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Psychometric Evaluation of a Myanmar Version of the Perceived Stress Scale for People Living with HIV/AIDS

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Abstract

Background and Purpose: Reliable instruments for the measurement of perceived stress in people living with HIV (PLHIV) are crucial. However, there is no Myanmar version of such an instrument.

Methods: We adapted the 35-item Perceived Stress Scale for People Living with HIV/AIDS (PSSHIV) into a Myanmar version (PSSHIV-M), and 150 PLHIV completed the survey.

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Authors' Contributions. WTC and HNO conceptualized the study. WTC and CSS conducted the in-depth dyadic interviews. FFH and SHL transcript and analyzed the in-depth interviews. MST, TWN, and YTN oversaw implementation of the study and all data collection. FFH and WTC prepared the draft manuscript and managed subsequent revisions. All authors have read and approved the final manuscript.

Disclosure. The authors have no relevant financial interest or affiliations with any commercial interests related to the subjects discussed within this article.

Ethical Statement. This study was approved by the relevant institutional review boards (grant number: #18-001769-CR-00001).

Results: The 31-item PSSHIV-M with a five-factor structure has a Cronbach's alpha of .85 to .95. Construct validity was demonstrated for the instrument, and the findings of Rasch analysis also suggest evidence of reliability and validity.

Conclusions: The psychometric properties of the 31-item PSSHIV-M with a five-factor structure support its efficacy in ascertaining how HIV perceived stress affects Myanmar PLHIV. It could also facilitate the development of stress management interventions for that population.

Keywords

HIV; stress; Myanmar; psychometrics; Rasch analysis

Globally, people living with HIV (PLHIV) have frequently reported high levels of stress from HIV-related symptoms and life events (Chen et al., 2013; Su et al., 2008). Perceived stress is defined as how a person feels about the stress in their life and their ability to handle it (Phillips, 2013). As such, perceived stress mirrors the relationship between a person and their environment, which is seen as tasking or exceeding their resources and hence endangering their well-being (Lazarus & Folkman, 1984; Su et al., 2008). Stressors reported by PLHIV include, but are not limited to, medication side effects, stigmatization, physical discomforts, uncertainty about one's future, social isolation, violence, unemployment, and financial problems (Adamu et al., 2019; Chen et al., 2013; Gousse et al., 2018).

The theory of stress and coping posits that stress is a dynamic process and that individuals' perceptions of a stressful experience determine their response to the stressors (Lazarus & Folkman, 1984). Perceived stress among PLHIV is associated with unhealthy behaviors and conditions such as substance, alcohol, or tobacco abuse (Hutton et al., 2017; Su et al., 2008); poor self-management skills (Chen et al., 2013; Su et al., 2008); maladaptive strategies (Su et al., 2008); failure to engage in HIV care (Harris et al., 2020; Tun et al., 2019); poor antiretroviral therapy (ART) adherence (Masa & Chowa, 2019); high levels of stigma (Su et al., 2008; Zhu et al., 2020); mental distress, such as depression, anxiety, and posttraumatic stress disorder (Catabay et al., 2019; Zhu et al., 2020); and sleep disturbances (Chen et al., 2013). This research highlights that perceived stress is an important influence on the quality of life (QOL) of PLHIV (Adamu et al., 2019; Zhu et al., 2020) and is one of the most salient bio-behavioral factors that negatively influences HIV disease progression and management (Seay et al., 2014).

The HIV epidemic in Myanmar is one of the greatest health concerns in Southeast Asia (Aung et al., 2017). Approximately, 240,000 PLHIV lived in Myanmar in 2018 (UNAIDS, 2019). In the same year, an estimated 7,800 people died from AIDS-related illnesses (UNAIDS, 2019). The HIV epidemic in Myanmar is concentrated among certain key populations, most notably people who inject drugs (PWID, 19% HIV prevalence in 2018), men who have sex with men (MSM, 6.4% HIV prevalence in 2018), and sex workers (5.6% HIV prevalence; Tun & Oo, 2018). Problems faced by PLHIV in Myanmar include socioeconomic disadvantages (Veronese et al., 2020), being rejected/discriminated against by health-care providers (HCP) or peers (Tun et al., 2019), lack of family support (Aung et al., 2017; Veronese et al., 2020), low ART uptake (Lum et al., 2020), lack of viral load testing (Thinn et al., 2019), and an underfunded and under-resourced health-care system for

HIV care (Aung et al., 2017, Veronese et al., 2020). All of these contribute to HIV-related stressors that lead to poor QOL (Chen et al., 2013; Tun et al., 2019). However, there is a dearth of data on mental health among PLHIV in Myanmar. The underdevelopment of mental health-related interventions might be attributable to the non-availability of validated scales measuring perceived stress among PLHIV.

Currently, the Chinese Perceived Stress Scale among People Living with HIV/AIDS (PSSHIV) is one of the HIV-specific instruments that has been developed through rigorous psychometric validation procedures (Su et al., 2008). The developers of the PSSHIV addressed the limitations of previously developed HIV stress scales (Pakenham & Rinaldis, 2002), which included global stress instruments that were not specific to evaluating HIV and had no formal validation (Pakenham & Rinaldis, 2002; Su et al., 2008). The 35-item PSSHIV has been validated and used to measure the perceived stress levels of PLHIV in China (Su et al., 2008; 2013) and the United States, and among Asian and Pacific Islanders (Chen et al., 2013; 2014). However, whether it is suitable for PLHIV in Myanmar is still unknown. In this study, the aim was to examine the psychometric properties of the PSSHIV with both classical test theory (CTT) and the Rasch analysis method among Myanmar PLHIV.

