

The Mental Health Continuum-Short Form: Measurement invariance in a South African context

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Remarks

The reader is kindly requested to take note of the following:

- In this mini-dissertation, the referencing and editorial style according to the *Publication Manual* (6th edition) of the American Psychological Association (APA) was followed, which is the prescribed referencing style for the Master's in Applied Positive Psychology of the North-West University, Vaal Triangle Campus. Due to the use of the APA referencing and editorial style, American spelling was employed throughout the mini-dissertation.
- This mini-dissertation was written in article format, which consists of an introductory chapter, one research manuscript containing the major findings of the study, and a final chapter outlining the conclusions, limitations, and recommendations pertaining to the study.

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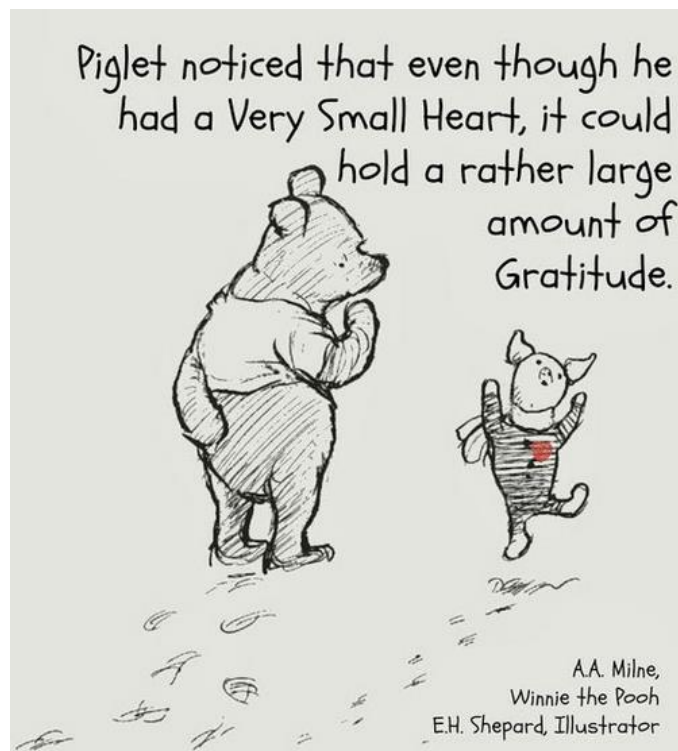
Without the support and love of my family I would never have been able to complete this mini-dissertation. Thank you is just not enough! Danny, Mamma, en Pappa, julle sal nooit weet hoe ek julle ondersteuning en aanmoediging waardeer. I also need to mention my two children, who shared my suffering, but rarely complained, and were always ready with a hug. Mamma is verskriklik lief vir julle!

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Summary

Title: The Mental Health Continuum-Short Form (MHC-SF): Measurement invariance in a South African context

Key terms: Mental Health Continuum-Short Form (MHC-SF); mental health; well-being; measurement invariance; latent variable modeling; cultural socio-demographic characteristics

This study explored the extent of measurement invariance present in four groups from a South African sample: age ($n = 400$), gender ($n = 475$), relationship status ($n = 273$), and religiosity ($n = 360$). A secondary data set was used for the analyses, originally compiled with the use of a cross-sectional quantitative survey design. Data applicable to this study were from the Mental Health Continuum-Short Form (MHC-SF), and descriptive statistics were calculated with SPSS 24. Mplus 7.8 was used for confirmatory factor analyses and measurement invariance testing through latent variable modeling.

The three-factor structure of the MHC-SF was confirmed separately for all the sub-groups, followed by the process of testing for measurement invariance, including the creation of configural models to be used for comparison, specifying metric models (and scalar models where applicable), as well as identifying problematic items. The results revealed that the age and gender groups achieved strong measurement invariance, while the relationship status group showed weak measurement invariance, and the religiosity group was too dissimilar for comparison. These results suggest that measurement invariance should be explored further with regards to culturally defined socio-demographic characteristics.

The mini-dissertation concluded with a chapter which outlined the conclusions and limitations of the study, followed by recommendations for future research, and practical application of the findings.

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Chapter 1

Introduction, Problem Statement, and Objectives

The aim of this chapter is to provide background information to the study behind this mini-dissertation. The study aimed to determine whether, and to what extent, measurement invariance regarding mental well-being as estimated with the Mental Health Continuum-Short Form (MHC-SF; see Appendix A) could be established for different groups (age, gender, relationship status, and religiosity) from a South African sample. The general introduction is followed by clarification of concepts and constructs used in the study, as well as a brief overview of existing literature on the topic and the research problem. After the research questions and aims are stated, the study's research methodology is discussed, followed by the presentation of ethical considerations. Finally, an overview of the division of the chapters of the study is provided.

1.1 Introduction and Problem Statement

The Mental Health Continuum (MHC; consisting of 40 items) was first developed by Keyes (2002) in an attempt to measure the prevalence of mental well-being in the United States' population. In 2005 he validated a shorter version of the original Mental Health Continuum-Long Form (MHC-LF), consisting of 14 items measuring emotional, social, and psychological well-being (Keyes, 2005). This Mental Health Continuum-Short Form (MHC-SF) has since been validated in numerous studies (Guo et al., 2015; Joshanloo & Jovanović, 2016; Lamers, Westerhof, Bohlmeijer, Ten Klooster, & Keyes, 2011; Petrillo, Capone, Caso, & Keyes, 2015), and its factor structure has been found to be of more relevance than that of the MHC-LF in certain contexts (Kheswa, 2016; Smit, 2015).

The MHC-SF has consistently shown trustworthy and valid psychometric properties in Southern African studies (Boshoff, Potgieter, Van Rensburg, & Ellis, 2014; Keyes et al., 2008; Rothmann, 2014). However, little is known about possible differences within certain groups of the South African population, specifically concerning potential item inequivalence. Item equivalence is confirmed when it has been established that different individuals interpreted the same questions in the same way, leading to the conclusion that their answers should be comparable with regards to the construct measured by those items (Byrne, 2012; Van de Schoot, Lugtig, & Hox, 2012; Wang & Wang, 2012). Failure to investigate this psychometric property of measuring instruments renders the comparison of scores among

different groups less certain and reliable, as it forces researchers to make assumptions of untested and unproven item equivalence. The results of such comparisons might lead to incorrect conclusions, as well as unsuccessful interventions – and unforeseen harm in the long term. As such, a need exists for an examination of the extent to which the construct of flourishing, as measured by the MHC-SF, exhibits measurement invariance across different South African demographic groups.

Keyes (2002) introduced the term *flourishing*, which he conceptualized as “[a]dults with complete mental health... with high levels of well-being... filled with positive emotion and... functioning well psychologically and socially” (p. 210). At the opposite end of the continuum he defined *languishing* as the absence of flourishing, but not necessarily indicating the presence of mental illness (Keyes, 2002). It was in line with these definitions that this study was approached.

Group comparisons of mental well-being were briefly touched upon in a previous study, when Keyes (2007) examined possible differences regarding race, gender, and years of education in the context of the MHC-SF as a whole. Support was found for some demographic variations: more years of education related positively to general mental health; black persons were more likely to exhibit complete mental health than white persons; and no difference in level of mental health was found between genders, except when race was introduced – black men were characterized by higher levels of well-being than black women. The comparisons of the group means were examined through analyses of variance (ANOVAs), which provided information on group differences, based on the concept of flourishing. However, neither the possible influence of participants’ previous knowledge on the subject nor their interpretation of individual items was examined or taken into account. The impact of and relationships between the three separate constructs of emotional, social, and psychological well-being were also not explored, but, although important, this aspect fell outside the scope of the current study and will therefore not be discussed here.

The focus of mental health research in South Africa has largely remained on mental illness and mental health services (Lund & Flisher, 2006; Petersen & Lund, 2011; Stein, 2014). Lund, Kleintjes, Kakuma, and Flisher (2010) referred to several studies – Bradshaw, Norman, and Schneider (2007); Williams et al. (2008); and Kleintjes et al. (2006) – that “reported no evidence that there were any differences between socially defined racial groups or cultural groups in the prevalence of mental disorders” (p. 394). In addition to these three

studies, others that looked at group differences also focused on mental disorders rather than mental health, e.g., Cholera et al. (2014); Petersen et al. (2015); and Mall et al. (2015).

Because the primary research focus within the field of mental health had remained on mental illness until recently – diagnosing the problem and treating its symptoms – it has led to current mental health policies that are also mainly aimed at alleviating the burdens of mental illness. The ideal solution would seem to be a change in focus from mental *unwellness* to mental wellness. This could lead not only to lowering instances of sub-symptomatic mental disorders, and to bettering the ability of service providers to target serious mental health issues, but also to a reduction in government and private expenditure regarding the treatment of less severe mental illness in and out of hospital.

Even though the basic focus of most studies remained on mental illness, the authors involved generally agreed on the following points (with implications for a shift in focus to mental health) to greater or lesser degrees of detail:

- The positive impact of mental well-being in all spheres of society, e.g., social, economic, and environmental contexts;
- The need for policies, strategies, and programs regarding the management of mental illness and the promotion of mental health;
- Equal allocation of mental health resources across all levels of society, proportionate to level of socioeconomic status – e.g., budget spend, staffing, facilities – as well as expanding services to community level;
- The necessity for legal enforceability of policies and strategies – although the Mental Health Care Act of 2002 is in place, with the Mental Health Policy Framework and Strategic Plan 2013-2020 in support, practical implementation is problematic and Review Boards do not have any authority to enforce consequences on dissenting persons or institutions;
- The lack of data and substantiated information on populations hinder the processes of planning and implementation of mental health care, and policies and programs to support mental well-being and prevent mental illness; and
- The significant impact of burden of disease on national and international budgets, as well as the secondary costs on government, community, and personal levels, e.g., costs associated with undiagnosed mental disorders, non-adherence

to treatment, substance use and criminality, and impact of mental illness on families.

