Validation of the Patient Health Questionnaire (PHQ-9) in an African context

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Mini-dissertation (article format) submitted in partial fulfilment of the requirements for the degree Master of Arts (Research Psychology) at the North-West University (Potchefstroom Campus)

Supervisor: Prof. Q.M. Temane
Co-supervisor: Prof. M.P. Wissing

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1. ACKNOWLEDGEMENTS

To God, all honour, glory and praise are due. Thank You, Father, for giving me the ability to complete this degree.

To my supervisors, Prof. Q.M. Temane and Prof. M.P. Wissing for your constant guidance and assistance. Thank you for believing in me.

To my parents, family and all my friends. Thank you, Daddy for giving me the opportunities you never had, for trusting in me and motivating me to do my best. Mommy, I could never have done this without your help, guidance, support and dedication, you are truly inspirational. To my Love, Jurie, thank you for your love and support.

The contribution of the Psychology Department at the North-West University and the financial assistance of the National Research Foundation towards this research is hereby acknowledged.

To you all, I salute you from the bottom of my heart.

2. SUMMARY

Validation of the Patient Health Questionnaire (PHQ-9) in an African context

Keywords: Patient Health Questionnaire (PHQ-9); depression; reliability; validity; factor analysis; psychometric properties; South Africa.

This research was aimed at validating the PHQ-9 in an African context. This study forms part of the project of Psychosocial Health and Biomarkers in an African context (FORT 3, Wissing, 2008).

The Patient Health Questionnaire (PHQ-9) is a nine-item depression scale that has the potential of being a dual-purpose instrument to establish the diagnosis of a depressive disorder, as well as the grade of symptom severity (Kroenke, Spitzer & Williams, 2001). The PHQ-9 was administered with criterion related measures to a multicultural convenience sample of 2214 participants from the North West Province of South Africa, including two groups of adolescents (n_1=1480 and n_2=559) and an availability sample of adults (n_3=185). Instruments to determine criterion validity were the General Health Questionnaire (GHQ), designed to detect symptoms of mental disorders; the Mental Health Continuum – Short Form for Adults (MHC-SF) which measures the degree of emotional, social and psychological well-being; and the New General Self-Efficacy Scale (NGSE) designed to measure an individual's general self-efficacy.

Descriptive statistics for the PHQ-9 including its reliability in the various groups is reported. The PHQ-9 manifested a Cronbach Alpha

reliability index of 0.86. Criterion-related validity was supported by significant correlations between the PHQ-9 and criterion measures. Confirmatory factor analysis for the PHQ-9 yielded a one-factor solution in all groups. The percentage variance explained ranged between 34.71% and 46.62%. Exploratory factor analyses yielded two factors in all groups with the second factor comprised of no more than 2 items and thus interpreted as a minor factor. The construct validity obtained in this research indicates that the PHQ-9 may be a valid measure to identify depression in a South African context.

Based on the psychometric properties found in this study, it can be concluded that the PHQ-9 is a valid measure of depression in two of the samples selected for this study. Future studies may further validate this instrument in specific language and cultural groups, and explore the cross-cultural measurement equivalence.

3. OPSOMMING

Validering van die Patient Health Questionnaire (PHQ-9) in 'n Afrika-konteks

Sleutelterme: Patient Health Questionnaire (PHQ-9); depressie; betroubaarheid; geldigheid faktorontleding Psigometriese kenmerke Suid-Afrika.

Die navorsing was daarop gemik om die geldigheid van die PHQ-9 in 'n Afrika konteks te verifieër.Die studie vorm deel van die projek Psychosocial Health and Biomarkers in an African context (FORT 3, Wissing, 2008)..

