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Preliminary Study on Translation, Cultural Adaptation and Validation of DASS-21 and Dysfunctional Scale (DS) in Tok Pisin Language of Bougainville

Ön Çalışma: Bougainville Tok Pisin Dilinde DASS-21 ve Disfonksiyon Ölçeği (DS) İçin Çeviri, Kültürel Uyum ve Geçerlilik Çalışması

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ABSTRACT

This study assessed reliability and validity of the Depression, Anxiety, and Stress Scale (DASS-21) and Dysfunction Scale (DS) in the Tok Pisin (TP) language of Bougainville. The process followed translation, back translation, expert review, pilot testing with students (N = 77), and conducting CFA. The sub-scale for Stress of DASS-21 did not show reliability and validity in the CFA and was omitted for the analysis for the stress domain, a DASS-14 is suggested. The two-factor measurement model of the Depression Anxiety Scale (DAS-14) and a single-factor model for DS have demonstrated reliability and validity. Cronbach's Alpha (α) for anxiety, depression, and dysfunction were .74, .82, and .73 respectively. McDonald's Omega (ω) reliability score for anxiety and depression components of DAS-14 were .74 and .81 respectively. For DS, McDonald's Omega (ω) reliability score was .72. For DAS-14, model fit indices for CFI = 0.90, TLI = 0.88, SMRs = 0.08, RMSEA = 0.07, and RMR = 0.06 indicating reasonable fit. For DS model fit indices were TLI = 0.91, and CFI = 0.94, and values of SMRs =0.06, RMR = 0.09, and RMSEA = 0.07 were measured which indicated a good fit. Convergent and discriminant validity scores showed appropriate to validate DAS-14 (TP) and DS
Keywords: DASS-14, dysfunction scale (DS), cultural adaption, Tok Pisin, Bougainville

ÖZ

Bu çalışma, Depresyon, Anksiyete ve Stres Ölçeği'nin (DASS-21) ve Disfonksiyon Ölçeği'nin (DS) Bougainville Tok Pisin (TP) dilindeki güvenilirlik ve geçerliliğini değerlendirmek amacıyla gerçekleştirilmiştir. Çalışma sürecinde çeviri, geri çeviri, uzman değerlendirmesi, öğrencilerle pilot uygulama (N = 77) ve doğrulayıcı faktör analizi (DFA) adımları izlenmiştir. DASS-21'in stres alt boyutu DFA sonuçlarında yeterli güvenilirlik ve geçerlilik göstermediğinden analiz dışı bırakılmış ve bu alan için DASS-14 modelinin kullanılması önerilmiştir. İki faktörlü Depresyon-Anksiyete Ölçeği (DAS-14) modeli ve tek faktörlü DS modeli güvenilirlik ve geçerlilik açısından tatmin edici bulunmuştur. Anksiyete, depresyon ve disfonksiyon için Cronbach Alfa (α) katsayıları sırasıyla ,74, ,82 ve ,73; DAS-14 için McDonald Omega (ω) değerleri anksiyete için ,74 ve depresyon için ,81 olarak belirlenmiştir. DS için McDonald's Omega değeri ,72'dir. DAS-14 modeli için uyum indeksleri CFI = 0,90, TLI = 0,88, SMRs = 0,08, RMSEA = 0,07 ve RMR = 0,06 olarak bulunmuş ve modelin makul uyum gösterdiği belirlenmiştir. DS modeli için ise TLI = 0,91, CFI = 0,94, SMRs = 0,06, RMR = 0,09 ve RMSEA = 0,07 değerleri elde edilmiş ve bu da iyi bir uyuma işaret etmektedir. Yakınsak ve ayrışan geçerlilik analizleri, DAS-14 (TP) ve DS ölçeklerinin geçerliliğini desteklemiştir.
Anahtar Kelimeler: DASS-14, disfonksiyon ölçeği (DS), kültürel uyarlama, Tok Pisin, Bougainville

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Introduction

In 2023, the Bougainville Executive Council of the Autonomous Region of Bougainville (ARoB) established the Office of the Missing Persons in Bougainville (OMPB) to address the issues of missing persons from the Bougainville Conflict of 1988 to 1998. One of the aims of this effort is to provide essential mental health and psychosocial support (MHPSS) to families of missing persons, promoting social cohesion and the healing process. The Nazareth Center for Rehabilitation (NCfR), a local NGO with expertise in trauma counseling, was selected by the OMPB as the implementing partner for the International Committee of the Red Cross (ICRC) supported Accompaniment Program for the families of missing persons (ICRC, 2013) for families. Monitoring and evaluating distress and impairment in daily functioning (dysfunction) using culturally appropriate measures is fundamental to the program implementation and to measure effectiveness (Cha et al., 2007; Van Ommeren et al., 1999). The use of psychometric tools in humanitarian contexts is on the rise. However, systematic translation and adaptation of tools into local languages remain challenging (Kohrt & Kaiser, 2021). In ensuring evidence-based monitoring and evaluation of the distress and functioning across the timeline of the intervention with validated and contextualized measures is a key priority, however there were no equivalent validated psychometric tools or data for distress and functioning available to use in the Bougainville context due to the gap on research and services to address the mental health needs of people (Fine et al., 2024; Tierney et al., 2016). The main objective of this study was to assess the reliability and validity of the translated DASS-21 and DS in the Tok Pisin language before implementing the Mental Health and Psychosocial Support (MHPSS) program.

