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A tool for sexual minority mental health research: The Patient Health Questionnaire (PHQ-9) as a depressive symptom severity measure for sexual minority women in Viet Nam

Trang Quynh Nguyen[1,2,3,4], **Karen Bandeen-Roche**[3], **Judith K Bass**[1], **Danielle German**[2], **Nam Thi Thu Nguyen**[1,5], and **Amy R Knowlton**[2]

[1]Department of Mental Health, Johns Hopkins Bloomberg School of Public Health, USA

[2]Department of Health, Behavior and Society, Johns Hopkins Bloomberg School of Public Health, USA

[3]Department of Biostatistics, Johns Hopkins Bloomberg School of Public Health, USA

[4]Institute for Studies of Society, Economy and Environment, Viet Nam

[5]Health Strategy and Policy Institute, Viet Nam

Abstract

In a context with limited attention to mental health and prevalent sexual prejudice, valid measurements are a key first step to understanding the psychological suffering of sexual minority populations. We adapted the Patient Health Questionnaire as a depressive symptom severity measure for Vietnamese sexual minority women, ensuring its cultural relevance and suitability for internet-based research. Psychometric evaluation found that the scale is mostly unidimensional and has good convergent validity, good external construct validity, and excellent reliability. The sample's high endorsement of scale items emphasizes the need to study minority stress and mental health in this population.

Keywords

Depression; sexual minority women; lesbian; Viet Nam; scale adaptation; validation

Introduction

Research from North America and Europe provides ample evidence that lesbian, gay and bisexual (LGB) persons suffer higher rates of psychological distress, depression and suicidality compared to heterosexuals (see meta-analyses by King et al., 2008; Marshal et al., 2011; Meyer, 2003). In Viet Nam, a lower middle-income Asian country, health research with sexual minority populations has mostly been conducted with men who have sex with

Corresponding author: Trang Quynh Nguyen, Department of Mental Health, Johns Hopkins Bloomberg School of Public Health, 624 N. Broadway, 8th floor, Rm. 896, Baltimore, MD 21205, tnguye28@jhu.edu.

Conflicts of interest

None.

men, and focused on HIV/AIDS and sexual behavior, with little attention to mental health and sexual stigma (see review by Le, Vu, & Bui, 2012). With increasing visibility of Vietnamese sexual minority populations (Institute for Studies of Society Economy and Environment & Academy of Journalism and Communication, 2010; T. Q. Nguyen et al., 2014), researchers have begun paying attention to broader sexual minority health and well-being and the life context of sexual minority persons. In men who have sex with men, homosexuality-related stigma has recently been examined as a predictor of sexual risk behavior (Ha, Risser, Ross, Huynh, & Nguyen, 2015). In sexual minority women, a qualitative study revealed that encounters with sexual prejudice, especially in the family environment, were common and seemed to cause tremendous psychological distress (T. Q. Nguyen, Nguyen, Le, & Le, 2010). Data on prevalence of mental health problems such as depression and anxiety in Vietnamese sexual minority women or men are not available. However, in a recent survey of sexual minority women, 17.6% reported having attempted suicide, and about half of this group reported having had more than one attempts (T. Q. Nguyen, 2014). This is much higher prevalence compared to the 0.4% or 0.5% reported from general population samples (H. T.-T. Tran, Tran, Jiang, Leenaars, & Wasserman, 2006; Vuong, Van Ginneken, Morris, Ha, & Busse, 2011).

To conduct rigorous research about the mental health and well-being of Vietnamese sexual minority populations, valid and reliable measurement instruments are needed as the first step. This paper is concerned specifically with the measurement of depressive symptom severity. Our review of existing measures led to the decision to adapt and validate the Patient Health Questionnaire (PHQ-9) (Spitzer, Kroenke, & Williams, 1999) as a measure of depressive symptom severity for Vietnamese sexual minority women.

Depression-related scales for research of Vietnamese populations

The lack of research attention to sexual minority mental health needs to be put in the broader context in Viet Nam, where mental health research is still limited. In clinical care, there has been attention to *common mental disorders* (CMD), a grouping that includes depression and anxiety disorders (World Health Organization & Calouste Gulbenkian Foundation, 2014), and thus several instruments have been validated and used as screening tools for CMD. Their validation typically involves assessment of criterion validity against diagnosis of a general category of disorders, without focusing on specific disorders. For example, Tran and colleagues identified cut-points on several scales – the Edinburg Postnatal Depression Scale (Cox, Holden, & Sagovsky, 1987), Zung's Self-rated Anxiety Scale (Zung, 1971) and the General Health Questionnaire (Goldberg & Williams, 1988) – that are predictive of a diagnosis of depression/generalized anxiety/panic disorder (T. D. Tran et al., 2011; T. D. Tran, Tran, & Fisher, 2012); Tuan and colleagues (2004) validated the Self-reporting Questionnaire (World Health Organization, 1994) against diagnosis of any neurotic disorder, and Giang (2006) validated the same instrument against diagnosis of any psychiatric disorder.

