Complementing Standard Western Measures of Depression with Locally Co-developed Instruments: A Cross-Cultural Study on the Experience of Depression Among the Luo in Kenya

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Abstract

Our present understanding of depression relies on a Western nosology that might not be generalizable across diverse cultures around the world. As a consequence, current clinical research and practice may not capture culturally salient features of depression. Expanded cross-cultural research that uses ethnographic methods and indigenous instruments may yield information of clinical utility to enhance culturally sensitive research and practice. In this mixed methods study, we used ethno-semantic interview procedures based on the DSM-5's cultural formulation process to elicit a broad range of depression features reported by the Luo people of Western Kenya. We identified how the Luo conceptualize depression, including idioms of depressive distress, moods associated with persistent negative affect, and other features including context, stressors and support systems. This information informed the co-development of a Luo Depression Questionnaire (LDQ-17). We used the LDQ-17 in a cross-sectional community survey (*N*=116) to investigate its association with a standard Western instrument (Patient Health Questionnaire-9; PHQ-9). Factor analysis revealed a 1-factor model for the PHQ-9 but not the LDQ-17 for which exploratory factor analysis suggested a 3-factor model including cognitive, affective, and physical symptoms. Psychological, environmental/social, and even supernatural causes of these symptoms were identified, as were support systems. Finally, visualizations through multidimensional scaling approaches showed some overlap between the LDQ-17 and the PHQ-9, but the indigenous LDQ-17 identified salient features the Luo associated with depression that the PHQ-9 missed. Our findings illustrate how simple ethnographic procedures may guide development of indigenous instruments to complement current standardized instruments, potentially enhancing cultural relevance.

Keywords: Depression, Culture, Cross-cultural psychiatry, Global mental health, Sub Saharan Africa

Complementing Standard Western Measures of Depression with Locally Co-developed Instruments: A Cross-Cultural Study on the Experience of Depression Among the Luo in Kenya

Depression is a major global health challenge. Epidemiological studies show high prevalence rates of depression around the world (Ferrari et al., 2013), and it is the leading mental health cause of the global disease burden (Chisholm et al., 2016; Patel et al., 2016). Even though 300 million people around the world are affected by depression (World Health Organization, 2017), many of them – and especially those in low- and middle-income countries – do not receive treatment (Patel et al., 2016). While it appears that depression is widespread and its consequences devastating globally, some recent observers have suggested a closer look at the global depression "epidemic" (Baxter et al., 2014). One reason for a nuanced look is that though many of the people affected with depression live in non-Western countries, the research that has informed our understanding of the epidemiology, clinical presentation and treatment of depression has been done primarily with populations in Western settings (Haroz et al., 2017). As a consequence, most of our present understanding of depression relies on assumptions about the generalizability of Western-derived research methods across the otherwise diverse populations of the world (Kirmayer et al., 2017). In order to arrive at a more robust understanding of depression, expanded cross-cultural research is urgently needed (Haroz et al., 2017).

There is evidence for a syndrome similar to major depressive disorder (MDD) per the Diagnostic Statistical Manual (DSM-5; American Psychiatric Association, 2013) across many cultures around the world (Kirmayer & Jarvis, 2006; Kleinman & Good, 1985; Steel et al., 2014). Studies have shown the prevalence, symptomatology, and clinical presentations of this syndrome to vary across these cultures (Ferrari et al., 2013; Kessler & Bromet, 2013). A recent qualitative review examined whether Western-derived diagnostic criteria were appropriate for persons from varied cultures globally: the review found substantial cultural variation and called for expanded research on how cultural diversity affects our present understanding of depression (Haroz et al., 2017). Insofar as the status quo puts emphasis on the experience of depression as defined by Western research and clinical practice approaches, a global understanding of depression remains elusive.

How we understand depression has remained largely consistent since the classification of MDD in the DSM-III – a classification that was heavily influenced by the American psychiatric school of thought (predominantly the Feighner criteria; Feighner, 1972) that has since become a kind of "gold standard" in clinical practice and research (Kawa & Giordano, 2012). A consequence of this is that subsequent research has relied on standard instruments based on a Western nosology of depression and has limited our ability to arrive at a complete picture of depression globally. Indeed, many medical anthropologists and cross-cultural psychiatrists have been critical of this dominant framework for conceptualizing depression and called attention to its potential bias towards Western clinical populations that fails to engage salient features of depressive distress across cultures (Bass et al., 2007; Kleinman, 2004; Lewis-Fernández & Krishan Aggarwal, 2013).

Although the existing Western orientation in our conceptualization of depression limits a global understanding of the syndrome, abandoning these now standard approaches might not be the answer to addressing global mental health inequality. Likewise, mere additions of locally derived symptoms to standard Western instruments do not absolve these measures of their inherent risk of bias and might even over-extend the category of clinical depression to include symptoms best understood under other classifications (Kirmayer et al., 2017). One solution might lie in co-developing local instruments through simple ethnographic approaches with the local communities for which their use is intended. This approach may result in the development of indigenous tools, that when used together with standard measures of depression, provide complementary and possibly high utility information for research and clinical practice within these communites. For example, such indigenous tools might complement the standard structured interviews and self-report questionnaires, and elicit culturally-sensitive information that could inform treatment. A recent suggestion of what such an approach could look like appeared in response to a call for a "broader, bottom-up, open-ended approach to better understand the applicability of DSM depression criteria" (Haroz et al., 2017); it involves decomposing depression into its constitutive symptoms and studying each independently (Kirmayer et al., 2017). In this approach, after depression is decomposed into its constitutive symptoms, these symptoms are studied independently and comparatively

to elicit local concepts and idioms of associated moods and distress. We adapted this approach for the present study with the aim of investigating whether such a framework could provide localized information of clinical utility.

We conducted this study with the Luo people of western Kenya, a low-income country that is understudied in global mental health research. We used a simple ethnographic procedure based on the cultural formulation interview (CFI) in the DSM-5 (American Psychiatric Association, 2013) to ascertain Luo understanding of depression and associated distress, focusing on these questions: What do the Luo think of depression as defined by the DSM-5 classification and its constituent symptoms? What are their perceptions of the causes, context, stressors, and support systems for these symptoms? What are the Luo idioms and concepts of moods and distress that are associated with persistent negative affect? We used our findings to iteratively and collaboratively co-develop an indigenous instrument for assessing depression as experienced by the Luo. We use this instrument – as well as a standard instrument – to investigate the degree of overlap between the indigenous instrument and a standard Western instrument, as has been done in previous similar cross-cultural undertakings (Lee & Kleinman, 1997; Manson et al., 1985) as well as in studies with refugees from low- and middle-income countries who have emigrated to the West (Kokanovic, Dowrick, Butler, Herrman, & Gunn, 2008). With a community sample, we also identify the correlation between depressive symptoms, as measured by both instruments, with anxiety and sociodemographic variables.

