Translation and Initial Validation of the Depression Anxiety and Stress Scale (DASS-21) in Ilokano

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Abstract The Depression Anxiety and Stress Scale (DASS-21) is a self-report screening tool of psychological symptoms used in many countries and translated in different languages. The DASS-21 was translated into Ilokano, one of the major languages in the Philippines spoken by over 9 million people all over the world. The translation process involved independent translations by multilingual clinical psychologists, reviews by two multilingual mental health professionals, and pilot testing. The translation was then validated in a study with 668 Ilokano speakers mainly from three regions of the Philippines where Ilokano was a native language or a lingua franca. A confirmatory factor analysis indicated a good fit of the three-factor model compared to a one-factor model. The three subscales showed good internal consistency were also positively correlated with other measures of depression, anxiety, and negative affect, and negatively correlated with measures of positive affect and flourishing. Using a stringent test of criterion validity, the results also show that DASS-Depression was more strongly correlated with a criterion measure of depression, compared to with measures of anxiety and negative affect, and that DASS-Anxiety was more strongly correlated with a criterion measure of anxiety compare to a measure of negative affect. The results provide good initial evidence for the validity and viability of the DASS-21 in Ilokano, which should be a useful tool in mental health programs in parts of the Philippine community, particularly in identifying individuals who may need attention of mental health professionals.

Keywords Depression · Anxiety · DASS-21 · Translation · Negative affect · Ilokano · Philippines

Abbreviations
CFI Comparative Fit Index
COVID-19 Coronavirus disease 19
DASS-21 Depression Anxiety and Stress Scale
DSM-IV Diagnostic and Statistical Manual, Fourth Edition
FS Flourishing Scale
GAD-7 General Anxiety Disorder-7
SPANE Scale of Positive and Negative Experiences
SPSS AMOS Statistical Package for the Social Sciences—Analysis of a Moment Structure
PHQ-9 Patient Health Questionnaire-9
RMSEA Root Mean Square Error of Approximation
TLI Tucker–Lewis Index

Introduction

The increase in anxiety and depressions across different countries is an ongoing global concern, and the COVID-19 pandemic has intensified this concern (Vahraitian et al., 2021). The prevalence of depression has increased threefold in some countries during the COVID-19 pandemic (Ettman et al., 2020). In the Philippines, various studies recorded increased rates of symptoms of anxiety and depression
during the COVID-19 pandemic (Mendoza et al., 2021; Tee et al., 2020); the increase being attributed to risk factors such as exposure to the virus, loss of income, among others (Galanza et al., 2021). In this regard, the availability of valid psychological instruments for screening symptoms of anxiety and depression, which can be used in different populations is important for identifying individuals who may need attention of mental health professionals. There are some self-report screening tools that are currently available and the analysis of the psychometric properties and validity of such tools make them suitable for use in non-clinical settings (e.g., schools, community health centers, and workplaces) and also in research (Gilbody et al., 2001). The translation and validation of such screening tools in different languages is essential in efforts to address the rising mental health concerns in all parts of the world (Kirmayer & Swartz, 2013). One screening tool that has been validated and translated into different languages is the Depression, Anxiety, and Stress Scale (Lovibond & Lovibond, 1995). In this study, we translated the scale into Ilokano, a language spoken by over 9 million persons in the Philippines. We provided initial validation for the Ilokano translation by studying the scale’s structural validity, internal consistency, and criterion validity of its subscales.

**Depression, Anxiety and Stress Scale (DASS-21)**

Lovibond and Lovibond (1995) developed the Depression, Anxiety and Stress Scale (DASS-21), which measures negative emotional states, particularly depression (DASS-D), anxiety (DASS-A) and stress or tension (DASS-S); it is the short form of the original 42-item measure that improved the administration time from the original. The DASS-21 has been widely used in clinical samples to screen for symptoms of mental health disorders (Yildirim et al., 2018), including in clinical and research settings (Crawford et al., 2009; Norton, 2007; Sinclair et al., 2012). The three-factor structure has also been validated in numerous translations of the DASS-21, which includes translations in Turkish (Yildirim et al., 2018), Chinese (Chan & Bernardo, 2017), Bahasa Malay (Musa et al., 2007), Persian (Asghari et al., 2008), and Australian, Chinese, Chilean and Malaysian (Mellor et al., 2015), among others. Other studies (Henry & Crawford, 2005, using the English DASS-21; Alfonsson et al., 2017, using the Swedish DASS-21; Lee & Kim, 2020, using the Korean DASS-21; Ruiz et al., 2017, using the Spanish DASS-21) have found support for a bifactor (also referred to as a quadripartite) model, where, in addition to the three factors, there is a general distress factor that is indicated by all the items in the scale. But these translations also demonstrated good fit with the original three-factor model. In other translations, some items were dropped because of difficulties in translating particular items. For example, translations of the DASS for Indonesia, Malaysia, Singapore, Sri Lanka, Thailand and Taiwan were all found to support the three-factor model, but after removing items that included words and phrases that were difficult to translate into the different local languages (e.g., “used a lot of nervous energy”) (Oei et al., 2013).