METHODS

Design

We culturally adapted the PSSHIV scale to create a Myanmar version and examined the psychometric properties of the scale, which were adherent to the **C**onsensus-based **S**tandards for the selection of health status **M**easurement **I**nstruments (COSMIN) checklist (Mokkink et al., 2010a,b). This study was approved by the relevant institutional review boards.

Participants

This cross-sectional descriptive study was conducted in Myanmar from January 2020 to May 2020. A sample of 250 eligible PLHIV was recruited from a closed Facebook group that included more than 10,000 Myanmar residents, more than 90% of whom were PLHIV. Other members were family members of the PLHIV or HIV-related workers who answered members' questions. The administrators of the Facebook site were health-care providers and HIV peer group volunteers.

By using random sampling methods, the researchers contacted one PLHIV for every five individuals on the site of the Facebook roster until the targeted sample size was achieved. The 10% of the Facebook group who were not PLHIV were health-care providers, case managers, and administrators in governmental health departments. By contacting every fifth person of the membership list, we invited 250 PLHIV to participate in this study. The screening questions ensured that all participants were at least 18 years of age, diagnosed with HIV, able to provide informed consent, and lived within Myanmar. If they agreed to participate and were able to provide informed consent, an individualized survey link was sent via the institutional Research Electronic Data Capture (REDCap) system.

Translation of the PSSHIV to Burmese

The 35-item PSSHIV scale is used to evaluate the severity of stress experienced during the prior month by PLHIV in the following eight factors: social/psychological problems, sexual relationships, functional problems, social acceptance/rejection issues, work-related issues, family/offspring issues, accessibility to treatment, and treatment outcomes. All of the items are rated using a 5-point Likert scale (1 = *absolutely not stressful* to 5 = *extremely stressful*). The Cronbach's alpha values ranged from .76 to .94 for the overall scale and each of the eight subscales (Su et al., 2008).

Based on Brislin's translation model, we adapted the PSSHIV to the Myanmar context in the following four stages: translation, back-translation, comparison, and linguistic adaptation (Brislin, 1970; Jones et al., 2001). First, the 35-item PSSHIV scale was translated independently from English into Burmese by a bilingual physician who was providing HIV care in Myanmar and has native proficiency in Burmese and English. Then, a bilingual researcher, who was blinded to the PSSHIV English items, back-translated the Myanmar version into English (Burmese-English). Later, one member of the research team compared the back-translated English version with the original English scale, and found that five items were different from the original instrument, including I-20, "*I have fear to disclose my HIV status to my sex partner,*" I-25, "*I feel nervous when people mention HIV,*" I-31, "*I have familial pressure to have offspring,*" I-32, "*I plan not to have children,*" and I-43, "*I'm especially concerned about others' attitude to me due to HIV infection.*" These five items were re-translated and back-translated. The PSSHIV-M-1 was then ready for pilot testing.

Pilot Test of the PSSHIV-M-1

Individual phone-based cognitive interviews were conducted with 10 PLHIV in Myanmar by one of the authors who is trained in qualitative research. The interview used structured probes to uncover how PLHIV interpreted items of the PSSHIV-M-1 to verify its comprehensibility and readability. Example probes included: "Tell me in your own words what this question is asking," "How did you decide on your answer to this question?" and "What does [survey concept] mean to you?" Interviews were audio recorded and transcribed verbatim. None of the participants reported confusion or incomprehension about the items of the scale. After this process, the PSSHIV-M-1 was ready for validation.

Psychometric Test of the PSSHIV-M-1

We invited 250 PLWHA in Myanmar to complete the PSSHIV-M-1; 150 PLWHA participants (60%) completed the REDCap survey. We first conducted item analysis and deleted an item if it met the criteria for deleting items of both CTT and Rasch analysis; then the PSSHIV-M-2 was formed. Finally, the reliability and validity of the PSSHIV-M-2 were examined by CTT and Rasch analysis.

Data Collection

All information was collected online through the REDCap system, a web-based survey tool that is supported by NIH's institutional Clinical and Translational Science Institute (CTSI). Participants completed the 30-minute REDCap survey, which comprised standardized measures to assess demographics, the PSSHIV-M-1, the HIV stigma scale (which in this

sample had an overall Cronbach's alpha of .95; Berger et al., 2001; Steward et al., 2008), and the Medical Outcomes Study–Social Support Survey (MOS-SSS; which had an overall Cronbach's alpha in this sample of .96; Sherbourne & Stewart, 1991). The demographic variables included participants' age, gender, marital status, ethnicity, educational level, employment status, health insurance, years of living with HIV, and recent CD4 and viral load. After completing the survey, participants were reimbursed for their participation.

Data Analysis

Data analyses were conducted using SPSS 23.0 (IBM, Chicago, IL, USA) and WINSTEPS 3.75.0 (Chicago, IL, USA), and $p < .05$ was considered significant. Missing values were replaced by using the multiple imputation calculation. We then conducted item analysis and deleted an item if it met the following criteria of both the CTT and Rasch analysis: (a) cross-loading or factor loading < 0.4 (Huang et al., 2017), (b) infit and outfit mean squares outside the range of 0.6 to 1.4 (Wolfe & Smith, 2007). Last, we evaluated the following reliability and validity factors of the PSSHIV-M-2, according to the recommendations in the COSMIN checklist (Terwee et al., 2012).

Cross-cultural validity: We used the COSMIN checklist with a 4-point scale (Terwee et al., 2012) to measure which of the descriptions on the translated scale adequately reflected the items from the original scale (Mokkink et al., 2010a,b).

