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THE MENTAL HEALTH CONTINUUM-SHORT FORM IN ORGANISATIONAL CONTEXTS

Factorial Validity, Invariance, and Internal Consistency

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The study aimed to examine the psychometric properties of the MHC-SF within selected organisational contexts. Specifically, the aim was to determine the factorial validity, measurement invariance, and reliability of the instrument for South African organisations. A cross-sectional online survey-based research design was employed, coupled with a convenience sampling strategy (*N* = 624). The results showed that the original three-dimensional factor structure of the MHC-SF fitted the data the best. Items loaded statistically significantly on all three subscales (emotional, psychological, social wellbeing). Further, the scale showed full configure, convergent and metric invariance between males and females. However, invariance was not established in either age cohorts, language groups, or marital status. The instrument proved to be reliable at both a lower (Cronbach Alpha) and upper level (Composite reliability) limit within South African organisational contexts.

Keywords: Measurement Invariance, Mental Health Continuum Short Form, Mental Wellbeing, Psychometric properties

1. Introduction

Mental health, as a construct of interest for organisations, has long been defined as the absence of mental illness (Keyes 2002; 2005; Westerhof & Keyes 2008). According to Keyes mental health is conceptualized as a 'complete state in which individuals are free of psychopathology and flourishing with high levels of emotional, psychological and social wellbeing' (2005, 539). In effect, Keyes (2002) argued that mental health is a function of feeling good (emotional wellbeing) and functioning well (psychological wellbeing; social wellbeing).

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Emotional wellbeing, stemming from the Greek concept of *hedonic* wellbeing, involves the study of happiness that focuses on positive emotions and one's overall level of life satisfaction or affect balance (DIENER 1984; SELIGMAN 2011; UCHIDA et al. 2004). Specifically, happiness relates to dynamic positive affective experiences ('states') that encompass positive thoughts, feelings, behaviours and attitudes, which fluctuate over time but remain at a positive median (GAVIN & MASON 2004). According to DIENER and BISWAS-DIENER (2008), happy people tend to live longer, are healthier, have more fulfilling jobs, and form personal relationships of a better quality.

Functional wellbeing, also known as eudaimonic wellbeing, incorporates aspects of psychological wellbeing (RYFF 1989) and social wellbeing (KEYES 2002) and reflects one's meaning in life. According to the eudaimonic approach, happiness is more related to positive relationships and a sense of purpose in life than the experience of mere positive emotions. Wellbeing in this context means to function well in life and is related to personal growth and fulfilment (PERUGINI et al. 2017).

KEYES (2002; 2005) unified the hedonic and eudaimonic perspectives of wellbeing and developed the *Mental Health Continuum* (MHC) and *Mental Health Continuum–Short Form* (MHC-SF) to measure these wellbeing components, also known as flourishing. The MHC and MHC-SF assess the degree of mental health across three domains: emotional wellbeing (feeling well) and psychological and social wellbeing (functioning well).

Emotional wellbeing (EWB) consists of the presence of positive emotions and satisfaction with life (DIENER et al. 1999). *Psychological wellbeing* (PWB) measures how much individuals see themselves thriving in their personal life (KEYES 2002) and includes aspects of an individuals' psychological functioning such as self-acceptance, autonomy, and having meaning in life and a purpose (RYFF 1989). *Social wellbeing* (SWB) captures an individuals' social integration and contribution as a member of a larger society. Social wellbeing evaluates the individuals' assessment of their social and public lives and includes dimensions of social integration, social contribution, social coherence, social actualisation, and social acceptance (KEYES 2002).

The wellbeing of individuals on the MHC and MHC-SF is measured on a continuum that includes three varying levels of positive mental health: from flourishing, to moderately mentally healthy, to languishing (KEYES 2005). Flourishing individuals are high in hedonic and positive functioning and thus experience high levels of emotional, psychological, and social wellbeing. Languishing individuals, however, are low in hedonic and positive functioning and thus display low wellbeing and an absence of mental health.

A mentally healthy or flourishing workforce is not only beneficial to individuals (i.e. in terms of longevity, mental fitness, buffers against the onset of illness) but also dramatically impacts on organizational outcomes such as performance, productivity, staff retention, quality of work and excellent customer service (ROTHMANN 2014; 2013; SELIGMAN 2011). Individuals with high amounts of wellbeing were, for example, found to display higher amounts of resilience (BURNS et al. 2011), and optimism (CARVER & SCHEIER 2014; PETERS et al. 2010; WU et al. 2013), and were additionally found to make use of adequate coping strategies (Carver & Connor-Smith 2010), and psychological flexibility (Kashdan & Rottenberg 2010; Woodruff et al. 2014). With respect to the organizational level, individuals with high amounts of wellbeing were among others found to function much better at the workplace. This excellent functioning is illustrated through the increased efficiency and capacity to perform at work, through the enhanced initiative, interest and responsibility, as well as through a heightened concern for the organisation and the colleagues (Fairbrother & Warn 2003). The beneficial effects of mentally healthy employees for organisations, as well as the possibility to influence wellbeing through the use of simple interventions, have increased the popularity of wellbeing and mental health promotion within the working environment (Bonde 2008). Given that mental health is such a beneficial component for both individual and organisational outcomes, it is imperative to measure it accurately within organizational contexts.

Although the psychometric properties of the MHC-SF were determined in several other studies across many countries, this study expands on the previous studies in a number of ways: (a) it assesses all known factor structures of the MHC-SF in organisational contexts, (b) the measurement invariance of the MHC-SF will be studied between different genders and across age cohorts, language groups and relationship statuses of individuals and (c) the internal consistency will be determined by calculating not only Cronbach's alpha values but composite reliabilities as well.

1.1. Factorial validity

The MHC-SF have been adapted in many countries, providing a considerable volume of evidence to support not only the utility, but the validity and reliability of the instrument. Several previous studies have confirmed the three-factor structure (EWB, SWB, PWB) of the MHC-SF using confirmatory factor analyses (CFA). For example, Karaś and colleagues(2014) on a Polish sample; Lamers and colleagues (2011) on a Dutch sample; Petrillo and colleagues (2015) in the Italian context; Guo and colleagues (2015) in Chinese adolescents, Salama-Younes and Ismaïl (2011) in a sample from Egypt, and Joshanloo and colleagues (2013), across three cultural groups: Dutch, South African, and Iranian. In contrast, in a 38-country comparison on the factor structure of the MHC-SF, Żemojtel-Piotrowska and colleagues (2018) could not find adequate data fit (i.e. CFI > 0.90) for the three-factor model within samples from Algeria, Armenia, Bulgaria, Chile, Colombia, India, Iran, Kenya, Latvia, Nepal, Panama, Pakistan, Puerto Rico, Serbia, Slovakia, and Spain. These authors also did not find support for a one factor structure of overall wellbeing in any of the surveyed countries (Żemojtel-Piotrowska et al. 2018). Further, with the exclusion of Kazakhstan, Malaysia and the Ukraine, Żemojtel-Piotrowska and colleagues (2018) also did not find support for a two-factor structure (i.e. hedonic and eudaimonic wellbeing) of the MHC-SF. Despite these findings, the three-factor structure is predominantly reported as the best-fitting model within diverse cultural contexts such as South Africa (Rothmann 2013; Schutte & Wissing 2017; Żemojtel-Piotrowska et al. 2018).