Methods

Study Setting

Our study took place in South Sakwa ward in Awendo constituency of Migori county, one of Kenya's 47 geographical counties. Located on the shores of Lake Victoria in Western Kenya, Migori has a population of 1.2 million people (Kenya National Bureau of Statistics, 2019) most of whom are members of the Luo tribe. The 7.5 million Luos in Kenya form part of the broader Luo people - several ethnically and linguistically related Nilotic groups in East Africa. The Luo culture is clan-based, with personal identity rooted in one's paternal group (for review, see Ocholla-Ayayo, 1980).

Our work focused on Waundha sub-location, one of the 8 sub-locations in South Sakwa. The first author—a native Luo born and raised in Waundha—solicited the help of the area chief and elders for the purpose of study activities. Study activities began in June 2019. We adopted a consultative model that incorporated guidance and feedback from local leaders and community members in South Sakwa. All study activities were approved by a local ethics review committee – the Maseno University Ethics Review Council.

Participants

All participants in the present study belonged to the Luo tribe and Dholuo was their native language. The first phase of our study consisted of informant focus group discussions. Adult participants (*N* = 21; ages 20-to-75; M age = 40.86, SD = 20.65; 42.86% female) were drawn from Nyabera village. The second phase of our study was a community survey in South Sakwa. We recruited 116 adult participants (48.28% female; M age = 39.17, SD = 17.30) through door-to-door home visits in August 2019. See Table 1 for sample characteristics. All participants provided written informed consent.

Procedures

Translation of study instruments into Dholuo.

Dholuo is the native language of the Luo people. It is rich in its descriptions of illness and disease, some of which not surprisingly deviate from traditional Western biomedical concepts (Ojwang, 2018). We translated and adapted study instruments, two brief standard screeners for symptoms of depression and anxiety (see Measures), per World Health Organization guidelines (World Health Organization, 2016).

Forward translation of all study measures to Dholuo was done by a native bilingual Luo from South Sakwa. The translator was instructed to emphasize conceptual rather than literal translations, and to use wording that would be natural and acceptable to the broadest and most common Luo audience. A bilingual expert committee of three people (2 males, 1 female) was convened. Members included a community mental health counselor, a member of the clergy, and a local newspaper journalist (who also served as editor-in-chief of the committee given their experience with writing and translation through

their work in the local media). The committee was provided with all study instruments and forward translated Dholuo versions of the instruments. The committee met two times for 90-minutes and produced complete translated Dholuo versions of the study instruments. Finally, a local headmaster back translated the Dholuo instruments in English. Discrepancies in translations were discussed with the editor-in-chief, in consultation with the expert committee, until final Dholuo versions of the instruments were arrived at. See online supplementary materials for more information.

Elicitation of Luo depressive symptoms.

Conceptualizing mental disorders like depression cross-culturally is not an easy task (Kleinman, 1977; Lee & Klehat inman, 1997; Manson et al., 1985). In Dholuo, there is no semantic equivalent for the word "depression." Thus, elicitations of depression and its presumed symptoms were required. Traditionally, ethno-semantic interview procedures are used to elicit lexical taxonomies of disease entities across cultures (Parfitt, 1996). As our study aimed to adopt a simple and accessible elicitation procedure, we based our methods on the "gold standard" cultural formulation process proposed in the DSM-5 (American Psychiatric Association, 2013; Lewis-Fernández et al., 2014).

The DSM-5's cultural formulation proposes a framework for assessing the cultural features of mental disorders, and how they relate to social, moral, and historical context within a specific culture. It provides a systematic procedure for assessing the role of cultural identity, cultural conceptualizations of distress, and the psychosocial stressors and cultural features of vulnerability and resilience. The Cultural Formulation Interview (CFI) is a set of 16 questions that may be used to obtain information about the impact of culture on a mental condition during the cultural formulation process (American Psychiatric Association, 2013). We adapted the CFI (see online supplementary materials) and used it as a framework to elicit a broad range of Luo cultural features of depression.

Informants were systematically recruited from Nyabera village with special attention to sex and age. Four focus groups (3 to 6 people per group) were formed from 21 informants (ages 20-to-75; M age 40.86; SD = 20.65; 42.86% female; see Table 1). As the CFI requires the presentation of a problem (or

symptom) as the starting point for discussions, we used each of the constituent symptoms of the Patient Health Questionnaire (PHQ-9; see Measures) to guide our discussions.

The focus group discussions were led by the first author who began by thanking informants for participation, welcoming and encouraging their active contribution, and explaining to them the privacy and confidentiality of group discussions. After this, the sessions were divided into three parts:

In part one, informants were told that different people understood the same problem in different ways. They were then asked what they thought about someone who had a specific PHQ symptom. For example, the first item in the PHQ-9 concerns anhedonia which is a hallmark of depression. Specifically, the PHQ-9 asks if in the last two weeks someone has been bothered by *"little interest, or pleasure in doing things"*. When this item was presented to start focus group discussions, the informants were asked: *"What do you think about someone who has little interest, or pleasure in doing things?"* They were then asked how someone with *"little interest, or pleasure in doing things"* would describe this problem to their family, friends, and community. Finally, informants were queried as to what they thought troubled someone with *"little interest, or pleasure in doing things"* the most.

In part two, the discussions aimed to elicit the cultural perceptions of cause, context, stressors and support of depressive symptoms. Questions included: what do you think is happening to someone with *"little interest, or pleasure in doing things"*; what is the cause of *"little interest, or pleasure in doing things"*; what do you think that the family, friends and others in the community of someone with this problem think causes the problem; are there any kinds of support to make someone who has *"little interest, or pleasure in doing things"* better; are there any kinds of stressors that would make the person worse; are there any aspects of this person's culture and background, including membership in the Luo tribe, that might make a difference as to how the person experienced this problem?

Finally, in part three the discussions focused on the cultural factors that might influence help-seeking. Questions included: what are the different kinds of treatments, help, advice or healing someone could seek for *"little interest, or pleasure in doing things"*, and what could prevent them from seeking the help that they needed. The same procedure was employed for each of the nine items in the PHQ-9.

Development of indigenous instrument: the Luo Depression Questionnaire.

Following informant focus group discussions, we set out to co-develop an indigenous Luo instrument for assessing depression via Dholuo idioms and concepts of distress. This process was iterative and included efforts by the study staff, a four-person panel of elders from South Sakwa and interested informants from the focus groups. Using audio recording and transcriptions of informant discussion, the first author developed a list of all Dholuo idioms for depression. This was done by systematically identifying both the common and uncommon idioms across all the group discussions (see online supplementary materials). This list was then presented to the panel and workshopped, a process in which repeated idioms and those that referred to biologically defined medical conditions were removed, and a list of 23 items was developed. Informants (*N*=7) were invited to another workshop with the panel and the first author. The workshop participants were instructed to identify items which were almost similar in meaning (redundant), whose meaning were ambiguous or subject to multiple possible meanings or referred to other medical concerns. In this process, the list of items was reduced to a final 17. We called this instrument the Luo Depression Questionnaire (LDQ-17). Table 2 shows the items of LDQ-17 (see online supplementary materials).