Structural validity: We combined the exploratory factor analysis (EFA) in the CTT and multidimensional Rasch analysis to assess the structural validity of the scale. In EFA, principal axis factoring analysis (PAF) and oblique rotation are used. The number of factors were extracted based on a scree plot with eigenvalue > 1.0 , factor loading above 0.4, percentage of explained variance, and interpretability (Huang et al., 2017). In multidimensional Rasch analysis, we used the rating scale model (RSM) to assess person separation reliability, person separation index, category probability curves, and person-fit statistics (Linacre, 2011; Xu et al., 2018). Pearson's fit statistics included infit and outfit mean squares, as well as difficulty (location) for individual items (Baker, 2001).

Construct validity: We estimated the convergent validity of the stress scale by Pearson's correlations, with expected significant positive correlations with the HIV stigma scale and negative correlations with the MOS-SSS.

Known-group validity: Known-group validity was performed by determining whether the total and dimension score of the PSSHIV-M-2 could discriminate among PLHIV with different CD4 cell counts (< 200 cells/mm³, 200~499 cells/mm³, and 500 cells/mm³).

Internal consistency: We used Cronbach's alpha and corrected item-total correlation to assess the internal consistency of the scale (Johnson et al., 2011).

Floor/ceiling effect: Floor effects were evaluated by examining the percentage of the respondents that achieved the lowest possible scores. Ceiling effects were evaluated by examining the percentage of respondents that reached the highest possible score.

RESULTS

Sample Characteristics

The mean age of participants was 29.14 years ($SD = 16.79$) and the average years of living with HIV was 10.14 years ($SD = 5.83$). The average recent CD4 count was 688.76 ($SD = 494.93$) and the average viral load was 760.00 ($SD = 1164.22$). About 5% of the participants spoke English. Table 1 presents the details of the participants' sociodemographic characteristics.

Item Retention

We found that nine items (I-16, I-18, I-24, I-30, I-31, I-32, I-35, I-41, and I-42) were cross-loading and that the infit and outfit mean squares of three items (I-24, I-31, I-32, and I-35) were outside the range of 0.6 to 1.4. Four items (I-24, I-31, I-32, and I-35) were deleted since they met both criteria (see Appendix A). Thus, the final 31-item PSSHIV-M-2 was formed (see Appendix B).

Cross-Cultural Validity

The process of translation and the sample size (150) met the requirements of "adequate" in the COSMIN checklist (Terwee et al., 2012).

Structural Validity

The Bartlett test of sphericity indicated that the sample was adequate for factor analysis ($\chi^2 = 3094.241$, $df = 465$, $p < .001$; Kaiser-Meyer-Olkin = 0.896). Six factors were extracted with an eigenvalue of 1.63 to 5.55, together explaining 68.21% of the overall variance. Factor loadings and commonalities for all items ranged from 0.44 to 0.81 (more than the criteria of 0.4) and from 0.52 to 0.82 (more than the criteria of 0.2), respectively (see Table 2). We found that the structure of the PSSHIV-M-2 was similar to the original structure of the PSSHIV (see Table 3), and after merging factors 1 and 6, research members discussed and determined the final five factors, which were labeled (a) function problems and medical care, (b) work-related issues, (c) sexual relationships, (d) psychological problems, and (e) social/family issues. The total score of the PSSHIV-M-2 was (81.53 ± 24.45); the scores of individual domains are shown in Table 4.

As shown in Table 5, in the Rasch analysis, the infit and outfit mean squares for each item ranged from 0.51 to 1.40 and the item difficulty for each item ranged from -0.41 to 0.37. No evidence of disordered thresholds was found in the category probability curves, as the category calibration increased in an orderly way (see Figure 1). We also calculated the item reliability (0.82), item separation index (2.11), person reliability (2.99), and person-separation index (0.90) in the analysis.

Convergent Validity

The convergent validity for the PSSHIV-M-2 was confirmed with a positive correlation with the HIV stigma scale (84.68 ± 56.35) ($r = .63$, $p < .001$) and a negative correlation with the MOS-SSS (54.42 ± 36.75) ($r = -.53$, $p < .001$).

Known-Group Validity

Except for the dimension of the work-related issue, no significant associations were observed between the total and individual dimension scores of the PSSHIV-M-2 and CD4 count (see Table 4).

Internal Consistency

The Cronbach's alpha for the PSSHIV-M-2 was .95; the Cronbach's alpha for the individual domains ranged from .85 to .92. The corrected item-total correlation ranged from 0.49 to 0.74 ($p < .05$).

Floor/Ceiling Effect

The floor/ceiling-effect analysis indicated that 4.67% (7/150) of participants achieved the lowest possible score (31) and 0.67% (1/150) achieved the highest possible score (155) on the scale. The occurrences of the lowest and highest possible scores were both below 15%, indicating that there were no floor or ceiling effects of the PSSHIV-M-2 (Terwee et al., 2007).

DISCUSSION

There is an urgent need to develop more effective intervention strategies to decrease perceived stress among PLHIV. This study adapted and validated the PSSHIV, which was developed in a Chinese context, following standard translation and cultural adaptation guidelines (Su et al., 2008; Wild et al., 2005). The development of a culturally sensitive and psychometrically sound perceived stress scale for the HIV-positive population in Myanmar will contribute to a more accurate evaluation and in-depth understanding of the levels and types of stress in the lives of PLHIV. A decrease in perceived stress can improve PLHIV's health outcomes and QOL (Adamu et al., 2019; Zhu et al., 2020).

