rodríguez MMD. Correction to: psychometric evaluation of a barriers to mental health treatment questionnaire for latina/o/x caregivers of children and adolescents. In: *Child and Youth Care Forum*. Springer; 2022:865.
36. Evans-Lacko S, Little K, Meltzer H, et al. Development and psychometric properties of the mental health knowledge schedule. *Can J Psychiatry*. 2010;55(7):440–448. doi:10.1177/070674371005500707
37. Urbina S. *Essentials of Psychological Testing*. John Wiley & Sons; 2014.
38. Tavakol M, Wetzel A. Factor Analysis: a means for theory and instrument development in support of construct validity. *Int J Med Educ*. 2020;11:245–247. doi:10.5116/ijme.5f96.0f4a