Community survey for depressive symptoms.

Finally, we conducted a community survey for depressive symptoms in South Sakwa. Four research assistants—trained and supervised by the first author—conducted door-to-door visits to homes in the region. In an attempt to ensure representative sampling of South Sakwa, we randomly selected four sub-locations in South Sakwa and assigned each assistant to one. Once at the homes, research assistants informed potential participants about the study and study goals, answered any questions, and obtained informed consent from participants. Participants then completed a questionnaire battery. Participants who could read and write had the option to fill out the questionnaires privately. For those who could not, the research assistants administered the questionnaires orally. All procedures were conducted in Dholuo. Participants had approximately 20 minutes to complete the questionnaires. There were two versions of the questionnaires with measures in different orders to help control for any effects of measure order on

participants. At the end, participants received 40 shillings ($0.40) of airtime - which was the equivalent of 20 minutes - on their mobile phones as a token of appreciation.

Measures

Patient Health Questionnaire – 9.

The Patient Health Questionnaire 9 (PHQ-9) (Kroenke & Spitzer, 2002) is a brief diagnostic and severity measure for depression that contains all of the nine diagnostic criteria in the DSM-5. The psychometric properties of the PHQ-9 have been documented with both clinical and general populations in America (Kroenke et al., 2001). The PHQ has been used in adult (Omoro et al., 2006) and adolescent (Osborn, Venturo-Conerly et al., 2020; Osborn, Rodriguez et al., 2020) populations in Kenya. Here, Cronbach's alpha for the PHQ -9 was 0.82, 95% CI [.77, .86].

Generalized Anxiety Disorder Screener – 7.

The Generalized Anxiety Disorder Screener-7 (GAD-7) is a brief diagnostic and severity measure for generalized anxiety disorder in general and clinical populations (Spitzer, Kroenke, Williams, & Löwe, 2006). Its psychometric properties have been documented with North American samples (Spitzer et al., 2006). To the best of our knowledge, the GAD-7 has not been used in a study with adult populations in Kenya but has been used with adolescent populations in Kenya (Osborn Venturo-Conerly et al., 2020; Osborn, Rodriguez et al., 2020). Here, Cronbach's alpha for the GAD-7 was 0.83, 95% CI [.78, .87].

Luo Depression Questionnaire – 17.

The Luo Depression Questionnaire (LDQ-17) is an indigenous depression screener in Dholuo that was developed for the present study as has been described above. It includes 17 items (each rated 0 to 3) and scores range from 0 to 51 with higher symptom scores indicating increased severity of symptoms. Here, Cronbach's alpha for the LDQ was 0.88, 95% CI [.85, .91].

Demographic and other information.

We also collected demographic information including gender, age and household size. Participants in the cross-sectional community survey were asked to rate how familiar they were with the three broad Luo symptom sub-categories for depression that had been elicited during the focus group

discussions (and which are discussed in detail in the Results section); the participants also provided their opinions on causes and support for these symptom sub-categories.

Data Analysis Plan

We performed quantitative analyses to understand the extent to which the experience of depression (conceptualization, prevalence, and correlates) overlapped between the Western PHQ-9 and the indigenous LDQ-17. We examined the psychometric properties of these instruments. Cronbach's alpha was used to determine internal consistency: scores of .70 and above indicate adequate internal consistency (Nunnally, 1978). To test for construct validity, we used confirmatory factor analysis (CFA) to test a one-factor model on both the PHQ-9 and LDQ-17. Previous studies have repeatedly identified a one-factor solution for the PHQ-9 (Gelaye et al., 2013; Yu et al., 2012). For the LDQ-17, we hypothesized that if the instrument was, like the PHQ-9, measuring the latent variable "depression", then a one-factor model would hold. Model fitting was done using the *lavaan* package in R (Rosseel, 2012), using maximum likelihood estimation. Latent factors were standardized to allow for free estimation of all factor loadings. Goodness of model fit was assessed using the root mean square error of approximation (RMSEA), Tucker –Lewis Fit Index (TFI), and the comparative fit index (CFI). TFI values of at least .9 indicate acceptable fit and values of at least .95 indicate a very good fit. Furthermore, RMSEA values no greater than .05 indicate good fit, values between .05 and .08 indicate moderate fit and values greater than .08 indicate poor fit (Hu & Bentler, 1999). As the factor structure of the indigenous LDQ-17 has not been investigated previously, we also conducted an exploratory factory analysis (EFA) with maximum likelihood estimation to investigate the number of factors in the LDQ-17 for purely hypothesis generation purposes. Promax oblique rotation was performed because the LDQ-17 factors might be intercorrelated with each other. The number of factors to extract was determined using the parallel analysis.

To determine the extent of the overlap between the PHQ-9 and the LDQ-17—and to maximize our study's heuristic and hypothesis generating potential—we examined item-level correlations between the two instruments and used a statistical technique called multidimensional scaling (MDS) to visualize the similarity between the items in both instruments. MDS allowed us to construct an interpretable picture

of the overlap and distance between the items in the PHQ-9 and the LDQ-17. MDS translates information about pairwise distances among a set of *n* objects into a configuration of *n* points mapped into an abstract Cartesian space (Borg & Groenen, 2003; De Leeuw, 1984; Kruskal, 1964). In this way we obtained quantitative estimates of similarity and dissimilarity among a group of items. MDS employs a set of statistical techniques to reduce the complexity of a dataset: proximities (similarities and dissimilarities) among objects are represented as distances among points in a low-dimensional space (with a given dimensionality). As such, we can graphically visualize similarity structures in a given dataset (see Hout, Papesh, & Goldinger, 2013). To assess the fit of an MDS solution, we calculated *stress* scores; per Kruskal's guidelines stress scores of 0.20 indicate a poor fit, 0.10 indicate a fair fit, 0.05 indicate a good fit and 0.00 indicate a perfect fit (1964). [Kruskal's guidelines are based on empirical experience rather than theoretical criteria, and some researchers have suggested that they be used flexibly with an eye toward the interpretability of the solution (Borg & Groenen, 2003; Hout et al., 2013)]. We ran MDS in R using the *SMACOF* package using two dimensions to enhance interpretability (de Leeuw & Mair, 2009).

