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Psychometric properties of a Swahili-translated Kessler Psychological Distress Scale (K6) in sample of aging Kenyans.

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ABSTRACT

Objective: The prevalence of psychological distress, such as depression and anxiety, is increasing among Kenyans. However, there is a lack of understanding about its prevalence rates among aging people, and we lack culturally standardized and concise tools to measure it.

Method: This study utilized a sample of 376 older individuals obtained from three regions in Kenya to investigate the distribution, prevalence, and psychometric properties of a Swahili-translated version of the Kessler Psychological Distress Scale (K6). A significant advantage of the K6 is its capacity to measure various mental health factors despite its conciseness.

Results: Distribution assessments reveal that most participants reported high psychological distress scores (13 or above), and women experienced significantly higher rates compared to men. The K6 indicators showed high internal consistency for the sample (alpha =.83). Exploratory factor analysis showed the six items loading to on 1 factor and subsequent confirmatory analysis demonstrated excellent fit (CFI = .95; RMSEA = .03) for the one-factor model.

Discussion: The high occurrence of psychological distress among the sample highlights this mental health problem as a potentially urgent area of need in the entire Kenyan population. Factor analysis results suggest that the Swahili-translated K6 is a concise tool with great potential for assessing psychological distress among older Kenyans

Keywords: **Psychological Distress, K6, Psychometric, Factor Analysis, Aging**

I.0 INTRODUCTION

1.1 Background of the Study

According Like other Sub-Saharan countries, Kenya is experiencing a health transition characterized by co-occurring burdens of infectious diseases and an acute rise in non-communicable diseases (NCDs; Gouda, 2019; WHO, 2016). Data on the prevalence of mental health issues in Kenya are limited. Yet, government reports show that approximately one in four Kenyans experience mental health disorders at one point in their lives (Kenya Ministry of Health, 2020). Concurrently, the absolute number of older adults requiring social and health protection is rising (Aboderin & Owii, n.d.) despite the relatively young demography. Together, these two transitions produce increased prevalence and severity of NCDs, such as diabetes, cancer, chronic illness, psychological distress, and depression among aging individuals in Kenya (Aboderin & Owii, n.d.; Smit et al., 2020). Among the noted NCDs in older people, mental health conditions (such as psychological distress) are extremely neglected, poorly recognized, managed, or understood due to cultural stigma, a lack

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of robust public focus and limited mental health resources by the government and individuals (Ndetei & Gatonga, 2011).

Psychological distress is a phrase that expresses a collection of psychophysiological mental health disorders, such as anxiety and depression. High psychological distress signals poor mental health and can lead to more severe illnesses such as major depression and post-traumatic stress (Kessler et al., 2003). It has been associated with chronic diseases, pain, self-rated health and frequent hospital visits in aging populations (Asante et al., 2022; Yang et al., 2021). An early diagnosis of these conditions is crucial in developing effective interventions for better mental health. However, there are limited culturally effective tools for conducting comprehensive assessments of psychological distress among older Kenyans. The Kessler Six (Kessler, 2002) is a brief tool that has shown excellent reliability in assessing psychological distress in low-resourced settings such as Kenya.

The K6 is a six-item scale used to screen general symptoms of psychological distress (Kessler et al., 2002). The Kessler scales were derived from a review of psychosocial screening scales by Dohrenwend and colleagues (1980). Kessler and colleagues (2002) applied item response assessments to identify items that measured non-specific psychological distress. The assessment yielded a 6-item (and 10-item scale) asking, "*During the last 30 days, how often did you feel (a) nervous, (b) hopeless, (c) restless or fidgety, so depressed that nothing could cheer you up, (d) that everything was an effort, and (e) worthless?* The responses range from "none of the time" (0) to "all of the time" (4). The summed scale has a score ranging from zero to 24. The K6 is a brief measurement that takes under two minutes to complete and has been used to screen for severe mental illnesses at population levels. Initially developed for use in the United States, the scale has gained international prominence in its use, especially in epidemiological studies. Its brevity and capacity to accurately screen for psychological distress in diverse settings (Kessler et al., 2010) make the K6 scale ideal for measuring mental illness among aging adults in low-resourced settings, such as Kenya.