(Allen, Balfour, Bell, & Marmot, 2014; Bradshaw et al., 2007; Burgess, 2015; Hanlon et al., 2014; Hugo, Boshoff, Traut, Zungu-Dirwayi, & Stein, 2003; Lund & Flisher, 2006; Lund et al., 2010; Marais & Petersen, 2015; Mendenhall et al., 2014; Petersen et al., 2015; Semrau et al., 2015; Vorster et al., 2000; Williams et al., 2008; World Health Organization, 2001).

It is clear from these opinions that the provision of worthwhile mental health services in South Africa is quite a challenge; the potential significant contribution that the general population's mental well-being could make to enhance effective solutions also becomes apparent. Positive mental health could conceivably impact greatly on the current demand for mental health services, but the focus on mental illness is obscuring that fact. However, for mental well-being to have a constructive impact, the contexts and attributes of the intended recipients need to be taken into account during the formulation of policies aimed at fostering mental health (Vorster et al., 2000).

Unfortunately, little research on what mental well-being looks like in different groups within populations could be located (Lupano Perugini, De la Iglesia, Solano, & Keyes, 2017; Petrillo et al., 2015), especially in the diverse South African context (Joshanloo, Wissing, Khumalo, & Lamers, 2013). It is important to understand the similarities and differences of the manifestation of mental well-being. Such understanding would make the development and implementation of tailored interventions and programs possible. Investigating the measurement invariance of the MHC-SF could be a first step in the right direction to address some of these issues.

This study attempted to identify initial differences in how mental well-being is measured and interpreted in specific sub-groups of a sample of South African adults, based on age, gender, relationship status, and religiosity. First, the three-factor structure of the MHC-SF was confirmed in the data set of each sub-group. Second, the extent of measurement invariance was tested with regards to the selected sub-groups. Following the identification of items that could possibly explain differences within groups, implications, limitations, and recommendations are discussed.

1.2 Research Questions

1.2.1 Primary research question

To what extent, if any, does the MHC-SF show measurement invariance within specific sub-groups (age, gender, relationship status, and religiosity) from a South African sample?

1.2.2 Secondary research questions

- Does the proposed three-factor structure of the MHC-SF extend to the identified sub-groups (age, gender, relationship status, and religiosity) from a general South African sample?
- What is the extent of measurement invariance between different age sub-groups?
- What is the extent of measurement invariance between the gender sub-groups?
- What is the extent of measurement invariance between the relationship status sub-groups?
- What is the extent of measurement invariance between the religiosity sub-groups?

1.3 Research Aims

1.3.1 Primary research aim

The primary research aim of this study was to determine to what extent, if any, the MHC-SF showed measurement invariance within specific sub-groups (age, gender, relationship status, and religiosity) from a South African sample.

1.3.2 Secondary research aims

The following research aims were identified for this study, namely to determine:

- whether the proposed three-factor structure of the MHC-SF extended to the sub-groups for age, gender, relationship status, and religiosity from a general South African sample.
- the extent of measurement invariance between different age sub-groups.
- the extent of measurement invariance between gender sub-groups.
- the extent of measurement invariance between relationship status sub-groups.
- the extent of measurement invariance between religiosity sub-groups.

1.4 Theoretical Framework

Keyes (2002, 2005) developed the MHC-SF based on the premise that complete mental health could be measured by persons reporting on a combination of three different, yet related, constructs:

- *Emotional well-being* (Keyes, 2002, 2005, 2009): The degree to which persons perceive themselves to be satisfied with their lives.
- *Social well-being* (Keyes, 1998, 2002, 2005, 2009): The extent to which persons experience their level of positive social functioning in the community.
- *Psychological well-being* (Keyes, 2002, 2005, 2009; Keyes & Ryff, 1999; Ryff, 1989): The level on which persons feel they are mentally functioning well.

Collectively, these three larger elements make up the level of overall mental well-being or flourishing of the respondent(s). In the context of the MHC-SF, the hedonic quality (happiness) of mental well-being is measured by the three items comprising emotional well-being, whilst the eudaimonic aspect (meaning) is represented by the 11 items of social and psychological well-being; in combination also identified as positive functioning (Keyes, 2002, 2005, 2007, 2009).

The MHC-SF uses an ordinal, five-point Likert-type scale to measure respondents' possible level of mental well-being. Responses are coded from 0 (*never*) to 5 (*every day*) and combined to result in a diagnosis of flourishing, languishing, or moderate mental health. Mental well-being is comprised of items estimating emotional (e.g., "satisfied"), social (e.g., "that people are basically good"), and psychological (e.g., "confident to think or express your own ideas and opinions") well-being. The first three items of the questionnaire measure emotional well-being (which comprises the experience of positive emotions, absence of negative emotions, and general life satisfaction; Keyes, 2002, 2005, 2009), followed by five items measuring social well-being (social contribution, social integration, social actualization, social acceptance, and social coherence; Keyes, 1998, 2002, 2005, 2009). The last six items are used to measure psychological well-being (self-acceptance, environmental mastery, positive relationships, personal growth, autonomy, and life purpose; Keyes, 2002, 2005, 2009; Keyes & Ryff, 1999; Ryff, 1989).

When a person reported an experience of *every day* or *almost every day* for one of the emotional well-being items, and for at least six of the positive functioning items, he/she

would be designated as flourishing. As a result of an individual reporting *never* or *once or twice* for the same grouping of items, he/she would be classified as languishing. Individuals who were neither flourishing nor languishing would be classified as having moderate mental health (Keyes, 2002, 2005, 2009).

Divergent validity and internal consistency ($\alpha > .80$) of this scale have been shown in developed countries like The Netherlands (Lamers et al., 2011). The MHC-SF has been validated for South African use (Boshoff et al., 2014; Keyes et al., 2008; Rothmann, 2014), but little research investigating measurement invariance for socio-demographic groups could be located, even internationally.

1.5 Methodology

1.5.1 Research design

This study made use of a secondary data set, which was originally collected in the context of a quantitative, cross-sectional survey design (Spector, 2013). A structured questionnaire was administered to a randomized sample of 984 participants by a team of 14 trained fieldworkers in the municipal areas of Tlokwe and Mahikeng (North West province), as well as Emfuleni (Gauteng).

The specific data set was considered appropriate for the current study due to the diversity of its respondents. The data were collected in different communities from two provinces, and from multiple sites with greatly varying ethnic and socio-economic attributes. The age range of respondents was large, and the gender distribution was nearly equal, which was of specific interest to the study. Also included among the biographical details was the relationship status of the respondents, as well as a self-report on their experience of level of religiosity.

1.5.2 Participants and sampling

The number of electoral districts in each community was used to estimate a representative proportion of participants needed in each community. Specifically, targeted households were identified through systematic sampling based on the previously calculated proportions. The subsequent participant sample ($n = 984$) was made up of Emfuleni ($n = 457$), Mahikeng ($n = 311$), and Tlokwe ($n = 216$) residents. Both genders were present in

near-equal numbers (male = 49.0%; female = 51.0%), with an age range of 18 to 92 years ($M = 41.18$ years, $SD = 15.10$).

1.5.3 Measuring instruments

A structured questionnaire, translated from English to Afrikaans and Setswana, was used for the original collection of data. Biographical information of participants pertaining to age, gender, and race, was collected first, after which the MHC-SF was completed. Other questionnaires were also utilized, but these had no impact on the current study and were therefore removed from the secondary data set.

The MHC-SF (Keyes, 2005, 2009) consists of 14 items measured on an ordinal scale from *never* (coded as 0) to *every day* (coded as 5). Participants are asked to evaluate the extent to which they experienced each of the descriptions during the previous month, e.g., “interested in life”, “that people are basically good”, and “confident to think or express your own ideas and opinions”. Emotional well-being is measured by three items, psychological well-being by six items, and social well-being by five items.

The MHC-SF has been shown to exhibit very good internal consistency ($\alpha > 0.80$) and discriminant validity in the U.S., The Netherlands, and South Africa, amongst others (Keyes, 2007; Keyes et al., 2008; Lamers et al., 2011).

1.5.4 Data analysis

First, descriptive statistics were calculated with the use of SPSS 24 (IBM Corporation, 2016). Then, using Mplus 7.8 (Muthén & Muthén, 1998-2016), measurement invariance (MI) testing was employed to determine whether comparisons regarding levels of mental well-being between four groups (age, gender, relationship status, and religiosity) from the sample would be acceptable and accurate. MI is a statistical technique where data for two or more groups are compared through the application of progressively strict parameters in order to pinpoint differences regarding, for instance, interpretation of items, or previous knowledge on the subject (Van de Schoot et al., 2012).

Cronbach’s alpha was not calculated; instead, the reliability of each sub-scale was determined with Raykov’s rho (Raykov, 2004). He suggested that alternative methods should be used for evaluation of composite reliability, as Cronbach’s alpha is only relevant when all

items of a factor load equally – which is assumed in the SPSS 24 statistical program, but which is not usually the case.

Separate data sets based on age, gender, relationship status, and religiosity, were created from the original data, followed by a basic validation of the original factor structure of the MHC-SF for each group with the statistical software package Mplus 7.8 (Muthén & Muthén, 1998-2016). Because the data distribution exhibited skewness and kurtosis, the decision was made to use the Maximum Likelihood Robust (MLR) estimator, which adjusts for non-normal data. Also, in order to evaluate for the best possible model fit, several complementary goodness-of-fit statistics were used in addition to the usual chi-square (χ^2) estimate, which included incremental fit indices (estimate the improvement of fit), absolute fit indices (estimate the fit of the model against the data), and predictive fit indices (correct for model parsimony) (Byrne, 2012; Kenny, 2015; Kline, 2011; Wang & Wang, 2012).

Due to the use of the MLR estimator, the chi-square values of the different models could not be compared directly, but had to be adjusted through the application of the Satorra-Bentler difference test (Satorra & Bentler, 2001). Using this method, if the change in chi-square, with the change in its associated degrees of freedom (*df*), is found to be significant, it is an indication that the nested model exhibits worse fit, and the original model should be retained for further analysis.