Finally, we examined the association between depressive symptoms (as endorsed by both the PHQ-9 and LDQ-17) and anxiety symptoms. Depression and anxiety are highly comorbid, and we expected to find significant associations (indicated by Pearson's correlations) between anxiety and depression as measured by both instruments. After this, we used two linear regression models to assess the association between depressive symptoms as endorsed by these two instruments and the sociodemographic variables: age, sex, and household size.

Results

Luo Categories for Symptoms of Depression

From our focus groups we identified various symptoms of depression which were classified into three broad categories: *paro mang'eny* (symptoms from too many thoughts), *chandruok mar chuny* (symptoms from troubles of the heart), and *dend mojony* (symptoms from general body weakness and somatic concerns).

Paro mang'eny refers to broad cognitive disturbances that cause some sort of functional impairment. Symptoms that characterize *paro mang'eny* include *kuyo* (sadness), *bedo maonge gimor* (being without happiness), *shida mag nindo* (sleep problems), *paro mariwni* (trouble concentration), and *paro mag negrouk* (suicidal ideation). It emerged that *paro mang'eny* was the closest Dholuo idiom to "psychological stress".

Chandruok mar chuny refers to broad "heart" (affective) disturbances that affect emotions, moods and cause some functional impairment. *Chandruok mar chuny* is closely related to other Luo idioms including *chuny ma-ool* ("a tired heart") and *chuny machandore* ("a troubled heart"). Symptoms that characterize *chandruok mar chuny* are *lek marach* (bad dreams; prevent people from sleeping well), *dangni* (psychomotor agitation) or wuotho*/wuoyo mos* (psychomotor retardation), and *kuyo* (sadness).

Dend mojony refers to general body weakness, a lack of energy for which physical causes cannot be discerned and other associated somatic concerns. It is characterized by *dhok marach* ("bad mouth"; appetite problems), *dangni* (psychomotor agitation) or wuotho*/wuoyo mos* (psychomotor retardation), and *paro mariwni* (trouble concentrating).

No clear patterns emerged in regard to the lives of the people who typically experienced these symptoms. Although there is no Dholuo word for "depression", paro *mang'eny, chandruok mar chuny,* and *dend mojony* were identified as the broad Luo symptom categories that most closely match the DSM-5 definition of a depression syndrome. The symptoms in these categories are thought to have internal, external and sometimes supernatural causes, and potentially to arise from a single disorder, à la depression, or even three distinct disorders that affect cognitive, affective and physical states.

Knowledge of Luo Categories of Depressive Symptoms

To what extent was our community sample familiar with the three indigenously defined categories of depressive symptoms that are described above? Participants rated their familiarity with these categories on a scale of 1 to 5 with higher values indicating more familiarity. For *chandruok mar chuny,* the mean rating was 4.82 (SD = 0.68); for *paro mang'eny,* the mean rating was 4.93 (SD = 0.37); and for

dend mojony, the mean rating was 4.77 (SD = 0.82). These high ratings indicate familiarity with these categories.

Cultural Conceptualizations of DSM-5 Diagnostic Symptoms for Depression.

To be diagnosed with clinical depression (MDD) per the DSM-5 criteria, an individual must experience five or more of the nine symptoms during a 2-week period a*nd* at least one symptom has to be either depressed mood or loss of interest or pleasure (American Psychiatric Association, 2013). What do the Luo think about these nine symptoms of depression?

Lack of interest or pleasure in doing things (anhedonia) is referred to as *samuoyo* in Dholuo. Informants suggested that people with *samuoyo* attribute their *samuoyo* to external causes such as sickness. For example, an individual with *samuoyo* might say "*atuoyora ga"* (I have some sickness from time to time) or *"angishida moro"* (I have some problem(s)). When they do not attribute *samuoyo* to external causes, they might attribute it to abstract internal problems like *"aonge gombo"* (I have lost my "want") or *"chunya ool"* (my heart is tired). Causes of *samuoyo* may be cognitive or affective such as *paro mang'eny* and *chandruok mar chuny* though it is difficult to discern the underlying cause of *samuoyo. Samuoyo* might also be the results of environmental and social difficulties (i.e., not doing well at a task repeatedly) and even supernatural causes (i.e., ancestors and spirits). A negative feedback loop exacerbates *samuoyo*: when one receives external negative feedback about their *samuoyo*, they are unlikely to get better. Social stigma may exist around *samuoyo* as many cultural activities require enthusiasm and zeal that people affected with *samuoyo* lack; thus *samuoyo* might lead to social isolation. In terms of help-seeking, *jojipo*— "motivators"; older men and women in the community who work to motivate people going through hardships; the traditional equivalent of counsellors—clergy, friends and family, and general social support were identified for *samuoyo.* A barrier to help-seeking is that people affected with *samuoyo* will seek help for external problems rather than *samuoyo* itself.

Depressed mood is closely associated with Luo idiom of *kuyo. Kuyo* is a blanket term for "being with sorrow and without hope". As individuals with *kuyo* can be easily discerned from their external appearance (i.e. looking down and sad), they are likely to express their problem more truthfully. They

may say "*an gi kuyo"* (am feeling sad and sorrowful), *"an gi yomyom"* (I am tired but I don't know why), *"pacha opong'"* (my mind is full), and "*okamor"* (I'm not happy). *Kuyo* may be caused by cognitive and affective problems like *chandruok mar chuny* and *paro mang'eny.* People with *kuyo* experience *dend mojony* (general body weakness/tiredness) and other somatic problems. The internal forces that cause *kuyo* are sometimes a direct result of external environmental issues. Things like romantic breakups, marital problems, bereavement, hunger, financial hardships, and unemployment are potential causes of *kuyo.* Like *samuoyo,* help for *kuyo* can be found in *jojipo,* clergy, social support systems, and physical activities like exercise.

Sleeping problems (both lack of sleep and oversleeping) are identified as *shida mag nindo* in Dholuo. Beyond physical sickness, hunger and other environmental issues, psychological issues like *paro mang'eny* and *chandruok mar chuny* were identified as causes of *shida mag nindo.* The Luo idiom *puodruok* (refers to moving around in bed and not being able to sleep) might best define a lack of sleep associated with psychological problems. For help, sleeping medications, sleeping aids (i.e. music, improving quality of sleep environment etc.), prayers, and *jojipo* were identified.