This study demonstrated the applicability of the 31-item PSSHIV-M-2 for PLHIV in Myanmar and its good reliability and validity based on CTT and Rasch analysis. PLHIV experience their illness within a cultural and social context that shapes how they assess and cope with aspects of their disease (Niu et al., 2016). Interestingly, we found that in comparing the Chinese and Myanmar versions of the PSSHIV for the underlying meanings of the factors, the cultural and social contexts were different in some respects but similar in general. Our findings indicate that the PSSHIV-M-2 can adequately measure the functional problems, medical care, work-related issues, sexual relationships, psychological problems, and social/family issues among PLHIV in Myanmar.

As shown in Table 3, the PLHIV in Myanmar perceived the highest stress in relation to social/family issues, which combined the original hypothesized factors of social acceptable/rejection issues, family/offspring issues, and social problems. These findings highlight the significant social consequences that PLHIV face in Myanmar (stigma, family or community rejection, and offspring issues) as a result of their status (Aung et al., 2017; Tun et al., 2019). Consider the offspring issue, for example: Due to the high prevalence and death rate of babies acquiring HIV infection from their mother (Thiha et al., 2017), many pregnant

PLHIV fear that they will pass the virus to their newborn babies and impact the continuity of the family tree, the continuation of which is an important part of the traditional culture in many Asian countries (Su et al., 2008; Thiha et al., 2017).

The significant perceived stress of PLHIV in Myanmar also presented as the factors of functional problems and medical care, which was aggregated in the PSSHIV-M-2 from the original hypothesized functional problems, accessibility to treatment, and treatment outcomes of the PSSHIV. Myanmar is a country critically in need of more public health-care resources (Aung et al., 2017). According to UNAIDS, about 70% of PLHIVs in Myanmar were on ART in 2018 but continued to lack access to evaluate their biomarkers (CD4 and viral load) and ART drug-resistance testing (UNAIDS, 2019). Only 65% of all PLHIV in Myanmar are virally suppressed (UNAIDS, 2019). Our findings echoed this fact. In Myanmar, despite improvements in treatment access, PLHIV not only suffered from their physical disorders caused by the disease, other comorbidities, and treatment side effects but also experienced the stress of limited availability of viral load testing and first-line ART drug-resistance testing, which is needed to switch to second-line ART (Kyaw et al., 2017).

In this study, the structural validity of the PSSHIV-M-2 was confirmed by Rasch analysis (Xu et al., 2018). Our data support that the category rating scale of the PSSHIV-M-2 worked well and that the combination of a good person-separation index (>2) and person reliability (>0.8) suggested that the PSSHIV-M-2 has acceptable measurement precision. This revised scale is also sensitive to distinguishing both high- and low-stress participants (Xu et al., 2018).

Similar to previous studies (Su et al., 2013; Gousse et al., 2018; Zhu et al., 2020), the construct validity of the scale was supported by the significant positive correlations with self-reported HIV stigma and negative correlations with the social support levels. The Cronbach's alpha was more than .7, which indicates that the PSSHIV-M-2 has satisfactory internal consistency and reliability (Johnson et al., 2011). Furthermore, our study first examined the known-group validity of PSSHIV, but we did not determine the validity of the PSSHIV-M-2 in capturing CD4 cell count differences, except for work-related issues. This indicates that CD4 count might not be taken as a rigid validation criterion for validation of perceived stress instruments among PLHIV, but this needs to be validated in larger sample sizes.

Implications

Evidence has consistently indicated that stress related to HIV is a common barrier to HIV prevention, testing, and treatment adherence (Srisorrachatr et al., 2013). HIV-related stress is an important predictor of quality of life (Tun et al., 2019)—especially in resource-limited countries such as Myanmar. Nurses and local health-care providers can use this 31-item PSSHIV-M-2 to accurately measure the functional problems, medical care, work-related issues, sexual relationships, psychological problems, and social/family issues among PLHIV in Myanmar. Furthermore, this scale can also facilitate to develop stress management interventions and evaluate the effects of future interventions. Additional research with more representative samples is needed to further examine the screening utility of this scale. It will

also be important to determine the cut-off value for the PSSHIV-M-2 (the low, middle, and high levels of stress) and to compare the perceived stress of PLWHA globally.

Limitations

This study has several limitations. First, the sample was recruited from a Facebook group, which may limit its representativeness, in that PLHIV who do not have access to the internet would not be included and PLHIV with higher levels of internalized stigma (likely related to higher stress) may not participate in this Facebook group. Second, the sample size (150) was relatively small, although a sample size of 150 to 200 is likely to be adequate if, in the EFA, the communities of all items exceed 0.50 (Worthington & Whittaker, 2006). In addition, some psychometric characteristics of the PSSHIV-M-2 could be assessed further, such as test/retest reliability, differential item function, and structural validity, and could be checked by confirmatory factor analysis. Second, the sensitivity of the PSSHIV-M-2 was not assessed. Therefore, future longitudinal or experimental studies are warranted. A further refinement of the scale based on a larger representative sample will produce more stable parameter estimations and robust results.

CONCLUSIONS

The Myanmar version of the Perceived Stress Scale for People Living with HIV/AIDS (PSSHIV-M-2) with a five-factor structure is a sufficiently valid and reliable tool for assessing perceived stress levels and categories among PLHIV in Myanmar. It can also contribute to a better understanding of how stress operates within PLWHA in Myanmar and how it can affect them. Furthermore, the PSSHIV-M-2 could also facilitate the development of stress management interventions and evaluate the effects of such interventions.

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APPENDIX

APPENDIX A.