DASS-21 translations also show good internal psychometric properties beyond the structural validity of the three-factor model. The DASS-21 Korean translation showed good internal consistency and measurement consistency over a one-week interval (Deokhoon et al., 2018). The Chinese version showed evidence of convergent and divergent validity using other well-established measures: Patient Health Questionnaire (PHQ-9), Generalized Anxiety Disorder (GAD-7) and the Positive and Negative Affect Schedule (Chang & Bernardo, 2017). The Turkish version showed good convergent validity with the Beck Depression Inventory, Beck Anxiety Inventory, Dissociative Experiences Scale, Somatoform Dissociation Questionnaire, and Toronto Alexithymia Scale (Yildirim et al., 2018).

DASS-21 translations also predicted non-clinical related factors. For example, DASS-21 scales were positively correlated with occupational stress in Korean employees with white-collar jobs, (Park et al., 2008) and Malaysian employees (Edimansyah et al., 2008). The DASS-21 subscales were also strongly associated with perceived stress in Chinese individuals living with HIV/AIDS (Su et al., 2007), disordered eating in Malaysian university students (Gan et al., 2008), and impaired sleep quality in pregnant women (Reshedat et al., 2018). The DASS Korean subscales...
were also negatively associated with the level of life satisfaction (Deokhoo et al., 2018). Thus, valid translations of the DASS-21 should also be significantly associated with relevant criterion variables.

We note, however, that there are some studies that do not find support for DASS-21’s three-factor structure. For example, there is evidence for a two-factor model, where the stress and anxiety items are incorporated into only one factor. Evidence for the two-factor model comes from studies that used the original English DASS-21 (Duffy et al., 2005; Osman et al., 2012; Shea et al., 2009; Tully et al., 2009; Willemsen et al., 2011), the Italian (Bottesi et al., 2015) and the Spanish DASS-21 (Daza et al., 2002). Thus, it is necessary to validate the three-factor model of the DASS-21 in any translation of the scale, instead of just assuming that translations have a valid three-factor structure.

The Current Study

The DASS-21 has not been translated into Philippine languages; instead, the English version has been used in studies that involve educated Filipino samples (e.g., Montano & Acebes, 2020; Tee et al., 2020). Educated Filipinos tend to be at least bilingual, with English as their second language (Bernardo, 2007), and the assumption seems to be that using English language psychological tools would be valid for these Filipinos. While this assumption has found support in the case of some psychological scales (e.g., Gafos et al., 2013; Nalipay et al., 2019; Simon, 2020), this is not always the case as the factor structure of some English language scales are not validated among educated Filipino samples (e.g., Bernardo, 2008; Datu et al., 2016). The validity of English language scales has been difficult to establish with less academically proficient samples who may not be fluent in English (Zhang & Bernardo, 2000). Thus, the validity of scales like the DASS-21 among Filipinos cannot be assumed.

In this manuscript, we first describe the processes undertaken to develop an Ilokano translation of the DASS-21. Then we report the results of our initial validation of the translation. While there is a preponderance of evidence supporting the three-factor structure and the criterion validity of the DASS-21 translations, we noted that there are cases when there was no evidence for three-factor structure in some translations (e.g., Bottesi et al., 2015; Daza et al., 2002). Thus, our first aim was to test the three-factor structure of the translated test (Lovibond & Lovibond, 1995) using a sample of Ilokano-speaking Filipinos, and to establish the internal consistency of the three subscales of the translation. We also sought to establish some evidence for the criterion validity of the translation by looking at the scales’ associations with the Patient Health Questionnaire (PHQ-9), General Anxiety scale (GAD-7), Scale of Positive and Negative Emotions (SPANE), and the Flourishing Scale (FS).