The incremental fit indices used consisted of the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI), which both indicate acceptable fit above 0.90 (Wang & Wang, 2012), while the absolute fit indices included the Root Mean Square Error of Approximation (RMSEA; acceptable between 0.05 and 0.08) and the Standard Root Mean Square Residual (SRMR; good fit below 0.08). The predictive fit indices of the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC), where the lowest value indicates the best model fit, were used only in the initial three-factor confirmation analyses, because they only apply to the estimation of non-nested models (Byrne, 2012).

Measurement invariance was estimated separately, but according to the same technique for the relevant groups of age, gender, relationship status, and religiosity. The first step was for configural variance to be obtained. The separately fitted models for the younger and older sub-groups, the male and female sub-groups, the single and married sub-groups, and the lower to moderate religiosity and higher religiosity sub-groups respectively, were combined into one confirmatory factor analysis (CFA) model to establish a baseline model for

consequent comparisons. The configural model consisted of an equal number of factors with the same fixed and free loadings for both groups, with no other specified equality restrictions (Byrne, 2012; Wang & Wang, 2012). The next step was to restrict factor loadings to be equal in order to establish metric (weak) invariance, which indicates that the relationships between item responses and the underlying factors are not significantly different across the five groups (Byrne, 2012; Wang & Wang, 2012). Once metric invariance was found, the analysis moved on to scalar (strong) invariance testing, where both factor loadings and intercepts were constrained to be equal. Had scalar invariance been confirmed, it meant that the five groups could be compared with regard to their scores and the interpretation thereof (Byrne, 2012; Wang & Wang, 2012).

If invariance at any stage cannot be established, it is advisable to find the problematic item(s). These items should then be released to be freely estimated one by one, until an insignificant change follows. In this way, partial measurement invariance can be established, and interpretations and recommendations can be provided regarding the identified items, as well as the comparisons between equivalent items and constructs (Byrne, 2012). Accordingly, this procedure was followed in the present study in cases where invariance could not be established.

1.6 Ethical Considerations

The original study was approved by the HREC (Health Research Ethics Committee) on the North-West University's Potchefstroom campus (approval no. NWU-00341-15-A1), and several leaders from the three communities provided permission for the original data collection. The study was conducted in accordance with ethical practices such as obtaining free and informed consent from all participants, informing participants that they were free to withdraw from the study at any time without penalty, and providing assurances of confidentiality and anonymity.

The privacy, confidentiality, and anonymity of the original participants were also assured in the current study, as the researcher worked with an anonymized data set which only contained participants' relevant demographic information, and responses to the MHC-SF.

1.7 Proposed Outline of This Study

The article format was utilized in the writing of this mini-dissertation, with the following chapter division:

Chapter 1: Introduction, problem statement, and objectives.

Chapter 2: The Mental Health Continuum-Short Form (MHC-SF): Measurement invariance in a South African context.

Chapter 3: Conclusions, limitations, and recommendations.

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Chapter 2

Research Article

The Mental Health Continuum-Short Form (MHC-SF): Measurement invariance in a South African context

Abstract

This study aimed to ascertain the extent of measurement invariance between various groups using latent variable modeling, with the focus on age, gender, marital status, and religiosity groups from a South African sample ($n = 984$). The results supported previous conclusions of scalar measurement invariance for groups containing age and gender, except where possible cross-loadings were indicated for social contribution on social and emotional well-being. Measured levels of mental well-being, as well as most intercepts, were comparable for the single and married sub-groups; significant dissimilarities were established regarding the starting points for happiness and autonomy. It was also established that differences between the lower to moderate and higher religiosity sub-groups were too distinct for comparison. While the higher religiosity sub-group's mental well-being data fitted the model well, the lower to moderate sub-group's information did not show acceptable fit at all. It was found that social contribution would need more examination due to possible cross-loading on both emotional and social well-being constructs. Also, social acceptance would need further scrutiny, specifically regarding societal interpretations of "good" and "people". Groups that showed scalar measurement invariance were based on physical characteristics (age and gender); whereas the groups that did not (or only partially) were based on culturally Western definitions (relationship status and religiosity). The results of this study suggest that establishing measurement invariance is crucial when empirically assessing a population's levels of mental well-being, as well as considering the implications of the level of equality found when developing interventions to improve mental health. The final conclusion was that more in-depth research regarding measurement invariance based on culturally defined socio-demographic characteristics is needed to successfully utilize the MHC-SF for the promotion of mental health in a majority of contexts.

Keywords: Mental Health Continuum-Short Form (MHC-SF); mental health; well-being; measurement invariance; latent variable modeling; cultural socio-demographic characteristics

Introduction

Mental well-being has gradually been receiving more intensive interest in recent years (Csikszentmihalyi, 2014; Ryff, 2014), with a ripple-effect causing increasing appeals for a change of direction in government policies (Knapp, McDaid, & Parsonage, 2011). Available mental health services are habitually inadequate globally, and the accessibility of care should be broadened to include community level assistance, especially in low-and middle-income countries (Semrau et al., 2015). The Mental Health Continuum-Short Form (MHC-SF [see Appendix A]; Keyes, 2005, 2009) has shown reliability and validity in various contexts and cultures (Diedericks & Rothmann, 2014; Joshanloo & Jovanović, 2016; Lupano Perugini, De la Iglesia, Solano, & Keyes, 2017), and its estimates of populations' mental health might thus ideally utilized as basis for such change. However, cross-cultural comparisons up to date have mainly focused on characteristics such as age and gender. In order to be a true reflection of any sample's level of mental well-being, additional measurement invariance tests need to be conducted. This research study endeavored to augment existing cultural comparisons by not only confirming non-invariance of age and gender groups, but by also looking at measurement invariance of two culturally constructed characteristics, namely relationship status and religiosity.

The Mental Health Continuum – Short Form (MHC-SF)

In 2005 Keyes derived a shorter version from the Mental Health Continuum-Long Form, which originally consisted of 40 items. The original questionnaire was developed with the intention of determining the extent of mental well-being present in the population of the United States (Keyes, 2002), and the Mental Health Continuum-Short Form (MHC-SF) contains 14 items that purportedly do the same. The MHC-SF is based on the theoretical framework outlined by Keyes (2002, 2005), who proposed that mental well-being is comprised of three separate, yet interrelated, elements:

- *Emotional well-being* is measured through the reported presence of positive emotions, absence of negative emotions, and the degree to which persons perceive themselves to be satisfied with their lives.
- *Social well-being* was adapted from Keyes' (1998) five suggested dimensions: social contribution; social integration; social actualization; social acceptance; and social coherence.

- *Psychological well-being* as a construct is based on Ryff's (1989) operationalization of its six proposed aspects: self-acceptance; environmental mastery; positive relations with others; personal growth; autonomy; and purpose in life.

Emotional well-being is equated to hedonic happiness, with social and psychological well-being providing the level of positive functioning or eudaimonic happiness (Keyes, 2002, 2005, 2009). The three constructs collectively aim to provide an estimate of an individual's level of flourishing, or lack thereof. With the introduction of the Mental Health Continuum, Keyes (2002) proposed the term *flourishing* to describe adults who exhibited "complete mental health... with high levels of well-being" (p. 210), who experienced positive emotions, and who were adept at psychological and social functioning. *Languishing* was used to define the opposite end of the suggested continuum (i.e., persons who did not flourish, but who did not necessarily suffer from mental illness either). An individual would be classified as flourishing after reporting *every day* or *almost every day* on an emotional well-being item, and on six or more items regarding positive functioning. Conversely, when an individual reported *never* or *once or twice* for a similar combination of items, he/she would be classified as languishing. Individuals categorized as neither flourishing nor languishing were described as presenting with moderate mental health (Keyes, 2002, 2005, 2007).

The MHC-SF has repeatedly been found to be reliable and valid in countries such as the United States, China, and Serbia (Guo et al., 2015; Keyes, 2005, 2007, 2009; Joshanloo & Jovanović, 2016), as well as in South Africa (Boshoff, Potgieter, Van Rensburg, & Ellis, 2014; Diedericks & Rothmann, 2014; Nell, De Crom, Coetzee, & Van Eeden, 2015). However, very little research on item-level measurement invariance for groups could be located.

Comparisons between groups

Different groups have been compared before in several studies, mostly regarding prevalence, treatment, and measurement of mental illness, not mental health. Olfson, Blanco, Wang, Laje, and Correll (2014), Sonuga-Barke et al. (2017), Kuijpers et al. (2016), and Macpherson et al., (2016) are only selected recent examples of such studies. Some studies on the presence of mental illness in South Africa found no apparent differences between races or cultures (Kleintjes et al., 2006; Williams et al., 2008). Unfortunately, little research could be located on what mental well-being looks like in different groups within populations,

especially in the South African context (Joshani, Wissing, Khumalo, & Lamers, 2013; Lupano Perugini et al., 2017; Petrillo, Capone, Caso, & Keyes, 2015).

In 2007 Keyes briefly referred to comparisons of mental well-being between different genders, races, and years of education – black individuals were more likely to be completely mentally healthy than white individuals, and no differences were found between genders, except for black men exhibiting higher mental well-being than black women. Lupano Perugini et al. (2017) conducted factorial invariance testing on the MHC-SF for an Argentinean sample. The groups they used for comparison consisted of age groups 18-40 years and 41-86 years, as well as a male and a female group. Interestingly, they found no statistically significant difference for either comparison, indicating that the three-factor structure of the MHC-SF was adequate for measuring mental well-being in these groups. In an Italian sample, Petrillo et al. (2015) tested for factor invariance only up to the metric level. They also claimed no significant differences in latent factor means between males and females, but did not investigate further. A measurement invariance study by Joshani et al. (2013) looked at three different nationalities (Dutch, South African, and Iranian). They found full metric invariance and partial scalar invariance. Unfortunately, it was unclear whether the three samples were equal in size, and they did not report on the significance of the difference in chi-square between models in support of the change in CFI.