Die Patient Health Questionnaire (PHQ-9)/ Pasient-Gesondheids-Vraelys (PGV-9) is 'n nege item depressieskaal wat die potensiaal het om 'n dubbele doel te dien, naamlik die diagnose van depressie asook die graad van ernstigheid daarvan. (Kroenke, Spitzer & Williams, 2001). Die PHQ-9 en ander kriteriumverwante vraelyste is voltooi deur 'n multikulturele gerieflikheidssteekproef van 2214 deelnemers in die Noorwes Provinsie van Suid-Afrika. Twee groepe adolesente (n1=1480 en n2 + 559) en 'n beskikbaarheidsteekproef van volwassenes (n3 = 185). Instrumente om die kriterium-verwante geldigheid te bepaal was die General Health Questionnaire (GHQ) of die Algemene Gesondheids Vraelys (AGV), wat ontwerp is om simptome van geestelike versteurdheid te bespeur; die Mental Health Continuum – Short Form for Adults (MHC-SF) ook bekend as die Geestelike Gesondheids Kontinuum (GGK) verkorte vorm vir Volwassenes (VVV) wat die graad van emosionele, sosiale en sielkundige welvaart meet, en die New General Self-Efficacy Scale (NGSE) of die Nuwe Algemene Self-doeltreffende skaal (NASS) wat

ontwerp is om ’n individu se algemene self-doeltreffenheidsbeskouïng meet.

Beskrywende statistiek vir die (PHQ-9) asook die betroubaarheidsindeks in die onderskeie groepe word gerapporteer. Die PHQ-9 het ’n Cronbach Alpha betroubaarheidsindeks van 0.86 getoon. Kriteria verwante geldigheid was ondersteun deur beduidende korrelasies tussen die PHQ-9en dieander kriterim verwante skale.Bevestigende faktoranalises vir die PHQ-9 lewer ’n een faktor oplossing in alle groepe. Die persentasie variansie verklaar wissel tussen 34.71% en 46.62%. Eksploratiewe faktor analise het twee faktore in alle groepe opgelewer. Die tweede faktor het net uit 2 items bestaan, en is dus as ’n geringe (minor) faktor geïnterpreteer. Die aanduidings van konstruk-geldigheid wat in die navorsing vekry is, dui aan dat die PHQ-9 ’n geldige meetinstrument mag wees om depressie in die Suid-Afrikaanse konteks te bepaal.

Gebaseer op die psigometriese kenmerke wat in die studiegevind is, kan gekonkludeer word dat die PHQ-9 oorwegend ’n geldige meetinstrument van depressie is in twee van die steekproewe wat vir die studie gekies is. Verdere navorsing is nodig om die PHQ-9 se geldigheid in spesifieke taal- en kulturele groepe te ondersoek, en om die kruis-kulturele ekwivalensiete bepaal.

4. PREFACE

4.1 Article format

For purposes of this mini-dissertation, which is part of the requirements for a professional master's degree, the article format as described by General Regulations A 7.5.1 of the North-West University was chosen.

4.2 Selected journal

The target journal for submission of the current manuscript is the *Social Science & Medicine Journal*. The manuscript as well as the reference list has been styled to the journal's specifications.

4.3 Letter of consent

The letter of consent from the co-authors in which they grant permission that the manuscript *Validation of the Patient Health Questionnaire (PHQ-9) in an African context* may be submitted for purposes of a mini-dissertation by the first author, Marguerite Nelise Botha, appears on the next page.

4.4 Page numbering

In the mini-dissertation page numbers run through the whole document. For submission to the above-mentioned journal, manuscript numbering will be according to the requirements and will thus start on the title page of the manuscript.

LETTER OF CONSENT

We the co-authors, hereby give consent that Marguerite Nelise Botha may submit the manuscript entitled "*Validation of the Patient Health Questionnaire (PHQ-9) in an African context*" for the purposes of a mini-dissertation. It may also be submitted to the Social Science & Medicine Journal for publication.

_____	_____
Prof. Q.M Temane	**Prof. M.P Wissing**
Supervisor	**Co-Supervisor**

5. MANUSCRIPT

Validation of the Patient Health Questionnaire (PHQ-9) in an African context

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Validation of the Patient Health Questionnaire (PHQ-9) in an African context

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Abstract

Key words: Patient Health Questionnaire (PHQ-9); depression; reliability; validity; factor analysis; psychometric properties; South Africa

The aim of this study was to validate the PHQ-9 scale in an African context. The PHQ-9 (Kroenke, Spitzer & Williams, 2001) and other measures of well-being were administered to a convenience sample of 2214 participants from FET colleges and other organisations in the North-West Province of South Africa (n_1=1480, n_2=559, n_3=185). The sample comprised of three sub-groups including adults and adolescents, both male and female from urban and rural areas who completed the PHQ-9 and other instruments used for criterion validity (General Health Questionnaire-28, Mental Health Continuum-SF, Collective Self-efficacy Scale and the New Generalised Self-efficacy Scale). The scale yielded good reliability across the three groups. Significant correlations between the PHQ-9 and other measures of depression indicated good criterion – related validity. Construct validity indicated that the PHQ-9 has good validity in two of the three groups of participants.