Method

Development of the Ilokano Translation

There were three main phases in the development of the Ilokano translation of the DASS-21: (a) independent initial translations, (b) independent review/audit, and (c) pilot testing with interviews. As noted earlier, Ilokano is spoken in several provinces in Ilocos Region, Cordillera Region, and Cagayan Valley Region in northern Philippines and other parts of the country, as well. As such, there are some differences in the versions of the Ilokano language spoken across the regions. In consideration of these variations, we sought to involve Ilokano speakers from different regions of the country in the different phases of the translation process and we note this in the subsections below.

In this study, we translated DASS-21 into Ilokano, the third most widely spoken language in the Philippines (Eberhard et al., 2020). Ilokano is used as the first language by more than 6 million individuals based on a 2010 census and is also the lingua franca of more than 9 million people in Northern Philippines (Rubino, 2000). It is the most widely spoken language in the provinces in the Ilocos Region and the Cordillera Region, and is a language used in legal documents and proceedings of various people in these regions in the northern Philippines. Though originally confined to the provinces of Ilocos Norte, Ilocos Sur, and La Union (all in the Ilocos Region), the Ilokano people, being migratory, brought along the language as they now predominate in other provinces in the Ilocos Region (Pangasinan, Tarlac), in the Cordillera Regions (Abra, Benguet). Ilokano is also widely spoken as a second language in provinces in the Cagayan Valley Region, and is spoken by many Ilokano migrants in the southern regions in the Philippines. Moreover, because of the Filipino diaspora, Ilokano is now spoken in sizable Filipino migrant communities in Brunei, Singapore, Hong Kong, Saudi Arabia, Kuwait and in the USA (Rubino, 2000). The 2015 census estimated 85,800 Ilokano speakers in the USA, while the 2016 census estimated 25,300 Ilokano speakers in Canada. Given the widespread use of the language within the Philippines and other Filipino communities in different countries, translating and validating an Ilokano version of the DASS-21 is a useful undertaking, as the translated tool could help screen common psychological symptoms among Ilokano speakers.

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in the Cordillera Region and thus spoke the same variant of Ilokano. The two researchers first independently translated the English items into Ilokano with the goal of capturing the meaning of the psychological symptoms represented in each of the items. The goal was not necessarily to develop literal Ilokano translation of the English statements. After the researchers completed their translations independently, they met to review and form a consensus on the initial Ilokano translation for the items in all the scales. While there were some differences in the specific terms and phrasings proposed by the two researchers, these were minor variations, and it was easy to form a consensus on the initial translation. In their deliberations, the two researchers noted some difficulties in translating particular English phrases that involved idioms and metaphors in the English language (e.g., to wind down, downhearted and blue, nervous energy). But they found and agreed on appropriate idioms and phrases in Ilokano as appropriate translations for such terms.

The second phase of the translation process involved two consultants who were sought to review and audit the initial translation. Both consultants are also multilingual speakers of Ilokano, Filipino, and English, and are also trained psychology professionals with graduate degrees in psychology and experience in psychological assessment and psychological interventions. One of the consultants was from the Cordillera Region and the other was from the Ilocos Region. The two consultants were shown the Ilokano translation and the original English items, and were tasked to provide feedback on whether the Ilokano translations were equivalent to the original English items. They were also asked to comment on whether the specific words and phrases in the Ilokano translation could be understood by Ilokano speakers of different variants or dialects of Ilokano from their region, and by individuals of different educational attainment. Based on the consultants’ suggestions, a few changes were made to revise and improve the translations by the original translators.

The third phase of the translation process was a pilot administration of the revised Ilokano translation. Ten university students who were fluent in Ilokano and English were recruited to participate in individual interviews; the students were recruited specifically so that they come from different provinces in Northern Philippines that made use of the Ilokano language. Four of the students came from the Cordillera Region, three from the Ilocos Region and the remaining three from the Cagayan Valley Region. All ten students were first informed about the nature of the research study and were assured complete confidentiality about their responses. They were told that they could withdraw from the study at any time without any consequence. After sharing this background information, all students provided their informed consent to participate in the pilot study, which involved individual interviews. During the interview, the students were asked to answer the Ilokano version of the DASS-21, followed by the original English version. They were then asked about whether they found the Ilokano items comprehensible, and whether they thought the Ilokano and English items were equivalent. They were also asked to share any other comments they had about the translated scale. After obtaining feedback from the pilot study, the original two translators met to finalize the translations and made a few minor changes.