It is important to understand the similarities and differences of the manifestation of mental well-being in culturally diverse populations. Indications of mental health could differ vastly between homogenous and heterogeneous populations, and even within specific cultures due to community conventions (Fernando, 2010). It is therefore imperative that policies regarding the promotion of mental well-being should be informed by the characteristics and needs of each targeted group and its context (Vorster et al., 2000). Mental health research consequently plays an important role in empirically establishing what these needs and characteristics are.

The impact of research on mental health

Regrettably, mental health research in South Africa, as in most countries, has essentially focused on mental illness (Cholera et al., 2014; Lund & Flisher, 2006; Mall et al., 2015; Petersen et al., 2015; Petersen & Lund, 2011; Stein, 2014). Current mental health policies are based on the existing body of research and mainly aim at relieving the burdens of mental illness.

Even so, many authors on mental illness found similar issues and made similar recommendations regarding mental health (Allen, Balfour, Bell, & Marmot, 2014; Bradshaw, Norman, & Schneider, 2007; Burgess, 2015; Hanlon et al., 2014; Hugo, Boshoff, Traut, Zungu-Dirwayi, & Stein, 2003; Lund & Flisher, 2006; Lund, Kleintjes, Kakuma, & Flisher, 2010; Marais & Petersen, 2015; Mendenhall et al., 2014; Petersen et al., 2015; Semrau et al., 2015; Vorster et al., 2000; Williams et al., 2008; World Health Organization, 2001). Agreement was clear on the impact of enormous proportions of government budgets worldwide that were allocated to “burden of disease”, including indirect costs of mental health issues to governments, communities, and individuals. They agreed on the necessity to manage mental illness; also to promote mental health through applicable policies, strategies, and programs. However, in order for these policy changes to be effected, it was not only deemed essential to allow for appropriate allocation of resources to assist with the implementation of specific policies and strategies, but also to have legal recourse in the establishment and enforcing thereof. Mental health and its positive impact on society as a whole have been highlighted in numerous studies, with many a call for more research on mental well-being in order to plan and implement mental health care initiatives based on sufficient data.

Keeping these guidelines in mind – together with the impact of context – would make the development and implementation of tailored interventions and programs possible, in turn enhancing their success and consequent positive impact on society. One of the most plausible solutions in the long term would be a much stronger focus on the mental well-being of the general population. The current focus makes it too easy to lose sight of the constructive impact that positive mental health could have on lowering the demand for mental health services. With a shift in policies’ focus from mental illness to mental wellness, the prevalence of sub-diagnostic mental illness might become lower, giving mental health service providers more ample opportunity to assist with serious mental disorders, while also alleviating monetary costs associated with in-and out-patient treatment of less severe mental issues currently covered by government and/or private citizens. Accurate interpretation of information obtained from the MHC-SF could be a first step in the right direction to address some of these issues, especially in diverse and/or developing countries.

Study Aim

The primary aim of this study was to establish whether, and to what extent, measurement invariance could be confirmed between different groups from a South African sample. A secondary aim was set to identify possible differences if measurement invariance was not found. The groups in question were constructed as follows: a) Younger and older age groups; b) Male and female groups; c) Married and single groups; and d) Lower to moderate, and higher religiosity groups.

Method

Research design

A quantitative, cross-sectional survey design (Spector, 2013) was originally applied to gather data for the construction of a data set. Relevant information from the resulting data set was used for secondary analyses in this study. Structural equation modeling, or latent variable modeling (Kline, 2011), was used to investigate whether measurement invariance was present within different groups of age, gender, relationship status, and religiosity, specifically regarding the MHC-SF.

Participants

A sample of 984 participants completed a structured questionnaire with the assistance of a team of 14 trained fieldworkers. The respondents resided in the provinces of North West (Tlokwe municipality: $n = 215$; Mahikeng municipality: $n = 310$) and Gauteng (Emfuleni municipality: $n = 456$). Specific households were targeted through systematic sampling based on proportions calculated according to the number of electoral districts present in each community. Basic characteristics of the participants are provided in Table 1.

Table 1
Characteristics of the Participants (n=984)

Item	Category	Frequency ^a	Percentage
Gender	Male	475	49.0
	Female	494	51.0
Age group	< 35 years	400	40.8
	35-60 years	444	45.3
	> 60 years	137	14.0
Area of residence	Tlokwe	215	21.9
	Emfuleni	456	46.5
	Mahikeng	310	31.6
Education level	None	27	2.8
	Some primary education	44	4.5
	Completed primary education	99	10.2
	Some secondary education	234	24.1
	Completed secondary education	415	42.7
	Post-school qualification	95	9.8
	University degree	57	5.9
Relationship status	Single	587	60.8
	Married	273	28.3
	Divorced	30	3.1
	Widowed	76	7.9
Religiosity	Not at all	50	5.2
	Slightly	109	11.4
	Moderately	201	21.0
	Very	495	51.8
	Extremely	101	10.6

^a Missing values not reported, number of participants might differ from expected total ($n = 984$).

Measuring instruments

Biographical information such as age, gender, and relationship status of participants was collected in the first section of the structured questionnaire.

The *Mental Health Continuum-Short Form (MHC-SF; Keyes, 2005, 2009)* was used to measure the level of participants' mental well-being through 14 questions: three items on emotional well-being, five items on social well-being, and six items on psychological well-being. An ordinal scale from *never* (coded as 0) to *every day* (coded as 5) was applied and participants reported on their experience of each description during the previous month, e.g., "happy", "that the way our society works makes sense to you", and "that your life has a sense of direction or meaning to it". A state of flourishing was identified with answers of *every day*

or *almost every day* on one emotional well-being item, and on six or more social and psychological items. A languishing individual would have reported *never* or *once or twice* for the same arrangement of items, whilst a moderately mentally well person would be seen as neither flourishing nor languishing (Keyes, 2002, 2005, 2009). The MHC-SF has produced trustworthy and valid psychometric properties in various contexts. In The Netherlands internal consistency was determined at $\alpha = 0.89$ (Lamers, Westerhof, Bohlmeijer, Ten Klooster, & Keyes, 2011), with moderate test-retest reliability, and good convergent and discriminant validity. An Argentinean study revealed an internal reliability score of 0.89 and also confirmed convergent and discriminant validity of the constructs (Lupano Perugini et al., 2017). Petrillo et al. (2015) found $\alpha = 0.86$, together with moderate test-retest reliability and verification of convergent, divergent, and discriminant validity.

Several other questionnaires were included in the original data collection, but were not of interest to the current study and were therefore omitted from the data set.

Research procedure

The research proposal developed for the original study was approved by the North-West University's Africa Unit for Transdisciplinary Health Research (AUTHeR), as well as by its Human Research Ethics Committee (HREC). Gatekeepers from the three communities were identified and informed on the scope of the study, before being asked for their support for, and endorsement of the research. With the necessary approvals and permissions obtained, 14 fieldworkers were recruited from the respective communities. The researchers trained the fieldworkers thoroughly, and confirmed that they understood how to treat participants with respect and dignity. No compensation was provided to any participants; however, fieldworkers received remuneration for transport and food expenses, as well as payment for completed questionnaires.

Field workers had to sign an undertaking of confidentiality, and it was ensured that only the researchers would have access to any identifiable respondent characteristics. The first round of data analysis was completed with the assistance of the NWU's statistical services. After capturing the data, all questionnaires were returned to the researchers, who are keeping physical documents in a locked office, and electronic information on a password-protected computer.

The data received for this study contained no identifiable attributes of any participants, but as an additional precaution, all data have been stored on a password-protected computer.

Data analysis

Descriptive statistics (frequencies, means, and standard deviations) were calculated with SPSS 24 (IBM Corporation, 2016).

First, all participants who had missing values on all questions of the MHC-SF were removed from the secondary data set. The remaining data were used to create separate data sets for the identified sub-groups: age groups 18-34 years and 35-60 years; males and females; single and married participants; and moderate to low religiosity and higher religiosity. The resulting data sets were equalized in terms of sample size by randomly selecting participants, and then removing them from the larger data sets in SPSS 24 (IBM Corporation, 2016).

Age sub-groups were specified according to the age division used by Statistics South Africa (Lehohla, 2017); however, the age sub-group above 60 years ($n = 137$) could not be used in this study due to a small sample size (Lee, Cai, & MacCallum, 2014). Divorced ($n = 30$) and widowed participants ($n = 76$) were also too few to be included in the analyses. The religiosity data sets were based on the scale in the original questionnaire. The question was “How religious do you consider yourself to be?” with options ranging from 0 (*not at all*) to 4 (*extremely*). A combined sub-group of lower to moderate religiosity that reported *not at all*, *slightly*, or *moderately* was created, to be compared to another higher religiosity sub-group that reported *very* or *extremely* on the available scale.

The original three-factor structure of the MHC-SF was examined through confirmatory factor analysis (CFA) in Mplus 7.8 (Muthén & Muthén, 1998-2016) for all eight subsequent data sets. The Maximum Likelihood Robust (MLR) estimator was used to adjust for skewness and kurtosis exhibited by the data (Muthén & Muthén, 1998-2016). Different fit statistics were used to determine acceptable model fit: absolute fit indices, including chi-square, the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Square Residual (SRMR); incremental fit indices, including the Comparative Fit Index (CFI), and the Tucker-Lewis Fit Index (TLI); and parsimony fit indices, including the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC; Byrne, 2012; Hooper, Coughlan, & Mullen, 2008; Kenny, 2015; Wang & Wang, 2012). According to these

authors, preferable cut-off values for RMSEA and SRMR are below 0.08 (acceptable) or below 0.05 (superior), and for CFI and TLI above 0.90 (acceptable) or above 0.95 (superior).