Validation of the Patient Health Questionnaire (PHQ-9) in an African context

Depressive disorders are associated with high levels of personal suffering, increased disability days, and elevated risks of cardiovascular mortality and suicide (Penninx, Beekman, Honig, Deeg, Schoevers, van Eijk, & Van Tilburg, 2001). There is scant empirical information on prevalence, incidence and duration of psychiatric disorders in South African populations (Kagee, 2008). Large patient numbers, overworked nursing staff, and general lack of infrastructure and resources in primary healthcare clinics of South Africa may possibly result in patients not receiving treatment for the symptoms of depression and anxiety. Validated instruments to measure depression may thus go a long way in helping to detect symptoms of depression in an African context. The aim of this study was to examine the possible validity of the PHQ-9 in an African context.

It has been demonstrated that screening costs of depression can be low and consequent effective treatments can be administered (Valenstein, Bijan, Zeber, Boehm, & Buttar, 2001) following such screening. Screening questionnaires that guarantee low screening costs are entirely self-administered, and only require a few minutes

for patients to complete and physicians to review (Lowe et al., 2004) and thus assume a level of reading ability and literacy. A scale that is as brief as the PHQ-9 may help both psychologists and psychiatrists screen clients and patients for depression in as efficient a manner as possible, especially as it is based on DSM-IV criteria. Secondly, although many different instruments have been used to study and measure depression few if any, have been validated for use in the African context. The aim of this study was therefore to validate the PHQ-9 in a sample of urban and rural South African participants.

The Patient Health Questionnaire is the first self-report questionnaire designed for use in primary care that actually diagnose specific disorders (Kroenke, Spitzer, & Williams, 2001). Its nine-item depression module, the PHQ-9, is increasingly being used as a brief diagnostic and severity measure in research and clinical practice (Kroenke, Spitzer, & Williams, 2001). The PHQ-9 has the potential of being a dual-purpose instrument that, with the same 9 items, can establish depressive disorder diagnoses as well as grade depressive symptom severity (Kroenke et al., 2001). Measuring instruments for use in depression amongst the Setswana-speaking population is not known. Therefore validating the PHQ-9 is even more important for this population.

The superior criterion validity of the PHQ-9 compared to two other established depression screening questionnaires has recently been demonstrated with respect to the diagnosis of 'major depressive disorder' made by a standard interview in assessing psychotic disorders (Lowe et al., 2004) in other social contexts excluding the South African context. The diagnostic validity of the PHQ-9 has been established in 2 studies involving 3,000 patients in 8 primary care clinics and 3,000 patients in 7 obstetrics-gynaecology clinics (Kroenke, Spitzer, Williams, 2001).The foregoing suggests that the utility of the PHQ-9 is clearly attested by the available empirical evidence. As indicated, in this study an attempt was made to test its validity in rural and urban South African participants.

Only scant empirical information (mainly from the nineties) is available on mental health issues in Sub-Saharan Africa. Rumble, Swartz, Parry, & Zwarenstein (1996) found that there was a prevalence rate of 18 per cent of depressive symptomatology in a rural South African village, while Rumble (1994) and Gillis, Welman, Koch, & Joyi (1991) found a prevalence rate of 27 per cent. In a study by Rogers (1992) it was found that over half of an unselected group of people in a South African village suffered from "the nerves", characterised by symptoms of bodily disorders, pain,

tension, sadness, weeping, anxiety and feeling hysterical. Poor economic conditions, worries, bad feelings and interpersonal conflict resulted in "*nerves*", and these findings are similar to findings in many other parts of the world. It is thus important to find out how a brief instrument such as the PHQ-9, based on its validity, could possibly help in the South African context to screen for depression, especially in contexts characterised by poor access to mental health services.