Validation of the Ilokano Translation

Participants and Procedures

Ilokano-speaking adults were recruited through various online platforms. An invitation in the Ilokano language briefly explained the purpose of the study and provided a link to an online survey. A total of 700 individuals responded to the invitation and provided their informed consent to participate in the study. We excluded data from participants who were younger than 18 years old, those who answered the survey twice, and those who had incomplete responses. The final sample was 668 Ilokano-speaking adults (76.20% were women and 23.80% were men), with the average age of 23.6 years (SD = 7.64). To help ensure that the participants are representative of the different Ilocano-speaking regions and provinces in the Philippines, they were recruited by sharing the survey link to key persons in universities in the three regions where individuals predominantly speak or use the Ilokano language. In the final sample, 274 (41%) participants came from the Cordillera Region, 260 (39%) from the Ilocos Region, 119 (18%) from the Cagayan Valley Region, and the remaining 15 (2%) participants came from other regions in the Philippines.

Participants were given debriefing information after they completed the survey. As some of the survey items pertained to concepts depicting psychological distress, the participants were given information about agencies, professionals and other resources that could address concerns that the participants were currently experiencing or may have been elicited by answering the survey form. The participants were then given the option to obtain a summary of the results from the different tests. Those who chose this option were given a general description of what symptoms they reported, with some suggestions of how they might cope with such symptoms. Participants who reported severe or extremely severe levels in any of the subscales were encouraged to contact mental health professionals and contact information of different centers were provided. Finally, participants were also given the option to join a raffle, where some participants were randomly picked to receive free load in their mobile phones.
**Measures**

Depression, Anxiety and Stress Scale-Ilokano (DASS-21-Ilokano) The DASS-21 Ilokano was the translation of the original scale designed to measure emotional distress in three subcategories (Lovibond & Lovibond, 1995) of depression, anxiety, and stress, with seven items for each category. Each item described a symptom and participants were asked to self-report whether each of the items (in the form of statements) applied to them over the past week, using a scale from 0 (did not apply to me at all) to 3 (applied to me very much or most of the time). For each subscale, the responses were summed and multiplied by two, and the higher scores indicated more severe levels of emotional distress.

Patient Health Questionnaire (PHQ-9) The PHQ-9 is the 9-item depression module of the full Patient Health Questionnaire (Kroenke et al., 2001), which originally measured eight diagnoses based on the Diagnostic and Statistical Manual, Fourth Edition (DSM-IV), including major depressive disorder, panic disorder, other anxiety disorder, bulimia nervosa, other depressive disorder, probable alcohol abuse/dependence, somatoform and binge eating disorder. The current PHQ-9 version is a self-administered questionnaire consisting of nine items that scores the 9 DSM-IV criteria for major depressive disorder in a scale from 0 (not at all) to 3 (nearly every day); total scores range from 0 to 27. An Ilokano translation of the scale was used, which had an internal consistency of Cronbach’s $\alpha = 0.93$ computed from the current sample.

General Anxiety Scale (GAD-7) The GAD-7 (Spitzer et al., 2006) is a 7-item scale that screens for generalized anxiety disorder and assesses its severity in clinical practice, based on the DSM-IV. The items of the test are measured using a scale from 0 (not at all) to 3 (nearly every day); the total scores range from 0 to 21. An Ilokano translation of the scale was used, which had a Cronbach’s $\alpha = 0.91$ computed from the current sample.

Scale of Positive and Negative Experience (SPANE) This SPANE (Diener et al., 2009) is a 12-item scale, with six items pertaining to positive experiences and six items to negative experiences. It assesses the full range of positive and negative experiences, including specific feelings that may have unique labels in particular cultures. It also reflects other states such as interest, flow, positive engagement, and physical pleasure. Each item is scored on a scale from 1 (very rarely or never) to 5 (very often or always). The positive and negative scales are scored separately because of the separability of the two types of feelings. The scores on both the positive scale (SPANE-P) negative scale (SPANE-N) can range from 6 to 30. The Cronbach’s $\alpha$ for SPANE-P and SPANE-N were 0.83 and 0.84, respectively.