For the models that showed acceptable fit, measurement invariance (MI) was utilized to compare relevant sub-groups of the sample. The parameters applied to the consecutive models became stricter in order to establish exactly where the differences were (Van de Schoot, Lugtig, & Hox, 2012). Models that did not achieve acceptable fit will only be briefly discussed.

For each well-fitting sub-group, the applicable models were combined to determine configural invariance. This step created the baseline models to which more strict models could be compared. After the models had been confirmed, factor loadings were constrained to be equal; thus, testing for metric (weak) invariance. Thereafter, scalar (strong) invariance was tested by forcing both factor loadings and intercepts to be equal. If metric and/or scalar invariance could not be established, relevantly identified parameters were allowed to be freely estimated in order to pinpoint possible items causing non-invariance (Byrne, 2012; Van de Schoot et al., 2012; Wang & Wang, 2012).

Ethical Considerations

The research ethics committee of the North-West University approved the original study. All participants voluntarily provided signed consent after being informed on the nature of the study. They were also informed that they were allowed to withdraw from the study at any point without negative consequences, and were assured of the confidentiality and anonymity of their information.

The data provided for the secondary study only contained participants' biographical information and responses to the MHC-SF, without any identifying information.

Results

The secondary data set's descriptive statistics for the three sub-scales of the MHC-SF are provided in Table 2. Raykov's rho (ρ) was used to determine reliability of the respective factors, which all showed acceptable values above the preferred cut-off value of 0.70 (Raykov, 2004). As expected, strong correlations were found between the three variables. The strongest relationship was found between social and psychological well-being, affirming

Keyes' (2005, 2007, 2009) assertion that together they provide a measure of positive functioning.

Table 2
Descriptive Statistics, Reliability Coefficients, and Correlations

Variable	<i>M</i>	<i>SD</i>	ρ	1	2
1. Emotional well-being	4.64	1.18	0.82	-	
2. Social well-being	3.82	1.14	0.74	0.39†**	-
3. Psychological well-being	4.49	0.99	0.80	0.45†**	0.53††**

M = mean; *SD* = standard deviation; ρ = Raykov's rho (reliability)

* $p < 0.05$

** $p < 0.01$

† $r > 0.30$

‡ $r > 0.50$

The newly created data sets were of different sizes: the younger sub-group had 400 participants, the older sub-group had 444; the male data set contained 475 participants, and the female group 494; the single sub-group contained 587 respondents, while the married sub-group included 273; lower to moderate religiosity had 360 individuals, and higher religiosity 598. Using SPSS 24 (IBM Corporation, 2016), participants from the larger sub-groups were randomly identified and deleted, to ultimately leave the relevant data sets with equal numbers of participants – age data sets: $n = 400$; gender data sets: $n = 475$; single and married data sets: $n = 273$; and religiosity data sets: $n = 360$.

First, the original three-factor structure was specified for each of the data sets. Few to none of the resulting fit statistics were at acceptable levels. The fit statistics for the original confirmatory analyses (CFAs) are provided in Table 3.

Table 3

Original Fit Statistics of Measurement Models for all the Data Sets

Model	χ^2	<i>df</i>	AIC	BIC	CFI	TLI	RMSEA	SRMR
Younger	274.05	74	17251.11	17430.73	0.88	0.86	0.08	0.07
Older	261.91	74	17467.04	17646.66	0.89	0.87	0.08	0.06
Male	337.44	74	20601.29	20788.64	0.87	0.85	0.09	0.07
Female	269.80	74	20385.34	20572.69	0.91	0.88	0.08	0.05
Single	176.41	74	11857.77	12020.03	0.90	0.88	0.07	0.07
Married	202.61	74	11649.74	11812.00	0.90	0.87	0.08	0.06
Lower religiosity	413.56	74	15949.96	16124.84	0.77	0.72	0.11	0.09
Higher religiosity	231.14	74	14900.21	15074.84	0.91	0.89	0.08	0.06

χ^2 = chi-square; *df* = degrees of freedom; AIC = Akaike Information Criteria; BIC = Bayesian Information Criteria; TLI = Tucker-Lewis Index; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual

After further inspection of the two age sub-group data sets, item 4 (“that you had something important to contribute to society”) was found to be problematic. The modification indices implied possible cross-loadings for item 4 (part of social well-being) with emotional well-being for both sub-groups (younger sub-group: $MI_{EWB} = 47.12$; older sub-group: $MI_{EWB} = 33.23$), as well as residual covariances with items from emotional and psychological well-being for the younger sub-group ($MI_{MHC2} = 15.83$, $MI_{MHC14} = 18.91$). With the removal of the item, and the residual errors of items 7 and 8 ($MI = 13.58$) being allowed to correlate in the younger sub-group, both age sub-group models showed acceptable model fit statistics.

Item 4 was also found to be challenging in the gender data sets: possible cross-loadings with emotional well-being were indicated (male sub-group: $MI_{EWB} = 57.56$; female sub-group: $MI_{EWB} = 38.20$). It was removed from both models and acceptable model fit statistics resulted from the analyses.

Although the removal of items from an established questionnaire is an ongoing debate, Gerrard (2014), Hair, Black, Babin, and Anderson (2010), and Hox, De Leeuw, and Zijlmans (2015) advised the deletion of problematic items with appropriate justification, provided that at least three items per construct were left. In this study, the removal of item 4 from the applicable analyses allowed further estimation of measurement invariance, while still enabling the calculation of social well-being from the remaining four items.

The single and married sub-groups both attained good enough fit only with residuals being allowed to covary for item 7 and item 8 ($MI = 14.83$) in the single sub-group, and items

6 and 8 (MI = 14.06) and items 9 and 14 (MI = 14.88) in the married sub-group. There were no indications of possible cross-loadings between items.

Regarding the religiosity groups, acceptable fit for the lower religiosity sub-group could not be reached without compromising the integrity of the data and losing valuable information. The higher religiosity sub-group achieved acceptable fit merely with the addition of a residual covariance between items 7 and 8 (MI = 19.53). However, the fit for the lower religiosity sub-group did not improve noticeably, not even with the removal of three items and residual covariances being allowed for several others. The two sub-groups could therefore not be analyzed further.

It was interesting to note that item 7 (“that people are basically good”) contributed below the preferred factor loading of 0.35 to its construct of social well-being in several of the data sets (younger age sub-group: $\beta = 0.31$; male sub-group: $\beta = 0.33$; single sub-group: $\beta = 0.27$; higher religiosity sub-group: $\beta = 0.29$). The item was, however, not removed from any analysis, because the low factor loading did not occur across all the applicable groups. The fit statistics for the final, developed CFAs are provided in Table 4.

Table 4
Fit Statistics of Measurement Models for all Data Sets, Excluding Lower to Moderate, and Higher Religiosity Groups

Model	χ^2	<i>df</i>	AIC	BIC	CFI	TLI	RMSEA	SRMR
Younger	177.10	61	16058.03	16229.66	0.92	0.90	0.07	0.06
Older	179.83	62	16270.96	16438.60	0.92	0.90	0.07	0.06
Male	209.20	61	19171.53	19350.55	0.92	0.90	0.07	0.06
Female	178.21	62	19034.96	19209.82	0.93	0.92	0.06	0.05
Single	161.68	73	11842.75	12008.62	0.92	0.90	0.07	0.07
Married	174.41	72	11619.91	11789.38	0.92	0.90	0.07	0.06

χ^2 = chi-square; *df* = degrees of freedom; AIC = Akaike Information Criteria; BIC = Bayesian Information Criteria; TLI = Tucker-Lewis Index; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual

After confirmation of fit for the relevant data sets, the corresponding sub-group models were combined to create a baseline model for each group. This allowed estimation of configural fit for comparison with the following, stricter models. To test for metric invariance, the factor loadings were forced to be equal. Next, where applicable, scalar invariance was tested through constraining both factor loadings and intercepts to be equal (Van De Schoot et al., 2012). Due to the fact that the MLR-estimator was used, the Satorra-

Bentler difference test was employed to enable comparison of chi-square values (Satorra & Bentler, 2001).

The fit statistics for each comparison of models are provided in table format, as well as the adjusted chi-square comparison, and the change in CFI for each configural model as compared to the subsequent metric and scalar models. A short discussion follows each set of comparisons.

Comparison of age groups

Table 5

Fit Statistics of Configural, Metric, and Scalar Models for the Combined Age Groups

Model	χ^2	<i>df</i>	CFI	TLI	RMSEA	SRMR
Configural	356.93	123	0.92	0.90	0.07	0.06
Metric	387.79	133	0.92	0.90	0.07	0.06
Scalar	400.30	146	0.92	0.91	0.07	0.06

χ^2 = chi-square; *df* = degrees of freedom; TLI = Tucker-Lewis Index; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual

Table 6

Difference Testing for Changes in Chi-square and CFI between Configural and Metric, and Configural and Scalar, Models for the Combined Age Groups

Model	$\Delta\chi^2$	Δdf	<i>p</i> -value	ΔCFI
Metric	31.18	10	0.00**	0.007
Scalar	40.22	23	0.02*	0.007

** *p* < 0.01

The difference in chi-square between the configural and metric models was found to be significant, indicating that metric invariance might not be present; however, the change in CFI was only 0.007 and thus not significant (Cheung & Rensvold, 2002; Wang & Wang, 2012). Seeing that the chi-square statistic might be sensitive to sample size, Chungkham, Ingre, Karasek, Westerlund, and Theorell (2013), and Meade, Johnson, and Braddy (2008) suggested that the change in CFI should be sufficient to establish invariance. Thus, metric invariance is confirmed, and comparisons between the two age sub-groups can confidently be made with regards to the way in which the items were interpreted.

The following comparison to the scalar model showed a less significant change in chi-square, but again only a change of 0.007 in CFI from the configural model. Thus, strong invariance was confirmed, meaning that all the items showed similar intercepts, or starting

points, in the two sub-groups – in other words, the participants in the two different sub-groups started the questionnaire from the same levels of awareness or experience, and comparisons between them could be safely made.