Community studies of depression in Viet Nam have used several different scales. Two of these scales were originally developed for Vietnamese refugees, the Vietnamese Depression Scale (VDS) for refugees in the United States (Kinzie et al., 1982) and the Phan Vietnamese

Psychiatric Scale (PVPS) for refugees in Australia (Phan, Steel, & Silove, 2004) but their psychometric properties for Vietnamese people living in Viet Nam have not been evaluated. Each scale was used in one applied study, the VDS in studying primary care patients (N.-L. D. Nguyen, Hunt, & Scott, 2005) and the PVPS in studying men living with HIV (Esposito, Steel, Gioi, Huyen, & Tarantola, 2009). In reviewing these scales, our team found that the Vietnamese expressions used in many of the scale items were either outdated or unclear.

A scale which seems more popular is the Center for Epidemiological Studies Depression scale (CESD-20) (Radloff, 1977), which has been used in studies of people living with HIV (H. M. Do, 2011), medical students (Q. D. Do & Tasanapradit, 2008) and high school students (Huong, Tien, Chi, Quynh Anh, & Phuong, 2010) in Viet Nam. This scale has been adapted and validated by two studies (H. T. Nguyen, Le, & Dunne, 2007; T. Đ. Nguyen & Le, 2010), both in the recent past, using data from Vietnamese adolescent samples. Evaluating the scale's factor structure and construct validity, these studies established that the CESD-20 is a valid measure of depressive symptom severity.

Research on risk factors, as well as protective factors, of psychological distress, depression and depression-related behaviors (e.g., suicide attempts) in sexual minority populations, requires measures of depressive symptom severity. For example, based on the minority stress model (Meyer, 2003), one could be interested in assessing whether experience of sexual-prejudice-based bullying at school or discrimination at work was associated with higher levels of depressive symptoms, or whether social support moderates this association. While the CESD-20 is an obvious candidate as a measure of depressive symptom severity, its 20-item length is more suitable for in-person interviews. With the increasing use of internet-based survey, especially to reach hard-to-reach populations, instruments that are shorter and can be self-administered are also needed. We therefore adapted and evaluated a shorter scale with good psychometric properties, the Patient Health Questionnaire (PHQ-9) (Spitzer et al., 1999).

The Patient Health Questionnaire (PHQ-9)

The PHQ-9 is a self-administered questionnaire with nine symptom items and a two-week time frame, based on DSM-IV diagnosis criteria for depressive disorders. It can be used to measure symptom severity by summing the items, or to detect probable clinical cases using a symptom-counting algorithm (Spitzer et al., 1999). It has been evaluated in different ethnic groups and many countries (Adewuya, Ola, & Afolabi, 2006; Chen, Huang, Chang, & Chung, 2006; Gilbody, Richards, & Barkham, 2007; C. Han et al., 2008; Huang, Chung, Kroenke, Delucchi, & Spitzer, 2006; Lotrakul, Sumrithe, & Saipanish, 2008; Monahan et al., 2009; Omoro, Fann, Weymuller, Macharia, & Yueh, 2006; Wulsin, Somoza, & Heck, 2002; Yeung et al., 2008; Yu, Tam, Wong, Lam, & Stewart, 2012). The PHQ-9 was found to have a one-factor structure in primary care outpatients (Cameron, Crawford, Lawton, & Reid, 2008; Huang et al., 2006) and in patients with major depression (Williams et al., 2009). Research with special samples including spinal cord injury patients (Kalpakjian et al., 2009; Krause, Bombardier, & Carter, 2008; Richardson & Richards, 2008), heart disease patients (de Jonge, Mangano, & Whooley, 2007) and soldiers (Elhai et al., 2012) found some support for a second somatic factor. Convergent validity of the PHQ-9 is strong, with correlations

around 0.67–0.68 or over 0.70 with various other depressive symptoms scales (Adewuya et al., 2006; Cameron et al., 2008; C. Han et al., 2008; Martin, Rief, Klaiberg, & Braehler, 2006). Internal consistency (Cronbach's alpha) ranged from 0.79 to 0.92 (Adewuya et al., 2006; Cameron et al., 2008; Esler, Johnston, Thomas, & Davis, 2008; C. Han et al., 2008; Hepner, Hunter, Edelen, Zhou, & Watkins, 2009; Hides et al., 2007; Lotrakul et al., 2008; Milette, Hudson, Baron, & Thombs, 2010; Stafford, Berk, & Jackson, 2007).