Flourishing Scale (FS) The FS (Diener et al., 2009) is an 8-item summary measure of self-perceived success in important areas such as relationships, self-esteem, purpose, and optimism; it provides a single psychological well-being score. Items, which are phrased in a positive direction, are answered on a scale from 1 (strongly disagree) to 7 (strongly agree). Scores range from 8 to 56, and higher scores signify a higher view of the self in positive areas of functioning. The items were translated into Ilokano, and the computed Cronbach’s $\alpha = 0.94$.

**Results**

**Structural Validity of the DASS-21-Ilokano**

To test the structural validity of the Ilokano translation of the DASS-21, we conducted confirmatory factor analysis using Statistical Package for the Social Sciences-Analysis of a Moment Structures (SPSS AMOS, v. 26). We tested three models: (a) a one-factor model where all 21 items indicated one general distress factor, (b) the three-factor model proposed by Lovibond and Lovibond (1995), with three factors correlated with each other, and (c) the same three-factor model, but with correlated errors suggested by the modification indexes. We hypothesized that two-three-factor models would have better fit with the data than the one-factor model. Multiple indices were used to assess model fit: Comparative Fit Index (CFI > 0.90) (Bentler, 1990), the Tucker–Lewis Index (TLI > 0.90) (Tucker & Lewis, 1973), root mean square of approximation (RMSEA < 0.08) (Steiger, 2000), and Chi-square statistics ($\chi^2$/df < 5.0) (Bentler & Chou, 1987); the coefficients were also examined to check whether they were significant indicators of the hypothesized factor.

| Model                               | $\chi^2$  | df  | $p$   | $\chi^2$/df | CFI | TLI | RMSEA | 90% CI |
|-------------------------------------|-----------|-----|-------|-------------|-----|-----|-------|--------|
| One-factor model                    | 1502.24   | 189 | <.001 | 7.95        | .85 | .83 | .10   | .10 .11|
| Three-factor model                  | 1275.72   | 186 | <.001 | 6.86        | .87 | .86 | .09   | .09 .10|
| Three-factor model with correlated errors | 610.57   | 147 | <.001 | 4.15        | .95 | .92 | .07   | .06 .07|

$CFI$ Comparative Fit Index, $TLI$ Tucker–Lewis Index, $RMSEA$ Root Mean Square Error of Approximation
Table 1 summarizes the fit statistics for the three models, and the standardized coefficients for each of the 21 items for each model are shown in Table 2. The one-factor model showed poor fit; although many items significantly indicated the one factor, a few were not significant. The hypothesized three-factor models both had adequate fit, and all the standardized coefficients were higher than those in the one-factor model, and more importantly, they significantly indicated their hypothesized factors. However, the third model (with correlated errors) showed the best set of fit indexes. Figure 1 summarizes the coefficients and covariances among the different subscales for the third model.

Table 2 Summary of standardized coefficients of the items for the three models of DASS-21-Ilokano

| Item         | One-factor model | Three-factor model | Three-factor model with correlated errors |
|--------------|------------------|--------------------|------------------------------------------|
| DASS-D-3     | .30**            | .54***             | .53***                                   |
| DASS-D-5     | .37*             | .76***             | .67***                                   |
| DASS-D-10    | .22*             | .77***             | .69***                                   |
| DASS-D-13    | .23*             | .80***             | .71***                                   |
| DASS-D-16    | .20              | .65***             | .62***                                   |
| DASS-D-17    | .27*             | .76***             | .69***                                   |
| DASS-D-21    | .21*             | .77***             | .72***                                   |
| DASS-A-2     | .25*             | .48***             | .49***                                   |
| DASS-A-4     | .29*             | .56***             | .57***                                   |
| DASS-A-7     | .33**            | .61***             | .59***                                   |
| DASS-A-9     | .29*             | .72***             | .68***                                   |
| DASS-A-15    | .20*             | .78***             | .73***                                   |
| DASS-A-19    | .23*             | .73***             | .71***                                   |
| DASS-A-20    | .19              | .78***             | .75***                                   |
| DASS-S-1     | .36**            | .63***             | .63***                                   |
| DASS-S-6     | .33**            | .67***             | .65***                                   |
| DASS-S-8     | .32**            | .71***             | .68***                                   |
| DASS-S-11    | .18              | .76***             | .73***                                   |
| DASS-S-12    | .20*             | .79***             | .76***                                   |
| DASS-S-14    | .29*             | .72***             | .69***                                   |
| DASS-S-18    | .49***           | .70***             | .66***                                   |

*p < .05; **p < .01; ***p < .001

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Internal Consistency of DASS-21-Ilokano Subscales

Having established the three-factor structure of the Ilokano translation of DASS-21, we then proceeded to examine the internal consistency of the subscales. All subscales had good internal consistency: DASS-Depression, $\alpha = 0.88$, for DASS-Anxiety, $\alpha = 0.86$, and for DASS-Stress, $\alpha = 0.87$.

