Factorial Composition of the Questionnaire for Eudaimonic Well-Being (Qewb) in Mexican University Students

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Abstract

The present study aims to provide empirical support for the factorial division Questionnaire adapted by Schutte et al. (2013) in a sample of women and men Mexicans adults. The total sample was of 1477 Mexican university students; 774 women and 703 men. The age ranged between 18 and 28 years (mean = 20.67 ± 1.90 years). The factorial structure of the questionnaire was analyzed by 1) Exploratory factor analysis and 2) confirmatory factor analysis and factorial invariance. The factors of both subsamples showed adequate reliability and high congruence between pairs of factors, particularly considering the small number of items in each, resulting in a fully confirmatory model. However, the model obtained does not match fully with that proposed by Schutte et al. (2013).

Keywords: Factorial structure, exploratory factor analysis, confirmatory factor analysis, factorial invariance

Introduction

Since ancient times there is great concern to know what it means to have a good life; human manifestations such as happiness or joy are directly related to certain conditions of life (Gomez Villegas, Barrera, & Cruz, 2007). The word happiness is used in various ways; in the broadest sense, it is a general term for all that is good, in this context, is often used interchangeably with terms such as well-being or quality of life and denotes both individual and social well-being (Veenhoven, 2012).

Well-being is a complex construction that affects the experience and the optimum performance; current research has resulted in two trends on this construct; the first, reflects the opinion that subjective well-being consists of pleasure and happiness and the avoidance of pain, which is called hedonism; in the second perspective, eudemonism or psychological well-being is not only happiness, but rather it is found in the updating of human potential (Anić & Toncic, 2013; Burns & Machin, 2010;. Diaz et al, 2006; Nuñez, Leon, González, & Martin-Albo, 2011; Ryan & Deci, 2001; Vallerand, 2012; Velasquez et al, 2008).

By entering to college the youth are faced with multiple stressors, there is a change of life, they approach an unknown world, new expectations, in some cases they require to leave their hometown, home, family, friends and the daily environment. Therefore it is likely that students present difficulties in adapting and thus exposed to factors that threaten their well-being, where those who are not able to see in a positive way their environment and to accept it, they could hardly accepted themselves as individuals inserted in it; however, those who adapt and value themselves show a better vision to the alternative that the future holds Pérez et al. (2011), Vaez and LaFlamme (2008) and Soares, Guisande and Almeida (2011).

The investigations that examine the relationship between health and psychological well-being have revealed links with the physical, psychological and social health (Salsman et al., 2014). It has also shown that there is a positive relationship between psychological well-being and academic performance (Chow, 2010; Salanova, Martínez, Bresó, Llorens, & Grau, 2005; Velasquez et al., 2008). Hence the importance of having adequate instruments to evaluate psychological well-being at the university level and to prove its psychometric characteristics in order to provide new evidence and contribute to the adaptation of them (Brenlla & Vázquez, 2010; Duran-Aponte & Pujol , 2013; Ferrando, Demestre, Anguiano-Carrasco, & Chico, 2011; English, Rodriguez-Marin, & González-Pienda, 2008).

There are several scales to measure psychological well-being among which is found the Questionnaire for Eudamonic Well-Being (QEWB) designed by Waterman et al. (2010) which consists of 21 items; this scale has been widely used in universities (Dezutter et al, 2014. Karas, Cieciuch, & Keyes, 2014; Kiaei & Reio, 2014; Taylor, Black, Novak, Ishida, & Judson, 2014) but not in a Mexican population, only a study of Mexican-Americans conducted by Su et al was found. (2015).

The importance of verifying the factorial structure of an instrument and the psychometric equivalence of it in different groups justifies the present study (Abalo, Lévy, Rial, & Varela, 2006). Consequently, the purpose was to provide empirical support for the factorial division Questionnaire adapted by Schutte et al. (2013) in a sample of women and men Mexicans adults.

Methods

Participants

A total of 1477 Mexican university students participated, 774 women and 703 men. The age ranged between 18 and 28 years (mean = 20.67 ± 1.90 years). The sample was randomly divided into two parts using the Statistical Package for the Social Sciences (SPSS, version 18.0) in order to perform parallel studies to corroborate and verify the obtained results (cross validation). The first half (subsample 1) was composed of 766 participants (401 women and 365 men; mean age = 20.63 ± 1.93 years). The second half (subsample 2) was composed of 711 participants (373 women and 338 men; mean age = 20.72 ± 1.88 years).