The present study

This study aimed to adapt and validate the PHQ-9 as a brief measure of depressive symptom severity for Vietnamese sexual minority women. It evaluated the adapted scale's factor structure, convergent validity, external construct validity, and reliability. Sexual minority women (SMW) are defined in this study as women who are romantically/sexually attracted to, or have romantic/sexual relations with, other women, or who identify as lesbian or bisexual.

Methods

Data source

The study sample was drawn from a web-based anonymous survey conducted in 2012 that targeted SMW. The survey was advertised as *Survey of Women who Love Women* on six Vietnamese internet forums catering to SMW. Potential respondents were screened using three statements: "You are over 18 years old", "You are a *woman*", and "You have *loved* another woman (/other women)". It should be noted that the Vietnamese word *"yêu"* (love) implies either having had romantic/sexual feelings for, or having been in a relationship with, someone, which corresponds to the study's broad definition of SMW. Also, the Vietnamese word *"nữ"* (woman) refers to a person being a woman, but it could also be interpreted to refer to female biological sex, a detail that we come back to shortly when describing this study's sample restriction. Those who indicated that all three statements were correct were provided with informed consent material including a description of the survey and their rights as (potential) participants, and respondents provided consent before answering the questionnaire. Respondents were not compensated; instead, for each completed questionnaire, a small amount equivalent to 1.44 USD was contributed to an internet forum they selected. The survey was a joint project between Johns Hopkins Bloomberg School of Public Health (JHSPH) and two Vietnamese organizations, the Institute for Studies of Society, Economy and Environment (iSEE, a research and advocacy organization focusing on minority groups including sexual minorities) and ICS Center (an activist organization working for equal rights for LGBT). It was approved by the Institutional Review Board at JHSPH.

Given the fact that transmen mingle with SMW online and offline (and that one of the six internet forums was explicit that it served both SMW and transmen), and given the ambiguity of the second screening statement, it was anticipated that some transmen might enter the survey. In order to separate the two groups, survey respondents were asked about gender identity in the questionnaire. Individuals who chose the answer "I consider myself a man/transguy (even though I was born female)" were excluded from the present study. The

sample for the present study was restricted to survey respondents who were SMW and living in Viet Nam (n=2498).

Scale adaptation

The scale was adapted in several steps. First it was examined by Vietnamese members of the study team (two of whom were fluent in English) to determine cultural relevance and suitability for anonymous self-administration, and was adjusted accordingly. Then the scale was translated into Vietnamese by the first author, and the translation was discussed with other Vietnamese researchers at iSEE, which resulted in additional modifications. The modified translation was then examined by staff and volunteers of iSEE and ICS Center who identify as lesbian women. They commented on each item – if they found it hard to understand, how they understood it, if they felt it accurately reflects a feeling or a problem experienced by someone who is sad, and how they would say the same thing better. They also commented on the whole set of items, and on whether new items should be added. Through this process, the scale was further adapted. The adapted scale was independently translated into English by two translators who were blind to the original scale and to the prior translation and adaptation process. The translations were compared, and any discrepancies were discussed and jointly resolved.

Psychometric evaluation

For internal validity, we evaluated the adapted PHQ-9's *factor structure*. We started with a simple one-factor confirmatory factor analysis (CFA). Goodness-of-fit was evaluated based on chi-square tests, CFI, TLI and RMSEA. Where there was lack of fit, exploratory analysis was conducted using the full sample as well as two half-samples (split by order of survey-starting time), with the aim of finding a better-fitting model that is robust across samples. Exploratory analysis involved adding residual correlations to the model based on modification indices, and examining eigenvalues to see if the data supported a multi-factor structure. All factor analyses were based on polychoric correlations among ordinal indicators.

To evaluate *convergent validity*, we correlated the scale's sum score with another measure of depressive symptoms, the CESD-20 (Cronbach's $\alpha = 0.94$ in this sample). This was compared to the PHQ-9's correlations with two measures of anxiety symptoms, the Zung Self-rated Anxiety Scale (Zung-SAS, $\alpha=0.90$), and the Generalized Anxiety Disorder scale (GAD-7, $\alpha=0.92$) (Spitzer, Kroenke, Williams, & Löwe, 2006). Moderate to strong correlations with anxiety measures were anticipated, because depressive and anxiety symptoms tend to co-occur (Sartorius, Ustün, Lecrubier, & Wittchen, 1996; Schoevers, Deeg, van Tilburg, & Beekman, 2005) and this has been documented in Viet Nam (T. D. Tran, Tran, & Fisher, 2013). Yet we expected such correlations to be smaller than the correlation with the CESD-20, because both instruments measure depressive symptoms.