Globally, the scale has been applied to various cultural settings and populations. For example, a study on psychological distress among Palestinian social workers found that an Arabic version of the K6 has satisfactory reliability (0.81) and showed better fit and validity over the longer version, the Kessler 10 (Easton et al., 2010). Another study on psychological distress among Australian adolescents revealed similar results, showing that the K6 had high internal consistency and was a good predictor of maladaptive and prosocial behaviors (Mewton et al., 2015). Within Africa, several studies have investigated the adaptation and use of the scale to measure psychological distress. For example, translated version of the scale has been used among postnatal women in Ethiopia (Tesfaye et al., 2010), rural Zambian adults (Tateyama et al., 2018), and traumatic brain patients in Tanzania (Vissoci et al., 2018). The Tanzania study showed that the Swahili-translated versions of the K6 and the longer Kessler 10 versions had good reliability (> 0.85) and were strongly correlated (R > 0.50) with depression and quality of life among 192 hospitalized patients with traumatic brain injuries.

Despite the wide application of the K6 scale to measure psychological distress in Sub-Sahara Africa, our review did not identify any empirical investigation of its psychometric properties among older individuals. Given this lack of published research and the need for a quick but comprehensive assessment tool for psychological distress in aging Kenyans, there is a critical need to establish the psychometric properties of a culturally relevant scale. Thus, the purpose of the present study was to investigate the psychometric properties of a Swahili-translated interviewer-administered the short Kessler Psychological Distress Scale (K6) among Kenyan aging adults. The main aims of the study were as follows: (1) To analyze the distribution, factor structure, internal consistency, and internal validity of the K6 in a sample of aging Kenyans, and (2) To determine the criterion validity of the K6 by examining its relationship with self-reported chronic and physical health. Establishing the psychometric properties of the Swahili version of the K6 scale offers a brief yet culturally reliable tool for health professionals to measure, screen, or create interventions to address psychological distress before acute levels among aging Kenyans.

2.0 METHOD

2.1 Sample

The current study is based on data collected in April and May of 2022 as part of a larger project to investigate the association between multiple dimensions of social support and psychological distress among

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aging Kenyans. The project used a cross-sectional design and utilized convenience sampling methods to sample individuals who were served by various community-based organizations. Community-based organizations (CBOs) serving older people from Mai Mahiu, Dagoretti, Ndunyu, and Machakos helped recruit participants for the study. The organizations were non-profit (independent or religious) that offered regular health and wellness programming for older adults in their immediate communities.

The CBOs recruited volunteers using phone calls, short text messages, and word-of-mouth. Eligibility criteria included the following: 1) ability to understand and speak Swahili, 2) 50 years or older, 3) cognitive and physical independence, and 4) ability to travel to the community centers for interviewing. The principal investigator (PI) worked with the community organizations to schedule data collection visits, explain the purpose of the study, and attain consent from the final participants. The PI and trained research assistants used computer-assisted personal interviewing techniques to collect data from 376 people selected for the study. The parent study collected limited demographic, psychological distress, chronic diseases, self-reported mental and physical health, social support, and economic variables.

The parent project was funded by the Mental Health Research Institute (California), and the University of Oregon's Institutional Review Board provided the human subject and ethical approval.

3.0 MEASURES

3.1 Psychological distress

Psychological distress was measured using the Kessler 6 (K6) scale (Kessler et al., 2002). The K6 is made up of six questions that ash respondents how frequently in the past 30 days they felt (a) hopeless, (b) nervous, (c) restless or fidgety, (d) worthless, (e) so depressed that nothing could cheer them up, and (e) that everything was an effort. The response options included *"never," "a little of the time," "some of the time," "most of the time," and "all of the time."* Response values ranged from 0 to 4. The K6 scale is created by summing up the scores with a range of 0 to 24 (Kessler et al., 2002). Due to reading literacy challenges and limited exposure to survey research procedures, the PI and trained research assistants read the questions and responses to all the study participants.