Although only a small number of studies investigated specifically the factorial validity of the MHC-SF within the South African context, several structural equation modelling (SEM) studies, employing a CFA measurement modelling strategy, have been shown to be a better fit for the three-factor correlated structure rather than a two or one factor model. Both De Bruin and Du Plessis (2015) and Van Zyl and Rothmann (2012a) confirmed the three-factor structure in a multi-cultural sample of higher education students; Keyes and colleagues (2008) the same within the general population of collectivistic Tswana-speaking individuals from a rural area in the North-West Province; van Rensburg and colleagues (2017) within a sample of employed individuals within the information technology sector; Żemojtel-Piotrowska and colleagues (2018) within the general population and Niemand (2019) in a sample of industrial and organisational psychologists. Neither the one or two factor structures reported in other international papers have been found to fit the data better than the three-factor structure within the South African context. Therefore support exists that the three components of mental health presented by Keyes (2002) and measured by the MHC-SF, are applicable to the diverse, multi-cultural, and socio-economically divided population within South Africa. However, the fit indices of several of these studies were only marginally acceptable according to conventional criteria (Brown 2006). Further, according to Jovanovic (2015), in a three-factor structure, the effects of general wellbeing are not controlled for, with the result that there is limited evidence for each subscale reflecting a variation on the specific component of wellbeing.

Therefore, several other researchers (De Bruin & Du Plessis 2015; Hides et al. 2016; Jovanovic 2015; Żemojtel-Piotrowska et al. 2018) extended their research into the validity of the MHC-SF by testing a bi-factor model. They provided evidence that a bi-factor model, consisting of one general factor of overall mental health and the three factors of EWB, SWB, PWB, where each item was allowed to load both on the general factor (overall wellbeing) and specific factor (EWB, SWB, PWB) (Reise et al. 2016), provided the best-fitting solution. It was, however, found in the study conducted by Jovanovic (2015) that although the bi-factor model provided strong support for the general factor of wellbeing for the MHC-SF , some of the PWB and SWB items did not display significant loadings on their specific factors, thus providing limited evidence for a viable multi-dimensional structure of the MHC-SF. Machado and Bandeira (2015) employed various techniques such as principal component analysis, factor analysis, Item Response Theory and network analysis to determine the psychometric properties of the MHC-SF among Brazilian-Portuguese speaking adults and found support for a unidimensional structure of the MHC-CF.

Both Joshanloo (2016a) in an Iranian sample, and Joshanloo and colleagues (2017) in a New Zealand context, found support for the tripartite model of mental wellbeing in comparison with one- and two-factor models using both Exploratory Structural Equation Modeling (ESEM) and CFA. However, ESEM provided a more sensitive fit and greater factor distinctiveness to the data than did CFA.

The results of a study conducted by Longo and colleagues (2017) in four countries (The Netherlands, Poland, Portugal, and Serbia) indicated that a bifactor ESEM model, in comparison to a three-factor ESEM and three-factor CFA, provided the best fit to the data in all samples. Thus, this supports the bifactor structure of wellbeing with a strong general factor explaining most of the variance in the items. Similarly, SCHUTTE and WISSING (2017) reported that a bifactor model displayed a superior fit among a culturally diverse South African sample.

Although various factorial permutations of the MHC-SF are reported in the literature, it would seem as though the three-factor structure is the most frequently occurring and best-fitting model across cultures, continents, and population groups. Given that the three-factor mental health structure predominantly shows a superior fit within the South African context, it is presumed that such will fit the data the best within the sample of employees from South African organisations.

1.2. Measurement invariance

Various studies have attempted to establish the invariance of the MHC-SF for demographic characteristics, and the results varied between sample types, cultures, and nations. For example, in a 38-country comparative study on the structure and application of the MHC-SF, ŻEMOJTEL-PIOTROWSKA and colleagues (2018) could not establish full or strong invariance between different nations (i.e. different cultures). This indicates that the way in which mental health is perceived and the components of the MHC-SF are interpreted, differs significantly between cultures. This is not surprising as KEYES (2002) argued that demographic characteristics such as culture, gender, age, level of education, relationship status, language group and occupational status might affect ongoing mental health. It is therefore important to investigate the invariance on various demographic characteristics within multi-cultural contexts such as South Africa.

Measurement invariance of the MHC-SF across gender in several diverse cultures was reported in various previous studies suggesting that the same basic factor structure (configural invariance), similar factor loadings (full metric invariance), and no differences in the intercepts were found between the genders (GUO et al. 2015; JOSHANLOO 2016b; JOSHANLOO & JOVANOVIĆ 2016; KARAŚ et al. 2014; LAMERS et al. 2011; PETRILLO et al. 2015). Using differential item functioning, MACHADO and BANDEIRA (2015) reported no difference between the two gender groups. However, it should be noted that these studies investigated the measurement invariance of the MHC-SF across genders within primarily individualistic cultures, where gender diversity is valued.

WESTERHOF and KEYES (2010) reported partial support for differences between age groups. They found that older adults experience more emotional, similar social and less psychological wellbeing in comparison to younger adults. GUO and colleagues (2015) reported measurement invariance across ages amongst Chinese adolescents.

SCHUTTE and WISSING (2017) reported full configural, but partial metric and scalar equivalence across three language groups within South Africa: English, Afrikaans and Setswana speakers. No studies could be found that tested for measurement invariance across language groups within organisational contexts.

Further, no studies were found establishing measurement invariance between individuals in different relationship/marital status groups. Research suggests that significant differences in the levels of mental health exist between married and unmarried individuals (DIENER et al. 2000; CHAPMAN & GUVEN 2016; QIAN & QIAN 2015; VEENHOVEN 2015). Married individuals report to be healthier, happier, and live longer than their unmarried counterparts (DIENER et al. 2000). Within the marital dynamic, the interpretation of individual emotional, psychological and social wellbeing could largely be influenced by the nature and quality of the relationship (CHAPMAN & GUVEN 2016). HELLIWELL and PUTMAN (2004), in their study across a US and Canadian sample, found that marriage seems to increase subjective wellbeing equally among men and women and is further enhanced by the presence of children. Having regular interaction and spending more time with the family increases individual-level subjective wellbeing. The wellbeing of the family (as a unit), directly influences the wellbeing of the individual members (HELLIWELL & PUTMAN 2004; KAMP DUSH & AMATO 2005). Further, within collectivistic cultures, such as those found predominantly within South Africa, the wellbeing of the family is not distinguishable from the wellbeing of the individual (DIENER & SUH 2003). It seems that being in a romantic relationship is not only beneficial to people's health and happiness, due to the social support and social integration that it provides, but could affect how wellbeing is seen, perceived and interpreted. The relationship status could therefore affect how the components of mental health are perceived, interpreted and experienced. Testing measurement invariance across genders, age cohorts, language groups and between different relationship/marital status does not serve to test the scale structure, but to determine whether there is a possibility to allow meaningful cross-gender, -age, -language and –relationship status comparisons of the strength of the relationship between the latent factor of the scale and other constructs (metric); to meaningfully compare latent means between males and females, age cohorts, language groups, and between individuals having different relationships/marital status (scalar); and to check whether identical patterns of factors and items exist across all these groupings (configural).

Therefore, the current study aims to investigate the configural, metric, and scalar measurement invariance across genders, age cohorts, language groups and between different relationships/marital status within South African organisational contexts.

1.3. Reliability

The internal consistency of the MHC-SF has been determined in various studies across a number of countries and was found to be a reliable measurement of wellbeing. In studies where the MHC-SF was presented as a three-factor structure, acceptable Cronbach's alpha values well above 0.70 were reported (GUO et al. 2015; KARAŚ et al. 2014; LAMERS et al. 2011; PETRILLO et al. 2015). In these studies, for example, alpha values ranging between 0.86 and 0.92 were reported for the total MHC-SF; coefficients ranging between 0.81 and 0.86 for the psychological wellbeing subscale;

values ranging between 0.75 and 0.92 for the emotional wellbeing scale and values between 0.70 and 0.83 for the subjective wellbeing scale. Predominantly, the internal consistency of the MHC-SF was estimated through the use of Cronbach's alpha, which often resulted in over- or underestimation of the reliability because it assumed that the factor loadings and error variances were equal (Cho & Kim 2015). Given the challenges and critiques associated with the use of Cronbach's alpha, an investigation was done and only one study was found that used a more 'accurate' estimation of internal consistency (i.e. composite reliability) (Wang & Wang 2012). Machado and Bandeira (2015) calculated the rho coefficients (as a measure of composite reliability) of the MHC-SF in a bi-factor model and reported a value of 0.90 for the general factor of wellbeing while the rho coefficients ranged between 0.34 and 0.47 for the three sub-factors.