For *external construct validity*, we examined the adapted scale's associations with several other variables: self-rated mood, life satisfaction, self-esteem, self-rated health, lifetime suicide attempt history, income, and residence in a major city. The variable expected to be most correlated with the PHQ-9 is *self-rated mood*, which was the respondent's subjective

evaluation of her mood “these days” on an ordinal scale from 1=very bad to 6=excellent (similar to the more common single-item measure of self-rated health). *Life satisfaction* and self-esteem were expected to be moderately correlated with the PHQ-9. The former was measured using the Satisfaction with Life scale (SWLS, α=0.87 in this sample) (Diener, Emmons, Larsen, & Griffin, 1985), reflecting the respondent’s global judgement of satisfaction with her life. Life satisfaction and depressive symptoms are related because they may both be impacted by the same events in life, and a judgment of life satisfaction may also be influenced by the person’s current mood (Pavot & Diener, 2008). The SWLS has been found to be associated (Pearson’s rho −0.49 to −0.57) with depressive symptoms in university students (Schimmack, Oishi, Furr, & Funder, 2004; Tremblay, Blanchard, Pelletier, & Vallerand, 2006) and middle-aged adults (Chang & Sanna, 2001). *Self-esteem* was measured with the Rosenberg self-esteem scale (α=0.86 in this sample) (Rosenberg, 1965). Self-esteem is considered a coping resource and has been found to reduce depressive and other psychological symptoms and buffer against stress (Thoits, 1995). Social disadvantage, such as experience of family rejection of minority sexual identity (which is associated with depression), can be damaging to self-esteem (Dahl & Galliher, 2010). Correlation between self-esteem and depressive symptoms have been found to be substantial in high stress samples, e.g., −0.42 in unemployed individuals (Shamir, 1986) and −0.67 in sexual minority young adults (Dahl & Galliher, 2010). *Self-rated health* was expected to be weakly to moderately correlated with the PHQ-9. Associations between depression and self-rated health have been documented in aging populations, with depression being a predictor of poor self-rated health (B Han & Jylha, 2006; B Han, 2002; Lenze et al., 2001; Rodin & McAvay, 1992). While this relationship seems to have not been examined in younger populations, adolescent studies have found that variables negatively related to depression (self-esteem and general well-being) were predictive of self-rated health (Breidablik, Meland, & Lydersen, 2009; Wade, Pevalin, & Vingilis, 2000). *Suicide attempt history* was expected to have a strong association with depressive symptoms. While income has been found to be associated with depressive symptoms (e.g., in women residing in a Detroit neighborhood, via financial stress (Schulz et al., 2006)), we expected to find a weak – if any – association between income (specifically *log monthly income*) and depressive symptoms, because in this national sample income was not adjusted for regional costs of living. We did not expect to find an association between *residence in a major city* and depressive symptoms. The scale’s associations with the continuous variables were assessed using Pearson’s correlation; its association with the binary variables (lifetime suicide attempt and major city residence) were assessed using differences in means.

In addition, we examined the association between these external variables and a binary variable *probable depression* using odds ratios. Based on the DSM-IV symptom-counting algorithm, this variable takes the value 1 if the respondent is positive for at least one of the first two PHQ-9 items (loss of pleasure and sadness) and positive for a total of at least five items – and 0 otherwise. Items 1 to 8 scored 2 (more than half the days) or 3 (almost everyday) count as positive; item 9 scored 1 (some days) or higher counts as positive.

Because the survey included multiple topics, to avoid respondent fatigue, not all survey sections were administered to all respondents. One section, which included four of the above-described measures (CESD-20, Zung-SAS, SWLS and Rosenberg self-esteem scale),

was administered only to the first 300 survey respondents. For the present study, this means these measures were available for only a sub-sample of 214 SMW living in Viet Nam.

Reliability was evaluated using Cronbach's (1951) alpha, which estimates the scale's internal consistency.

Results

The adapted scale

Before the scale was translated into Vietnamese, one modification was made changing item 9 from "Thoughts that you would be better off dead or of hurting yourself in some way" to "Thoughts that you would be better off dead." The "hurting yourself" component of this item implied possible suicidal ideation, which would have activated investigators' obligation to assess risk and provide crisis management, an obligation we would not have been able to fulfill because the survey was anonymous. Besides, "hurting yourself in some way" could be interpreted to include self-cutting, a behavior that has recently emerged among youth, involving shallow cuts on the body (often the arms), which reportedly provide a kind of pleasure or distraction from psychological pain (Xuân-Hoàng, 2008) but is not necessarily suicidal. Kroenke, one of the authors of the PHQ-9, endorsed this modification (via personal communication), because a systematic review had documented that such modification would not change the psychometric properties of the scale (Kroenke, Spitzer, Williams, & Löwe, 2010).