More frequently, depression goes undetected and so remains untreated (Gelenberg, 1999). Unfortunately, physicians only detect 30-50% of patients with depression in primary care (Williams et al., 1999; Hansen et al., 2001). Depression is, however, seen as one of the most prevalent and treatable mental disorders and is regularly seen by a wide spectrum of care providers. The foregoing supports the validation of the Patient Health Questionnaire in this study as the rates of detection (or lack thereof) in third world countries are generally unknown compared to first world countries. Major and minor depressive disorders respond well to psychotherapy and/or treatment with anti-depressants (Williams et al., 1999; Jarrett et al., 2001), thus emphasising the need to improve detection by clinicians (Lowe et al., 2004). As indicated previously, the validation of a

scale such as the PHQ-9 in an African context will help in the end to screen for depression if it is found to be a valid instrument.

Although the Beck Depression Inventory (BDI: Beck, Steer, Ball, & Ramieri, 1996) has been used in numerous studies, the PHQ-9 is much preferred for this study. Firstly, the differences between the two scales is their length (with the BDI having 21 items and the PHQ only 9). Secondly, the PHQ's correspondence to DSM-IV criteria may help with preliminary diagnoses of depression and the identifying the severity of the symptoms. Thus using the PHQ, this study will serve as an important contribution in terms of making it possible to measure depression with a brief instrument validated in an African context.

In line with the suggestion made by Paunonen and Ashton (1998) regarding validation processes, the following statistical processes will be explored: reliability indices (e.g., Cronbach alpha and internal homogeneity) and validity indices (such as construct and criterion-related validity). Thus, the aim of this study is to validate the PHQ-9 that potentially could be used in epidemiological studies to assess and measure depression in a sample of South African participants from rural and urban areas.

METHOD

Design

A cross-sectional survey was implemented to study the main aim of the present study.

Participants

A convenience sample of 2214 participants from Further Education Training (FET) colleges and other organisations in the North-West Province of South Africa participated in this study. The sample comprised of three sub-groups including both male and female participants so as to be large enough to perform all necessary analysis for validation purposes. Group one consisted of 1480 FET-students between the ages of 16 and 21. Group two consisted of another sample of 549 FET-students between the ages of 16 and 21, while group three was made up of an availability sample of adults (N=185)

Measuring Instruments

Patient Health Questionnaire: Depression Symptoms (PHQ-9) (Kroenke, Spitzer & Williams, 2001). This 9-item, self-administered scale is used to measure depression severity, which scores each of

the DSM-IV criteria as 0 (‘Not at all’) to 3 (‘Nearly every day’). Individuals are asked to rate how often they have been bothered by any of the following problems over the last 2 weeks, for example: ‘Little interest/pleasure in doing things’ and ‘Thoughts that you would be better off dead/of hurting yourself in some way’. Once the scale had been completed, participants were asked to indicate how difficult these problems, if ticked off, have made it for them to do their work, take care of things at home or get along with other people. Kroenke et al. (2001) found excellent test-retest reliability as well as internal reliability of the PHQ-9 with a Cronbach alpha of 0.86. Reliabilities for the present study on this scale are reported in Table 1.

General Health Questionnaire (GHQ) (Goldberg & Hillier, 1979). The GHQ is a 28-item scale designed with the aim of detecting symptoms of mental disorder. This scale consists of 4 sub-scales including Somatic Symptoms (SS), Anxiety and Insomnia (AI), Social Dysfunction (SD) and Severe Depression (DS). Ratings are done on a 4-point scale where anchors indicate 1 (‘Not at all’), 2 (‘No more than usual’), 3 (‘Rather more than usual’) and 4 (‘Much more than usual’), although these fluctuate throughout the measure. Individuals are asked ‘Have you recently?’ followed by, for example: ‘Been feeling perfectly well and in good health?’.

Goldberg and Hillier (1979) reported Cronbach alphas from 0.82 to 0.86. Wissing et al. (1999) noted the applicability of the GHQ in a South African context by reporting a Cronbach alpha of 0.91 for the total scale.