The results of the comparison showed that for the younger sub-group social integration and actualization (growth) were more important to social well-being than for the older sub-group. They also entered the research situation experiencing higher levels of emotional well-being, environmental mastery, and positive relations with others, while the older sub-group had already exhibited higher levels of social coherence (interest).

Comparison of gender groups

Table 7

Fit Statistics of Configural, Metric, and Scalar Models for the Combined Gender Groups

Model	χ^2	<i>df</i>	CFI	TLI	RMSEA	SRMR
Configural	387.47	123	0.93	0.91	0.07	0.05
Metric	402.62	133	0.93	0.91	0.07	0.05
Scalar	416.25	146	0.92	0.92	0.06	0.06

χ^2 = chi-square; *df* = degrees of freedom; TLI = Tucker-Lewis Index; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual

Table 8

Difference Testing for Changes in Chi-square and CFI between Configural and Metric, and Configural and Scalar, Models for the Combined Gender Groups

Model	$\Delta\chi^2$	Δdf	<i>p</i> -value	ΔCFI
Metric	12.45	10	0.26	0.001
Scalar	22.94	23	0.47	0.002

** *p* < 0.01

From the configural to metric models, the difference in chi-square was found to be non-significant, indicating that metric invariance has been established. The change in CFI of 0.001 served to confirm the metric invariance and the possibility of comparing the two sub-groups regarding interpretation of the items. Neither the change in chi-square, nor the change in CFI for comparison between the configural and scalar models was significant. Strong invariance was found, and comparisons between the male and female sub-groups could therefore be made with confidence.

The female sub-group's results indicated that social integration and actualization (growth) added more weight to its sense of social well-being. The group also started out with less negative affect than the male sub-group, and with higher levels of self-acceptance.

Comparison of combined relationship groups

Table 9

Fit Statistics of Configural, Metric, and Scalar Models for the Combined Relationship Status Groups

Model	χ^2	df	CFI	TLI	RMSEA	SRMR
Configural	335.93	145	0.92	0.90	0.07	0.06
Metric	363.93	156	0.91	0.90	0.07	0.07
Scalar	393.45	170	0.90	0.90	0.07	0.07

χ^2 = chi-square; df = degrees of freedom; TLI = Tucker-Lewis Index; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual

Table 10

Difference Testing for Changes in Chi-square and CFI between Configural and Metric, and Configural and Scalar, Models for the Combined Relationship Status Groups

Model	$\Delta\chi^2$	Δdf	p-value	ΔCFI
Metric	28.18	11	0.00**	0.007
Scalar	57.48	25	0.00**	0.014

** p < 0.01

The comparison between the configural and metric models for the single and married sub-groups showed a significant change in chi-square, but again a non-significant CFI-change. Thus, metric invariance was accepted, as with the combined age sub-groups (Chungkham et al., 2013; Meade et al., 2008). The change in chi-square from the configural to the scalar models was again significant; thus, together with a significant change in CFI (> 0.01; Wang & Wang, 2012) showed that strong invariance was not present.

According to Byrne (2012), modification indices of the scalar model could provide an indication of items that might cause non-invariance. Examination of these showed that item 1 ("happy") might have incomparable intercepts for the two sub-groups. This item was then specified to be freely estimated for both sub-groups; the resulting fit statistics indicated that the difference between the configural and newly specified scalar model was still significant. The next item with possible unequal starting points was item 13 ("confident to think or express your own ideas and opinions"), which was then also allowed free estimation. The change in chi-square was less significant, but the CFI-change was reduced to just below the

suggested significance level of $\Delta CFI < 0.01$. Therefore, partial scalar variance was established. The conclusive difference-testing values are provided in Table 11.

Table 11
Difference Testing for Changes in Chi-square and CFI from the Configural Model to the Two Scalar Models, Each with a Released Parameter

Model	$\Delta\chi^2$	Δdf	p-value	ΔCFI
Scalar 1 (MHC1 free)	51.08	24	0.00**	0.012
Scalar 2 (MHC13 free)	44.18	23	0.01*	0.009

** p < 0.01

*p<0.05

Both the single and married sub-groups displayed similar levels of emotional well-being and found social contribution more important to their social well-being than the other four dimensions. The married participants originally felt a greater sense of belonging, with the single participants experiencing a higher level of social actualization (growth) before completing the questionnaire. For neither sub-group did social acceptance add any significant value to their sense of social well-being. The married sub-group seemed psychologically more well than the single sub-group, with specific reference to self-acceptance and purpose in life (both items for which they also had higher intercept values). Autonomy was the only psychological dimension more important to the single than the married participants. Social integration appeared more essential to married participants; however, both sub-groups exhibited quite low intercepts on social coherence (interest).

Discussion

This study's aim was to investigate whether it was possible to reliably compare different groups in a South African sample with regards to their well-being as measured with the MHC-SF. Latent variable modeling, specifically measurement invariance testing, was employed to confirm (or refute) such similarities. The four groups identified for possible comparisons comprised the following sub-groups: a) younger (18-34 years) and older (35-60 years); b) male and female; c) single and married; d) lower to moderate and higher religiosity.

As others, e.g., Karaś, Ciecuch, and Keyes (2014), Lupano Perugini et al. (2017), and Petrillo et al. (2015), have found when assessing comparability of age and gender groups on the MHC-SF, it became apparent in this study that levels of well-being could be confidently compared between the younger and older age sub-groups, and between the male and female

sub-groups. With the assessment of the single and married sub-groups, it was concluded that only their measured levels of mental well-being could be compared. The original levels on which they experienced happiness and autonomy differed to such an extent that they were not comparable. However, with free estimation of the two aforementioned intercepts, the starting points of the other dimensions could be analyzed and compared (Byrne, 2012; Wang & Wang, 2012).

The results obtained from assessing the models based on the combined religiosity group revealed that testing of measurement invariance was not possible, because only the confirmatory factor analysis model for the higher religiosity sub-group achieved acceptable fit. Without conceding the trustworthiness of the lower to moderate religiosity data set, it was not viable to adapt the model for good fit and further analyses were therefore not attempted.

A noteworthy finding was the fact that item 4 (“that you had something important to contribute to society”) exhibited problems with model fit in two of the eventual three analyses, even before the specification of the configural model – an early warning sign that the assumption of equivalence for different populations and different samples within populations might not always be true. Item 4 theoretically measures the contribution that the respondents feel they make to society, and its factor loading agreed with this postulation. However, it would seem that individuals experience their social contribution as simultaneously adding to (or detracting from) their emotional well-being. The close association between contribution and emotional well-being has often been reported and even forms the basis of several interventions commonly utilized in the field of positive psychology (e.g., Seligman, 2011). It is important for future studies to investigate this item that is classified under eudaimonic happiness (and positive functioning), while at the same time apparently contributing to hedonic happiness.

Furthermore, after the confirmatory factor analysis models had been verified, it was found that item 7 did not seem to make a worthwhile contribution to the measurement of social well-being among a number of sub-groups. The dimension of social acceptance was measured by whether participants felt “that people are basically good”. In light of this finding, it would seem prudent to investigate possible reasons behind this discrepancy. It might, for instance, be the case that irrespective of whether or not participants believed that people are “basically good”, it might not necessarily imply that they experience them as such in their daily lives, or within their particular life contexts. The definition of the word “good”,

as used in the questionnaire, likewise does not distinguish between the intent to be/do good and actual integrity. A lack of clarity also exists in terms of whether respondents' perception of the people to be evaluated was seen to pertain to society at large or persons in their specific community.

An important distinction was noted between the groups with measurement invariance and those without (or with partial) invariance. The groups that achieved scalar/strong invariance were based on physical biographical attributes, namely age and gender. On the other hand, the groups that were based on culturally defined concepts, i.e., relationship status and religiosity, either attained partial invariance or none at all. Studies that previously found measurement invariance mainly focused on the physical characteristics of participants (Guo et al., 2015; Joshanloo & Jovanović, 2016), even when comparing samples that originated from different cultures (Joshanloo et al., 2013). Although measurement invariance was found in some studies where comparisons had been made according to level of education, it could be argued that despite the fact that education could, and should, be culturally defined, its measurement parameters are still strongly biased towards a Western conception of the meaning of education. The conclusion was that mental well-being increased as level of education increased. However, notions of well-being might be differentially understood and conceptualized within other contexts. A person without formal education has the same capacity for mental well-being as a person with, for instance, a university degree, but the current criteria for creating groups according to the level of education obtained does not acknowledge that fact. It is therefore possible that measurement non-invariance might result for groups compiled according to such evaluations of level of education.

Implications of the Study

This study's findings add to the growing body of knowledge on mental well-being and the crucial role it plays in managing and preventing mental illness, as well as emotional and positive functioning in society. The findings confirmed that mental well-being might not be understood or measured in the same way for all people in a sample, irrespective of whether or not they shared a significant number of socio-demographic characteristics. This is significant in that it means that no mental well-being intervention can ever be regarded or approached within a proverbial "one-size-fits-all" manner.

Some practical implications go along with these findings. Policies, programs, and strategies implemented by government or private organizations should in future be tailored specifically to the targeted group. This does not entail new interventions to be developed for each implementation; only that small adjustments might need to be made to existing interventions in order to have the highest potential for positive outcomes for a specific community or institution.

Successful intervention programs are some of the most basic and practical ways to cut back on the burden of disease – specifically mental illness, with indirect benefits for some physical ailments – that governments carry. In return, mentally well citizens add to a growing economy and a stronger social foundation for future generations. It has been argued before that seemingly high initial costs of £40 000 (\pm R720 000) spent on workplace mental health interventions annually, could generate an incredible £387 722 (\pm R6 990 000) in economic returns, without taking the advantages to mental health services into consideration (Knapp et al., 2011).

