Personality and Individual Differences 87 (2015) 136–140

Contents lists available at ScienceDirect

Personality and Individual Differences

journal homepage: www.elsevier.com/locate/paid

Factorial invariance of the mood and anxiety symptom questionnaire-short form across gender

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ARTICLE INFO

Article history:
Received 7 May 2015
Received in revised form 22 July 2015
Accepted 28 July 2015
Available online 10 August 2015

Keywords:
MASQ-SF
Tripartite model
Anxiety
Depression
Factorial invariance
Gender differences

ABSTRACT

The mood and anxiety symptom questionnaire (MASQ; Clark & Watson, 1991) is a specific assessment for the tripartite model of depression and anxiety. The current study aimed to evaluate the factor structure and factorial invariance of the short form of MASQ (MASQ-SF) across gender. The sample consists of 2,394 undergraduates (44.2% males), with a mean age of 20.89 years (SD = 1.23). Consistent with previous studies, the tripartite model fitted the data well, both for the total sample and each gender group. Results of multi-group confirmatory factor analysis demonstrated measurement and structural invariance of MASQ-SF across gender. Moreover, Findings with respect to the latent mean differences across gender revealed that general distress was higher in females than in males. To our knowledge, the current study is the first attempt to evaluate the factorial invariance of the MASQ-SF across gender, which makes meaningful contributions to the validity of the MASQ-SF as a widely used self-report measure for the tripartite model of depression and anxiety.

1. Introduction

Despite that depression and anxiety have been traditionally considered as two distinct constructs, apparently, depressive and anxiety symptoms are highly correlated in non-clinical populations (Cummings, Caporino, & Kendall, 2014; Stark & Laurent, 2001), and the considerable comorbidity of depression and anxiety indicates common etiological and clinical factors, which makes it difficult to make a accurate diagnosis (Cummings et al., 2014; French & Finch, 2006; Lamers et al., 2011). Furthermore, many studies have argued that most self-report assessment tools of depression and anxiety are strongly correlated, with coefficients ranging from 0.45 to 0.75 (Mendels, Weinstein, & Cochrane, 1972; Reidy & Keogh, 1997; Tanaka-Matsumi & Kameoka, 1986). Accounting for this overlap and diagnostic comorbidity between anxiety and depression, researchers have tried to find alternative explanations for this phenomenon, of which the 'tripartite model' developed by Clark and Watson (1991) is one of the most diffusely studied (Anderson & Hope, 2008).

According to the tripartite model, depressive and anxiety symptoms are grouped into three dimensions. General distress (GD) dimension contains common features (i.e., general psychological distress or negative affect) that exist in both depression and anxiety. Anhedonic depression (AD) describes the absence of positive affect and loss of energy (i.e., lack of interest, hopelessness), as a unique feature of depression. Anxious arousal (AA) describes the symptoms of somatic hyperarousal (i.e., tension, nervousness), as a unique feature of anxiety. The tripartite model has been validated in adolescents and college students, and some clinical populations (Chorpita, 2002; Jacques & Mash, 2004; Joiner, Catanzaro, & Laurent, 1996).

The mood and anxiety symptom questionnaire (MASQ) was introduced to be a specific self-report assessment of the Tripartite model (Clark & Watson, 1991). Many previous studies have provided satisfactory levels of convergent and discrimination validity, internal consistency, and test–retest reliability for MASQ (Buckby, Yung, Cosgrave, & Killackey, 2007; Geisser, Cano, & Foran, 2006; Keogh & Reidy, 2000; Watson, Weber et al., 1995).

Given that the lengthy 90-item questionnaire is time-consuming and may be unsuitable for administration in large studies, Watson and Clark (1991) omitted 28 items of the original one and developed a 62-item short Form of MASQ (MASQ-SF), which includes four subscales separately testing general depressive symptoms (e.g., felt upset or lost confidence), general anxiety symptoms (e.g., felt afraid or felt uneasy), physiological hyperarousal and anhedonia. The former two subscales subordinate to the higher-order GD dimension of the tripartite model, while the physiological hyperarousal and anhedonia subscale subordinate to the higher-order AA and AD dimension respectively. The MASQ-SF has been demonstrated to have acceptable reliability and validity in western samples (Watson, Weber et al., 1995), and it has

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http://dx.doi.org/10.1016/j.paid.2015.07.036
0191-8869/

been widely applicated in screening for anxiety and depressive symptoms (Ameringer & Leventhal, 2015; Dindo & Fowles, 2011; Jin et al., 2014; Zhu et al., 2008). Xiao et al. (2014) utilized the Chinese version of MASQ-SF to test the tripartite model in patients with essential hypertension and found that it is validated in Chinese clinical sample. In an earlier study, confirmatory factor analysis (CFA) was conducted to test the factor structure of MASQ-SF in a sample of Chinese college students, however, they didn't directly test the tripartite model but obtained a four-factor structure according to the four subscales of MASQ-SF (Yang & Yao, 2009), whether the tripartite structure is validated in Chinese general community is still unknown. Thus, the first goal of our study is to test the factor structure of MASQ-SF in a large sample of Chinese undergraduates.