Feeling tired or having little energy is *nyosruok* in Dholuo. *Nyosruok* for which a physical cause cannot be discerned was attributed to external causes like unexpected and sudden news such as termination of employment or death of a loved one. Other causes might include *paro mang'eny* and *chandruok mar chuny. Jojipo* and the clergy were presented as help for *nyosruok.*

Appetite problems (both overeating and poor appetite) are defined as *shida mag chiemo.* Like with *samuoyo,* people with *shida mag chiemo* attribute it to external circumstances. They might say *"dhoga rach"* (I have a bad mouth), *atuo* (I am sick), "*okayieng'ga"* (I normally don't get full), or *ayieng'* (I am already full). Psychological factors like *paro mang'eny* and *chandruok mar chuny* were identified as causes for *shida mag chiemo.* Help included medication, change of diet, and *jojipo.*

Feelings of worthlessness are defined as seyruok in Dholuo. *Seyruok* is accompanied by feelings of spite and failure, constant self-blame, and repetitive feelings of guilt for disappointing loved ones. People with seyruok describe it as *"gikma timo podha podha"* (everything I try falls down (fails)), "*geno*

na oremo" (my hope is inadequate), "*adak marach"* (I'm living life badly). *Seyruok* may be accompanied by a "give-up" attitude: people with *seyrouk* will blame circumstances out of their control for their present condition. *Seyruok* is caused by unexpected and abrupt life changes, or constant negative life experiences, failure to meet societal expectations (i.e., failure in school exams or not getting married), and constant criticism from loved ones. Other causes include romantic disappointment and *ichwang'* (bitterness and anger). *Seyruok* is a symptom of both *paro mang'eny* and *chandruok mar chuny,* and unresolved *seyruok* can lead to *"paro mag negruok"* (suicidal ideation). Of the PHQ--9 symptoms, *seyruok* appears to be the most complicated. It is associated with shame—both personal and societal—as an individual with *seyruok* is not likely to fulfill their responsibilities to themselves, their families, and their communities. Older informants suggested that *seyruok* is a particularly difficult problem because individuals with *seyruok* are, in their experience, less likely to share their feelings, and more likely to internalize and keep it to themselves, perhaps as a result of societal stigma, resulting sometimes in disastrous consequences like suicide.

Paro mariwni refers to ***trouble concentrating***. An individual with *paro mariwni* might express it as general tiredness or might say *"apango gimoro"* (am planning something) or "*miya saa mathis"* (I need some small time). *Paro mariwni* is associated with psychomotor agitation (*dangni)*, psychomotor retardation (*wuotho kata wuoyo mos)*, and might be a result of *paro mang'eny.* Help for *paro mariwni* might lie in change in one's external environment or seeing *jojipo.*

Psychomotor difficulties are conceptualized as *dangni* (psychomotor agitation) and *wuotho kata wuoyo mos* (psychomotor retardation). They can be caused by *paro mang'eny, chandruok mar chuny,* and *dend mojony. Jojipo,* social support, and clergy emerged as support systems for psychomotor problems.

Finally, *paro mag negruok* refer to ***suicidal ideation***. Suicidal ideation is difficult to discern as people with *paro mag negruok* are not likely to express these thoughts openly. It is often when one attempts or commits suicide that the community becomes aware of their suicidal thoughts. Many attribute *paro mag negruok* to external circumstances rather than internal psychological difficulties. For example, a diagnosis with a chronic disease like HIV/AIDS or cancer can lead to *paro mag negruok.* Romantic

rejections, extreme poverty, and constant family feuds might also lead to *paro mag negruok.* Informants did not rule out that external circumstances might precipitate or exacerbate psychological problems like *paro mang'eny,* that lead to suicidal ideation, but they concluded that the link is too difficult to discern and quantify. People with *paro mag negruok* have this almost constant feeling of *dwaro mar ringo shida* (a yearning to run away from life's problems). Sometimes they have *paro mang'eny* that is accompanied with intense feelings of *kuyo* (sadness)*,* hopelessness and a belief that *mor* (happiness) cannot be found. Interestingly, while *paro mag negruok* is often self-directed, it is sometimes directed to loved ones and close friends. People with *paro mag negruok* might also have *paro ni joodi ber kotho* (thoughts that your people (i.e., family) are better off dead), *paro mar dwaro nego joodi* (thoughts of killing your family), or even *par mag nego joodi gi negori* (thoughts of killing your people and then yourself). It is hard to get help for *paro mag negruok,* but informants conclude that *paro mag negruok* is often proceeded by other symptoms for which help should be sought. Societal stigma, especially from the resulting shame of suicidal ideation, make it difficult for people with *paro mag negruok* to come forward and seek help.

Prevalence and Descriptive Statistics

Table 2 shows the descriptive statistics for the LDQ-17, PHQ-9, and GAD-7. We calculated rates of mild, moderate, and severe depression with for the PHQ-9 (M = 8.16, SD = 4.79) using cut-offs from previous clinical studies (Kroenke et al., 2001; Kroenke & Spitzer, 2002). Some 42.99% scored in the mild depression range (5-9), 20.56%% scored in the moderate depression range (10-14), 9.35% scored in the moderately-severe depression range (15-19), and 1.86% reported severe depressive symptoms. Given that there were no previous studies and no norms for the LDQ-17, we could not apply cutoffs for the LDQ-17 (M = 18.15, SD = 7.82).

Factor structure of the PHQ-9 and LDQ-17

Consistent with our hypothesis, a 1-factor model for the PHQ-9 provided an *excellent* goodness of fit in our sample (χ^2_{27} = 41.80; p = 0.034; RMSEA, 0.07; CFI, 0.95; TFI, 0.93). As expected, the indicators all showed significant positive factor loadings, with standardized coefficients ranging from .19 to .64. For the LDQ-17, the 1-factor model provided a *bad* goodness of fit in our sample (χ^2_{27} = 310.68; p

< 0.001; RMSEA, 0.12; CFI, 0.72; TFI, 0.68). See online supplementary materials for factor diagrams and factor loadings.

We also conducted an exploratory factor analysis of the LDQ-17 for future hypothesis generating purposes. Parallel analysis suggested a 3-factor model that explained a total of 46% of the variance. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.83 and the Bartlett's test of sphericity χ^2 was 771.78 ($p < .001$). We labeled Factor 1, which explained 21% of the variance, as *paro mang'eny* (cognitive disturbances) due to the high loadings for "*iwinjo ni geno ni orem"* [feeling like your life's hope is inadequate] and "*ineno ni in gi joodi onge gi chieno"*[feeling that you and your family are better off dead]. Factor 2, which explained 19% of the variance, was labelled *chandruok mar chuny* (affective disturbances) due to the high loadings for "*winjo ni chunyi ool ma timo gikomoko thagi"*[feeling that your heart is tired to the extent that you have troubled doing things] and "*gimoro miyo chunyi chandore"* [feeling that your heart is troubled]. Finally, Factor 3 only explained 6% of the variance and only had a high factor loading for "*nindo maki mainindo ahinyi*" [sleep catches you making you sleep a lot]. Factor loadings and diagram can be seen in Table 3.