Methods

Participants

Seventy-seven students, aged 15 to 21, were selected for the study, following the necessary consent and approval from the school management and students, because in the social context like Bougainville most of the parents are illiterate and are confused with data protection and parental consent–getting access to them, and getting them to sign a parental consent document can be rather intimidating and causing anxiety. School teachers and principal, who also belong to the same community, are highly respected and trusted by the parents. The parents, being not literate, trust the school system to guide and consent for the activities for their children, while the social village interactions require their consent. The sampling method employed convenience-based sampling based on the availability of students in a school in Buka, Bougainville. Before implementing the tools on program beneficiaries, the authors decided to pilot test the translated tools for comprehension as recommended (Kohrt & Kaiser, 2021). A sample comprising of 77 students (20 male and 57 female), aged between 15-21 years, were available at the school, for the survey. Despite having an inadequate sample size than recommended, a pilot testing of the tools was essential and ethical before directly applying the translated tools to program beneficiaries (Kohrt & Kaiser, 2021).

Tools and Measures

Depression, Anxiety, and Stress Scale Questionnaire

DASS-21 is a shorter version of a 42-item survey designed by Lovibond and Lovibond (1995) and adapted and validated by Henry and Crawford (2005) to evaluate an individual's negative emotional states, comprising measures of depression, anxiety, and stress. This validated tool is widely utilized across diverse contexts and cultures to assess psychological burden (Le et al., 2017; Oei et al., 2013). University of New South Wales (2023), in the webpage dedicated to DASS, states that researchers can translate in new languages without any permission and apply the tool in non-clinical samples to adolescences and adults. Although the lower age of the sample was 17 years during the development of the tool, the University advises that, given the necessary language proficiency, there seems to be no compelling case against the use of the scales for comparative purposes with children as young as 12 years. Based on this recommendation, the researchers decided to test the tool including adolescents aged 15 and above in the sample. The translated tool after the completion of study has to be reported for the repository and reference.

The questionnaire has four-point Likert scale options (starting from, 0 = *did not apply* to 3 = *applied to me very much*) for each item to gauge the presence of distress experienced in the preceding week. While calculating the scores for severity, total scores of each sub-scale has to be multiplied by two, and cut-off scores were used as per the original research on DASS-21 (Henry & Crawford, 2005). The depression domain of the DASS-21 scale encompasses seven specific items (Items 3, 5, 10, 13, 16, 17, and 21). Upon calculation of the total score of these items, the result is multiplied by two to derive the depression severity score. Similarly, the anxiety domain of the assessment has seven

items (Items 2, 4, 7, 9, 15, 19, 20). After multiplying the total score by two, the severity of anxiety is classified. The stress-related measures use another seven items (Items 1, 6, 8, 11, 12, 14, and 18) to be calculated in the same way (Henry & Crawford, 2005).

Dysfunction Scale (DS)

The DS, developed by the second author using a free-listing method (Poudyal et al.; 2009), was used in Sri Lanka with the families of missing persons (Andersen et al., 2020). It assesses an individual's ability to perform various activities necessary to function effectively as an individual and within family and community settings. The questions have a five-point Likert scale to measure impaired functioning (dysfunction), from *not at all* = 0 to *too much* = 4. A higher total score indicates greater difficulty in functioning. As a categorization of total score between 0-7 "no dysfunctionality", scored between 8-14 "mild dysfunctionality", scored between 15-21 "moderate dysfunctionality", and scored between 22-28 "severe dysfunctionality" is applied. The categorization is arbitrary and should be interpreted as indicative not absolute. The categorization is meant to be correlated with distress scales to establish dysfunction associated with psychological distress.

Assessment of Suicide

The DASS-21 questionnaire lacks an assessment of suicidal ideation or intention. To compensate, two items related to current and past suicidal thoughts or attempts were included in the questionnaire in this study. The first item pertains to current thoughts about self-harm or suicide (Yes or No). The second enquires about a history of thoughts or plans of self-harm over the past month or acts of self-harm within the past year (Yes or No).

Social Support

An item aimed at gauging available social support in times of need is added by asking about the number of people who can be readily counted on for real help during difficulties or emergencies.