Coping Self-Efficacy Scale (CSE) (Chesney, Neilands, Chambers, Taylor & Folkman, 2006). The CSE comprises of 26 items and is a measure of a person's confidence or perceived self-efficacy in performing coping behaviours when facing challenges or threats in life and can also be used to assess changes in coping self-efficacy over time (Chesney et al., 2006). Respondents are asked 'When things aren't going well for you, or when you're having problems, how confident are you that you can do the following:' at which they are required to rate the extent to which they believe they will be able to perform behaviours important to adaptive coping such as 'Keep from getting down in the dumps', 'Take your mind off unpleasant thoughts' and 'Get friends to help you with the things you need'. The anchors of the 11-point scale are 0 ('Cannot do it at all'), 5 ('Moderately certain can do') and 10 ('Certain can do'). The total CSE score is determined by summing the item ratings (Chesney et. al., 2006). Chesney et al. (2006) developed a 13-item reduced form of the CSE with three factors: Use problem-focused coping (6 items, $\alpha = .91$), Stop unpleasant emotions and thoughts (4 items, $\alpha =$

.80). For all three factors the internal consistency and test-retest reliability was found to be strong (Chesney et al., 2006).

New General Self-Efficacy Scale (NGSE) (Chen, Gully & Eden, 2001). The NGSE, an 8-item scale, was developed to measure an individual's tendency to view the self as capable of meeting task demands in various contexts. Various validation studies have shown that the NGSE measures a construct that is related to, but distinct from both self-esteem and situational self-efficacy (Chen, Gully & Eden, 2001). The 8-item measure is rated on a 5-point scale ranging from 1('Strongly disagree) to 5('Strongly agree'). Chen et al. (2001) reports stability coefficients ranging from r=0.62 to r=0.65 as well as an undimensional factor structure.

Mental Health Continuum – Short Form for adults (MHC_SF) (Keyes, 2006). The MHC_SF is a 14-item scale and measures the upper end of the mental health continuum. Respondents specify how frequently during the preceding month they have experienced fourteen feelings – "never", "once or twice", "about once a week", 2 or 3 times a week", "almost every day" or "every day". The scale comprises of three sub-scales, namely Emotional well being (satisfaction with life, presence of positive affect and the absence of negative affect), Psychological/ Personal well being (self-

acceptance, purpose in life, personal growth, positive relations with others, environmental mastery and autonomy) and Social well being (social integration, social coherence, social actualization, social contribution and social acceptance). Keyes (2006) attests to the reliability and validity of this scale and model in a Setswana speaking African group. The Cronbach alpha reliability was 0.77 for the total scale.

Procedure

This study formed part of the larger project on Psychosocial Health and Biomarkers in an African context (FORT 3: Wissing, 2008). The majority of criterion related questionnaires that were used for the analyses form part of the FORT 3 project and had already been validated in other studies linked to this project.

The first step in the procedure was to obtain consent from the different institutions in which data were collected as well as participants to ensure their willingness to participate in the study voluntarily. Secondly, the questionnaires were filled in by the different groups under the supervision of individuals who had been trained in the administration of the test battery. The test administrators were in turn supervised by psychologists registered with the Health Professions Council of South Africa (HPCSA) and

are ethically bound by a code of conduct to protect the interests of participants.

Ethical Approval

Informed consent was obtained from each participant who showed the willingness to participate and who understood that participation was voluntary. The ethics committee of the North West University approved this study (Approval number: NWU-00002-07-A2).

Data Analysis

SPSS (ver. 16) was used to determine the various descriptive statistics (means and standard deviations). Cronbach alpha coefficients and inter-item correlation coefficients were used to assess the reliability of the PHQ-9 (Clark & Watson, 1995; Field,2005). According to Clark and Watson (1995) contemporary researchers classify reliabilities between 0.60 and 0.70 as adequate, whereas Nunnally and Bernstein (1994) suggested a reliability of 0.70 as sufficient in construct validation research. Field (2005) indicates that a Cronbach value of 0.8 or 0.9 for ability tests are good. Inter-item correlations provide an indication of the degree to which the items in the scale measure a single construct or factor (Smith & McCarthy, 1995), for a broad construct, these correlations should fall between 0.15 and 0.50 (Clark & Watson, 1995).