ITEM AND FACTOR ANALYSIS OF THE PSSHIV-M-1

Item	Factor loading							Infit MNSQ	Outfit MNSQ	Item retention
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7			
I1	0.77							0.95	1.05	Yes
I2	0.75							0.77	1.01	Yes
I3	0.72							0.61	0.76	Yes

Item	Factor loading							Infit MNSQ	Outfit MNSQ	Item retention
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7			
16	0.71							0.70	0.72	Yes
17	0.69							0.53	0.56	Yes
15	0.64							0.68	0.85	Yes
18	0.64							0.61	0.65	Yes
19	0.62							0.89	0.85	Yes
117	0.61							0.53	0.56	Yes
116	0.55				0.41			0.63	0.70	Yes
128		0.80						1.36	1.32	Yes
129		0.77						1.40	1.28	Yes
126		0.74						1.28	1.19	Yes
130		0.74					0.41	1.10	1.03	Yes
124		0.51	0.44					1.50	1.47	No
138			0.75					1.18	1.10	Yes
137			0.69					1.35	1.31	Yes
139			0.66					0.79	0.78	Yes
118			0.51	0.49				1.12	1.07	Yes
141			0.51				0.43	1.04	0.98	Yes
142		0.43	0.48					0.95	1.09	Yes
122				0.73				1.09	1.01	Yes
123				0.69				0.77	0.75	Yes
120				0.66				1.28	1.16	Yes
119				0.54				1.26	1.16	Yes
121				0.52				0.77	0.85	Yes
111					.821			1.03	0.96	Yes
110					.810			1.03	1.12	Yes
112					.792			0.84	0.87	Yes
134							0.77	0.94	0.99	Yes
133							0.67	1.20	1.42	Yes
135			0.48				0.61	1.46	1.47	No
131		0.49					0.57	1.55	1.45	No
132		0.45		0.44			0.48	1.47	1.48	No
125							0.60	1.19	1.04	Yes

MNSQ: mean squares.

PSSHIV-M: the Myanmar version of the Perceived Stress Scale for People Living with HIV/AIDS appendix.

APPENDIX B.

THE PSSHIV-M IN MYANMAR

Item	
1. အစိုးရထံအအောတီအခမဲ့မရခြင်းကိုစိုးရိမ်သည်။ 1. I'm afraid I cannot obtain free ART from the government.	Keep
2. အစိုးရထံ ပုံမှန် အအောတီအခမဲ့မရတော့မည်ကို စိုးရိမ်သည်။ 2. I'm afraid I cannot obtain free ART from the government regularly.	Keep
3. ကျန်းမာရေးအသုံးစရိတ်အတွက် ပူပန်သည်။ 3. I feel it is difficult to afford medical expenses.	Keep
5. အအောတီဆေး၏ ဘေးထွက်ဆိုးကျိုး တို့ကိုစိုးရိမ်သည်။ 5. I worry about the side effects triggered by ART.	Keep
6. ဆေးကုသပုံစံ ရလဒ်မကောင်းမည်ကို စိုးရိမ်သည်။ 6. I'm afraid that the treatment effectiveness is not good enough.	Keep
7. လိုအပ်လာပါက လိုအပ်သည့် အစားထိုး ဆေးဝါးများမရနိုင်မည်ကို စိုးရိမ်သည်။ 7. I'm afraid I can't get the optimal ART regimen when I need to change the prescription.	Keep
8. အိတ်ချ်အိုင်ဗီပိုးကင်းရှင်းမှု လုပ်ငန်းများ မလုပ်ဆောင်နိုင်တော့မည်ကို စိုးရိမ်သည်။ 8. Because of my health status, I can't cope with heavy work load.	Keep
9. အအောတီဆေး နှိပ်နစ်ခြင်းကင်းရှင်းမှု နှုတ်ခွင့်လုပ်ငန်းများ ပျက်ကွက်မည်ကို စိုးရိမ်သည်။ 9. I'm afraid that my work would be affected by medical visits.	Keep
10. မိမိတွင်အိတ်ချ်အိုင်ဗီပိုးရှိနေခြင်းကို အလုပ်ရှင်သိသွားမည်ကို စိုးရိမ်သည်။ 10. I'm afraid that my HIV status will be known in my work place.	Keep
11. အိတ်ချ်အိုင်ဗီပိုးရှိနေခြင်းကင်းရှင်းမှု အလုပ်ပျက်မည်ကို ပူပန်သည်။ 11. I'm afraid of losing my job due to HIV infection.	Keep
12. နအင်အလုပ်တွင် အလုပ်နှင့်ပတ်သက်သော သွေးစစ်ဆေးခြင်း များပြုလုပ်ရပါက မိမိတွင်အိတ်ချ်အိုင်ဗီပိုး ရှိကြောင်းသိသွားမည်ကို စိုးရိမ်သည်။ 12. I'm afraid of being subjected to a health check-up in a new job.	Keep
16. အိတ်ချ်အိုင်ဗီပိုးကင်းရှင်းမှု သတိနှင့် မှတ်ဉာဏ်များ ချို့ယွင်းမည်ကို ပူပန်သည်။ 16. HIV/AIDS decreases my capacity for thought and memory.	Keep
17. အိတ်ချ်အိုင်ဗီပိုးကင်းရှင်းမှု ကာယစွမ်းရည် လျော့ကျမည်ကို စိုးရိမ်သည်။ 17. HIV/AIDS decreases my physical strength.	Keep
18. အိတ်ချ်အိုင်ဗီပိုးသည် ကျွန်ုပ်၏ လိင်ကိစ္စကို အနှောင့်အယှက်ဖြစ်စေမည်။ 18. I feel tense during sex encounters.	Keep
19. အိတ်ချ်အိုင်ဗီပိုးရှိနေခြင်းကင်းရှင်းမှု လိင်ကိစ္စ ရှောင်ကျဉ်နိုင်ရန် ကြိုးစားရမည်။ 19. I feel disturbed to avoid sexual encounter due to HIV infection.	Keep
20. မိမိ၏လိင်ဆက်ဆံဖော်အား မိမိတွင် အိတ်ချ်အိုင်ဗီပိုး ရှိနေကြောင်း ဖွင့်ပြောရန် စဉ်းစားရသည်မှာ မိမိကို စိတ်ဒုက္ခပေးသည်။ 20. I have fear to disclose my HIV status to my sex partner.	Keep
21. မိမိ၏အဖတ်သို့ အိတ်ချ်အိုင်ဗီပိုး ကူးစက်သွားမည်ကို စိုးရိမ်သည်။ 21. I have fear of transmitting HIV to a sex partner.	Keep
22. အိတ်ချ်အိုင်ဗီပိုးကင်းရှင်းမှု လိင်ဆက်ဆံဖတ် ရရှိရန်ခက်ခဲမည်ကို စိုးရိမ်သည်။ 22. HIV has decreased my chances of finding a sex partner.	Keep
23. မိမိတွင်အိတ်ချ်အိုင်ဗီပိုးရှိနေခြင်းကင်းရှင်းမှု လိင်ဆက်ဆံဖတ်အပေါ်တွင် အားတုံ့အားနာဖြစ်မိသည်။ 23. I feel guilty toward sex partner about having HIV/AIDS.	Keep
24. အိတ်ချ်အိုင်ဗီပိုးကင်းရှင်းမှု စိတ်အားငယ်သည်။ 24. I feel low self-esteem due to HIV.	Delete
25. တစ်စုံတစ်ယောက်က အိတ်ချ်အိုင်ဗီပိုး အကြောင်း ပြောလာလျှင် မိမိသည် စိတ်လှုပ်ရှားပျံ့ ဂဏှာမငြိမ်ဖြစ်လာသည်။ 25. I feel nervous when people mention HIV.	Keep
26. အထီးကျန်သည်။ 26. I often feel lonely.	Keep