Translation and Cultural Adaptation Process

To achieve the standard for 'translation, cultural adaptation, and validation,' the researchers established a framework incorporating best practices and procedures for validating measures within a new context (Adhikari, 2020a; Arafat et al., 2016; International Test Commission, 2017).

Translation

Two translators–one with bachelor's degree in English and counseling experience working for CARE International, and the other, a professional translator working for Bougainville Bible Translation Organization–were engaged to independently translate (blind translation) the measures into the Tok Pisin language, focusing on the Bougainville context.

Synthesis

A local counselor with a diploma degree in gender studies and an internal program staff member with a graduate degree in English Literature reviewed and merged the translated text of the measures in Tok Pisin. Discrepancies were identified and resolved through a consultative process involving the translators, principal investigator, and two staff members. Subsequently, a final draft version of the tools in Tok Pisin was produced.

Back Translation and Adjustments

The process of translation, back translation, and cultural adaptation comprised of several steps prior to collecting responses from the students. This included the selection and finalization of measures and the involvement of individuals with technical expertise and translation experience to ensure the accuracy and appropriateness of the translation and adaptation process (Cha et al., 2007).

An independent language expert conducted a blind review of the Tok Pisin version of the tools and performed the back translation into English. Another independent language expert reviewed both the English and Tok Pisin versions and presented findings on discrepancies related to semantics, grammar, and cultural usage of words. Based on the feedback, adjustments were made to the Tok Pisin version before engaging another translator for the back translation. The final draft of the Tok Pisin version was prepared after addressing the discrepancies and repeating the back translation process.

Panel Review

Both versions of the measures were then subjected to a panel review consisting of senior counselors (clinical supervisors), bilingual experts, and practicing counselors. Adjustments in words in Tok Pisin used in the Bougainville context to reflect the English equivalent were recommended for modification. Consequently, the final version was approved for testing the tool with students for validation and psychometric testing purposes.

Data Collection Procedure

As per the child safeguarding policy of IFRC (2021) informed and voluntary consent of children participating in any research is mandatory. Abrar and Sidik (2019) emphasized the involvement and informed consent on the participation of children in research is key. Upon obtaining consent and approval from the school principal and a class teacher, verbal consent was obtained from the students after clarifying the purpose of the adaptation exercise. As guided by IFRC (2021), the researcher gathered no personal data, such as name, address, phone number, or parents' names, which may be considered identifiers. Only the age and sex of the participants were collected as demographic information. The data collection process was conducted in the presence of class teachers, and students were allowed to withdraw from participation without the need for explanations, with the primary focus being the protection of their emotional and psychological well-being.

Statistical Analysis

The data was cleaned using SPSS version 24 (IBM SPSS Corp., Armonk, NY, USA) and analyzed (IBM, 2016). Missing data was found in 16 responses, one item was missing for 15 responses and 4 items were missing for one response. Missing data was aligned in the principle of missing completely at random and was substituted with mean scores derived from the responded items to uphold the integrity of the overall rating. Confirmatory Factor Analysis (CFA) utilized structural equation modeling techniques in SPSS AMOS 25 (IBM, 2017). Before proceeding with the CFA, the assumptions of CFA such as multivariate normality, linearity, and no outliers, were tested. Normality was assessed through distribution, scatterplots, box plots, and kurtosis and skewness tests. The data had no outliers. The distribution, scatterplots, and box plots showed a normal distribution of data as values of kurtosis and skewness data were found below the threshold of +1 and -1 (Hatem et al., 2022).

Reliability, validity, tests were executed, and cut-off scores were used as recommended by Awang (2015) to validate the measures. Findings are presented in the results section.

Ethics Considerations

Ethics committee approval was received for this study from the ethics committee of ICRC's Ethical Board for Research (Date: August 26, 2024, Number: 1024).

Results

Prevalence and Severity of Distress

Based on the severity analysis with the cut off scale presented by Henry and Crawford (2005), 42.86% of respondents exhibited mild symptoms of anxiety and above. In addition, 59.73% and 54.55% of the surveyed sample presented mild and above levels of severity in the domains of depression and stress, respectively (refer to Table 1).

Table 1

Severity of DASS Scores

		Severity Level					
		Extremely severe	Severe	Moderate	Mild	Normal	Total
Anxiety	Female	7	3	12	4	31	57
	Male	1	1	2	3	13	20
	Total	8	4	14	7	44	77
	%	10.39	5.19	18.18	9.09	57.14	100
Depression	Female	6	11	12	8	21	57
	Male	1	2	3	3	10	20
	Total	7	13	15	11	31	77
	%	9.09	16.88	19.48	14.29	40.26	100
Stress	Female	0	11	14	7	24	57
	Male	1	2	4	3	11	20
	Total	1	13	18	10	35	77
	%	1.30	16.88	23.38	12.99	45.45	100

Independent samples t-test on distress severity based on sex were determined; depression mean scores were only found to be significantly different between Males (M = 9.90, SD = 9.00) and Females (M = 14.95, SD = 9.49) and independent t test results was ($t_{(75)}$ = 2.073, p = 0.042).