Criterion-related validity was determined by correlating the PHQ-9 with other scales measuring depression and psychological well-being. Construct validity on the other hand, was established firstly by conducting confirmatory factor analysis using structural equation modelling on the PHQ-9 to assess the number of factors (according to theory) and model fit. Model fit and associated indices (such as RMSEA and GFI) were established based on the output of structural equation modelling. RMSEA indicates amount of error in the hypothesised model-data fit comparative to the number of estimated parameters or the complexity of the model are indicated by the RMSEA. Browne and Cudeck (1993) state a value of 0.05 or less indicates a good fit. Other measures of fit such as the GFI were used. The GFI shows the relative amount of variance and co-variance found in the sample predicted by estimates of the population. Analyses were conducted on the total sample, as the descriptive statistics used to explore the data from the subgroups were comparable. Exploratory factor analysis was used to establish the number of factors yielded by the PHQ-9.

RESULTS

Descriptive statistics of measures used in the study

Descriptive statistics of the PHQ-9 and internal consistency indices are reported in Table 1. Cronbach alpha reliabilities for the 3 sub-groups ranged between 0.76 and 0.78 with specifically the following reliabilities 0.77 for group 1, 0.78 for group 2 and 0.76 for group 3. Inter-item correlations, which serve as indicators of internal consistency (Clark & Watson, 1995), yielded values ranging from 0.28 and 0.56. Clark and Watson (1995) indicated that values between 0.15 and 0.50 fall within the desirable range for inter-item correlations. Inter-item correlations for the various PHQ-9 sub groups range between 0.26 and 0.28. Thus, it can be concluded that internal consistency of the PHQ-9 in the 3 sub-groups is satisfactory.

[Insert Table 1 approximately here]

Criterion-related validity of the PHQ-9

Correlations of the PHQ-9 with other scales measuring various dimensions of well being were used to determine criterion-related validity. Results are reported in Table 2. All the correlations are

statistically significant. The highest practical significance was obtained for the correlation between the GHQ and the PHQ-9 with a value of 0.63** which can be interpreted as a large effect (see Field, 2005). This correlation would explain 39.69% of the variance.

[Insert Table 2 approximately here]

Confirmatory Factor Analysis of the PHQ-9

Confirmatory factor analysis for the PHQ-9 yielded a one-factor solution in all groups. The percentage variance explained ranged between 34.71% and 46.62%. Table 3 summarises the results of the confirmatory factor analysis.

[Insert Table 3 approximately here]

Exploratory factor analysis

Exploratory factor analysis was conducted using the maximum likelihood method of factor extraction with oblique rotation on the PHQ-9. As maximum likelihood is the preferred method of factor extraction when data is relatively normally distributed (Fabrigar, Wegener, MacCullum, & Strahan, 1999), it was used as extraction method in this study. A two-factor solution was yielded for all the

groups. The second factor in all subgroups comprised of only two items and was thus considered a minor factor and consequently discarded. Results are also reported in Table 3.

Construct Validity of the PHQ-9

The construct validity obtained in this research indicate that the PHQ-9 is a relatively valid measure of identifying depression for only two out of three subgroups used in the study (RMSEA= 0.08 in group 1; 0.11 in group 2; 0.07 in group 3). According to Browne and Cudeck (1993) RMSEA should be 0.05 or less to indicate good fit and RMSEA values ranging between 0.08 and 0.10 would then indicate a mediocre fit. Thus only the results for group 2 indicated a poor fit of the data to the model. Fit indices such as GFI were also consistent with good indication of fit as they were above 0.9 in groups 1 and 3 (Yu, 2002) including its alternative the Akaike Information Criterion (AIC) that must be small to indicate the best fit if different models are compared. The AIC for group 3 models is relatively the smallest as indicated in Table 4.

[Insert Table 4 approximately here]

Overall, the results indicate that the PHQ-9 is relatively valid for use in the two groups selected for this study and has an acceptable

reliability in all groups. The results further show that the PHQ-9 is related to other measures of depression and mental health.

DISCUSSION

The aim of this study was to explore the validity of the Patient Health Questionnaire (PHQ-9) in an African context. Based on construct validity results yielded by the findings, the PHQ-9 is relatively valid for the sample used in this study based on goodness of fit indices. Previous research findings on this instrument in different contexts have also indicated similar findings (Lowe et al., 2004; Spitzer, Kroenke, Williams, 2001).