3.2 Other Health Outcomes

Participants were asked about chronic health conditions and self-reported physical health. Regarding chronic health conditions, they were asked to indicate whether (*yes*) or not (*no*) they experienced or were diagnosed with one of the following health conditions: stroke, arthritis, heart disease or complications, diabetes, lung disease, asthma, high blood pressure, eye problems, muscle and bone pains, and cancer. A chronic disease index was created by summing the total number of conditions identified by the individuals. Participants rated their physical health using a five-point self-reported Likert scale ranging from 1 (*excellent*) to 5 (*poor*). The ratings were re-coded so that high scores indicated good physical health.

3.3 Demographics

Participants provided details about their demographic characteristics, including age, gender (*male or female*), locale (*urban or rural*), educational status (*No formal education, primary school, some secondary school, some university, trade or technical degree, bachelor's degree, master's degree, or doctorate or other professional degrees*), and relationship status (*single or never married, married, widowed, divorced, or separated*).

4.0 Statistical Analyses

Our analyses happened in four steps using SPSS 25 and Mplus Version 8. The first step involved assessing the demographic characteristics of the sample and estimation of the prevalence and distribution of the K6. We estimated means, ranges, and frequency distributions for all the demographic variables and other health outcomes (chronic conditions and self-rated physical health). We also calculated the reliability (Chronbach's alpha) and cumulative prevalence of the summed K6 scale (range: 0 - 24) by sex and locale. Second, we assessed the suitability for performing factor analysis through Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity (Kaiser, 1974). Third, exploratory factor analyses (EFA) were conducted to determine whether the K6 items measured a single construct in the sample of aging Kenyans. The success of the analysis was determined by checking the Eigenvalues to ascertain unidimensionality.

Fourth, confirmatory factor analysis (CFA) was then performed using Mplus Version 8 to assess the fit of

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the K6's factorial structure to the data. The CFA employed maximum likelihood estimations as they have been shown to have more robust performance than variance-adjusted alternatives when using relatively small sample sizes (Li, 2016). Model fit was assessed using the following fit indices: the Comparative Fit Index (CFI; ≥ 0.95 considered very good), Root Mean Square Error of Approximation (RMSEA; ≤ 0.08 - 0.10 was considered adequate, ≤ 0.05 was considered very good), and the Tucker Lewis Index (TLI; ≥ 0.95 considered very good) (Hu & Bentler, 1999). Post hoc modification indices were also assessed for the CFA.

5.0 Results

5.1 Sample Characteristics and Distribution of the K6

The sociodemographic characteristics of the study participants (N = 376) are displayed in Table 1. The mean age of the sample was 69.56 years (SD = 8.46). Study participants were predominantly women (73.7%; N = 274), married (40%; N = 150), and with primary school education (40%; N = 150). Figures 1a and 1b show the distribution of the summed psychological distress scores for men and women respectively. Figure 2 depicts the frequency distribution of a three-level grouping of psychological distress by sex. The distribution table and gender comparison results indicate that most participants reported high psychological distress scores (13 or above). Mean summed psychological distress was significantly higher (t [376] = 4.20, p < .001) among women (15.12) as compared to men (12.34). The K6 items showed high overall internal consistency for the total sample (Cronbach's alpha = .83; 95% CI [0.81, 0.86]) and for men (Cronbach's alpha =.77; 95% CI [0.68, 0.83]) as well as women (Cronbach's alpha =.84; 95% CI [0.81, 0.87]).