Suicide

Four (5.19%) participants reported current severe and urgent suicidal thoughts and four (5.19%) had a history of such thoughts. Two participants reporting current self-harming thoughts had also experienced similar thoughts in the past. Following the completion of data collection, the lead researcher conducted relaxation exercises after providing psychoeducation on distress and positive coping mechanisms. Students, teachers, and school management were briefed on the counseling services available in the area for seeking help. As a duty of care, safeguarding, and do no harm principle of research with children (IFRC, 2021), students and teachers were notified to immediately seek support if someone is having constant thoughts of self-harm or any other psychological concerns.

Dysfunction

The prevalence of dysfunction within the studied population presents a complex picture, primarily due to the absence of established cut-off scores for assessment. The collected data yielded a mean score of 6.35 and a standard deviation of 5.186. The scores ranged from a minimum of 1 to a maximum of 21, indicating variability in dysfunction levels among participants. The distribution of total scores revealed significant insights into the population's dysfunction: 57.10% scored between 0-7, 39.00% scored between 8-14, 3.9% scored between 15-21, and 0% scored between 22-28. This distribution suggests that most (96.1%) participants fall within the lower range of dysfunction scores (0-14). It is important to note that the data collection involved adolescents, whose levels of dysfunction are typically lower compared to adults and the elderly. This demographic factor likely contributes to the observed skew towards normal levels of dysfunction in the sample.

Social Support

In the social support response, 27.3% indicated that less than two individuals in their close circle could assist them when needed. The data ranged from 0 to 30, with an average score of 4.84 people and a 4.566 standard deviation. 2.6% of the respondents reported having no close family or friends available for support, while 7.8% mentioned having at least one close person who can help.

Reliability of DASS-21

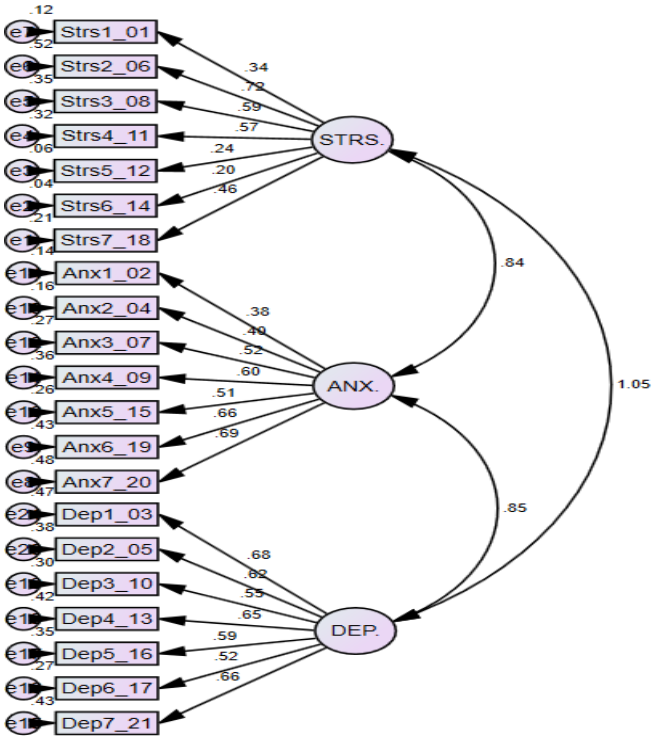
The internal consistency of the DASS-21, evaluated using Cronbach's Alpha coefficient (α = 0.89), reflects a high level of reliability. The individual Cronbach Alpha values for the subscales of Anxiety, Depression, and Stress were .74, .80, and .66, respectively, and Dysfunction was .73. McDonald's Omega (ω) reliability scores for stress, anxiety and depression components of DAS-21 were measured .65, .74, and .80 respectively.

Confirmatory Factor Analysis of DASS-21 in Tok Pisin

The confirmatory factor analysis conducted on the DASS-21, did not validate the model due to inadequate factor loadings, particularly within the stress component (refer to Figure 1) for details.CFA results measured χ^2= 309.47, df = 186 $p < 0.001$. Model fit indices for χ^2/df = 1.66, CFI = .72, TLI = .72, SMRs = .10, RMSEA = .09, and RMR = .08., indicating the rejection of the model.

Figure 1

CFA DASS-21 in Tok Pisin



Subsequently, a two-factor measurement of CFA incorporating Depression and Anxiety was evaluated. Scores of key fit indices such as Normed-Fit Index (NFI) = .76, Tucker-Lewis Index (TLI) = .81, Goodness-of-Fit Index (GFI) = .80, Comparative-Fit Index (CFI) = .73, Root mean square residuals (RMR) = .09, Standardized root mean square residuals (SMRs) = .10, and Root mean square error of approximation (RMSEA) = .10 were measured accordingly. The model fit indices did not show the sufficient model fit and demanded for a post hoc analysis.