The results also showed good criterion-related validity for the PHQ-9. All correlations of the PHQ-9 with other scales measuring well-being were statistically significant. The high correlations between the GHQ and the PHQ-9 could be expected since the GHQ measures symptoms of depression and psychological functioning.

Measures of consistency for the PHQ-9 indicated that it was reliable for use with the groups selected for this study. Establishing reliability is of course one of the first step in demonstrating that a particular instrument is suitable for a certain context (Field, 2005).

The Cronbach alpha for the total PHQ-9 of 0.77 can be regarded as adequate especially as it gives an indication of the presence of depression through the items used in the scale. This result is comparable to the Cronbach alpha indicated for the GHQ of 0.91 (Wissing et al., 1999). Inter-item correlations were generally satisfactory indicating that overall, reliability of the PHQ-9 is acceptable as indicated by the Cronbach alpha, and inter-item correlation. It is clear that inter-item correlations among the groups are within similar ranges leading to higher homogeneity in items.

Exploratory factor analysis yielded 2 factors in two out of three groups. The second factor was however a minor factor with less than three items. Essentially, it can be concluded that the exploratory factor analysis yielded only one factor. These factors relate to a sense of coping with everyday life and mental wellness. Based on the principles of the PHQ-9, respondents rate how often they have been bothered by various problems which could indicate levels of mental wellness or depression.

The RMSEA value of this scale was a good fit in all groups (Browne & Cudeck, 1993). Fit indices such as GFI were also consistent with good fit as they were above 0.9 in groups 1 and 3 (Yu, 2002). It can therefore be concluded that the PHQ-9 presented a good model fit

for two of the groups selected in this study. As described in the introduction of this article, efficient coping with life's challenges is important for psychological well-being which emphasizes the importance of the PHQ-9 to measure depression in a group of South African youth.

CONCLUSION AND RECOMMENDATION

It can be concluded that the PHQ-9, a short-item scale that measures depression is therefore valid to use as a measurement of depression in an African context.

Future studies can explore the validity of the PHQ-9 in other cultural contexts to compare its cross-cultural usefulness in the various communities of South Africa who are based in both rural and urban areas. The validity of this scale could further be enhanced by including data analysis across different demographic, cultural and language groups. Future work should investigate validity and reliability in various ethnic and gender subgroups more comprehensively. Construct equivalence and bias can also be measured in these ethnic and gender subgroups.

In terms of the limitations of the present study, the study is cross-sectional in nature and included convenience samples, and therefore limits the generalisations that could be made to other groups. However, the study makes important contributions to the possibility of the use of the PHQ-9 for detecting depression in the specific South African groups selected in this study.

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Table 1: Descriptive statistics of the PHQ-9 and reliabilities in various sub-groups

Group	Mean	SD	Range		Item-total correlation	Item-total correlation range	Reliability coefficient
			Min	Max			
1 (N=1480)	8.78	5.2	0	27	0.27	0.29-0.54	0.77
2 (N=559)	10.50	5.6	0	27	0.28	0.28-0.56	0.78
3 (N=185)	9.23	5.5	0	25	0.26	0.37-0.50	0.76

Table 2: Criterion-related validity of the PHQ-9

PHQ	1				
GHQ	0.63**	1			
CSE	-0.27**	-0.29**	1		
NGSE	-0.20**	-0.20**	0.43**	1	
MHC_SF	-0.30**	-0.29**	0.49**	0.27**	1

** Correlation is significant at the 0.01 level (2-tailed)
NB: PHQ= Patient Health Questionnaire; GHQ = General Health Questionnaire; CSE = Coping Self Efficacy Scale ; NGSE = New General Self-Efficacy Scale ; MHC_SF = Mental Health Continuum – Short Form for adults.

Table 3: Factor Analysis of the PHQ-9

	CFA		EFA	
Group	Number of factors	% variance explained	Number of factors	% variance explained
1 (N=1480)	1	34.71	2	45.33
2 (N=559)	1	36.79	2	47.93
3 (N=185)	1	46.62	2	57.03

Table 4: Construct Validity of the PHQ-9

		Fit indices	
Group	RMSEA	GFI	AIC
1 (N=1480)	0.08	0.94	0.36
2 (N=559)	0.11	0.89	0.88
3 (N=185)	0.07	0.95	0.26