Criterion Validity of the DASS-21 Ilokano

We attempted to establish some initiation criterion validity of the Ilokano translation of DASS-21 by examining correlations of the subscales with different related scales. For this purpose it is worth considering some descriptive statistics of the three subscales. As summarized in Table 3, the means are generally low, but the scores represent the full range of possible scores, which was important for examining the correlations. The correlations are summarized in Table 4, and all the correlations are significant and in the expected direction. That is, the DASS subscales were all positively correlated with PHQ-9, GAD-7, and the negative subscale of SPANE, and negatively correlated with FS and the positive subscale of SPANE.

We undertook further tests to see whether the DASS-21-Ilokano subscales correlated differently with the criterion variables. That is, DASS-Depression should be more strongly correlated with the other measure of depression symptoms (PHQ-9) and DASS-Anxiety should be more strongly correlated with the other measure of generalized anxiety symptoms (GAD-7) compared to all other correlations. This is a stringent test because variables that relate to anxiety are also known to relate to depression. For these tests, we used a software (Lee & Preacher, 2013, using the equations of Steiger, 1980) to compute the $z$-score to test the difference between two dependent correlations with one variable in common.

First, DASS-Depression should be more strongly correlated with PHQ-9 than with GAD-7 and SPANE-N. This is because DASS-Depression and PHQ-9 are both screening for depression symptoms, while the GAD-7 and SPANE-N are measuring anxiety and negative affect, respectively. The results are consistent with this expectation. The correlation between DASS-Depression and PHQ-9 stronger compared to DASS-Depression’s correlation with GAD-7 [0.74 vs. 0.69; $z = 1.89$, $p = 0.029$, one-tailed test] and to DASS-Depression’s correlation with SPANE-N [0.74 vs. 0.61; $z = 4.27$, $p < 0.001$, one-tailed test]. We further assume that DASS-Depression’s correlation with PHQ-9 would be stronger compared to its negative correlations with SPANE-P [0.74 vs. −0.38; $z = 9.52$, $p < 0.001$, one-tailed test] and with FS [0.74 vs. −0.50; $z = 6.94$, $p < 0.001$, one-tailed test], and these were all verified by the analysis.

Second, DASS-Anxiety should be more strongly correlated with GAD-7, than with PHQ-9 and SPANE-N. Again, this is because DASS-Anxiety and GAD-7 are both screening for anxiety symptoms, whereas PHQ-9 and SPANE-N are screening for depression symptoms and negative affect. The correlation between DASS-Anxiety and GAD-7 was higher compared to DASS-Anxiety’s correlation with SPANE-N [0.74 vs. 0.59; $z = 4.79$, $p < 0.001$, one-tailed test].
but not to DASS-Anxiety’s correlation with PHQ-9 [0.74 vs. 0.71; \(z = 119, p = 0.117\), one-tailed test]. The latter result suggests that DASS-Anxiety subscale scores seem to be equally correlated with other measures of both anxiety and depression. But also, as expected, DASS-Anxiety’s correlation with GAD-7 was stronger compared to its negative correlation with SPANE-P [0.74 vs. −0.29; \(z = 11.36\),

### Table 3 Descriptive statistics of DASS-21-Ilokano subscales

| Subscale       | Minimum | Maximum | M    | SD    |
|----------------|---------|---------|------|-------|
| DASS-depression| 0       | 42      | 5.83 | 7.43  |
| DASS-anxiety   | 0       | 38      | 5.13 | 6.94  |
| DASS-stress    | 0       | 42      | 8.05 | 8.21  |
| DASS-total     | 0       | 118     | 19.02| 21.23 |

### Table 4 Correlations (Pearson R) among DASS-21-Ilokano subscales and criterion variables

| Criterion variables               | DASS-depression | DASS-anxiety | DASS-stress |
|-----------------------------------|-----------------|--------------|-------------|
| Generalized anxiety scale (GAD-7) | .69***          | .74***       | .79***      |
| Patient health questionnaire (PHQ-9) | .74***          | .71***       | .73***      |
| Scale of positive and negative emotions-negative (SPANE-N) | .61***          | .59***       | .65***      |
| Scale of positive and negative emotions-positive (SPANE-P) | −.38***         | −.29***      | −.27***     |
| Flourishing scale (FS)            | −.50***         | −.41***      | −.38***     |