A post hoc analysis was conducted using a two-factor model of CFA on the DAS-14, which includes measures for anxiety and depression. For details on coding of items such as ANX-1. DEP-1, etc., and factor loadings.

The findings regarding the model fit indices were comparatively fit (refer to Table 2). During the Post-Hoc CFA process, several items were identified as highly redundant; specifically, these redundancies occurred between ANX-1 and ANX-2, ANX-1 and DEP-1, ANX-3, and DEP-16, as well as ANX-7 and DEP-7. These identified redundancies were addressed prior to finalizing the post-hoc CFA.

Table 2

Fit Indices from Post Hoc CFA with Two Factor Model of DAS-14

Model	χ^2/df	NFI	TLI	GFI	CFI	RMR	SMRs	RMSEA	P-Close	Hölter Kriterium
Two Factor DASS	1.389	.75	.88	.86	.91	.06	.08	.07	.15	79

Note. NFI = Normed-Fit Index, TLI = Tucker-Lewis Index, GFI = Goodness-of-Fit Index, CFI = Comparative-Fit Index, RMSR = Root mean square residuals, SMRs = Standardised root mean square residuals, RMSEA = Root mean square error of approximation, Hölter Kriterium for number of required samples with p = .01

The expert review of the items yielded reasonably acceptable insights regarding the potential causes for low factor loadings especially in the Anxiety scale, recommending modifications to the text for future applications. For item number one on the Anxiety scale, the concept of "dryness of mouth" is perceived as thirst in Bougainville culture. The local expression is "nek i drai–dryness of neck (throat)" rather than dryness of mouth. Regarding item number two on the Anxiety scale, the phrase "breathing difficulty in the absence of physical exertion" was translated as "maski yu no mekim bikpla wok." This translation conveys a sense of breathing difficulty experienced without engaging in strenuous activity, which does not resonate culturally. The phrase "in the absence of physical exertion" was interpreted as "without doing hard work".

Following the survey, experts recommended using a more accurate term: "i no makim wanpla wok," meaning "without doing anything". Similarly, the word trembling (guria) in item seven gives the meaning of shaking "such as earthquake". Thus, "body" has to be specified. So, "bodi bilong mi guria" (my body is shaking) is added. In Tok Pisin, item 15 (close to panic) and item 20 (scared for no reason) were also understood as interchangeable. The qualitative feedback highlighted these items, which could explain their lower factor loadings.

This model has been evaluated for the first time within the context of the Tok Pisin language in Bougainville. It is a preliminary study with a limited sample size that does not adequately reflect the various socio-demographic groups. A subsequent analysis of the CFA was conducted after removing two problematic items (ANX-1 and ANX-2), but there were no notable enhancements in the fit indices. Therefore, it is recommended that the two-factor measurement model of DAS-14 be implemented for a larger population, incorporating modifications to the text of the anxiety-related problematic items (refer to Table 3).

Reliability and Validity of the DAS-14 Tok Pisin version

Reliability

The metrics for the reliability coefficient (Cronbach's Alpha), Composite Reliability (CR), Average Variance Extracted (AVE), and the factor loadings associated with each item are presented in Table 4.

Table 3

Final DAS-14 (TP) Items in Tok Pisin Language of Bougainville

Number	Tok Pisin Version
DAS-14 (TP)-ANX-1	Long wik igo pinis, mi pilim neck i drai
DAS-14 (TP)-DEP-1	Long wik igo pinis, mi no pilim hamamas o pilim gut
DAS-14 (TP)-ANX-2	Long wik igo pinis, mi painim olsem mi sot win (eg., mi kisim win hariap hariap maski mi no mekim bikpla wok).
DAS-14 (TP)-DEP-2	Long wik igo pinis, mi bin painim hat long long kirapim ol tingting na laik long mekim wok
DAS-14 (TP)-ANX-3	Long wik igo pinis, mi lukim olsem bodi bilong mi guria (eg., long ol han blong mi)
DAS-14 (TP)-ANX-4	Long wik igo pinis, mi belhevi long sampla samting we imekim mi bai guria na mekim mi ting ting nogut long mi yet
DAS-14 (TP)-DEP-3	Long wik igo pinis, mi no pilim olsem mi nogat samting long tingting long en long bihaim taim
DAS-14 (TP)-DEP-4	Long wik igo pinis, mi no pilim gut na tu mi pilim sore
DAS-14 (TP)-ANX-5	Long wik igo pinis, mi pilim olsem sikin blo mi poret nating nating
DAS-14 (TP)-DEP-5	Long wik igo pinis, mi no bin nap hamamas long wanpela samting taim mi lukim
DAS-14 (TP)-DEP-6	Long wik igo pinis, mi pilim olsem mi no gutpela long stap olsem mi man o meri
DAS-14 (TP)-ANX-6	Long wik igo pinis, mi bin save olsem lewa bilong mi wok long pam hariap tumas (eg., Reit blo lewa I pam hariap igo antap, lewa imisim wanpela bit)
DAS-14 (TP)-ANX-7	Long wik igo pinis, mi poret nating wantaim nogat gutpela risen
DAS-14 (TP)-DEP-7	Long wik igo pinis, mi pilim olsem laip inogat mining moa