Item	
28. အိတ်ချ်အိုင်စီပိုးရှိနေခြင်းကြောင့် ညှိုးငယ်ထိုင်းမိုင်းစသောသည်။	Keep
28. I feel depressed due to HIV infection.	
29. အိတ်ချ်အိုင်စီပိုးရှိနေခြင်းကြောင့် မိမိကိုယ်မိမိ အပူဖြတ်င်မိသည်။	Keep
29. I always blame myself for contracting HIV.	
30. အိတ်ချ်အိုင်စီပိုးရှိနေခြင်းကြောင့် မိမိကိုယ်မိမိရှုရှာသည်။	Keep
30. I always feel self-loathing due to HIV.	
31. အိတ်ချ်အိုင်စီပိုးရှိနေခြင်းသည် မိမိကို ကလေးမယူအောင် ယူလုပ်သည်။	Delete
31. I have familial pressure to have offspring.	
32. အိတ်ချ်အိုင်စီပိုးရှိနေခြင်းကြောင့် မိမိသည် ကလေးမယူတာမှာ ဆုံးဖြတ်လိုက်သည်။	Delete
32. I plan not to have children.	
33. မွေးလာမည့်ရင်သွေးတွင် အိတ်ချ်အိုင်စီပိုး ရှိမည်ကိုစိုးရိမ်သည်။	Keep
33. I have fear of infecting newborn baby.	
34. အိတ်ချ်အိုင်စီပိုးရှိနေခြင်းကြောင့် မိမိ၏မိသားစုကျင့်ဖယ်ခံရမည်ကို စိုးရိမ်သည်။	Keep
34. I'm afraid my family is stigmatized because of my HIV infection.	
35. အိတ်ချ်အိုင်စီပိုးရှိနေခြင်းကြောင့် မိသားစု၏ကျင့်ဖယ်ခြင်းခံရမည်ကို စိုးရိမ်သည်။	Delete
35. Family does not accept me due to HIV infection.	
37. အိတ်ချ်အိုင်စီပိုးရှိနေခြင်းကြောင့် မိတ်ဆွသေခံများမထားဖွဲ့တတ်ပါ။	Keep
37. I try to avoid social interactions with others.	
38. အခြားသူများကို အိတ်ချ်အိုင်စီပိုးရှိကြောင်း ရင်ဖွင့်ရန်ခက်ခဲသည်။	Keep
38. I feel difficult to confide in other people about my HIV infection.	
39. မိမိကျန်းမာရေးကကြောင့် လူမှုရေးကိစ္စများတွင် မပါဝင်နိုင်မည်ကို စိုးရိမ်သည်။	Keep
39. I feel incapable of participating in social activity.	
41. အိတ်ချ်အိုင်စီပိုးရောဂါကြောင့် မိသားစုနှင့်သူငယ်ချင်းများ မိမိကိုပယ်ချမည်ကိုစိုးရိမ်သည်။	Keep
41. I'm afraid I'm rejected by family and friends.	
42. အိတ်ချ်အိုင်စီပိုးရောဂါကြောင့် လူအများအထင်သေးသည်။	Keep
42. I'm looked down upon by others.	