***\(p < .001\)
Finally, the DASS-Stress scale is supposed to measure stress and tension symptoms associated with generalized anxiety (Brown et al., 1997; Lovibond & Lovibond, 1995) and as such is expected to be more strongly related to GAD-7 and less so with PHQ-9 and SPANE-N. The analyses support these propositions. DASS-Stress’ correlations with GAD-7 was statistically higher than its correlation with PHQ [0.79 vs. 0.73; \( z = 3.02, p = 0.001 \), one-tailed test] and with SPANE-N [0.79 vs. 0.65; \( z = 5.56, p < 0.001 \), one-tailed test]. And as expected, DASS-Stress’ correlation with GAD-7 was stronger compared to its negative correlation with SPANE-P [0.79 vs. -0.27; \( z = 13.86, p < 0.001 \), one-tailed test] and with FS [0.79 vs. -0.38; \( z = 11.63, p < 0.001 \), one-tailed test].

Overall, the above results provide evidence for the criterion validity of the DASS-21 Ilokano version. The three DASS subscales are positive correlated with other measures of psychological symptoms and negative affect and are negatively correlated with measures of positive affect and flourishing. Generally, the subscales also correlate more strongly with other scales that measure the same set of symptoms, except for the DASS-Anxiety subscale being equally strongly correlated with measures of anxiety and depression.

**Discussion**

We developed an Ilokano translation of the DASS-21 following a careful multistage process that involved various bilingual and multilingual Ilokano speakers in vetting the translated items. In the main study, we validated the three-factor model (Lovibond & Lovibond, 1995) of the DASS-21 Ilokano version of the DASS-21 and confirmatory factor analysis revealed indicated a good fit between the data from the Ilokano version and the hypothesized three-factor model compared to a one-factor model. The three subscales representing the three factors also showed good internal consistency. These results are consistent with findings of other DASS-21 translations (e.g., Ashgari et al., 2008; Mellor et al., 2015; Musa et al., 2007; Yildirim et al., 2018).

We provided further evidence for the validity of the scale by showing that the DASS-Depression, DASS-Anxiety and DASS-Stress subscales positively correlated with validated tests that measured depression and anxiety similar to previous studies (e.g., Alfonsson et al., 2017; Chan & Bernardo, 2017; Deokhoon et al., 2018; Lee & Kim, 2020; Sinclair et al., 2012). The subscales also had moderate positive correlations with tests that measure negative affect, similar to other studies (Henry & Crawford, 2005; Oei et al., 2013). The findings also converged with previous studies (Deokhoon et al., 2018; Henry & Crawford, 2005; Kyriazos et al., 2018) that indicated weak to moderate negative correlations with tests that measure positive affect, flourishing and other indicators of positive well-being. Moreover, using a stringent test, DASS-Depression was more strongly associated with another depression measure compared to anxiety and negative affect measures, and DASS-Anxiety was more strongly associated with another measured of anxiety compared to a negative affect measure. These results find further evidence for the criterion validity of the DASS-21 Ilokano version.

As we noted in the Introduction, the DASS-21 has been validated in many other languages; as such, some might think that this translation and validation does not contribute much to the global research literature. However, to our knowledge, the only previously validated translations of DASS-21 into Austronesian languages involved translations into Bahasa Malay and Bahasa Indonesia (Musa et al., 2007; Oei et al., 2013), and this is the first attempt to translate the scale in Ilokano, an Austronesian language spoken by over 9 million in the Philippines and in diasporic Filipino communities in different continents. Similar to what was observed by Oei and colleagues, some words in the English version of DASS-21 could not be easily translated into Ilokano. For the English words that were idiomatic or metaphorical (e.g., to wind down, downhearted and blue), the Ilokano translation referred to the Ilokano idioms and metaphors, without direct translating the English words. However, some terms such as “relax” were used in English as there was no Ilokano translation that would fit in the context referred to in the screening tool. Indeed, words such as “relax” seem to be integrated into the lexicon of Ilokano and other Philippine languages as the word is sometimes spelled using the local orthography (e.g., relaks) and seems to be understood by most Filipinos and even those who primarily use Ilokano. As a result of these adaptations, all 21 items were translated and showed good psychometric properties.