Table 4

Factor Loadings and Reliability Scores of DAS-14 (TP)

Construct	Item	Factor loading	Cronbach Alpha	CR	AVE
Anxiety	ANX_1	.37	.743	.749	.269
	ANX_2	.41			
	ANX_3	.55			
	ANX_4	.6			
	ANX_5	.53			
	ANX_6	.7			
	ANX_7	.64			
Depression	DEP_1	.65	.817	.814	.225
	DEP_2	.62			
	DEP_3	.56			
	DEP_4	.64			
	DEP_5	.66			
	DEP_6	.61			
	DEP_7	.60			

Note. AVE = average variance extracted, CR = composite reliability

The CR values for the assessments of Anxiety and Depression were found to be .75 and .81, respectively. McDonald's Omega (ω) reliability score for anxiety and depression components of DAS-14 were measured .74 and .80 respectively. The Anxiety assessment demonstrated an acceptable internal consistency, whereas the Depression assessment showed a robust internal consistency. These results indicate that both scales can be reliably utilized to evaluate anxiety and depression levels in the Bougainville population.

Validity

The convergent validity of the Anxiety and Depression assessments within the DAS-14 TP framework was examined. The CR scores for both the Anxiety and Depression measures exceeded .70, indicating a strong level of reliability. The AVE scores were recorded at .33 for Anxiety and .38 for Depression. According to the research by Adhikari (2020b) and Fornell and Larcker (1981), an AVE score below .50 can still be deemed acceptable if the CR is above .70 or if CFA has been conducted for the first time within a population being studied.

An analysis was conducted on the maximum shared squared variance (MSV) and average shared squared variance (ASV) scores to determine discriminant validity. For these metrics to fulfill the required standards, both MSV and ASV scores must exceed the AVE score. In this

investigation, the MSV and ASV scores for anxiety were identified as .70 and .41, respectively, while the AVE score stood at .33. For depression, the MSV and ASV scores were noted at .70 and .48, with an AVE score of .38. Given that both MSV and ASV scores for each construct exceeded their respective AVE scores, this confirms that discriminant validity for the DAS-14 TP has been established. Consequently, the DAS-14 TP is now prepared for application within the Bougainville Population.

Table 5

Factor Loadings and Reliability Scores of DS

Construct	Item	Factor loading	Cronbach Alpha	CR	AVE
Dysfunction scale	FUN_1	.63	.73	.72	.24
	FUN_2	.72			
	FUN_3	.68			
	FUN_4	.75			
	FUN_5	.69			
	FUN_6	.68			
	FUN_7	.69			

Note. AVE = average variance extracted, CR = composite reliability

The CR value for DS was found to be .72, while the α score for DS was noted at .73. ω reliability score was .72 for DS. The reliability assessments of the DS demonstrated an acceptable degree of internal consistency as per the recommendations by Awang (2015). This finding suggests that the DS can effectively assess levels of dysfunction within the Bougainville population.

Validity

For the first time since the Dysfunction Scale was developed by Bhava Poudyal (Andersen et al., 2020) in Sri Lanka, a CFA was conducted on the Tok Pisin version of the DS. This scale includes three theoretical constructs: self, family, and

societal dysfunction, which are represented by items: Self (DS-1 and DS-3), Family (DS-2 and DS-5), and Society (DS-4, DS-6, and DS-7). The initial CFA examined a three-factor model of the DS. However, this model encountered issues known as “Heywood cases” and could not accurately represent each factor because it lacked more than three items with significant factor loadings (McDonald, 1985). Consequently, a CFA focusing on a one-factor model of the DS was implemented.