In the majority of studies where a bifactor model of the MHC-SF was confirmed, coefficient omega hierarchical (ωh) was used to measure reliability. According to Zinbarg and colleagues (2005), omega hierarchical outperforms Cronbach's alpha because it indicates the reliability of the general trait controlling for specific factor variance. As a rule of thumb, a minimum of 50%, preferably 75% of subscale variance, should be accounted for before a subscale is considered to be a valid representation of a separable dimension (Reise et al. 2016). Jovanović (2015) reported a high reliability as estimated by the omega coefficient for the general factor of wellbeing: (ωh) = 0.81 in a student sample and 0.83 in an adult sample), but low omega-subscale coefficients. The reliabilities of the EWB, SWB, and PWB subscales reported were 0.28, 0.32, 0.10 in the student sample and 0.31, 0.35, 0.07 in the adult sample, respectively. These results illustrated that the ability of the subscales to reliably measure the specific variances of EWB, SWB and PWB is low, because they reflect variations primarily on the general wellbeing factor. These results were affirmed by De Bruin and Du Plessis (2015), who reported a McDonald's coefficient ω-hierarchical for the general factor of 0.74 and coefficient ω-specific of 0.26, 0.38 and 0.19 for the EWB, PWB and SWB subscales respectively. Similarly, Hides and colleagues (2016) as well as Longo and colleagues (2017) found only the general factor of wellbeing to be reliable as evidenced by an omega hierarchical (ωh) of above 0.80. However, the sub-factors were not reliable, with all ωhs below 0.41.

As such, the current study aims to determine the internal consistency of the MHC-SF at both the lower (Cronbach's alpha ≥ 0.70) and upper (composite reliability/rho coefficients > 0.80) level limits.

1.4. Current study

Based on the discussion above, the purpose of this study was to examine the psychometric properties of the MHC-SF within selected organisational contexts. Specifically, the aim was to determine the (a) factorial validity, (b) measurement invariance between genders and across age cohorts, language groups and relationship status, as well as (c) to determine the reliability of the instrument for South African organisations. It was expected that the instrument validly, invariably, and reliably measures mental health within the South African business environment.

2. Methods

2.1. Participants

A convenience sampling strategy, following a descriptive cross-sectional survey-based research design, was employed to withdraw 624 respondents from various South African organisations. The demo- and biographic information of the respondents is summarized in *Table 1*.

Table 1
Demo- and biographic characteristics

Variable	*Category*	*Frequency (f)*	*Percentage (%)*
Gender	Male	285	45.7
	Female	339	54.3
Age in years	19 to 29 years	158	25.3
	30 to 39 years	182	29.2
	40 to 49 years	131	21.0
	50+ years	153	24.5
Ethnicity	Asian	47	7.5
	African	203	32.5
	Coloured	61	9.8
	Caucasian	286	45.8
	Other	27	4.3
Home Language	English	166	26.6
	Afrikaans	216	34.6
	African	242	38.8
Level of Education	Grade 11 and below	1	0.2
	Grade 12	149	23.9
	National Certificate	72	11.5
	Higher Certificate	30	4.8
	Bachelor's Degree	97	15.5
	Master's Degree	272	43.6
	Doctoral Degree	3	0.5
Marital Status	Single	128	20.5
	Married	290	46.5
	Divorced or Widowed	206	33.0

The majority of the participants was married (46.5%) Afrikaans speaking (34.6%) Caucasian (45.8%) females (54.3%) between the ages of 30 to 39 (29.2%) with a master's degree (43.6%). Further, almost all the participants were full-time, permanent employees (98.4%) of their respective companies.

2.2. Procedures

The sample consisted of three independent organisations where the MHC-SF scale was used. The procedure involved the distribution of electronic surveys using LimeSurvey™ to various organisations within the broader South African context. Primarily, the sample consisted of registered industrial psychologists, selected Blue Chip Financial Companies, and a Public Utility. The data was captured online and stored on a secure SQL server for later retrieval. The data was downloaded in MS Excel format and prepared for analysis in both SPSS and Mplus.

2.3. Measures

The following instruments were used to gather data for this study:

A self-developed *biographical questionnaire* was used to gather biographic information of the participants relating to gender, ethnicity, age group, home language, level of education, marital status and employment status.

The *Mental Health Continuum – Short Form* (MHC-SF; Keyes 2002; 2005) was used to measure the emotional, psychological, and social wellbeing of the participants. The instrument consisted of 14 items, which were rated on a five-point Likert scale ranging from 1 (all of the time) to 5 (none of the time). Examples of the items are *During the last month how often did you feel* . . . 'happy' (EWB), 'that the way in which our society functions, makes sense to you' (SWB) and 'confident to think or express your own ideas and opinions' (PWB). High levels of internal consistency have been found in various clinical studies ranging from Cronbach Alpha levels of 0,7 to 0,9 (Keyes et al. 2002; Keyes & Shapiro 2004).

2.4. Analysis

The statistical analysis was conducted with the aid of SPSS 24 (IBM 2016) and Mplus version 8 (Muthén & Muthén 2017). First, *factorial validity* was estimated through a confirmatory factor analytic (CFA) approach; employing the maximum likelihood estimator (Muthén & Muthén 2017). Structural equation modelling (SEM) was employed to assess the model fit for the competing measurement models whereby the following fit indices were considered: a) *absolute fit indices* which included the χ^2 statistic, the Root-Means-Square Error of Approximation (RMSEA) and the Standardized Root Mean Residual (SRMR), b) *incremental fit indices*, including the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) and c) *comparative fit indices*, Akaike information criterion (AIC), and Bayesian information criterion (BIC) were used to compare competing models. Model fit is considered when the TLI and CFI are greater than 0.90, and RMSEA and SRMR are lower than the 0.05 and 0.08 cut-offs (Wang & Wang 2012). Further, the lowest AIC, BIC and χ^2 values indicate the best fitting model (Muthén & Muthén 2017).

Second, to assess the *internal consistency* or 'reliability' of the MHC-SF, both Cronbach Alpha (lower-bound) and Rho (upper-bound) were estimated. Rho is calculated through the use of Rothmann's (2013) rho calculator, which estimates internal consistency through the proportion variance explained by a factor divided by the total variance (Wang & Wang 2012). Reliability cut-offs are set at 0.70 (Cronbach Alpha; Nunnally & Bernstein 1994) and 0.80 (Rho; Wang & Wang 2012) respectively.

Finally, *measurement invariance* was investigated based on gender, age cohorts, predominant languages in the South African culture, and relationship/marital status. Configural (similar factor structures), metric (similar factor loadings), and scalar (similar intercepts) invariance was computed. Before invariance testing could be computed, the sampling adequacy for each demographic characteristic needed to be established. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was employed to assess the adequacy of the sample size for each sub-sample of the demographic characteristics which were to be employed for invariance testing ($p < 0.01$; KMO < 0.70) (Cerny & Kaiser 1977). To assess whether MHC-SF was perceived similarly or differently by respondents of different genders, ages, and language groups: configural- (similar factor structure / model form), metric- (equivalence of the item loadings), and scalar (similar intercepts) invariances were computed. Invariances estimation was based on *non-significant* ($p > 0.05$) (a) chi-square ($\Delta\chi^2$) as well as (b) ΔCFI differences between the configural, metric, and scalar invariance models (Wang & Wang 2012). Further, (c) changes greater than 0.01 in the magnitude of the CFI were regarded as an indication that the more restrictive model should be rejected (Wang & Wang 2012). Finally, (d) all invariance models needed to meet the cut-off criteria of the fit-indices mentioned above. Invariance was only established if all four of these conditions (non-significant $\Delta\chi^2$ & ΔCFI, ΔCFI > 0.01 and model fit) were simultaneously satisfied (Chen 2007; Cheung & Rensvold 2002; Van de Schoot et al. 2012; Vandenburg & Lance 2000). If the conditions for strong invariance were not met, and at least two out of the three invariant model comparisons showed non-significant differences (e.g. metric vs configural and scalar vs. configural), partial invariance testing was pursued. A top-down approach would be employed where constraints were sequentially released on parameters that lacked invariance (Byrne 2012; Van de Schoot et al. 2012). If the conditions for partial scalar invariance were met, the variance and means of the common factors were evaluated to determine if these were invariant. Here, common factor means and variances would be constrained to be equal (Wang & Wang 2012).