Similarities between the Western (PHQ-9) and the Indigenous Instruments (LDQ)

Symptom level correlations

We examined item-level correlations between the PHQ-9 and the LDQ-17, for the most part correlations were in expected directions (see online supplementary materials). It is difficult to determine the specific nature of the relationships using symptom-level correlations. That being said, the PHQ item "little interest or pleasure" was most correlated to *"geno ni orem"* [inadequate hope] $r = .59$ ($p < .01$); "depressed mood" was most strongly associated with "*koso gombo"* [lacking want] $r = .56$ ($p < .01$); "sleeping problems" was most strongly associated with "*winjo ol"*[feeling tired] $r = .46$ ($p < .01$); "little energy" was most strongly associated with "*koso mor"*[lacking happiness] $r = .31$ ($p < .01$); "eating problems" was most strongly associated with "*dendi yomyom"*[body tiredness] $r = .47$ ($p < .01$); "self-blame" was most strongly associated with "*neno ni joodi ber kotho"*[feeling that your people are better off dead] $r = .49$ ($p < .01$); "trouble concentrating" was most strongly associated with "*onge gimamiyi*

mor"[nothing brings you happiness] $r = .48$ ($p < .01$); "psychomotor problems" was most strongly associated with "*koso gombo mar timo gimoro"*[lacking want to do anything] $r = .39$ ($p < .01$); and "suicidal thoughts" was most strongly associated with "*ber ka iringo shida"*[self-directed social thoughts] $r = .40$ ($p < .01$).

Visualizing the overlap between PHQ-9 and LDQ-17 symptoms

We used multidimensional scaling (MDS) to visualize the degree of similarity between the individual symptoms of the PHQ-9 and LDQ-17. With an eye toward simplicity and interpretability, we used a 2-dimensional Cartesian space. MDS dimensions are generally arbitrary and are used to measure distances between items in the cartesian space. Items that are similar have shorter distances in the cartesian space and are closer together on the MDS graph than objects which as less similar and have longer distances. Thus, PHQ-9 and LDQ-17 items that are closer together can be considered more similar than those that have longer distances. As seen in Figure 1, six PHQ-9 and ten LDQ-17 items were clustered close to each other. This clustering is suggestive of a possible overlap in the conceptualization of depression across these two instruments. Some seven LDQ-17 items and three PHQ-9 items were far away from this cluster. This suggests that there are some salient features of depression amongst the Luo that the PHQ-9 may miss. That said, the Kruskal *stress* score that assesses the fit of an MDS solution was 0.15 for our solution suggesting that the solution was only a fair fit for the data.

Relationship between Depression, Anxiety and Sociodemographic Factors

Associations with anxiety symptoms

Depression as measured by both symptoms was strongly and significantly associated with anxiety symptoms: PHQ-9 scores and GAD-7 scores, $r(103) = .71$, $p < 0.001$, 95%CI[.59, .79]; LDQ-17 scores and GAD-7 scores, $r(103) = .84$, $p < 0.001$, 95%CI[.77, .89].

Associations with sociodemographic symptoms

We examined the relation between depressive symptoms as measured by the PHQ-9 and the sociodemographic variables age, household size, and gender using a linear regression model. The model

revealed a significant effect for gender (B = 1.89, p = 0.040, see Table 3). We did not find significant effects for age (B = -0.03, p = 0.340) or household size (B = 0.12, p = 0.433).

We also examined the relation between depressive symptoms as measured by the LDQ-17 and the sociodemographic variables age, household size, and gender. The model also revealed a significant effect for gender (B = 5.02, p = 0.003, see Table 3). As with the PHQ-9, we did not find significant effects for age (B = -0.03, p = 0.542) or household size (B = =0.01, p = 0.975).

Discussion

The current research and clinical practice on depression that relies heavily on standard Western-developed instruments might benefit from complementing those standard measures with localized tools that are developed from bottom-up, culturally sensitive approaches. These local tools may provide information of clinical utility that can supplement data from existing tools, expanding understanding of how depression is experienced by distinctive cultural groups. In our study we adopted simple ethnographic procedures based on the DSM-5's cultural formulation process to elicit conceptualizations of depression among the Luo in Western Kenya. We also co-developed an indigenous Luo instrument for assessing depression (LDQ-17) and investigated the overlap between this tool and a standard Western instrument (PHQ-9). Our findings suggest that Luo conceptualized a syndrome that has similarity to depression and includes three broad symptom categories that encompassed cognitive (*paro mang'eny*), affective (*chandruok mar chuny*), and physical (*dend mojony*) symptoms. Participants reported openly on their understanding of the features associated with depressive symptoms, including etiology, causes, stressors and support. Finally, our community survey indicated that the PHQ-9 and the LDQ-17 shared significant overlap, although the LDQ-17 appeared to identify salient features of depression amongst the Luo that the PHQ-9 might miss. These findings suggest the potential clinical utility of combining indigenous and standard instruments and illustrate one approach to co-development of indigenous tools.

Strengths and Limitations

A main strength of our study is its use of a mixed method design that generated a combination of rich qualitative information and quantitative data on the experience of depression amongst the Luo. Our

approach employed the latest methods in cross-cultural work, including the "gold standard" cultural formulation as well as the most recent WHO guidelines on translation. For instance, the simple elicitation procedure based on the DSM-5's cultural formulation interview—which has been shown to be a feasible, acceptible, and clinically useful way to assess the cultural features of mental disorders (Wallin et al., 2020)—allowed us to generate in-depth data on the role of cultural identity in the experience of depression amongst the Luo, as well as the cultural conceptualizations of distress and the psychosocial stressors and cultural features of vulnerability and resilience. This, together with our quantitative analyses that used diverse statistical techniques including factor analysis, multidimensional scaling, and linear regression strengthened our ability to recognize the extent to which the experience of depression amongst the Luo reflected overlap between a standard Western measure (PHQ-9) and an indigenous measure developed for this study (LDQ-17).

Another strength of this paper is that the first author is a native Luo who was born and raised in the South Sakwa region where study activities took place. As a result, our study benefitted from enhanced sociocultural validity and community involvement. Finally, we also adopted a consultative model in our study activities that actively included and privileged the participation of local leaders and community members in study activities, further strengthening the sociocultural appropriateness of our study and cultural validity of our findings and conclusions.

One limitation of our study concerns generalizability. As our efforts were focused on the Luo in Western Kenya, our findings cannot be generalized to other communities in Kenya and SSA. This, though, reflects the nature of cross-cultural ethnographic research; research efforts that focus on a local population are equipped to unmask nuance at the expense of generalizability. Our study's aim was particular to the Luo, but the methods we employed could be used globally to enrich cross-cultural research. The accessibility of our methods—particularly their grounding in the DSM-5 cultural formulation—suggests that practitioners can easily use similar approaches to enhance clinical research and practice. Another limitation is that the standard Western instruments used in our study have not been psychometrically validated for this population; however, given our adaptation of these tools for our study

purposes, and prior psychometric analyses with Kenyan samples (Osborn, Venturo-Conerly et al., 2020; Osborn, Wasil et al., 2020), the magnitude of this challenge was reduced to some degree.