As we noted earlier, there are regional variations in how Ilokano is spoken in different parts of the Philippines. The variations were noted in the pilot study where individual interviews were conducted to ask the participants to evaluate the different translations of items. Those that came from provinces in and/or closer to the Ilocos region recognized some of the translated words and phrases as typical Ilocano terms. On the other hand, those that came from the Cordillera region found those same translations less familiar, but still understandable in context. So while the results of the validation study involved participants from different regions of the Philippines, we did not validate the results separately based on the origin of the participants. Further research might inquire into differential items functioning depending on the region of the person answering the DASS-21 Ilokano version.

The preceding point relates to a limitation of our initial validation study. Although our sample was drawn from the...
three Philippine regions where there are high number of native speakers and second language speakers of Ilokano, we cannot claim to have had a representative sample. The online data-gathering inevitably biased the sample for those who are younger adults, who are more educated, and who had easy access to the internet and computers. Another limitation of this study is that it did not differentiate native Ilokano speakers from those who use Ilokano as their second or passive language. We also mentioned the Ilokano speakers in the diasporic Filipino communities, but the study did not deliberately sample such individuals in the validation study. So our validation results should be seen as preliminary evidence for the structural validity, internal consistency, and criterion validity of the Ilokano version of the DASS-21. More validation studies should be undertaken to establish the validity of the Ilokano DASS-21 with more diverse Ilokano-speaking samples, particularly less educated individuals who may also need to be assessed using oral administration of the screening tool. As the initial validation study was undertaken with a non-clinical sample, it is also important to establish the validity of the Ilokano DASS-21 by comparing non-clinical samples with samples diagnosed with depression and different anxiety disorders. Future research could also inquire into other psychometric properties of the translation such as test–retest reliability, invariance across sex, and whether different norms need to be established using the Ilokano DASS-21.

Even as we note limitations in the scope of the current translation and validation study, we undertook a careful and systematic approach to the translation and adaptation process and to the initial structural validation and construct validation of this translation in the Ilokano language. This language that is the third most widely spoken language in a very populous country and is spoken by a diasporic community across the globe but that has never been used systematically in psychological assessment. Given the initial evidence for the three-factor structure, the good reliability, and criterion validity of the Ilocano version of the DASS-21, it appears to be an adequate tool in assessing aspects of depression, anxiety, stress and general distress for Ilokano-speaking individuals. The availability of a viable and valid tool should help screen individuals with distress who come from regions and province of the Philippines where mostly communicate using their native Ilokano, instead of the official languages of English or Filipino.

Even as there are already several studies that translated and validated the DASS-21, we should underscore the need to continuously translate and validate the screening tool in languages used in communities that are not served by psychologists and other mental health professionals, whose assessment tools are in foreign unfamiliar languages. If psychology seeks to be a truly global science and profession, its tools and approaches need to be adapted and validated in as many different cultures and social groups as possible. We believe that our study has taken a small but important step in making psychological services a bit more responsive to one of the ethnolinguistic communities that might be currently underserved.

Author Contributions Basic conceptualization was contributed by ABB; detailed conceptualization was contributed by PDB and SIM; translation methodology was contributed by PDB and SIM; translation audit and pilot were contributed by PDB and SIM; validation methodology was contributed by PDB and SIM; plan for formal analysis was contributed by ABB; data curation was contributed by PDB; main formal analysis was contributed by PDB; additional analysis was contributed by ABB; writing—original draft was contributed by PDB and ABB; writing—review, editing, and revision was contributed by PDB, MIB and ABB; supervision was contributed by ABB; project administration was contributed by PDB and MIB; funding acquisition was contributed by ABB. All authors have read and agreed to the published version of the manuscript.

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Availability of Data and Materials The dataset analyzed in the current study are available from the corresponding author on reasonable request.

Code Availability Not applicable.

Declarations

Conflict of interest The authors declare no conflict of interest or any competing interests.

Consent to participate All participants in the study provided their written informed consent to participate in the study.

Consent for publication Not applicable.

Ethical approval The research procedures in the comply with ethical principles for research with human participants consistent with the 1964 Helsinki Declaration and its later amendments and comparable ethical standards. Informed consent was obtained from all participants in the pilot study and validation study, no information that can indicate the identity of the participants was encoded or recorded.

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