Discussion with Vietnamese researchers resulted in two other changes. One was to remove the example of "letting family down" from item 6, "Feeling bad about yourself – or that you are a failure or have let yourself or your family down," because it might be leading, given the study population's common experience of family rejection (T. Q. Nguyen et al., 2010). We believe that this change did not affect the quality of the item. The other change was to leave out the examples of "reading newspapers or watching television" in item 7 (about having trouble concentrating). These examples were considered not suitable because not everyone reads newspapers, and because watching television is often a household activity involving talking about things on and off the screen, therefore concentration is not something generally expected.

Consultation with iSEE and ICS staff and volunteers (who identify as lesbian women) helped fine-tune the wording of the items so they were clear in language and meaning. In one instance, a phrase was added, in parentheses, to item 1; this phrase – *"không thiết làm gì"* – is a colloquial expression which means feeling no interest in doing anything. For all modifications, see the adapted scale and original scale in Table 1.

A question was raised about the double-barreled nature of three items: item 3 combining trouble sleeping and sleeping too much; item 5 combining poor appetite and overeating; and item 8 combining moving/speaking slowly and restlessness. We considered splitting these items each into a pair and using the higher score in each pair as the score for the symptom category; this approach is used in the Major (ICD-10) Depression Inventory (MDI) (Olsen, Jensen, Noerholm, Martiny, & Bech, 2003). However, a review of the PHQ-9 literature did

not reveal any study that had tried this method, and thus no data on the agreement (or lack thereof) between the two methods. We therefore decided to use the combined format of the original scale for this validation study and leave the examination of split versus combined formats to a later study.

One person proposed adding an item: “Not feeling like meeting, talking or communicating with others; wanting to withdraw to oneself”. The data show that this item correlated well with other items and with the whole scale. Since it does not seem to add to or subtract from the psychometric properties of the scale, in this paper we only present analyses involving the nine original items.

The survey sample

The sample comprised 2498 SMW. Three-fourths (76.6%) lived in the country’s major cities. The majority was young – 37.2% were 18–20 years old, and 42.5% were 21–25 years old. Half (49.4%) had some university level education, another 33.7% were high school graduates. A substantial proportion (17.5%) reported having ever attempted suicide. Slightly over half (51.8%) of the sample identified as lesbian, 28.9% identified as bisexual, 16.3% reported being unsure about their sexual identity, and a small proportion (2.96%) identified as heterosexual. The presence of this last group was not surprising, as T. Q. Nguyen et al. (2010) found that some women who were in long-term relationships with lesbian women identified as heterosexual.

A summary of item responses and pairwise polychoric correlations are included in Tables 2 and 3. PHQ-9 symptoms were prevalent in this sample. Nearly one fourth of the sample (23.5%) reported loss of pleasure; a similar proportion (23.9%) reported feeling sad/hopeless at the same frequency; and 32.5%, 25.8%, and 22.5% reported having sleeping problems, eating problems and feeling tired/low energy, respectively – all at the frequency of more than half the days or almost everyday in the past two weeks. In addition, 29.2% felt bad about themselves everyday; 11.1% thought they would rather be dead almost everyday, and another 21.9% thought so on some days in the past two weeks.

Factor structure

In the a simple one-factor model, the loadings for all items were high (0.64 to 0.82). The chi-square statistic was significant (p-value < 0.0001), suggesting lack of fit. However, this p-value should be interpreted with caution, as the test is sensitive to large sample size (Jöreskog & Sörbom, 1993). Using a 0.95 threshold (Hu & Bentler, 1999), CFI=0.970 and TLI=0.959 indicated that the model fit the data well. RMSEA=0.090 suggested not very good fit, but its 95% confidence interval (0.084,0.096) was below the 0.1 poor-fit threshold (MacCallum, Browne, & Sugawara, 1996). Overall, the model had acceptable fit to the data, but the fit could be improved.

Exploratory analysis using modification indices on the full sample led to sequential respecification of the model to allow residual correlations between items 3 (sleep problems) and 5 (eating problems), between items 5 and 4 (low energy), between items 3 and 4, between items 2 (sad/hopeless) and 7 (trouble concentrating), and between items 2 and 8 (slow movement/fidgety). With half-sample 2, exploration led to adding the same residual

correlations. For half-sample 1, exploration led to adding only three residual correlations among items 3, 4 and 5. These results combined suggested that the residual correlations among items 3, 4 and 5 were more likely to be robust across different samples than the other residual correlations. The modified one-factor model with only these residual correlations was therefore preferred. Fit to the full sample, this model had excellent CFI (0.987) and TLI (0.981), and an RMSEA of 0.062 (90% CI 0.055 to 0.069) under the 0.08 threshold of reasonable errors of approximation (Browne & Cudeck, 1992).