Although there have been some fix evidences on psychometric properties of MASQ-SF, further empirical evaluation would be helpful to sustain its continued application as a self-report measure. One particularly significant area of investigation is the factorial invariance of MASQ-SF across gender. This is a very important test for any measure of the tripartite model of depression and anxiety, as important gender differences in depression and anxiety were suggested in many previous studies (Alosaimi, Al-Sultan, Alghamdi, Almohaimeed, & Alqannas, 2014; McLean, Asnaani, Litz, & Hofmann, 2011; Parker & Brotchie, 2010; Parker, Fletcher, Paterson, Anderson, & Hong, 2014). Notably, researchers have used raw scores of MASQ-SF and its subscales to compare levels of depressive and anxiety symptoms in men and women (Watson, Clark et al., 1995; Yang & Yao, 2009). In order to make these comparisons valid, all items of MASQ-SF must imply equivalent meaning across gender (French & Finch, 2006). In other words, the scale must show factorial invariance between males and females (Vandenberg & Lance, 2000). To the best of our knowledge, however, no study can be found that has ever tested the factorial invariance of MASQ-SF across gender. This is a particularly important test that would be helpful to support continued use of MASQ-SF, which urges us to provide the first investigation of the MASQ-SF's factorial invariance across gender within a large sample of undergraduates in the current study.

In all, the aims of our study were to: (1) examine the model fit of the tripartite structure of MASQ-SF in a large sample of Chinese undergraduates; (2) test different levels of measurement and structural invariance of MASQ-SF across gender; (3) investigate latent mean differences of MASQ-SF factors across gender.

2. Method

2.1. Participants and procedures

Participants were recruited from two universities in Hunan and Guangdong Province of Mainland China between April and September, 2014. All subjects gave written, informed consent before the administration. Questionnaires were administered to 2500 undergraduates, and 2394 data sets (95.8%) were included in the final analysis: 72 (2.8%) subjects who answered less than 90% of all items of MASQ-SF and 34 (1.4%) subjects who provided the same answer to every item were excluded. The sample consisted of 1058 men (44.2%), with a mean age of 20.77 (SD = 1.33) and 1336 women (55.8%), with a mean age of 20.98 (SD = 1.13). The whole sample aged from 16 to 26 years old, with a mean age of 20.89 (SD = 1.23), 62 participants did not report their age. The missing data in this study has been handled with full information maximum likelihood estimation.

2.2. Measure

The MASQ-SF is a 62-item questionnaire derived from the original 90-item MASQ that estimate the severity of depressive and anxiety symptoms during the past week. Responses to each item are rated on a 5-point Likert scale ranging from 1 (not at all) to 5 (extremely). Higher scores on the whole scale and its subscales reflect greater depressive or anxiety symptoms. The Chinese version of MASQ-SF was adapted through a two-stage process of translation and back translation (Zhu et al., 2008). Watson, Weber et al. (1995) has reported high levels of internal consistency in multiple samples, as the results showed that all Coefficient alpha ≥ 0.78 for each of the three dimensions in student samples.

2.3. Data analysis

Confirmatory factor analysis (CFA) was conducted in Mplus 6.12 (Muthén, 1998–2011). The robust maximum likelihood (MLR) estimator was chosen. We made this decision carefully, because the outcomes of Kolmogorov–Smirnov test showed significant skewness and kurtosis for each item ($p < 0.01$) which indicated nonnormality of our data. According to Satorra and Bentler (2001), the MLR estimator with a mean adjusted chi-square (Satorra–Bentler χ^2) statistic and robust standard errors yield unbiased goodness-of-fit indices which is robust to nonnormal data.

Data analyses were carried out in three steps. As a first step, a CFA method was used to examine the factor structure of MASQ-SF in the full sample and separately by gender groups. The hypothesized tripartite model, as established by Clark and Watson (1991) was evaluated. χ^2 is a traditionally used index to evaluate overall model fit but it is sensitive to sample size (Hu & Bentler, 1993). In large samples, statistically significant χ^2 are often found. Thus some other commonly used fit indexes were chosen: the Comparative Fit Index (CFI), the Tucker–Lewis Index (TLI), the root-mean-square error of approximation (RMSEA), and the standardized root mean squared residual (SRMR). Generally, RMSEA ≤ 0.08, SRMR ≤ 0.08, TLI ≥ 0.90 and CFI ≥ 0.09 can be considered acceptable (Hu & Bentler, 1999).

In the second step, multigroup CFA methods were used to test for factorial invariance of MASQ-SF across gender, which consisted of a hierarchical set of steps (Samuel, South, & Griffin, 2015). The first type of invariance tested was configural invariance (Model 1) which conducted an initial analysis with no constraints that was estimated simultaneously across gender. The factor loadings, intercepts of variables and error variances of this model were set for free. Next, metric invariance (Model 2) were tested. In this step, constraints of equivalent factor loadings were imposed to make sure whether the MASQ-SF has the same structure and meaning across gender, whereas intercepts of variables and error variances were estimated freely. For the scalar invariance, also called strong invariance (Model 3), the factor loadings, intercepts of variables were constrained to be equal across gender. Finally, in a test of strict invariance (Model 4), the factor loadings, intercepts of variables and error variances were all set to be equal across gender. Although not technically involved in the measurement invariance, the equivalence of factor variances/covariances was conducted to evaluate structural invariance (Model 5),which indicates that all latent variables share the same relationship across gender. The changes in CFI, along with the Bayesian information criterion (BIC) value were used to evaluate invariance among different consecutive models, a ΔCFI ≤ 0.010 (Cheung & Rensvold, 2002) supplemented by a smaller BIC value was considered evidence of invariance as suggested by Cheung and Rensvold. As for BIC, a 0 to 2 difference between two models indicates weak evidence; a 2 to 6 difference indicates positive evidence; a 6 to 10 difference represents strong evidence and if the BIC values differ by more than 10, it means very strong evidence (Raftery, 1995).

Finally, the latent mean differences across gender were tested. In this step, one of the compared groups was selected as the reference group, and the latent mean of this group was constrained to 0, while the latent mean of other group(s) was estimated freely. And by significance test, we made a decision whether the latent means of these groups were different. The critical ratio (CR) was chosen as the index to evaluate