Limitations of the Study and Directions for Future Research

Some limitations were identified in the current research, first of which was that the cross-sectional design of the study prevented any causal inferences to be made. Future research should explore longitudinal data, as well as possible predictive relationships between the three MHC-SF constructs of emotional, social, and psychological well-being. Different factor structures of the MHC-SF have been tested before – single-factor structures, three-factor structures (as in the current study), and second-level factor structures with mental well-being consisting of Keyes' (2002, 2005) three proposed factors – and were found to fit different data sets and different samples. However, no research could be located on a possible third-level latent variable structure, containing emotional well-being (or hedonic happiness) as a first-level latent variable, and positive functioning (or eudaimonic happiness) as a second-level latent variable comprising both social and psychological well-being as first-level latent variables.

Unfortunately, the age sub-group above 60 years old was under-represented in the sample, and could therefore not be used. In Africa, this particular age group is expected to increase by 64% from 2015 to 2030 (United Nations, Department of Economic and Social Affairs, Population Division, 2015). It would be greatly beneficial for future mental wellness

promotion and maintenance to repeat this analysis including a large enough sample of this age sub-group.

Given that the racial composition of the sample used for this study was very uneven, with the greater part consisting of black individuals (88.9%), generalization of the findings to other population groups should only be made in a cautious and tentative manner, subject to further empirical verification. However, it should be noted that as far as race is concerned, the sample composition is broadly in line with South African race demographics: Black population group = 80.66%; Colored population group = 8.75%; White population group = 8.12%; and Indian/Asian population group = 2.47% (Statistics South Africa, 2016). Also, as indicated by the finding of the current study, the outcomes might actually look completely different for other ethnicities, and due to cultural traditions and local conventions might even contrast between black persons who, for instance, live in the same region.

The original data collection was conducted in three different languages, according to each participant's preference – English, Afrikaans, or Setswana. Language was not controlled for as a possible cause of non-invariance, as only respondents' home languages were reported, not their language of choice regarding the questionnaire. Only 1.0% of participants reported English as their home language, while 44.4% of participants indicated home languages other than the three abovementioned options. Due to the high number of English second language speakers, it is important to take level of language proficiency into account when analyzing data in future studies.

It is possible that the religiosity sub-groups were ill-fitting due to ambiguity of the interpretation of the term “religion”. Perhaps it could be distinguished from spirituality and/or traditional religion practices in future research. Nevertheless, comprehension of this aspect is crucial to the measurement, promotion, and maintenance of mental well-being, and deserves more in-depth attention in future studies.

The fact that only the MHC-SF was used for invariance testing in this study, limited the definition and structure of well-being to such as defined by Keyes (2002, 2005, 2009). Thus, given levels of invariance between sub-groups might well be found to exhibit different patterns to those found in this study if alternative conceptualizations of well-being were to be used. Structural invariance testing for groups with scalar invariance would be beneficial too, as well as testing measurement invariance for groups other than those included in this study, e.g., diverse professions, or number of children in the household.

Conclusion

The primary aim of this study was to use a structural equation modeling strategy to establish whether, and to what extent, measurement invariance could be confirmed between different groups from a South African sample, focusing specifically on age, gender, marital status, and religiosity. Results revealed that strong measurement invariance held across age and gender, confirming previous findings, with the only exception being the possible cross-loading of social contribution onto social and emotional well-being. Measurement of single and married individuals' mental well-being was comparable, except for significant differences in their initial levels of happiness and autonomy, making only intercepts on the other dimensions of the MHC-SF equivalent. It was apparent that participants with lower to moderate religiosity could not be compared to those who reported higher religiosity. Although the higher religiosity sub-group's mental well-being measurements showed acceptable fit to the model, such was not true for the lower to moderate religiosity sub-group.

It seemed that social contribution might adversely affect the psychometric robustness of the scale and would require additional empirical scrutiny to establish the principal reason behind its possible significant cross-loading. It could be due to substantive reasons or simply because of the expected correlation between the underlying variables. Furthermore, social acceptance seemed to pose an additional challenge and also needs to be explored, with the focus on the specificity of the concepts "good" and "people".

Another notable finding was the distinction between groups that achieved measurement invariance, and those that did not (or only partially). Those that showed strong invariance were based on physical biographical attributes (age and gender), while those that exhibited partial or non-invariance were based on culturally defined Westernized constructs, namely relationship status and level of religiosity. Additional research on the true levels of measurement invariance between cultures, based on specifically cultural socio-demographic characteristics, would be of significant value.

The results of this study suggest that not only is establishing measurement invariance crucial when empirically assessing a population's levels of mental well-being, but also considering the implications of the level of equality found when developing interventions to improve mental health. However, key similarities will only become evident through the exploration of clearly understood differences. Consequently, more in-depth research regarding measurement invariance based on culturally defined socio-demographic characteristics is

needed to successfully utilize the results of the MHC-SF for the promotion of mental health in a majority of social and cultural contexts.

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Chapter 3

Conclusions, Limitations, and Recommendations

This chapter is dedicated to an overview of the conclusions, limitations, and recommendations that arose from the study. After a brief summary, the main conclusions of the study are reviewed. Following this, the perceived limitations are summarized, before recommendations for future research are considered.

3.1 Summary and Conclusions

The primary purpose of this study was to examine the trustworthiness of comparisons of mental well-being between several demographic groups in a South African context, as estimated with the Mental Health Continuum-Short Form (MHC-SF [see Appendix A]; Keyes, 2005, 2007, 2009). For groups where measurement invariance could not be established, the resultant objective was to establish where the differences might be situated. Existing research indicated no distinctions between the mental well-being of groups constructed according to age, gender, or level of education (Joshanloo, Wissing, Khumalo, & Lamers, 2013; Keyes, 2007; Lupano Perugini, De la Iglesia, Solano, & Keyes, 2017; Petrillo, Capone, Caso, & Keyes, 2015). However, no research regarding other combinations of groups could be located. Therefore, the present study not only aimed to validate and confirm the existing findings, but also to compare different groups in order to extend them.

This study was based on a quantitative, cross-sectional design (Spector, 2013) used for the original collection of data from 984 participants residing in the Tlokwe, Mahikeng, and Emfuleni municipalities of South Africa. The initial data was adapted for use as a secondary data set, containing only respondents' non-identifying socio-demographic characteristics, and responses to the 14 questions of the MHC-SF. Descriptive statistics for the sample were determined with the use of SPSS 24 (IBM Corporation, 2016). Scale reliabilities, calculated with Raykov's rho (Raykov, 2004), all indicated acceptable levels of $\rho > 0.07$.

Measurement invariance testing was conducted with the identified groups in Mplus 8 (Muthén & Muthén, 1998-2016), starting with the combination of the relevant sub-groups into single configural models to create baseline models for subsequent comparisons to stricter, more constrained models (Van de Schoot, Lugtig, & Hox, 2012). In this way, metric/weak and scalar/strong invariance were checked. Models with unsubstantiated fit statistics were further investigated in order to identify possible problematic items.

Four groups were determined for analysis, and separate data sets were created accordingly, which included: age (older and younger sub-groups); gender (male and female sub-groups); relationship status (single and married sub-groups); and religiosity (lower to moderate and higher sub-groups). Keyes (2002, 2005) proposed a three-factor structure of emotional, social, and psychological well-being that was assessed in all the sub-groups through confirmatory factor analyses (CFAs). Where applicable, the structure was confirmed with the use of absolute fit indices (chi-square, Root Mean Square Error of Approximation [RMSEA], and Standardized Root Mean Square Residual [SRMR]), incremental fit indices (Comparative Fit Index [CFI], and Tucker-Lewis Fit Index [TLI]), and predictive fit indices (Akaike Information Criterion [AIC], and Bayesian Information Criterion [BIC]), according to cut-off values suggested by Byrne (2012), Hooper, Coughlan, and Mullen (2008), Kenny (2015), and Wang and Wang (2012).

Although previous conclusions of strong/scalar measurement invariance for age and gender groups were substantiated (e.g., Guo et al., 2015; Joshanloo & Jovanović, 2016), possible cross-loadings of social contribution for age, gender, and combined age and gender groups were indicated in the current study. Item 4 (“that you had something important to contribute to society”) was removed in order to facilitate further analyses (Gerrard, 2014; Hair, Black, Babin, & Anderson, 2010; Hox, De Leeuw, & Zijlmans, 2015). The same issue of possible cross-loadings of item 4 did not manifest with sub-groups divided along the lines of relationship status.

The comparison between single and married participants led to the conclusion that although the mental well-being constructs were measured in the same way for both sub-groups, they started out with incomparable levels of well-being in relation to items assessing happiness and autonomy. The implication was that these individuals have significantly different experiences of the manifestation of the two concepts. It is possible that while the married participants were still single, they might have had the same frame of reference as the single participants; however, once they started sharing their lives intimately with another person, they probably adapted their view of happiness and autonomy substantially. It might be expected that the interpretation of a hedonic term, namely happiness, could change completely with a change from single to married in relationship status. In a serious relationship, the level of a person’s positive emotions is usually directly influenced by the other person’s experience of happiness. It was also noteworthy that a eudaimonic attribute, such as autonomy, could differ so vastly according to relationship status. Feeling “confident

to think or express your own ideas and opinions” (item 13) seems to be based on a person’s level of self-confidence. The dynamic of autonomy within an intimate relationship would need to be explored more in order to understand why it could not be compared between the two sub-groups.

Furthermore, it transpired that the lower to moderate and higher religiosity sub-groups differed too much to make the creation of a baseline model viable; the group was consequently not used for further analysis. A significant difference was already apparent after the first set of confirmatory factor analyses, with the higher religiosity sub-group achieving, for example, a CFI and TLI combination of 0.91 and 0.89, and the lower to moderate religiosity sub-group only 0.77 and 0.72. Attempts to attain fit for the latter sub-group proved unsuccessful, as all factor loadings were above the preferred cut-off value of 0.35, and modification indices did not indicate the same issues with possible cross-loadings for the two sub-groups. A residual covariance between item 5 (social integration) and item 6 (social actualization [growth]) was the only potential improvement to the model, but did not allow acceptable fit statistics values to be reached.