The residual correlations of items 3, 4 and 5 raised the question whether these somatic items merit a separate factor. However, the data presented only one eigenvalue (5.15) greater than 1 (followed by 0.83, 0.64, 0.52, etc.). The one-factor model with residual correlations among items 3, 4 and 5 was, therefore, the final model.

Convergent validity

The PHQ-9 has good convergent validity with the CESD-20, with Pearson's correlation between the two sum scores 0.84, 95% CI=(0.80,0.88). This correlation was larger, but only slightly larger, than the PHQ-9's correlations with the anxiety symptoms scales Zung-SAS [0.80, 95% CI=(0.74,0.84)] and GAD-7 [0.78, 95% CI=(0.77,0.80)].

External construct validity

The left half of Table 4 presents the PHQ-9 sum score's associations with the external variables considered. These associations were as expected. The score was weakly associated with log-income (correlation −.14) and not associated with big city residence. It was most strongly related to self-rated mood (correlation −.54) as expected, followed by self-esteem (−.50) and life satisfaction (−.44), and had a lower correlation with self-rated health (−.30). A history suicide attempt was associated with a mean score that is 2.58 points higher.

The right half of Table 4 presents odds ratios of probable depression associated with the external variables. The trend of association is similar to that for the sum score.

Reliability

The scale had strong internal consistency: Cronbach's alpha was 0.86.

Discussion

In this study, we translated and adapted the PHQ-9 to the population of Vietnamese SMW, while maintaining the key contents of the original scale to ensure comparability with international versions as well as applicability to general Vietnamese women. We then evaluated the scale as a measure of depressive symptom severity. Statistical analyses found that the adapted scale is unidimensional with limited item residual correlations as expected, and has good convergent validity, good external construct validity and excellent reliability. In addition, this scale version is easy to understand and takes only a few minutes to complete, which makes it suitable for use in research that requires self-administration (including but not limited to internet-based research). It will play an important role in several

ongoing and planned studies by our team examining risk and protective factors for mental health among Vietnamese SMW.

Since the adapted scale uses general wording without specific reference to the sexual minority experience, it is important to note that its applicability is not restricted to Vietnamese SMW, and that it can be used for Vietnamese women in general. In addition, given its non-gender-specific language, and given the PHQ-9's good track record in different countries and cultures with both men and women, we believe that this scale version is generalizable to Vietnamese sexual minority men and Vietnamese men in general, and recommend it be evaluated in a male sample.

This newly adapted scale adds to the still limited repertoire of mental health scales available in Vietnamese. Similar to the CESD-20, the adapted PHQ-9 can be used in research using depressive symptom severity as a variable (e.g., an outcome caused by social disadvantage and structural injustice, or an antecedent of a health or social outcome); our study established its validity for this purpose. As it is a short scale and can be self-administered, the adapted PHQ-9 could potentially be explored for use as a screening tool (e.g., in a general primary care setting or in a counseling center for LGB) that would alert providers to conduct further assessment. To establish the scale as a screening tool, validation against clinical diagnosis would be needed. This type of assessment in other settings has generally found support for using the PHQ-9 as a screening tool for major depressive disorder (for examples, see Kroenke & Spitzer, 2002; Lotrakul et al., 2008; Wulsin et al., 2002).

Regarding the PHQ-9 scale itself (not specific to the adapted version), our study identified two aspects that may benefit from further consideration and research. The first is the double-barreled nature of three items. While we did not modify the scale to address this issue, we recognize that this could make it harder for respondents to process the items. Whether and how this affects measurement should be explored in further research. The second aspect concerns somatic symptoms in the scale's factor structure. Reports of a two-factor structure for the PHQ-9 have mostly come from populations characterized by a physical illness or injury. In our sample (which is not characterized by a physical illness or injury) we found best support for a one-factor structure with residual correlations among somatic symptoms. Also, despite these residual correlations, the simple sum score was a good proxy for the underlying depression factor (as it has good convergent validity with the CESD-20). However, future research of the PHQ-9 should examine when a minor somatic factor (influencing somatic symptoms) may be needed in addition to the primary depression factor (influencing all items) to avoid confounding depression. In samples with severe physical illness, correlations among somatic items could be partially caused by the physical condition.