Luo Concepts of Depression

From our informant group discussions, many Luo idioms for symptom distress and negative affect associated with depression emerged. These symptoms were classified broadly as cognitive, affective, and physical; this is similar to findings from other cultures and settings that have shown symptoms of depression to cluster in similar ways (Anthony et al., 1985; Chang, 1985). Luos in our community survey reported high mean ratings of familiarity with these symptom categories.

Several perceived causes of the depressive symptoms described in these categories were identified by the informants. These encompassed internal (psychological) and external (social and environmental) causes. Affective (*chandruok mar chuny*) and cognitive (*paro mang'eny*) disturbance were the broad psychological factors identified as causing depressive symptoms. Social issues such as abrupt changes in life circumstances, relationship difficulties (breakups and divorces), a diagnosis with a chronic disease like HIV/AIDS and even chronic poverty also emerged as potential risks that might lead to depression. Sometimes, supernatural causes like ancestors and spirits, or God and the devil (for Christians), were also suggested to potentially lead to symptoms associated with depression. In sum, the Luo appeared to have clear views as to the causes of depressive symptoms if the symptoms were presented individually rather than as "depression". They were cognizant of the difficulties in determining causes of these symptoms and were aware that more than one cause was often involved. These findings are in line with research in other societies showing depressive symptoms to be attributed to supernatural causes (Caplan et al., 2011; Razali et al., 1996), as well as psychological, social and environmental causes (Calhoun et al., 1974; Choi et al., 2008; Jorm et al., 1997).

Interesting observations emerged regarding the clinical presentation of depressive symptoms. Some Luos were likely to *externalize* depressive symptoms by presenting them as somatic concerns or external environmental or social issues. For example, an individual with anhedonia (*samuoyo*) might say "*atuoyoraga"* [I'm sickly], a somatic problem, or "*angishida moro mathaga"* [I have a problem (i.e.,

financial, social)], an external concern. Research in other cultures has found similar observations (Chang et al., 2017; Kleinman, 1982, 2008; Kleinman, 1977). Other Luos offered internalized interpretations, with symptoms presented as cognitive or affective disturbances. For example, depressed mood might be presented as internal "heart" difficulties e.g. *"chuny ok omor"* [my heart is not happy].

Many options were suggested for help-seeking for depressive symptoms. These included psychosocial support, social support, religious support, hospital and medicine, and physical activities like exercise. One question that arose was whether stigma inhibits help-seeking among the Luo. Many studies have suggested that stigma associated with mental health syndromes limits help-seeking in SSA contexts (Ndetei et al., 2016). A thorough exploration of this complex question lies outside our study, but our findings show that help-seeking attitudes, at least amongst the Luo, might be influenced by *how* a syndrome is presented. Many Luos easily and quickly identified help for individual symptoms. For example, for anhedonia (*samuoyo*), help can be found through *jojipo* (counsellors), the clergy, or through social support from friends – options that seem readily and easily accessible. Perhaps if we considered the question of stigma and help-seeking from a syndromal level, rather than a symptom level, then we might be likely to find high stigma around help-seeking. The Luo have no word for "depression" and might not consider the symptoms we associate with depression as a constellation of symptoms that belong to one disease classification. It therefore only makes sense for them to wonder *what is wrong* with an individual with this symptom collection and imagine limited help-seeking options for such an individual. Future studies are required to investigate this possibility.

Overlap between Western and Indigenous Instrument

A CFA confirmed that a 1-factor model for the PHQ-9 in our sample suggested that the PHQ-9 may be useful for assessing depression with the Luo, though robust psychometric studies are required to ascertain this in the future. CFA also showed a 1-factor model to be a bad fit for the LDQ-17. An EFA suggested a 3-factor model for the LDQ-17. Two of these factors broadly corresponded to the cognitive and affective dimensions of depressive symptoms that we discussed previously.

It seems that the Western PHQ-9 and the local LDQ-17 overlapped as they were strongly correlated and clustered closely in an exploratory MDS map (Figure 1). These findings suggest that local instruments might capture salient features of depression within the Luo context or from syndromes that are highly comorbid with depression such as anxiety. Future studies should investigate this. Finally, we also found similar correlates of depression with both instruments. Both the LDQ-17 and the PHQ-9 showed similar strong correlations with anxiety and regression models found females to be more likely to endorse high depressive symptoms on both instruments.

Implications for Research and Practice

Our study findings illustrate that standard Western instruments for measuring depression may fail to capture the salient features of this condition when used outside the settings for which they were developed. We also show that simple ethnographic processes can guide the development of more sensitive indigenous instruments that can complement the current ones. One implication, therefore, is that practitioners and researchers may enhance the cultural relevance of their work by adopting the use of locally developed instruments alongside the standard ones that they currently employ. This approach may be particularly beneficial as it seems to lead to a comprehensive clinical understanding of depression within the local context of the research and practice. Our study also highlights the value of a consultative and collaborative approach to research and practice. Researchers and practitioners should consider the communities that they are working in as partners in their work. As we show in this study, members of the community are intimately familiar with mental health problems and have much to contribute to research and practice should they be actively involved.

One other implication may warrant further consideration: our findings suggest that the presentation of a mental disorder may affect people's attitude toward the disorder. In our study, we found that once we conceptualized depression in a manner that was familiar to Luos, many of them easily understood idioms for symptom distress and negative affect associated with it and were quick to identify help-seeking avenues for people afflicted with depression. It is interesting to consider this finding in light of studies that have shown societal stigma around mental health to inhibit help-seeking for these problems

amongst Kenyan populations (e.g. Ndetei et al., 2016 and Getanda, Papadopoulos, & Evans 2015). One possibility—especially plausible in light of the fact that there is no semantic equivalent for the word "depression" in Dholuo—is that when researchers and practitioners present depression using standard Western terminology and instruments—rather than through local conceptualizations—the risk of stigma may be increased. Should this be the case, researchers and practitioners might consider using local idioms of distress, as a method of reducing stigma. It would be important to learn, in future research, whether some of the mental illness stigma identified in prior studies may have been an artifact of the western framing of the concepts involved.

Conclusions

Our study makes a contribution to a cross-cultural understanding of depression. We found that the Luo people in Western Kenya conceptualize a syndrome that resembles depression and includes three broad symptom categories that incorporate cognitive, affective, and physical symptoms. When surveyed, participants responded openly regarding their understanding of the features associated with depression as locally defined within these three symptom categories. When we compared how depression – as defined by the Luo – overlapped with depression as defined through a Western DSM-5 based instrument, we found that both conceptualizations shared significant overlap, but the local instrument captured what appeared to be salient features of depression amongst the Luo. Our study was strengthened by its combination of qualitative and quantitative methods, the fact that the first author is a native Luo, and its consultative approach that privileged active community involvement. Our findings suggest that widely-used standardized measures of depression may be usefully complemented by measures developed within particular cultural groups and focused on how those groups construe symptoms and their association with one another. Future studies may well overcome limitations of the present study or generate different findings, but our investigation illustrates the potential utility, for future research, of an approach that combines indigenous and standard instruments and honors the wisdom and perspective that reside in the indigenous community.