In instances where full/strong or partial invariance was established, *latent mean differences* between the groups were computed and categorically compared. Here, one group was identified as a reference group (its mean is set to zero), whilst the comparative groups' mean was estimated freely. Should the comparative group's latent mean differ significantly from zero, then groups are found to differ significantly from one another (BYRNE 2012; WANG & WANG 2012).

3. Results

To test the six hypotheses of this study, the results of the factorial validity, measurement invariance, and internal consistency (reliability) will be separately reported. The results will be presented in tabulated format with a brief subsequent interpretation.

3.1. Factorial Validity

To determine the factorial validity of the MHC-SF, CFA approach was employed comparing all theoretically known factor structure permutations of the MHC-SF. A competing measurement model strategy was employed where these theoretical models were systematically compered through (exploratory) structural equation modelling. No items were omitted, and observed/measured items were used as indicators of the latent variables within these measurement models (WANG & WANG 2012). These observed variables (measured items) were treated as continuous variables (given the level of measurement) and measurement error terms were uncorrelated. Neither item parcelling nor correlations between items, or error terms, was allowed.

The following models were tested:

Model 1 was hypothesized as a unidimensional factorial model of overall mental health which consisted of all the 14 items (*Figure 1*).

Model 2 was specified as the original theoretical model proposed by KEYES (2002), which was comprised of three first-order factors consisting of EWB (Item 1, 2 &3), SWB (Item 4, 5, 6, 7 & 8), and PWB (Item 9, 10, 11, 12, 13 & 14) (*Figure 2*).

Model 3 was hypothesised as a second order hierarchical model was comprised of three first-order factors consisting of EWB (Item 1, 2 &3), SWB (Item 4, 5, 6, 7 & 8), and PWB (Item 9, 10, 11, 12, 13 & 14) as well as a second-order factor for overall Mental Health (*Figure 3*).

Model 4 was a first-order factorial model which consisted of the hedonic (EWB items 1, 2 & 3) and eudemonic (PWB and SWB items 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14) components of wellbeing (*Figure 4*).

Model 5 was hypothesised as a second order hierarchical model encompassing two first order factors namely: hedonic- (EWB items 1, 2 & 3) and eudemonic- (PWB and SWB items 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14) wellbeing, which loaded on a second-order factor for general mental health (*Figure 5*).

Model 6 specified a bi-factor model with three first-order factors consisting of EWB (Item 1, 2 & 3), SWB (Item 4, 5, 6, 7 & 8) and PWB (Item 9, 10, 11, 12, 13 & 14) and a global mental health factor ecompassing all items. All factors were specified as orthogonal, with inter-factor correlations constrained (*Figure 6*).