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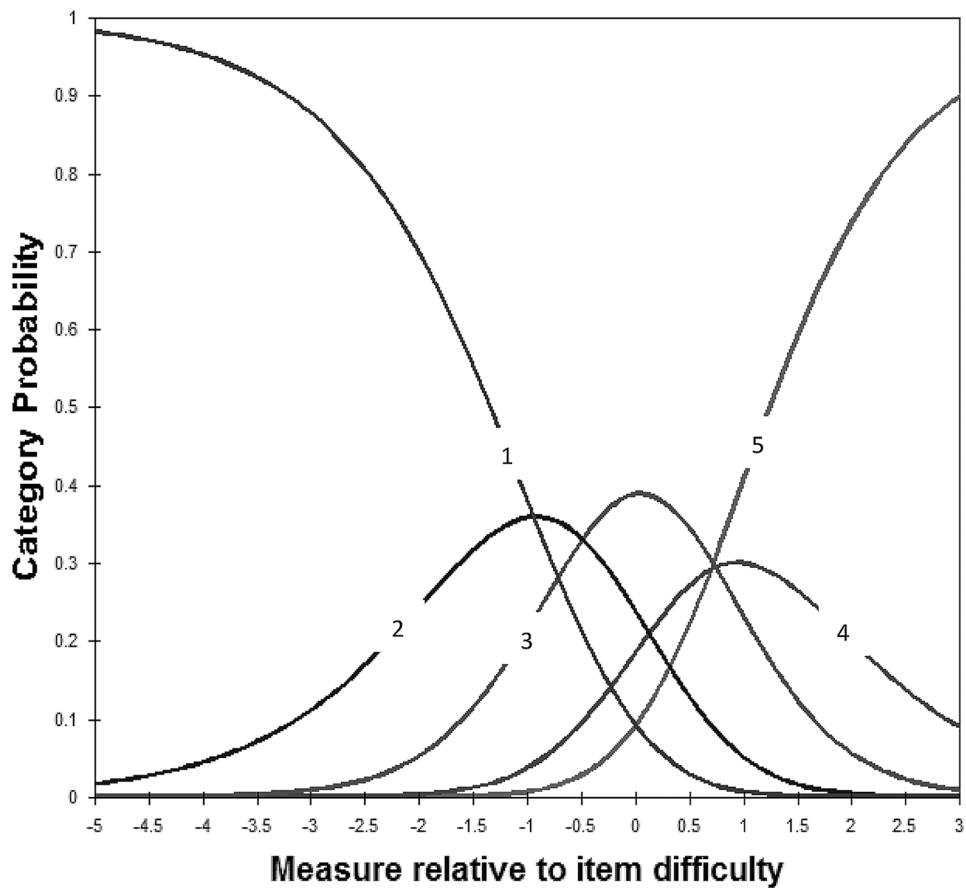


Figure 1. Category probability curves for the 31 items of PSSHIV-M-2.

PSSHIV-M: The Myanmar version of the Perceived Stress Scale for PLHIV. The five curves from left to right represent 5 response categories (1 - *Absolutely not stressful*, 2 - *A bit stressful*, 3 - *Moderately stressful*, 4 - *Quite stressful*, 5 - *Extremely stressful*).

TABLE 1.Sociodemographic Characteristics of the Participants (*N* = 150)

Variables	<i>N</i> (%)
Gender	
Male	91 (60.40%)
Female	57 (38.30%)
Transgender	2 (1.3%)
Ethnicity	
Bamar	118 (78.4%)
Chin	3 (2.0%)
Kachin	3 (2.0%)
Kayin	5 (3.4%)
Kayah	1 (0.7%)
Mon	8 (5.4%)
Rakhine	4 (2.7%)
Shan	2 (1.4%)
Others *	6 (4.1%)
Marital status	
Married or steady partner	67 (44.6%)
Widowed	17 (11.5%)
Separated	5 (3.4%)
Divorced	11 (7.4%)
Single, never married	50 (33.1%)
Educational level	
Middle school graduate	19 (12.8%)
High school graduate	65 (43.0%)
Professional (vocational) training school graduate	1 (0.7%)
Some College but no degree	24 (16.1%)
College graduate	39 (26.2%)
Post college graduate	2 (1.3%)
Employment status	
No	29 (19.6%)
Part time	33 (21.6%)
Full time	88 (58.8%)
Health insurance	
Not enough	125 (83.60%)
Just enough	25 (16.40%)

* Palaung, Islam, Tamil.

TABLE 2.

Factor Structure of the PSSHIV-M-2

Items	Factors						Communalities
	1	2	3	4	5	6	
I1: Cannot obtain free ART	0.77						0.65
I2: Cannot obtain free ART regularly	0.76						0.68
I3: Difficulty affording medical expenses	0.71						0.65
I6: Effectiveness of treatment	0.70						0.69
I7: Accessibility of second line regimen of ART	0.66						0.68
I5: Experiencing ART side effects	0.66						0.57
I8: Difficult to cope with heavy work load	0.65						0.66
I9: Worried that work would be affected by medical visits	0.62						0.70
I17: Decreasing physical strength	0.59						0.62
I16: Decreased capacity for thought and memory	0.53						0.58
I23: Feel guilty towards sex partner about having HIV/AIDS		0.73					0.75
I22: HIV has decreased my chances of finding a sex partner		0.71					0.69
I21: Fear of transmitting HIV to a sex partner		0.66					0.68
I19: Avoid sexual encounters		0.61					0.57
I20: Fear of disclosing HIV status to sex partner		0.55					0.52
I18: Feel tense during sex encounters		0.55					0.69
I38: Feel difficult to confide in other people about my HIV infection			0.77				0.75
I39: Feel incapable of participating in social activity			0.72				0.78
I37: Avoid social interactions			0.68				0.69
I41: Rejected by family and friends			0.68				0.73
I42: Looked down upon by others			0.56				0.59
I29: Blame myself for contracting HIV				0.81			0.76
I30: Self-loathing due to HIV				0.78			0.77
I28: Depression due to HIV				0.77			0.71
I26: Loneliness				0.74			0.67
I25: Feel nervous when people mention HIV				0.44			0.54
I11: Fear of losing my job					0.81		0.82

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Items	Factors						Communalities
	1	2	3	4	5	6	
I10: Fear of my HIV status being known in my workplace					0.81		0.82
I12: Fear of being subjected to a health checkup in a new job					0.75		0.75
I33: Fear of passing the virus to newborn baby						0.73	0.70
I34: Family is stigmatized						0.64	0.69
Eigenvalue	5.55	3.59	3.57	3.55	3.26	1.63	
Cumulative percentages	17.92	29.49	40.99	52.44	62.95	68.21	

Note. ART = antiretroviral therapy.