The initial CFA of the DS results did not completely validate the proposed model. Specifically, items DS-1, DS-5, and DS-7 exhibited factor loadings below .45. Awang (2015) suggested to delete such items, however Ertz et al. (2016) used .40 or above factor loadings for the analysis as the tool

Reliability and Validity of the Dysfunction Scale (DS)

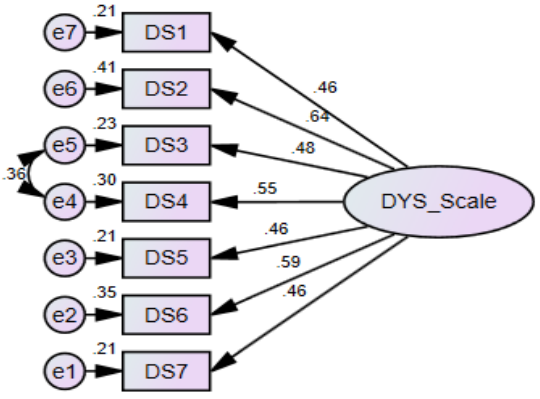
Reliability

The metrics for the reliability coefficient (Cronbach’s Alpha), CR, AVE, and the factor loadings associated with each item are detailed in Table 5.

is first time applied for the CFA. Prior to removing these items from consideration, a post hoc CFA was conducted. It was noted that there was a redundant correlation between items DS-3 and DS-4, which was subsequently adjusted. For coding of items such as DS-1 and factor loadings (refer to Figure 2).

Figure 2

Post-hoc CFA Dysfunction Scale in Tok Pisin



The model demonstrated an acceptable range of fit indices (refer to Table 6), except for the Normed Fit Index (NFI) score, which fell below .90. The factor loadings for problematic items also reached above .45. Therefore, it is recommended that the Tok Pisin version of the DS be applied to a larger population in Bougainville.

Table 6

Fit Indices from CFA with One Factor Model of Dysfunction Scale–7

Model	χ^2/df	NFI	TLI	GFI	CFI	RMR	SMRs	RMSEA	P-Close	Hölter Kriterium
Dysfunction Scale (TP)	1.363	.83	.91	.94	.94	.09	.06	.07	.31	96

Note. NFI = Normed-Fit Index, TLI = Tucker-Lewis Index, GFI = Goodness-of-Fit Index, CFI = Comparative-Fit Index, RMSR = Root mean square residuals, SMRs = Standardised root mean square residuals, RMSEA = Root mean square error of approximation, Hölter Kriterium for number of required samples with p = 0.01

The convergent validity of the Dysfunction Scale (DS) was assessed. The scale achieved a CR score of .72, which surpasses the threshold of .70, indicating a strong level of reliability for the measure. Conversant validity was tested through AVE scores (Awang, 2015) due to the unavailability of an equivalent external scale to compare in the cultural context. The AVE was recorded at .27. Although this score is below the commonly accepted benchmark of .50, it can still be considered acceptable under certain conditions, such as when CR exceeds .70 or if CFA has been conducted for the first time within the studied population, as supported by previous research (Adhikari, 2020b; Fornell & Larcker).

The study confirmed discriminant validity as the shared variance between constructs was measured at .19, lower than the AVE score of .27 from individual constructs (Awang, 2015). In conclusion, based on these findings, the DS (refer Table 7) is now deemed ready for application within the Bougainville Population.

Table 7

Final DS (TP) -7 Questionnaire in Tok Pisin Language of Bougainville

Number	English Version	Tok Pisin Version
DS (TP) -1	In the last two weeks, how much difficulty have you had with taking care of yourself? Taking a shower, brushing teeth, wearing clean clothes, etc.	Long laspela tupela wiks, yu painim hat olsem wanem long lukautim yu yet? Waswas, brasim tit, werim klin pela kolos
DS (TP) -2	In the last two weeks, how much difficulty have you had with taking care of your household responsibilities? Laundry, shopping, cleaning the house	Long laspela tupela wiks, yu painim hat olsem wanem long wok bilong luakuatim haus? Long sait blong waswas, wasim kolos, baim kaikai, klinim haus
DS (TP) -3	In the last two weeks, how much difficulty have you had with concentrating?	Long laspela tupela wiks, yu painim hat olsem wanem long tingting stret or long tingting gut?
DS (TP) -4	In the last two weeks, how much difficulty have you had with calling and talking to Someone?	Long laspela tupela wiks, yu painim hat olsem wanem long singautim o toktok long sampela lain?
DS (TP) -5	In the last two weeks, how much difficulty have you had with taking care of children or grandchildren? *	Long laspela tupela wiks, yu painim hat olsem wanem long lukautim ol pikinini o ol liklik bubu?
DS (TP) -6	In the last two weeks, how much difficulty have you had with visiting friends, neighbors, or relatives?	Long laspela tupela wiks, yu painim hat olsem wanem long visitim ol porman o meri, ol lain klostu long yu o famili lain?
DS (TP) -7	In the last two weeks, how much difficulty have you had with doing other tasks outside of the house? selling things at the market, involvement in community activities, attending church, etc.	Long laspela tupela wiks, yu painim hat olsem wanem long wokim ol narapwela wok autsait long haus? Salim samting long maket, wok komuniti, go long lotu, etc.

Note: for adolescences, use examples such as playing/taking care of siblings or other children in the house.