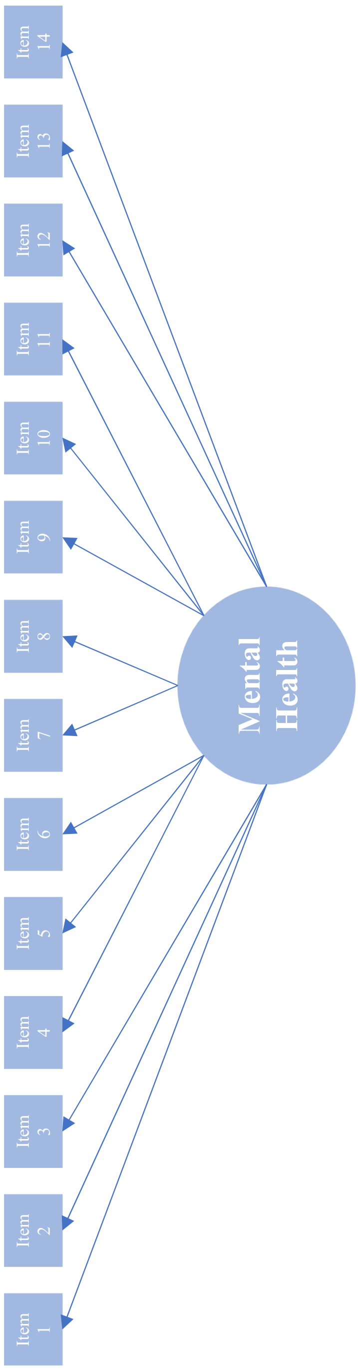

Figure 1
Model 1: Unidimensional Factorial Model

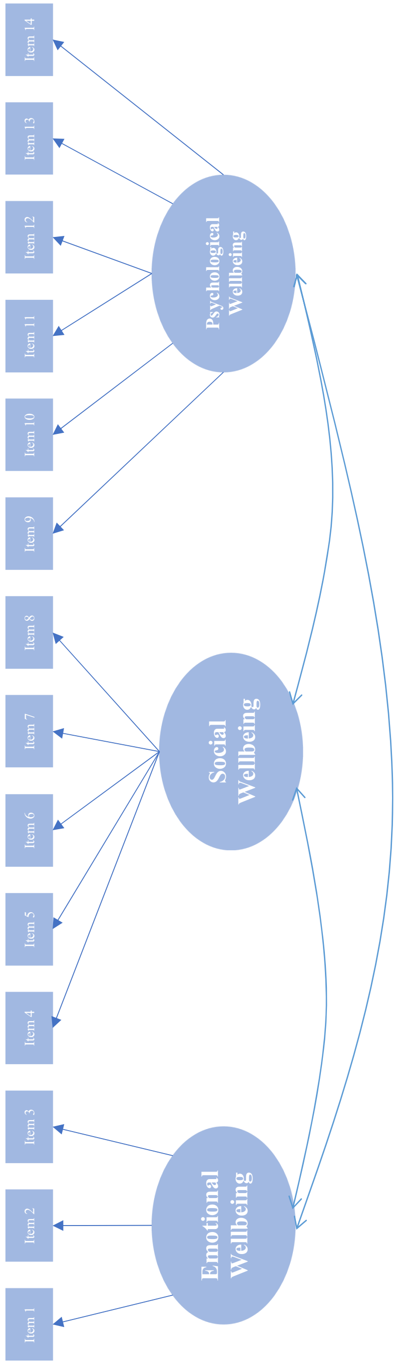

Figure 2
Model 2: Three first-order Factorial Model

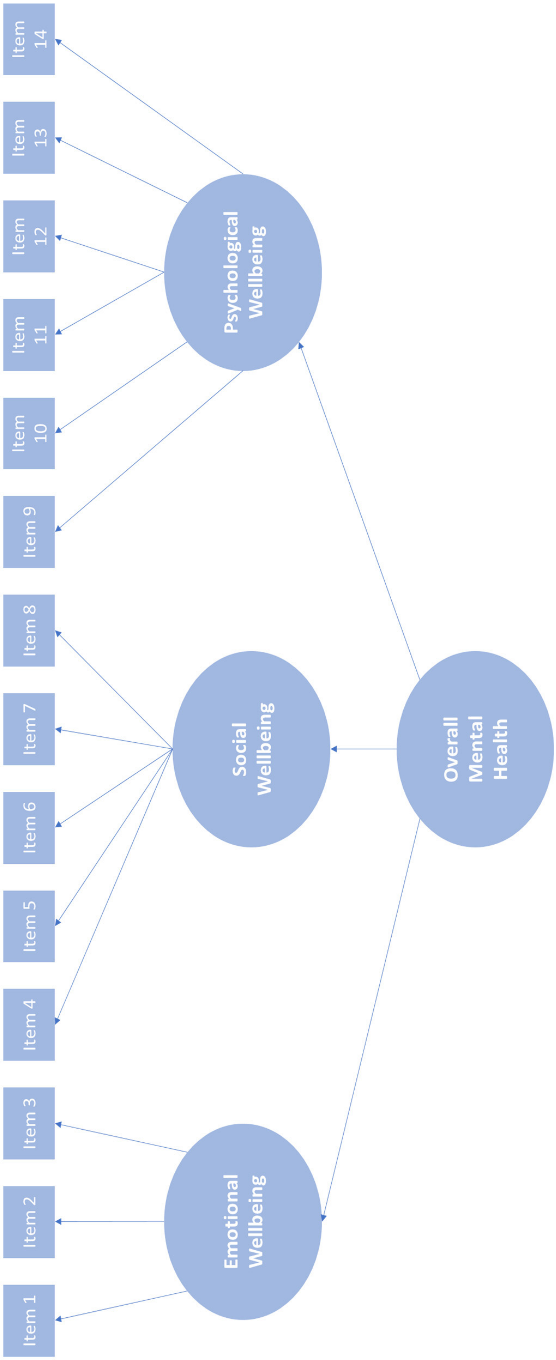

Figure 3
Model 3: Second order Hierarchical Three first-order Factorial Model

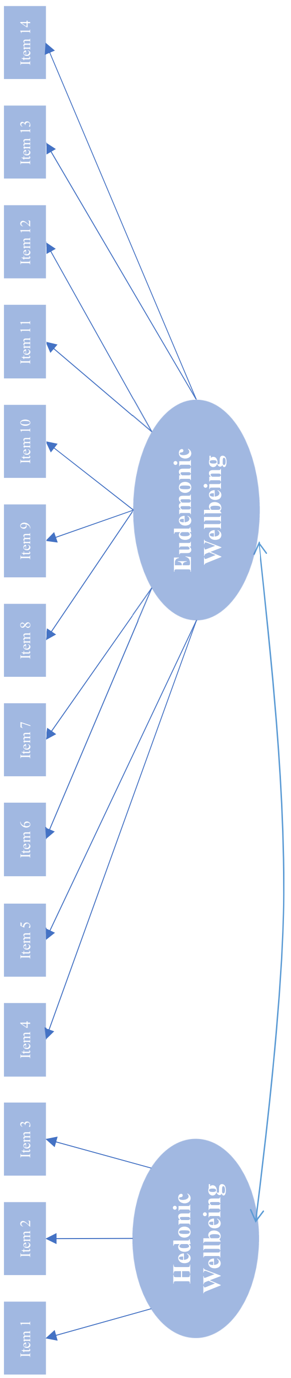

Figure 4
Model 4: Two first-order Factorial Model

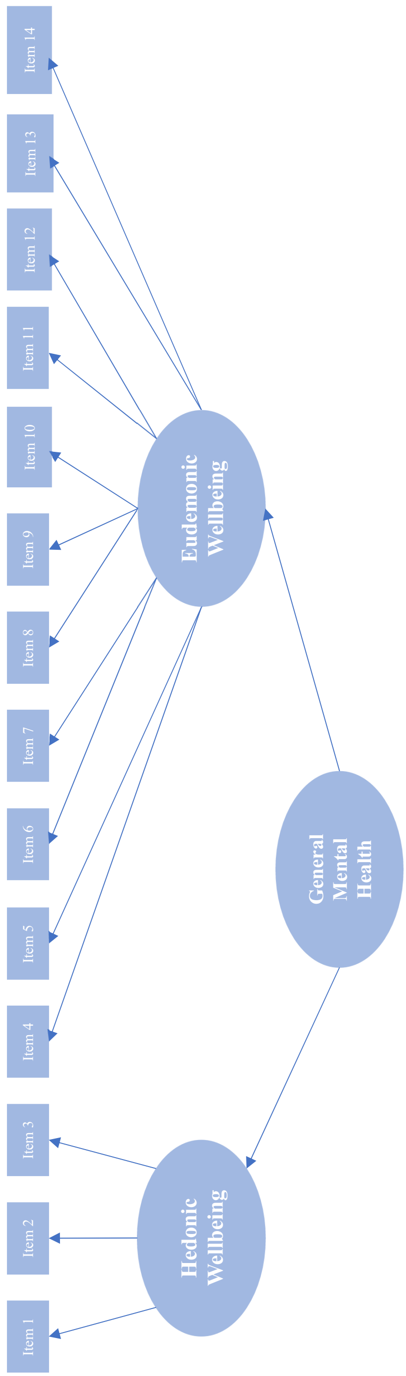

Figure 5
Model 5: Second order Hierarchical two first-order Factorial Model

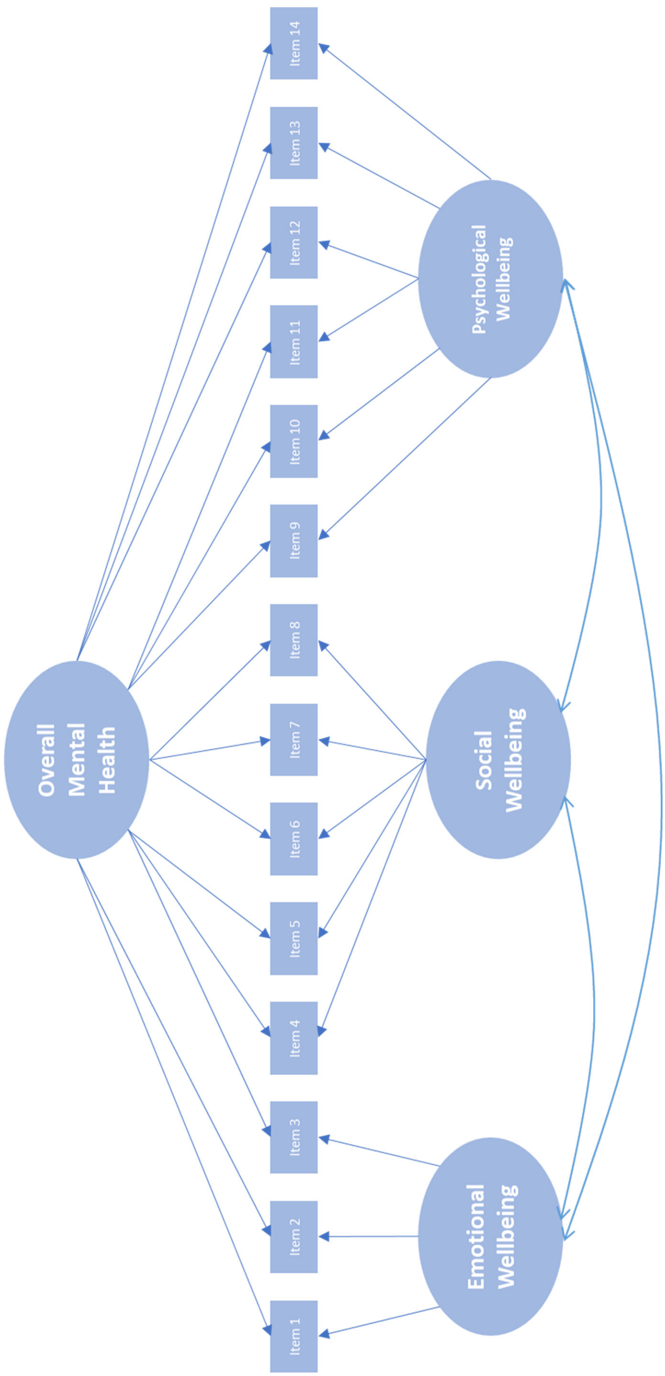

Figure 6
Model 6: Bi-factor model with three first-order factors

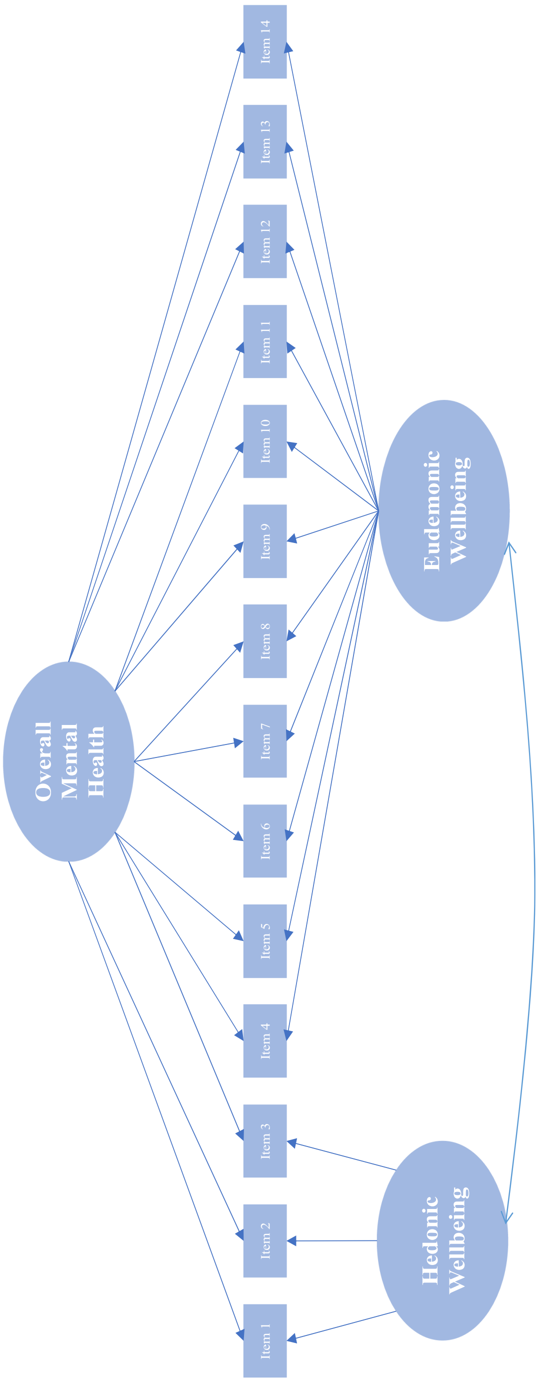

Figure 7
Model 7: Bi-factor model with two first-order factors

***Model** 7* specified a bi-factor model with two first-order factorial models that consisted of hedonic (EWB items 1, 2 & 3) and eudemonic (PWB and SWB items 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14) components of wellbeing, coupled with a global mental health factor was comprised of all items. Again, all of these were specified as orthogonal, with inter-factor correlations constrained (*Figure 7*).

Although the results (reflected in *Table 2*) indicated that the two bi-factor models (Models 6 and 7) fitted the data significantly better than the unidimensional- (Model 1), first-order (Models 2 & 4) and the hierarchical models (Models 3 & 5), several items had non-significant factor loadings (Items 10, 11, 12, 13 & 14 on Model 6 and Items 10, 12, 13 & 14 on Model 7). These models were therefore not further considered as significant modifications to the instrument (i.e. error term correlations, item omissions, slope /intercept constraints), rendering comparisons within the current framework – as well as in relation to the theory – impractical.

Table 2
Fit statistics for competing measurement models

Model	χ^2	*df*	*TLI*	*CFI*	*RMSEA*	*SRMR*	*AIC*	*BIC*	*90% C.I RMSEA*	
									LL	*UL*
Model 1	2136.43	77	0.64	0.57	0.21	0.18	25676.13	25862.45	0.08	0.10
Model 2	436.24	74	0.94	0.92	0.08	0.06	23983.94	24188.08	0.08	0.09
Model 3	436.24	74	0.94	0.92	0.08	0.06	23983.94	24188.08	0.08	0.09
Model 4	1480.37	76	0.71	0.75	0.17	0.16	25022.07	25212.82	0.16	0.18
Model 5	1480.37	75	0.70	0.75	0.17	0.16	25024.07	25219.26	0.17	0.18
Model 6	316.81	63	0.94	0.96	0.08	0.05	23884.51	24132.93	0.07	0.09
Model 7	298.39	63	0.94	0.96	0.08	0.04	23866.09	24114.51	0.07	0.09

c^2 = Chi-square; *df* = degrees of freedom; TLI = Tucker-Lewis Index; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardised Root Mean Square Residual; AIC = Akaike Information Criterion; BIC = Bayes Information Criterion; LL = Lower Level; UL = Upper Level