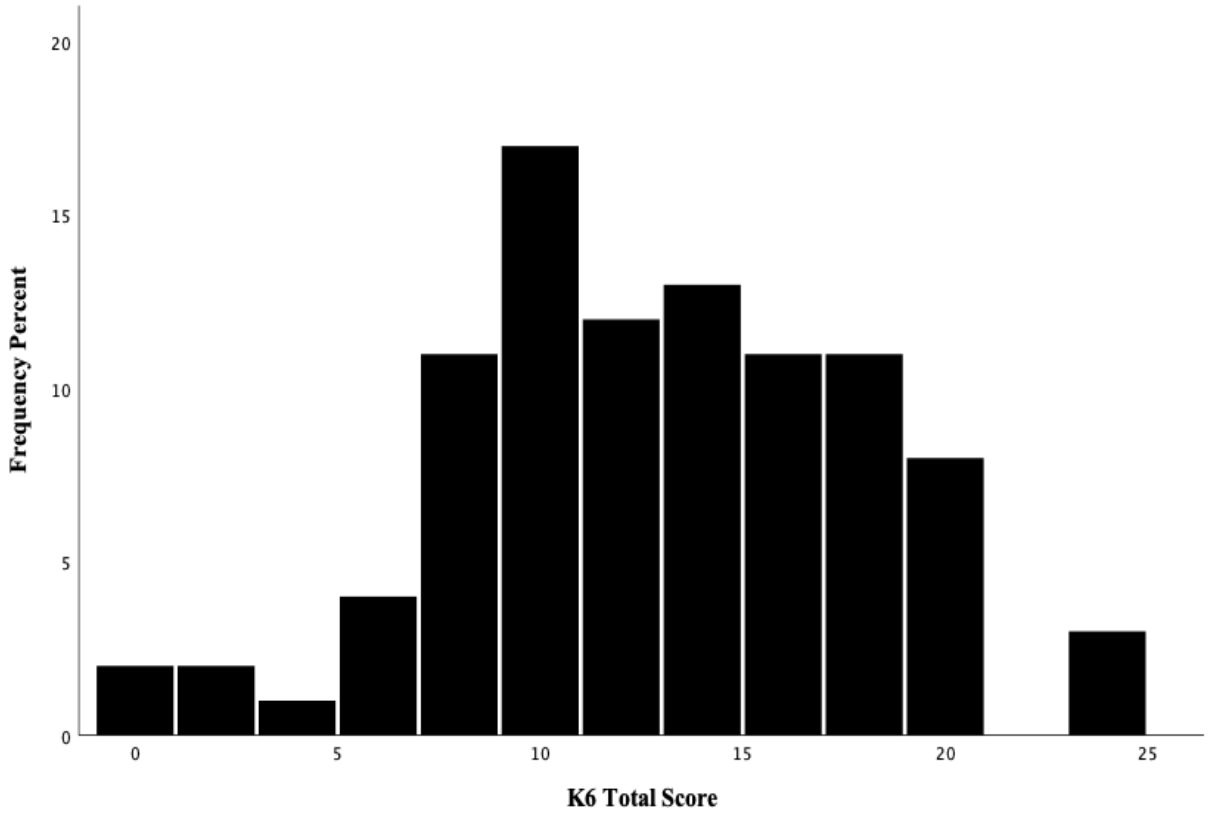

Figure 1 (a). The distribution of Swahili-translated Kessler Psychological Distress (K6) score among men (n = 98).