Discussion

The study aimed to translate, culturally adjust, and validate the DASS-21 and DSscales in the Tok Pisin language of Bougainville. The DASS-21 tool is commonly used to assess depression, anxiety, and stress. The study revealed that the three-factor model of DASS-21 did not match the cultural context of the population studied. Instead, a two-factor measurement model combining Anxiety and Depression domains was considered more appropriate based on CFA results. This finding is consistent with prior studies involving different populations like Korean students (Lee & Kim, 2022), and adolescents in North Macedonia (Naumova, 2022).

One significant reason for the lack of support for the three-factor model was the weak factor loadings observed in the

stress domain of the DASS-21. Similar issues were identified in a study with nurses in Thailand, where three stress-related items were removed due to insufficient factor loadings (Wittayapun et al., 2023). Additionally, it was noted that cultural understandings of stress can vary significantly across different cross-cultural contexts, potentially explaining the differences in model fit (Tsegaye et al., 2023).

Bougainville's culture emphasizes communal ties and subsistence farming, contrasting with many Western societies' individualistic and work-focused perspectives. Distress in Bougainville is expressed communally, reflecting a focus on group well-being over individual emotional experiences. Research in northern Bougainville by Fine et al. (2024) highlighted overlapping symptoms related to mental and emotional states, indicating a general psychological distress with various facets. In their study in Aceh with victims of conflict, including torture, Poudyal et al. (2009) also found that symptoms overlapped across domains and showed substantial general psychological symptomatology but did not generate any evidence that these problems are grouped within a specific syndrome or set of syndromes. Naumova (2022) studied adolescents in North Macedonia and discovered a lack of differentiation in understanding and expressing negative emotional stress among those in middle to late adolescence. While cultural discrepancies hindered the three-factor model's performance, the bifactor model of DAS-14 (TP) emerged as a more reliable tool with valid indicators for future use.

CFA has validated the DS as a single-factor model used to assess dysfunction. The examination of three potential theoretical constructs linked to dysfunction, including self, family, and societal aspects, could not be adequately tested in the sample of this study. Despite this constraint, the internal consistency of DS was measured at .729 (p = 0.01), showing a similar score to the Sinhala version of .76 (n = 127) but lower than the Tamil version at α = .87 (n = 235; Andersen et al., 2020). Since this is the tool's initial CFA study, no validity indices were available for comparison. Nevertheless, the CFA outcomes for DS presented satisfactory reliability and validity indicators.

Conclusion and Recommendations

The results of this study suggest that the translated and culturally adapted version of DASS-21 is not appropriate for the population of Bougainville. However, the adapted Depression and Anxiety Scale (DAS-14) and Dysfunction Scale (DS) in Tok Pisin have been supported by evidence, demonstrating reliability and validity for future use. Regarding future implementation research, the cultural validation process through CFA could benefit programs of the ICRC, NCfR and other humanitarian organizations in expanding evidence-based practices by conducting larger-sample cross-country studies in various languages to ensure that psychometric tools are culturally validated and contextualized to measure what they are meant to measure. In future studies, authors recommend analyzing and comparing means and correlations among the measures of DASS, suicidal ideation, dysfunctionality, and social support with a larger sample. Consequently, further studies are recommended to continue testing the validity of the cross-cultural validation processes of the DAS-14 (TP) and DS within and beyond Bougainville.

Limitations

The study findings certainly have some strengths and limitations. The researchers followed established scientific methods in their study, bolstering the credibility of their results. They employed standardized procedures for translation and validation to reduce potential biases from subjective interpretations. Additionally, they provided detailed documentation of each step undertaken, ensuring transparency for future replication. The precise reporting of results contributed to the trustworthiness of their findings, with careful attention to cultural nuances enhancing the tool's relevance to its target audience. Utilizing various validation methods like expert reviews and statistical analyses further solidified the effectiveness of their work.

The sample size of this study is not sufficiently large to carry out a proper CFA; ideally it should be over 300. Nor does the studied sample sufficiently represent the demography and diversity of the Bougainville population-adult male, adult female, elderly, and other strata of the population, such as people with disability and people from far remote versus semi-urban populations. Thus, this study findings are to be considered as preliminary and interpreted accordingly.

Another limitation of the study is not to have cut-off scores of measures in Tok Pisin version, researchers used same scores as guided in the original study by Henry and Crawford (2005). The study findings suggest using the DAS-14 and DS in the population. Authors could not retrieve any knowledge and resources regarding the validation of any psychological measures equivalent to DASS-21 and DS in the Bougainville context except a few perception studies with an aim to develop psychometric tools (Fine et al., 2024; Tierney et al., 2016). Conclusively, the generalizability of the findings might only be possible after the tool's

administration to the targeted populations of a larger population size and authors highly recommend prioritizing such studies in the future.

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