As such, Model 2 (c^2 = 436.24; *df* = 74; TLI = 0.94; CFI = 0.92; RMSEA = 0.08; SRMR = 0.06; p < 0.01) with three first-order factors best fitted the data. Model 2 fitted the data significantly better than its closest competitor (Model 4) (Δc2= 118.77; Δ *df* = 1; ΔCFI = -0.03; *p* < 0.01). These results suggest that a three-factor first order model or a second order hierarchical three first-order factorial model would fit the data significantly better than other factorial permutations.

Table 3
Standardized factor loadings for latent variables

Factor	*Item No*	*Item text*	*Loading*	*S.E.*
Emotional Wellbeing	1	Happy	0.81*	0.02
	2	Interested in life	0.81*	0.02
	3	Satisfied with life	0.82*	0.02
Social Wellbeing	4	That you had something important to contribute to society	0.62*	0.03
	5	That you belong to a community (like a social group or your neighbourhood)	0.85*	0.02
	6	That our society is a good place, or is becoming a better place, for all people	0.84*	0.02
	7	That people are basically good	0.76*	0.02
	8	That the way our society works makes sense to you	0.73*	0.02
Psychological Wellbeing	9	That you liked most parts of your personality	0.57*	0.03
	10	Good at managing the responsibilities of your daily life	0.68*	0.03
	11	That you had warm and trusting relationships with others	0.64*	0.03
	12	That you had experiences that challenged you to grow and become a better person	0.63*	0.03
	13	Confident to think or express your own ideas and opinions	0.73*	0.02
	14	That your life has a sense of direction or meaning to it	0.80*	0.02

*: $p < 0.001$; No cross-loading items; S.E. = Standard Error

Table 3 provides an overview of the standardised item loadings for the three latent variables of the best fitting Models (Model 2 & 3). The results showed that the items loaded sufficiently on the respective latent factors (> 0.40) with small standard errors (< 0.04). For emotional wellbeing the item loadings ranged from 0.81 to 0.82, whereas the item loadings for social wellbeing ranged from 0.62 to 0.85. Items loading on psychological wellbeing ranged from 0.57 to 0.80. These item loadings are significantly higher than the suggested 0.40 cut-off as suggested by WANG and WANG (2012).

3.2. Measurement Invariance

Measurement invariance was assessed in two phases. *First*, KMO sphericity was assessed to determine sampling adequacy for each sub-category of the demographic characteristics being employed. The results showed that all categories; i.e. genders (male vs female), age categories (19 to 29 years; 30 to 39 years; 40 to 49 years; 50+ years), language groups (Afrikaans, English and African) and marital status (single, married, and divorced/widowed) had adequate sample sizes to continue with invariance testing (KMO < 0.70, p < 0.01; Cerny & Kaiser 1977). Second, measurement invariance was assessed. The specifics of each analysis are presented below.