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Tables and Figures

Table 1: Means (average item scores), standard deviations, and correlations with confidence intervals

Variable	*M*	*SD*	1	2
1. PHQ-9 (9 items, scores range: 0-to-27)	8.16 (0.91)	4.79		
2. LDQ-17 (17 items, scores range: 0-to-51)	18.15 (1.07)	7.83	.76**	
			[.67, .83]	
3. GAD-7 (7 items, scores range: 0-to-21)	7.87 (1.12)	4.11	.67**	.83**
			[.56, .76]	[.76, .88]

Note. M and *SD* are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. * indicates $p < .05$. ** indicates $p < .01$. The PHQ-9: Patient Health Questionaire-9; LDQ-17: Luo Depression Questionaire-17; GAD-7: Generalized Anxiety Disorder Screener – 7.

Table 2: Items of the Luo Depression Questionnaire (LDQ-17)

Item (in Dholuo)	Direct Translation
1. *Winjo ni chunyi ool ma timo gikomoko thagi*	Feeling that your heart is tired to the extent that you have troubled doing things
2. *Bedo maonge gi mor*	Being without happiness
3. *Gimoro miyo chunyi chandore*	Feeling that your heart is troubled
4. *Itemo nindo to ningo onge*	Trying to sleep but can't find sleep
5. *Iyudo ni iparori ahinya kata paro mangey thandi*	Finding yourself with too many thoughts
6. *Iwinjo ka iol kata ka dendi ojony kata ka okitimo gimoro amora*	Feeling tired even when you haven't done anything
7. *Nindo maki mainindo ahinyi*	Sleep catches you making you sleep a lot
8. *Dhogi rach ma iyudo shida kuom chiemo*	Bad mouth that prevents you from eating
9. *Dendi yomyom to okine gimamiyi yomyom*	Feeling weak but can't find what causes the weakness
10. *Ionge gi gombo mar timo gikmoko*	You don't have a want to do things
11. *Ichiemo mangeny, samoro makadho kiwango*	Eating too much past normal portions
12. *Ineno ni gik ma itimo podha podha*	Feeling that things that you do fall down
13. *Iyudo ka idangni, samoro maonge gimpango*	You find yourself moving up and down without any plan
14. *Iwinjo ni geno ni orem*	You feel like your life's hope is inadequate
15. *Onge gimamiyi mor engimani*	There is nothing that brings joy to your life
16. *Chandruok omaki maineno ni ber ka iringo shida gi*	Tough things have caught that you think it is better to run away from these troubles
17. *Ineno ni in gi joodi onge gi chieno*	Feeling that you and your family are better off dead

Table 3: Factor Loadings for the LDQ-17 (Luo Depression Questionnaire)

Item	M (SD)	Factor 1	Factor 2	Factor 3
LDQ-1: *"feeling-down"*	1.41(0.80)		0.670	
LDQ-2: *"feeling-sad"*	1.34 (0.68)		0.729	
LDQ-3: *"troubled-heart"*	1.53 (0.73)		0.561	
LDQ-4: *"trouble-sleeping"*	1.16 (0.80)		0.473	
LDQ-5: *"repetitive-thoughts"*	1.44 (0.81)		0.845	
LDQ-6: *"feeling-tired"*	1.26 (0.80)		0.522	
LDQ-7: *"Over-sleeping"*	0.89 (0.93)			0.646
LDQ-8: *"Poor-appetite"*	0.89 (0.77)		0.499	
LDQ-9: *"Feeling-weak"*	1.02 (0.75)		0.545	
LDQ-10: *"Little-interest"*	0.94 (0.81)	0.452		
LDQ-11: *"Over-eating"*	0.70 (0.77)	0.315		
LDQ-12: *"Self-blame"*	1.12 (0.72)	0.658		
LDQ-13: *"Psychomotor-agitation"*	0.98 (0.77)	0.810		
LDQ-14: *"Hopelessness"*	1.17 (0.82)	0.903		-0.302
LDQ-15: *"melancholy"*	0.88 (0.83)	0.543		
LDQ-16: *"Suicidal-ideation-self"*	0.80 (0.87)	0.478		0.394
LDQ-17: *"Suicidal-ideation-others"*	0.71 (0.81)	0.757		
SS loadings		3.53	3.21	0.99
Proportion Var		0.21	0.19	0.06
Cumulative Var		0.21	0.40	0.46

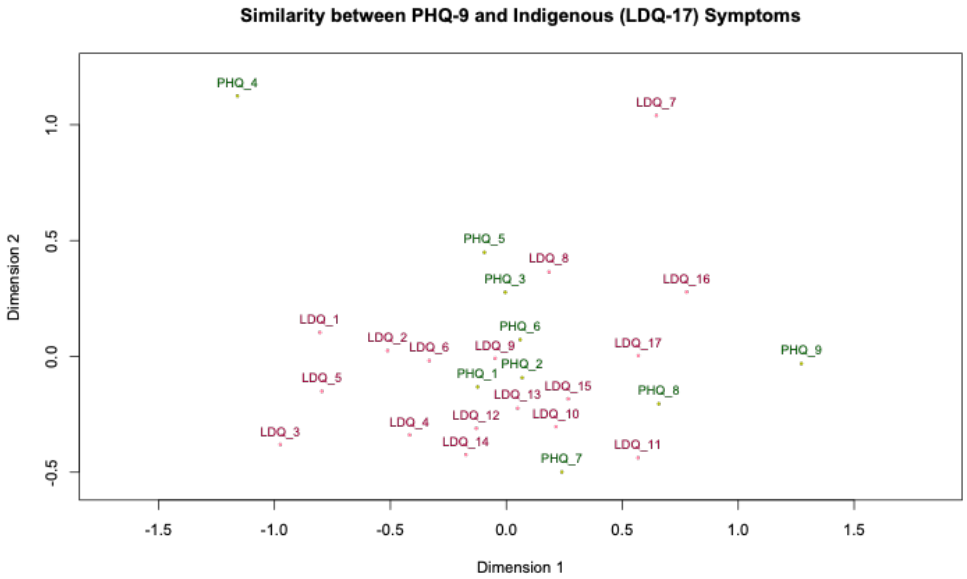

Figure 1. MDS Map showing the extent of overlap between the local Luo Depression Questionnaire (LDQ) and the Western Patient Health Questionnaire (PHQ). See online article for color version.