TABLE 3.

The Comparison of Factor Structure of the Original and Myanmar Version of the PSSHIV

Item number	PSSHIV ^a	Item number	PSSHIV-M-2 ^b	Range	Mean (SD)
I1-3	Accessibility to treatment	I1-3,	Function problems and medical treatment	10-50	25.62 (8.13)
I5-7	Treatment outcomes	I5-9,			
I8-9,I16-17	Functional problems	I16-17			
I10-12	Work-related issues	I10-12	Work-related issues	3-15	7.27 (3.35)
I18-23	Sexual relationships	I18-23	Sexual relationships	6-30	16.16 (6.02)
I24-26, I28-30	Social/psychological problems	I25-30	Psychological issues	5-25	12.80 (5.51)
I37-39	Social/psychological problems	I33-34, I37-39, I41-42	Social/family issues	7-35	19.23 (7.16)
I31-33	Family/offspring issues				
I34-35, I41-42	Social acceptable/rejection issues				

Note. PSSHIV = The Perceived Stress Scale for People Living with HIV.

^aThe original 35-item PSSHIV.

^bThe 31-item PSSHIV in Myanmar.

TABLE 4.

Description and Known-group Comparison of the PSSHIV-M-2

Dimension/ total	Range	Mean (SD)	CD4 cell counts (cells/mm ³)				F- value	p- value
			<200 (n = 40)	200-499 (n = 30)	500 (n = 80)			
Function problems and medical care	10-50	25.62 (8.13)	24.13 ± 9.56	27.72 ± 7.00	25.83 ± 7.51	1.67	0.19	
Work-related issues	3-15	7.27 (3.35)	6.84 ± 3.07	8.90 ± 2.82	6.70 ± 3.51	4.13	0.02	
Sexual relationship	6-30	16.16 (6.02)	15.65 ± 6.11	17.62 ± 4.64	16.04 ± 6.33	0.98	0.38	
Psychological problems	5-25	12.80 (5.51)	12.78 ± 5.80	14.71 ± 5.23	12.24 ± 5.35	2.14	0.12	
Social/family issues	7-35	19.23 (7.16)	18.7 ± 7.09	21.68 ± 5.83	18.75 ± 7.45	1.93	0.15	
Total score	31-155	81.53 (24.45)	78.49 ± 28.21	90.60 ± 19.37	80.49 ± 23.07	2.93	0.10	

PSSHIV-M: the Myanmar version of the Perceived Stress Scale for PLHIV.

TABLE 5.

The Difficulty, Infit, Outfit MNSQ, and Corrected Item-total Correlation of PSSHIV-M-2

Item	Item difficulty ^a	Infit MNSQ	Outfit MNSQ	Corrected item-total correlation
I1	0.09	0.94	1.04	0.57 [†]
I2	-0.05	0.76	0.95	0.62 [†]
I3	-0.15	0.60	0.72	0.62 [†]
I5	0.26	0.69	0.82	0.60 [†]
I6	0.20	0.68	0.68	0.62 [†]
I7	-0.05	0.51	0.53	0.70 [†]
I8	-0.08	0.59	0.61	0.71 [†]
I9	0.31	0.87	0.83	0.63 [†]
I10	0.31	1.02	1.08	0.58 [†]
I11	0.24	1.03	0.95	0.61 [†]
I12	0.10	0.86	0.87	0.62 [†]
I16	0.00	0.62	0.68	0.67 [†]
I17	0.03	0.52	0.55	0.69 [†]
I18	0.07	1.16	1.11	0.55 [†]
I19	-0.33	1.35	1.26	0.60 [†]
I20	0.32	1.30	1.19	0.56 [†]
I21	-0.24	0.79	0.85	0.62 [†]
I22	-0.08	1.12	1.07	0.61 [†]
I23	-0.24	0.80	0.78	0.69 [†]
I25	0.37	1.22	1.07	0.59 [†]
I26	-0.02	1.36	1.28	0.55 [†]
I28	-0.07	1.38	1.37	0.50 [†]
I29	-0.10	1.40	1.39	0.55 [†]
I30	0.10	1.20	1.14	0.54 [†]
I33	-0.24	1.30	1.37	0.49 [†]
I34	-0.07	1.03	1.07	0.57 [†]
I37	-0.41	1.40	1.33	0.56 [†]
I38	-0.19	1.26	1.18	0.64 [†]
I39	-0.10	0.83	0.82	0.74 [†]
I41	0.11	1.11	1.05	0.60 [†]
I42	-0.10	1.01	1.11	0.61 [†]

Note. MNSQ = mean square.[†]
p < .05

^aMeasured in logit; positive item logit indicates that the item requires a lower visual ability than the mean of the items and is an easier item; a negative item logit indicates that the item requires a higher visual ability than the mean of the items and is a more difficult item.

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