Invariance was first tested between different genders (males vs females). The participants consisted of 285 males and 339 females. The results provided strong evidence of measurement invariance across the different genders (*Table 4*). No significant Δc^2 or ΔCFI differences could be found between the configural, metric, and scalar models (p > 0.05).

Table 4
Invariance testing based on gender

	Model	χ^2	*df*	*TLI*	*CFI*	*RMSEA*	*SRMR*	*AIC*	*BIC*	*Model Comparison*	$\Delta\chi^2$	*ΔCFI*
M1	*Configural Invariance*	436.24	146	0.94	0.92	0.03	0.05	23983.94	24188.08	–	–	
M2	*Metric Invariance*	552.94	157	0.92	0.93	0.05	0.06	23889.52	24235.55	M2 vs M1	116.70*	–0.01*
M3	*Scalar Invariance*	537.62	168	0.92	0.93	0.03	0.06	23902.20	24310.33	M3 vs M2	–15.32*	0.00*

*: No statistically significant differences exist (p > 0.05)

Strong invariance was supported between males and females, therefore latent mean differences between the groups were investigated. With males as the reference group, the results showed that females did not score statistically significantly lower on the unstandardized fitted mean on EWB (M = 0.04, SE = 0.09, p = 0.68), PWB (M = −0.06, SE = 0.09, p = 0.49) or SWB (M = −0.07, SE = 0.09, p = 0.41).

Table 5
Invariance testing based on Age

	Model	χ^2	*df*	*TLI*	*CFI*	*RMSEA*	*SRMR*	*AIC*	*BIC*	*Model Comparison*	$\Delta\chi^2$	*ΔCFI*
M1	*Configural Invariance*	751.15	292	0.92	0.90	0.10	0.07	23943.40	24759.64	–	–	
M2	*Metric Invariance*	796.24	325	0.92	0.91	0.09	0.08	23922.47	24592.33	M2 vs M1	45.08	–0.01
M3	*Scalar Invariance*	865.85	358	0.91	0.91	0.09	0.09	23926.09	24449.58	M3 vs M2	69.92	0.00

[*] No statistically significant differences exist ($p > 0.05$)

Next, invariance was assessed between different age categories (*Table 5*). The participants consisted of 158 individuals between the ages of 19 and 29 years, 182 between 30 and 39 years, 131 between 40 and 49 years, and 153 that were over 50 years of age. The results indicated no evidence of measurement invariance across the groups. Significant differences in both Δc2 and ΔCFI were found between the configural, metric, and scalar invariance models ($p < 0.05$). Partial invariance was not pursued as comparisons between all invariance models were shown to be statistically significant. Further, none of the models met the RMSEA and SRMR requirements for model fit. Therefore, the MHC-SF was not invariant among age categories and meaningful mean comparisons cannot be made.

Further, measurement invariance was assessed between different language groups (*Table 6*). The participants consisted of English- (*n* = 166), Afrikaans- (*n* = 216) and African language groups (*n* = 242). Again, the results indicated no evidence of measurement invariance across the different language groups. Significant differences in both Δc^2 and ΔCFI were found between the configural, metric, and scalar invariance models ($p < 0.05$). Partial invariance was not pursued as comparisons between the invariance models showed that a non-statistically significant difference only existed for one model (the configural vs. metric model). Further, none of the models met the model fit criteria for RMSEA and only the configural model met the requirements for SRMR. The conditions for further investigations were thus not met. Therefore, the MHC-SF was not invariant among different language groups and meaningful mean comparisons cannot be made.

Table 6
Invariance testing based on Language

	Model	χ^2	df	TLI	CFI	RMSEA	SRMR	AIC	BIC	Model Comparison	$\Delta\chi^2$	ΔCFI
M1	Configural Invariance	638.02	219	0.93	0.91	0.09	0.06	23733.03	24345.22	–	–	
M2	Metric Invariance	666.86	241	0.92	0.93	0.09	0.08	23717.86	24232.46	M2 vs M1	28.83*	0.02*
M3	Scalar Invariance	726.42	263	0.92	0.92	0.09	0.08	23733.42	24150.42	M3 vs M2	59.56	–0.01*

* No statistically significant differences exist ($p > 0.05$)

Table 7
Invariance testing based on Marital Status

	Model	χ^2	df	TLI	CFI	RMSEA	SRMR	AIC	BIC	Model Comparison	$\Delta\chi^2$	ΔCFI
M1	Configural Invariance	712.06	219	0.90	0.92	0.10	0.07	23454.31	24066	–	–	
M2	Metric Invariance	740.112	241	0.91	0.92	0.10	0.08	23438.36	23952.96	M2 vs M1	28.06*	0.00
M3	Scalar Invariance	859.86	263	0.90	0.91	0.10	0.09	23514.14	23931.13	M3 vs M2	119.77	–0.01

* No statistically significant differences exist ($p > 0.05$)

Finally, measurement invariance was assessed for individuals with different marital statuses (*Table 7*). The participants consisted of Single- (n = 128), Married- (n = 290) and Divorced/Widowed individuals (n = 206). Again, the results indicated no evidence of measurement invariance across the different groups. Significant differences in both Δc^2 and ΔCFI were found between the configural, metric, and scalar invariance models ($p < 0.05$). Partial invariance was not pursued as comparisons between the invariance models showed that a non-statistically significant difference only existed for one model (the configural vs. metric model). Further, none of the models met the model-fit criteria for RMSEA and only the configural model met the requirements for SRMR. The conditions for further investigations were thus not met. Therefore, the MHC-SF was not invariant among people with different marital statuses, and meaningful mean comparisons cannot be made.

3.3. Reliabilities and descriptive statistics

Table 8 indicates the descriptive statistics (means, standard deviations, skewness, kurtosis), Cronbach alphas, composite reliabilities, and Pearson/Spearman relationships amongst the latent variables. The results showed that all the scales are reliable at both the lower (Cronbach Alpha > 0.70) and upper bound limits (Composite reliability / Rho coefficients (ρ) > 0.80). *Hypotheses 5*, which indicates that the MHC-SF is a reliable measure, therefore it can be *accepted.*

Table 8
Descriptive statistics, Cronbach alpha coefficients, and composite reliabilities for Model 2&3

Variable	$\bar{x}$	Σ	Skewness	Kurtosis	ρ	α
Overall Mental Health	4.33	0.88	–0.57	0.31	0.94	0.80
Emotional Wellbeing	4.71	0.99	–1.13	1.38	0.85	0.86
Psychological Wellbeing	4.74	0.89	–0.94	1.07	0.83	0.86
Social Wellbeing	3.54	1.27	–0.13	–0.87	0.87	0.88

$\bar{x}$ = mean; σ = standard deviation; ρ = composite reliability; α = Cronbach's alpha

4. Discussion

The purpose of this paper was to investigate the psychometric properties of the MHC-SF within selected organisations within the South African context. Specifically, the aim was to determine the factorial validity, the measurement invariance for different demographic factors, and to determine the reliability of the instrument for South African organisations. The results showed that the original three-dimensional factor structure of the MHC-SF proposed by Keyes (2002) fitted the data comparatively better than any other theoretical permutation of the model. Items loaded statistically significantly on all three subscales (emotional, psychological, social wellbeing) of the best-fitting model. Further, the scale showed full configure, convergent and metric invariance between males and females. Within the current study, no differences in emotional, psychological, and social wellbeing between the genders were found. However, invariance was not established for different age cohorts, language groups, or marital statuses. The instrument proved to be reliable at both a lower (Cronbach Alpha) and upper-level (Composite reliability) limit within South African organisational contexts.