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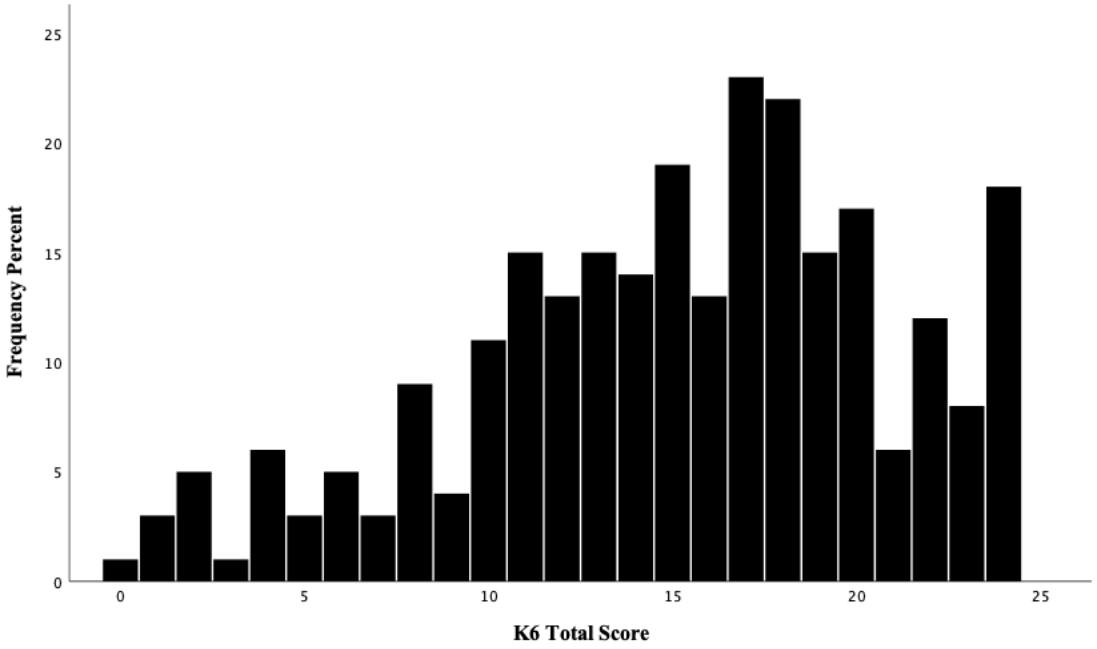

Figure 1 (b). The distribution of Swahili-translated Kessler Psychological Distress (K6) score among women (*n* = 274).

Table 1

The sociodemographic characteristics of the sample (N = 376)

Characteristic	*n* (%)	*M (SD)*
Sex		
Men	98 (26.1)	
Women	274 (72.9)	
Relationship status		
Divorced	19 (5.1)	
Married	150 (39.9)	
Separated	38 (10.1)	
Single/never married	27 (7.2)	
Widowed	140 (37.2)	
Region of residence		
Urban	151 (40.2)	
Rural	220 (58.5)	
Highest level of education		
No formal education	147 (39.1)	
Primary school	150 (39.9)	
Some secondary school	53 (14.1)	
Secondary graduate	19 (5.1)	
Trade or technical school	2 (.5)	
Bachelor's degree	5 (1.3)	
Self-rated mental health		

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Excellent	80 (21.3)	
Very good	72 (19.1)	
Good	101 (26.9)	
Fair	89 (23.7)	
Poor	33 (8.8)	
Self-rated physical health		
Excellent	27 (1.9)	
Very good	59 (15.7)	
Good	118 (31.4)	
Fair	123 (32.7)	
Poor	42 (11.2)	
Age		69.76 (8.17)
Chronic diseases		2.15 (1.47)
K6 score		14.34 (5.68)

Note. The percentages do not total 100% because the missing tallies are left out.