Turning our attention to the well-being of the study population, the sample's high endorsement of scale items (e.g., about one fourth felt sad/hopeless for more than half the days or nearly every day, and 11% thought they would rather be dead nearly everyday, in the past two weeks) strongly suggests this population has high exposure to stress. This is consistent with the pervasive experience of family disapproval and negative treatment (T. Q. Nguyen et al., 2014, 2010) and the high prevalence of lifetime suicide attempt (T. Q.

Nguyen, 2014) documented in this population. Further work examining the relationships between family rejection, depressive symptoms and suicidality should be conducted, which in the context of Viet Nam would be useful contribution to the ongoing efforts by activist groups, including ICS and a newly formed group of parents of LGBT, in fighting stigma and promoting support within families. Besides family rejection, the prevalence and the harms of other forms of sexual prejudice, such as bullying and discrimination (which anecdotal evidence suggests are commonplace), need to be examined. In addition, other components of minority stress in this population, including internalized homophobia, concealment of sexual minority status (Meyer, 2003) and anticipation of heterosexual marriage either for oneself or one's female partner (T. Q. Nguyen et al., 2010), need to be studied. Protective factors that increase resiliency in the face of minority stress in the Vietnamese context are another important area for research. This study, which validated a depressive symptom scale, is a first step in laying the groundwork for a research agenda that helps inform the design, targeting and implementation of interventions to protect the health, well-being and lives of sexual minority populations in Viet Nam.

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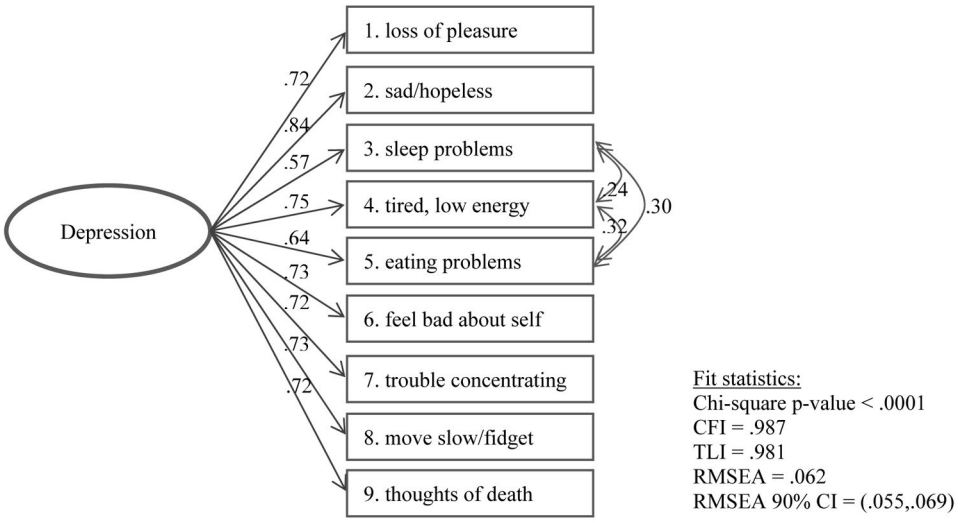