4.1. The factorial validity of the MHC-SF

Various factor-structure permutations of the MHC-SF exist within the literature; with little consistency in their application across samples or contexts. Research has shown that the MHC-SF is used either as (a) a unidimensional model (i.e. general mental health), (b) a three- (emotional, psychological, and social wellbeing) or two-factor (hedonic and eudemonic wellbeing) first order model, or (c) as a hierarchical model comprised out of either the three- or two- first order factors that builds up to an overall second-order called 'Overall Mental Health'. Contemporarily, two additional types of models have been introduced in the literature: ESEM and Bi-Factor models (JOSHANLOO 2016; JOSHANLOO & JOVANOVIĆ 2016; JOSHANLOO et al. 2017; ŻEMOJTEL-PIOTROWSKA et al. 2018).

The current study attempted to categorically compare all the aforementioned models (with the exclusion of the ESEM approach) within the South African organisational context. Initially, the results indicated that these two bi-factor models assessed in this study fitted the data best. However, upon further inspection it was found that even though these models fitted the data comparatively better than the other competing models, the majority of the items on the 'psychological wellbeing' (or eudemonic subscales for the two-factor, bi-factor model) had non-significant factor loadings. DE BRUIN and DU PLESSIS (2015) presented similar results. These authors found that the bi-factor model fitted the data better than a large amount of total test variance. However, even though the general mental health factor's items loaded significantly on the global factor, most of the item loadings reported on the individual subscales did not meet WANG and WANG'S (2012) suggested item loading cut-off of 0.5, nor FIELD's (2016) more lenient 0.40.

REISE and colleagues (2016) explain that even though bi-factor models provide a better fit relative to unidimensional or correlated factor models (as a result of the complexity of the specified model; it's the least restrictive of all possible models), it '…Accommodates implausible, possibly invalid, response patterns. We warn readers that, even if such suspect patterns could be reliably identified with high precision, there is no "adjustment" to factor score estimates that can turn invalid responses into valid score estimates' (p. 19). These authors specifically warn against employing bi-factor models in general, as these models do not provide the 'answers' to the traditional questions posed when developing or validating instruments; especially when competing CFA approaches are employed. Bifactor models are predispositioned to ignore cross-loadings and may result in biased estimates (JOSHANLOO 2016). Finally, in some instances and for some psychometric instruments, the general factor estimated in bi-factor models does not function as a 'true' general factor, but rather acts as a general function to superficially inflate model-fit (MORGAN et al. 2015). In these instances, a normal two-level hierarchical factorial model would be more preferential and could yield better results (REISE et al. 2016; ŻEMOJTEL-PIOTROWSKA et al., 2018).

As such, these bi-factor models were excluded from further analyses. Therefore, the results showed that KEYES' (2002) original three-factor model (Model 2: EWB, PWB, SWB; Model 3: Overall Mental Health = EWB, PWB, SWB) fitted the data significantly better than the unidimensional- (Model 1), first-order (Model 4) and the hierarchical models (Model 5). For employees within the South African organisational context, a clear distinction exists between three different, yet complimentary, components of wellbeing: emotional wellbeing, psychological wellbeing, and social wellbeing. Our results are aligned with several studies conducted by JOSHANLOO and colleagues (2017) ranging from Italy (PETRILLO et al. 2015), and the Netherlands (LAMERS et al. 2011), to France (SALAMA-YOUNES & ISMAÏL 2011) and Argentina (PERUGINI et al. 2017). Further, it is important to note that our findings were also in contrast to other studies that conceptualised KEYES' (2002) instrument as a unidimensional-, two-factor model- or two-factor hierarchical models (JOSHANLOO 2017).

4.2. Measurement invariance for Genders, Age cohorts, Language groups and Relational /Marital status

Determining the best fitting model allowed for further investigation into equivalence factor structures (configural invariance), similarity in factor/item loadings (metric invariance), and to determine if different groups have similar intercepts (scalar invariance). The aim was to specifically investigate the measurement invariance of genders, age cohorts, language groups and between different relationships/marital status. The results only showed support for invariance between males and females; and in contrast to our initial belief, not for individuals of different ages from different language groups and people who are in different types of relationships. Also, partial invariance for these groups could not be established. This implies that men and woman interpret the items of the MHC-SF in a similar way, and therefore interpret emotional, psychological and social wellbeing in the same way (VAN DE SCHOOT et al. 2012). As such, future studies can make meaningful cross-gender comparisons on the occurrence, determinants and consequences of the components of MHC-SF within South African organisational contexts. This is in line with the findings of GUO and colleagues (2015), JOSHANLOO and colleagues (2017), KARAŚ and colleagues (2012), PETRILLO and colleagues (2015), all of whom reported invariance in gender in different cultures and contexts.

In contrast, according to GUO and colleagues (2015) as well as others, individuals from different age groups and with different relationship statuses will interpret the constructs being measured differently and therefore, cross-generation and cross-relationship comparisons cannot be reasonably made. Importantly, differences that may occur between these groups could be therefore due to inadequate mental-health measurement within these groups. Further, in contrast to SCHUTTE and WISSING (2017), measurement invariance could not be established between the different language groups within the current sample. Within the South African context, the native language is used as a proxy for cultural identification and classification. Seeing that significant differences exist between Afrikaans-, English-, and African-speaking individuals within this sample, cross-cultural comparisons on mental health between these groups – within this context – cannot meaningfully be made.

Care should therefore be given when applying the instrument to people from different ages, as they may understand and interpret the information differently due to the magnitude of experiences accumulated over time (older generations), or due to naivety as a result of a lack of insight (younger generations). Similarly, when applied to or within cross-cultural or multi-lingual environments, it is to be suggested to utilise one of the many translated and validated versions of the MHC-SF in order to ensure that language does not impact the quality of the results. Finally, although we know that differences in wellbeing exists between individuals in or out of relationships, when applying the MHC-SF to measure and compare wellbeing between individuals that are in a relationship or are single or are divorced/widowed, one must be cognisant that underlying relational dynamics may affect how the questions are interpreted.

4.3. The internal consistency of the MHC-SF

Although the MHC-SF is considered to be a reliable instrument to assess mental health, it has been shown to fluctuate in reliability between different cultures, between adults and adolescents, as well as within different contexts (Karaś et al. 2014; Keyes et al. 2008; Singh et al. 2015). The reliability also depends on the type of theoretical model that was employed in the given context (e.g. a unidimensional measure may present with higher levels of internal consistency than the three-factor model in the same context).

The results of this study showed that the instrument is a reliable measure (at both the lower and upper bound consistency limits) for mental health within South African organisational contexts. The results showed acceptable levels of internal consistency (Cronbach Alpha > 0.70; Nunnally & Bernstein 1994) and composite reliability (Rho / (ρ) > 0.80; Wang & Wang 2012). Our findings are primarily aligned with the other South African studies where the MHC-SF was applied to multi-cultural groups and found to be reliable (Keyes et al. 2008).

5. Recommendations and Limitations

This study has a number of limitations that need to be reported in order to appropriate interpret the results and discussion. The first limitation of this study pertains to the fact that the MHC-SF is a self-report measure, relying on the self-knowledge and the subjective experience of an individual's situations that might have an impact on the accuracy of the results. Secondly, a convenience South African sample was utilised, therefore the results cannot be generalised to other samples. In this study, only the positive mental health model was tested. It might be beneficial to determine the factor structure of both positive and negative patterns at the same time in future studies. Third, this was a cross-sectional study. Seeing that mental health fluctuates over time, it might be viable to conduct longitudinal validation studies.

6. Conclusion

The MHC-SF is a proven instrument to assess the mental health of both students (Van Zyl & Rothmann 2012b) and adults (Keyes et al. 2008) within the South African context. This study showed that it could further be used as a tool to assess the wellbeing and mental health of working adults within the given context. This, however, should be taken against the backdrop that within the current study, a number of context-specific factors and differences from the literature exist. The MHC-SF can be used to differentiate between genders, but not between different languages (i.e. cultures), age cohorts, and people within various marital statuses. Albeit such, the tool is still one of the most prominent positive psychological assessment measures which has – stood the test of time!

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