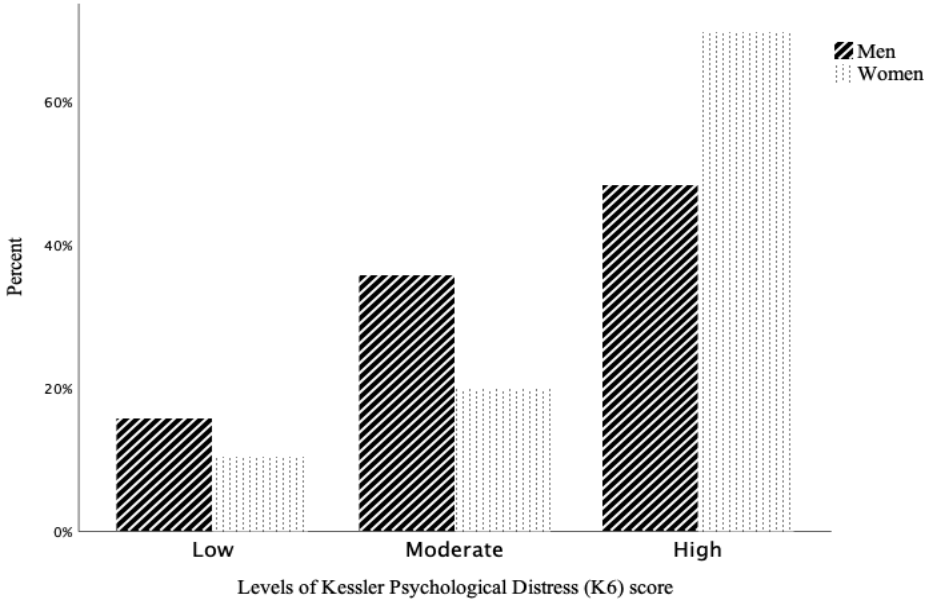

Figure 2. The distribution of Swahili-translated Kessler Psychological Distress (K6) score, compared by sex (N = 376).

5.2 Factor Analyses

Preliminary assessments showed that our data was very suitable for factor analysis (Bartlett's test of sphericity, $p < 0.001$ for the sample; KMO measure of sampling adequacy, 0.85). The six psychological distress indicators were subjected to exploratory factor analyses on the total sample, N = 376. The EFA asked for between one- to three-factor loadings using the oblique GEOMIN rotation. The K6 indicators were significantly correlated with each other, with correlations ranging from .32 to .62 (Table 3). Eigenvalue inspections for values greater than one suggested a one-factor (3.36) structure. The model revealed suitable fit parameters: CFI (.95), TLI (.92), and $\chi2(9, N = 376) = 48.85$, $p < .001$. The two-factor model parameters were as follows: CFI (.99), TLI (.99), and $\chi2(4, N = 376) = 7.11$, $p = .13$. RMSEA estimations showed a marginal fit (.10) for the one-factor model and a good fit (.05) for the two-factor model. The three-factor

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model did not converge. The factor loadings from the EFA are also presented in Table 3 below.

Table 3

Means, Standard Deviations, and Factor Loading Results from the EFA of the Swahili-Translated Kessler Psychological Distress Scale (K6) Items (N = 376)

Items	Tired	Hopeless	Restless	Depressed	Effort	Worthless
Tired	1					
Hopeless	.48	1				
Restless	.49	.62	1			
Depressed	.37	.47	.47	1		
Effort	.35	.49	.51	.61	1	
Worthless	.32	.53	.46	.42	.43	1
Mean	2.85	2.35	2.45	2.39	2.27	1.92
Standard deviation	1.25	1.34	1.18	1.25	1.17	1.53
Factor loadings (one-factor model)	.58	.78	.77	.67	.70	.63
Factor loadings (Factor 1, two-factor model)	.59	.84	.68	.18	.00	.51
Factor loadings (Factor 2, two-factor model)	.00	-.02	.13	.58	.86	.15

Note. The six eigenvalues from the exploratory factor analysis are 3.36, .75, .66, .48, .39 and .36.

A CFA model was fitted to investigate the dimensions of the K6 scale further. The CFA assessed the fit for a one-factor model using the Maximum Likelihood estimator. Results showed all six items loading to one single factor. The fit parameters were excellent, CFI (.95), TLI (.92), and $\chi 2(9, N = 376) = 48.85$, $p < .001$, but, as depicted in Table 4, the RMSEA for this model showed a marginal fit (.10). Post hoc modification indices were inspected, and then we correlated the error terms of the highly associated variables ("*everything is an effort*" and "*feeling depressed*") in a separate analysis. The modified results yielded an excellent fit with the data, CFI (.99), TLI (.99), and $\chi 2(8, N = 376) = 11.33$, $p < .001$, and RMSEA (.03). Hence, the modified CFA model was selected as the best-fitting model for the sample.

Table 4

Fit Statistics for the Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) for the Swahili-Translated Kessler Psychological Distress Scale (K6) Items (N = 376)

Factor analyses	**χ2(df)**	**RMSEA**	**CFI**	**TLI**
EFA				
One-factor	48.85 (9)	.10	.95	.92
Two-factor	7.11 (4)	.05	.99	.99
CFA				
Model 1	48.85 (9)	.10	.95	.92
Model 1a	11.33 (8)	.03	.99	.99

Note. *df* = degrees of freedom; RMSEA = root mean square error of approximation; CFI = comparative fit index; TLI = Tucker Lewis index.