Figure 1.
The final factor model

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Table 1

The adapted scale

Vietnamese version (web-based format)	**English translation of Vietnamese version**	**Original PHQ-9**
The global question:		
Trong HAI TUẦN vừa qua, bạn có gặp các vấn đề sau không? Với mỗi vấn đề, hãy đánh dấu mức độ bạn gặp phải. Chú ý đừng đánh dấu nhầm vào cột "không muốn trả lời".	**In the past TWO WEEKS, did you have the following problems?** With each problem, please mark the degree you had it. Be careful not to mark "don't want to answer" by mistake.	Over the past 2 weeks, how often have you been bothered by any of the following problems? *(use "✓" to indicate your answer)*
The items:		
1 Cảm thấy mình không quan tâm, không thích thú làm gì (không thiết làm gì)	**1** Feeling no interest or pleasure in doing anything (don't feel like doing anything)	**1** Little interest or pleasure in doing things
2 Cảm thấy buồn rầu, chán nản, hoặc tuyệt vọng	**2** Feeling sad, down and discouraged, or hopeless	**2** Feeling down, depressed, or hopeless
3 Trằn trọc khó ngủ, ngủ không ngon, hoặc khi đang ngủ bị thức giấc và khó ngủ lại hoặc: ngủ quá nhiều (so với bình thường)	**3** Trouble falling asleep, not sleeping well, or waking up while sleeping and having trouble falling back asleep or: sleeping too much (compared to usual)	**3** Trouble falling or staying asleep, or sleeping too much
4 Cảm thấy mệt mỏi, không có sức lực	**4** Feeling tired, without energy	**4** Feeling tired or having little energy
5 Ăn không ngon miệng, không muốn ăn hoặc: ăn nhiều hơn bình thường	**5** Poor appetite, not wanting to eat or: eating more than usual	**5** Poor appetite or overeating
6 Cảm thấy mình tồi tệ, hoặc kém cỏi, hoặc không hài lòng với bản thân	**6** Feeling that you are bad, or that you are incompetent, or feeling unhappy with yourself	**6** Feeling bad about yourself – or that you are a failure or have let yourself or your family down
7 Thấy mình khó tập trung vào việc gì (ví dụ khó tập trung vào việc đang làm hoặc câu chuyện đang nói với người khác)	**7** Trouble concentrating on things (for example on something you are doing or on a conversation you are having with someone)	**7** Trouble concentrating on things, such as reading the newspaper or watching television
8 Đi đứng, cử chỉ hoặc nói năng chậm chạp đến mức người khác có thể để ý thấy hoặc ngược lại: bồn chồn bứt rứt đến mức đi qua đi lại, đứng lên ngồi xuống nhiều hơn mọi khi	**8** Walking, moving or speaking so slowly that others may notice or the opposite: being so restless that you walk back and forth, sit down and stand up more than usual	**8** Moving or speaking so slowly that other people could have noticed? Or the opposite – being so fidgety or restless that you have been moving around a lot more than usual
9 Có ý nghĩ thà chết còn hơn	**9** Thoughts that you would rather be dead	**9** Thoughts that you would be better off dead or of hurting yourself in some way
Response options:		
không hề 0 | một số ngày 1 | đa số ngày 2 | gần như hàng ngày 3 | không muốn trả lời	not at all 0 | some days 1 | more than half the days | almost every day 3 | don't want to answer	not at all | several days | more than half the days | almost every day

Vietnamese version (web-based format)					English translation of Vietnamese version				Original PHQ-9			
□	□	□	□	□	□	□	2 □	□	□	0	1	2	3

Table 2

Response proportions in the full sample (n=2498)

	not at all (0)	some days (1)	more than half the days (2)	almost every day (3)
1. loss of pleasure	23.2%	53.3%	11.6%	11.9%
2. sad/hopeless	26.7%	49.3%	13.2%	10.7%
3. sleep problems	28.5%	39.0%	16.3%	16.2%
4. tired, low energy	27.7%	49.8%	13.0%	9.5%
5. eating problems	33.8%	40.4%	14.3%	11.5%
6. feel bad about self	28.3%	42.4%	0%	29.2%
7. trouble concentrating	30.3%	42.6%	0%	27.0%
8. move slow/fidget	66.5%	23.8%	0.3%	9.4%
9. thought of death	67.0%	21.9%	0%	11.1%

Table 3

Pairwise polychoric correlations among scale items

	1.	2.	3.	4.	5.	6.	7.	8.
1. loss of pleasure								
2. sad/hopeless	0.65							
3. sleep problems	0.43	0.48						
4. tired, low energy	0.55	0.65	0.56					
5. eating problems	0.47	0.53	0.55	0.64				
6. feel bad about self	0.51	0.60	0.38	0.52	0.42			
7. trouble concentrating	0.47	0.52	0.42	0.53	0.47	0.59		
8. move slow/fidget	0.46	0.55	0.41	0.54	0.48	0.56	0.61	
9. thought of death	0.48	0.65	0.40	0.50	0.44	0.55	0.48	0.56

Table 4

Associations with external constructs/variables of PHQ-9 sum score (left) and PHQ-9-based *probable depression* (right)

	PHQ-9 sum score	**PHQ-9-based *probable depression***
	Pearson's correlation (95% CI)	odds ratio per SD[b] (95% CI)
Self-rated mood	−.54 (−.57,−.51)	0.23 (0.20,0.27)
Self-esteem	−.50 (−.59,−.39)	0.39 (0.26,0.57)
Satisfaction with life[a]	−.44 (−.54,−.33)	0.45 (0.30,0.64)
Self-rated health[a]	−.30 (−.33,−.26)	0.54 (0.48,0.61)
Log-income	−.14 (−.18,−.10)	0.75 (0.67,0.83)
	difference in means (95% CI)	odds ratio (95% CI)
Ever vs. never attempted suicide	2.58 (1.74,3.42)	2.11 (1.56,2.85)
Big city vs. not	−0.51 (−1.11,0.08)	0.89 (0.71,1.13)

CI = confidence interval; SD = standard deviation.

[a] These scales were only administered to a sub-sample (n=214).

[b] These are odds ratios of probable depression associated with one SD difference in the external variable.