From these outcomes it follows that religion is an important aspect to be taken into account with the promotion of mental well-being. The first major issue pertains to the definition of what religion is and/or means to individuals, given that the specific operationalization of this construct is pertinent to group comparisons. Second, it needs to be established from which religious paradigm (e.g., Christian, indigenous African beliefs, a combination of the previous, etc.) the respondents’ beliefs stem, and to be determined whether these beliefs play a role in affecting measurement non-invariance. Whilst the exact reasons for this would need to be determined in future studies, the results of the present study strongly suggest that religion is a key contributor to possible measurement non-invariance, which urgently requires further research.

A notable inconsistency for four of the initial eight sub-groups was that social acceptance (measured by item 7 [“that people are basically good”]) showed low contribution to the measurement of social well-being. Despite this, item 7 was not considered for removal, because the low factor loading was not present concurrently in all sub-groups. The four sub-groups where social acceptance did not contribute to the overall measurement of social well-being were the younger age sub-group, the male sub-group, the single sub-group, and the higher religiosity sub-group, with the married sub-group showing an estimate of exactly 0.35. It is possible that the terms “people” and “good” used in the question could be interpreted

ambiguously, and this incongruity should be further examined in future studies, as this item potentially poses a challenge to the psychometric robustness of the scale.

Item 4 (“that you had something important to contribute to society”), which attempts to measure social contribution, was found to influence model fit negatively for all the sub-groups containing age and gender. Possible cross-loadings on social, as well as emotional well-being were indicated by the modification indices. These results suggest that social contribution would seem to be as much part of individuals’ level of emotional well-being as it is of social well-being. On the one hand, it confirms the close association among the three separate constructs comprising the MHC-SF; but on the other hand it introduces the possibility that item 4 might not be interpreted or measured the same for all biographical groups due to the fact that such possible cross-loadings were not indicated with the relationship status or level of religiosity groups. It also supports previous suggestions (e.g., Huta & Ryan, 2010) that hedonic and eudaimonic happiness should not be seen as independent from each other, but as simultaneous contributors to overall well-being.

The issues highlighted around items 4 and 7 have important implications for the psychometric robustness of the MHC-SF and consequently need to be investigated in-depth. The interpretation of the current wording seemed to be inconsistent, influencing the reliability as well as validity of the scale in certain circumstances, and thus also the comparability of mental well-being levels of respondents. Furthermore, theoretical consequences are implied for the operationalization of social well-being, specifically where cross-loadings are indicated.

Previously mentioned studies in which measurement invariance has been confirmed mainly focused on the physical characteristics of participants, even when comparing samples that originated from different cultures (Joshi et al., 2013). Some previous comparisons included level of education (Lamers, Glas, Westerhof, & Bohlmeijer, 2012), for which measurement invariance was found as well. In the current study, the groups that achieved scalar/strong invariance were likewise based on physical biographical attributes, namely age and gender. However, the groups that were created around culturally defined concepts, i.e., relationship status and religiosity, either attained only partial invariance or none at all. The implication seems to be that measurement invariance especially needs to be investigated with regards to culturally determined socio-demographic characteristics, as these appear to be more prone to invariance than bio-physical attributes. Level of education should be included for further examination, as it could be argued that the current measurement parameters are

based on a Westernized conception of the meaning of education, which might be a reason behind its achievement of measurement invariance in previous research.

The benefit of established measurement invariance is that it makes it possible to adapt existing interventions, or develop new ones specifically tailored to a sub-group's level of mental well-being. When measurement invariance is present between two or more sub-groups, it does not, however, mean that their levels of mental well-being are equal, but that these levels could be compared to one another. As an example, from the current study it was possible to determine that the levels of emotional well-being for male and female sub-groups were similar, both measuring comparatively low on satisfaction with life; thus, constituting a possible focus for improvement. Because measurement invariance was proven, it was also evident that older respondents experienced a lower sense of community integration than the younger sub-group, indicating a need for intervention in relation to this dimension specifically for the older sub-group. The non-invariance of the religiosity sub-groups meant that the mental well-being of the lower to moderate sub-group and the higher sub-group could not be confidently compared, and that incorrect assumptions might follow if this is to be done.

The findings of this study add to the expanding knowledge reserves of mental well-being and how it differentially manifests among different populations. On a theoretical level, it confirmed the interrelation between the distinct constructs of emotional, social, and psychological well-being; consequently, the interdependent nature of hedonic and eudaimonic happiness was corroborated too. Finally, the main finding of this study was that it would be empirically unjustified and unethical to presume measurement invariance for all possible socio-demographic groups centered on selected studies that had found equivalence based only on universal biographical attributes, or aspects defined according to a single culture. In particular, it is concluded from the results of the study that measurement invariance that holds for one arrangement of groups does not necessarily allow assumption of equivalent measurement for another combination of groups within the same sample. Therefore, even though measurement invariance for the MHC-SF has been established in various previous studies, assumptions of measurement equivalence for the same groups in other populations should not be made without empirical support.

3.2 Limitations of the Study

A number of limitations were recognized in this study. Some positive longitudinal comparisons have been made in previous research (Lamers et al., 2012; Lamers, Westerhof, Glas, & Bohlmeijer, 2015); however, in the current context, causal conclusions were not possible due to the cross-sectional nature of the study. Even though the sample size was adequate ($n = 984$), the age sub-group of those above 60 years old was under-represented ($n = 137$), and could not be used. Therefore, the results noted with regard to the younger and older age sub-groups might not extend to the aforementioned senior age sub-group. The predominantly black racial composition of the sample, whilst relatively representative of South African demographics, was such that mental well-being between different races could only be compared superficially, and such analysis was therefore not conducted.

The influence of language proficiency was not considered in the analysis of the data. It might affect non-invariance substantially, as nearly half of the sample reported home languages different from the three languages in which the questionnaire was available. However, potential resultant non-invariance would have been difficult to link expressly to following from the influence of home language or from the construction of the meaning of concepts during the translation process.

The scope of the study was limited to the conceptualization of mental well-being as measured with the MHC-SF (Keyes, 2005, 2007, 2009). Other definitions and theories were not applied to cross-validate the current study's findings of absent, weak, or strong measurement invariance.

3.3 Recommendations

In the following sections recommendations for future research and implications for practical applications will be discussed.

3.3.1 Recommendations for future research

Themes for future research could be identified along the lines of this study's limitations. Longitudinal studies are needed to explore the findings of measurement invariance, partial invariance, and non-invariance. More varied samples (including other socio-demographic features, particularly culturally determined aspects) are also important to determine the generalizability or specificity of these findings, especially regarding the diverse populations present in numerous developing countries, with diversity also increasing in many

developed countries. Additionally, further structural/strict invariance testing should yield valuable conclusions, as would measurement invariance testing for groups not yet examined.

Ideally, large samples are needed for measurement invariance studies to facilitate the division of sub-groups to include as many applicable characteristics as possible. At least one physical biographical attribute and one culturally defined characteristic should be included per sub-group.

Measurement invariance needs to be assessed through the lens of other mental health theories in order to determine the extent to which the operationalization of the construct adds to the attainment (or lack) thereof. One approach would be to measure mental health within a population with assorted questionnaires based on differing conceptualizations of the construct, and to then determine whether measurement invariance concerning the same groups could be found for the various scales.

It would add profound meaning to the future development and application of mental well-being programs to be able to identify characteristics likely to influence group invariance, as, for example, cultural socio-demographic attributes did in the current study. Significant benefits could also be derived from further exploration of the possible impact that each factor might have on the measurement of mental health with the MHF-SF, as well as the underlying relationships between the constructs of emotional, social, and psychological well-being.

3.3.2 Recommendations for practice

The results of this study indicated that mental well-being could be confidently compared between sub-groups of different ages and genders. In-depth analysis of such comparisons is needed to translate this study's findings into practice. In order to create successful positive mental health policies and interventions, the differences and similarities between sub-groups ideally need to be taken into consideration at government level, but at least on community level. Given that culturally determined characteristics were found to be more prone to add to cross-group variance than bio-physical characteristics, the findings suggested that tailoring of interventions aimed at enhancing mental health should center particularly on such culturally determined attributes of the targeted populations.

The conclusions of this study could be beneficial to counselors and other professionals in the field of psychology, when assisting clients and/or patients from particular communities with the improvement of their mental well-being.

3.4 Summary

This chapter provided an overview of the main conclusions drawn from the study. Following this, the limitations of the study were outlined, and recommendations for future research and practice were made.

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APPENDIX A

Adult MHC-SF (Ages 18 or older)

Please answer the following questions about how you have been feeling during the past month. Place a check mark in the box that best represents how often you have experienced or felt the following:

During the past month, how often did you feel ...	NEVER	ONCE OR TWICE	ABOUT ONCE A WEEK	ABOUT 2 OR 3 TIMES A WEEK	ALMOST EVERY DAY	EVERY DAY
1. happy						
2. interested in life						
3. satisfied						
4. that you had something important to contribute to society						
5. that you belonged to a community (like a social group, or your neighborhood)						
6. that our society is becoming a better place for people like you						
7. that people are basically good						
8. that the way our society works makes sense to you						
9. that you liked most parts of your personality						
10. good at managing the responsibilities of your daily life						
11. that you had warm and trusting relationships with others						
12. that you had experiences that challenged you to grow and become a better person						
13. confident to think or express your own ideas and opinions						
14. that your life has a sense of direction or meaning to it						

TRANSLATION AND EDITING SERVICES

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DECLARATION OF EDITING

I hereby declare that I was responsible for the language editing of the mini-dissertation *The Mental Health Continuum-Short Form (MHC-SF): Measurement Invariance in a South African Context* by E. M. Bothma (24889199).

A handwritten signature in black ink, consisting of a stylized 'E' and 'D' followed by the name 'Diedericks'.

DR ELSABÉ DIEDERICKS

10 November 2017