5.4 Discussion

While the K6 remains a well-used instrument for assessing non-specific psychological problems across cultures, our literature review did not identify any psychometric studies of a Swahili-translated version for use among aging Kenyans. To our knowledge, the current study is the first to investigate the factor structure of a Swahili-translated K6 scale among aging Kenyans. Based on a sample of community-dwelling aging

adults, our study revealed two key results: (1) most of the participants in the study reported high levels of psychological distress (K6 summed score above 13), and (2) the translated K6 is a unidimensional scale with great promise for use among aging Kenyans.

The frequency and distribution results found that most people reported high psychological distress. These results underline the troubling theme of poor psychological health among aging Sub-Saharan Africans living in socioeconomically marginalized regions (Animasahun & Chapman, 2017; Sanuade et al., 2014). Individuals in these regions experience disproportionately higher high rates of social isolation, poverty, and comorbidities, conditions that have been associated with poor mental health among aging people (Animasahun & Chapman, 2017; Gyasi et al., 2019). Another critical observation in the distribution of the K6 is that women reported higher mean scores for psychological distress than their male counterparts. This finding can be explained by the intersectionality and lifecourse lenses as discussed by Weil (2023). Weil argues that besides structural and other identities, women's age must be considered as a significant variable in explaining their health in old age. Natural frailty caused by biological aging, women are disproportionately more vulnerable to predictors of poor mental health, such as social isolation and low economic status. Based on lifecourse component of cumulative disadvantage, low economic status is especially a salient vulnerability factor for aging women in Kenya due to a lifetime of sociocultural barriers to accumulating wealth (Kimani & Maina, 2010).

The results showed that the K6 could be used among aging Kenyans upon further investigations. First, the six measurement items revealed high internal consistency. This finding is consistent with previous research and shows that the Swahili-translated items measure the same factor (Vissoci et al., 2018). EFA revealed a one-factor structure, showing that all six questions for measuring components of psychological distress loaded to one latent factor. Following this exploration, our CFA results supported previous literature that depicts the K6 as a unidimensional scale (Kessler et al. 2010). Despite this key finding, modification indices had to be added to achieve the best-fitting model. As modified, the residuals of effort and depression were correlated, indicating that the unexplained variances of the two items were correlated (Kline, 2015). The modification is theoretically acceptable as the level of motivation or energy to handle daily chores is a vital predictor of depression in aging people (Yesavage et al., 1982; WHO, 2017).

The following potential limitations should be considered when interpreting these results. First, the study sample cannot be assumed to represent the entire aging Kenyan population. Second, the K6 assessment relies on memory and may lead to inaccurate representations of psychological distress. Future replication studies can address some of these concerns by (1) utilizing larger, population-based samples of aging Kenyans, and (2) testing the validity of the K6 by correlating it with well-established scales of related mental health problems, such as the General Anxiety Disorder scale (Easton et al., 2017). Despite these limitations, the results of the present study are essential additions to the Kenyan aging literature. We observed a very high occurrence of severe psychological distress in the sample. We also found that the average score of global psychological distress was higher among women than men. Future studies should refine the steps of our research using more representative data. Perhaps more importantly, the high occurrence of severe psychological distress in this sample calls for urgent attention to this mental health problem among aging Kenyans.

5.5 Conclusion

Findings from this pioneering study illustrate two main conclusions. First, they reveal the prevalence of psychological distress among the study participants. This finding underscores the need for urgent attention to this mental health issue, particularly in socioeconomically disadvantaged regions of Kenya. Furthermore, they highlight possible gender differences depicting high rates of psychological distress among older women. Second, the unidimensional structure of the Swahili-translated K6, supported by high internal consistency and factor analyses, suggests its potential utility in assessing psychological distress in aging Kenyans. Despite potential limitations, this study contributes essential knowledge to the discourse on mental health among aging populations in Kenya, emphasizing the urgency of addressing severe psychological distress as a significant non-communicable health concern.

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