Instrument

Spanish version of the Questionnaire for Eudamonic Well-Being (QEWB) designed by Waterman et al. (2010) revised by Schutte et al. (2013), is a Likert questionnaire consisting of 21 items distributed among three factors: sense of purpose, purposeful personal expressiveness, and effortful engagement that measure the psychological well-being according to the way it is conceptualized in the eudaemonist philosophy. Seven of the items are set out in a negative way.

For our study, besides the Spanish translation of the questionnaire, two adaptations to the version of Schutte et al were made. (2013):

First adaptation, the version of Schutte et al. (2013) is scored with seven response options from 1 (strongly disagree) to 7 (strongly agree); in the version used in this research the subject chooses from 11 possible answers. We combine the version of Schutte et al. (2013) with our version to make it as follows: strongly disagree (0) disagree (1, 2 and 3), neither agree nor disagree (4, 5 and 6), agree (7, 8 and 9) and strongly agree (10). This first adaptation is justified because participants as students are used to the scale of 0 to 10, since like that they have been evaluated by the education system in our country (Mexico).

The second adaptation was to apply the instrument through a computer; this in order to allow storage of data without prior encoding stages, with greater precision and speed.

Procedure

The students of the degrees offered at the Faculty of Physical Culture Sciences (FCCF) of the Autonomous University of Chihuahua were invited to participate in the study, explaining them the purpose of the study. Those who agreed to participate signed the corresponding acceptance. Then were applied the QEWB by a personal computer (administrator module of the scales editor of typical run, Blanco et al., 2013), in a session of about 30 minutes and in the computer labs of the participating faculty. At the beginning of the session the importance of research was introduced and how to access the instrument. They were asked the utmost sincerity and they were guaranteed the confidentiality of the data obtained. The instructions were in the first screens of the computerized version of the instrument. At the end of the session they were thanked for their participation. Once the instrument was applied, data was collected by the results generator module of scales editor, version 2.0 (H. Blanco et al., 2013), and finally analyzed using SPSS 18.0 and AMOS 21.0 package.

Data analysis

The psychometric analysis was conducted in two stages in order to obtain proof of the best properties for the conformation of the scores of perceived psychological well-being: 1) Exploratory factor analysis and 2) confirmatory factor analysis and factorial invariance.

Classic Analysis of the Psychometric properties of the scale.

The first step of the analysis was to calculate the mean, standard deviation, skewness, kurtosis and discrimination indexes of each item, to later remove of the scale those who obtain a kurtosis or extreme asymmetry, or a discrimination index below 0.30.

Then, to determine the minimum number of common factors capable of reproducing, in a satisfactory way, the observed correlations between the instrument items (with good discrimination), exploratory factor analysis with the subsamples 1 and 2 were made, from the method of maximum verisimilitude, based on the criterion of Kaiser-Guttman (Costello & Osborne, 2005), plus to ensure an adequate representation of variables (items), only those whose initial communality was higher than 0.30 were kept; after a varimax rotation (Costello & Osborne, 2005). Subsequently, the reliability of each of the factors of the models obtained obtained in both subsamples was calculated through the Cronbach's alpha coefficient (Elosua & Zumbo, 2008; Nunnally & Bernstein, 1995) and the Omega coefficient (Revelle & Zinbarg, 2009; Sijtsma, 2009).

Confirmatory factor analysis and factorial invariance.

Four measurement models: Model 1 (M3), three-factor model according to the distribution proposed by Schutte et al. (2013) of the items of the questionnaire; the Model 2 (M3b), were submitted to comparison, that corresponds to the factorial structure of the previous model, eliminating the items with discrimination indexes below 0.30; Model 3 (M3c) three-factor model according to the results of the exploratory factor analysis; and Model

4 (M3d) that corresponds to the three-factor structure of the previous model, removing the items that were not well enough explained.

To conduct the confirmatory factorial analysis, AMOS 21 software was used (Arbuckle 2012), variances in terms of error were specified as free parameters, and in each latent variable (factor) a structural coefficient was set associated to one, so that scale was equal to one of the observable variables (items). Was used the maximum likelihood estimation method; following the recommendation of Thompson (2004), so when the confirmatory factorial analysis is used, it is necessary to verify not only the fit of the theoretical model but it is recommended to compare the fit indexes of some alternative models to select the best.

To evaluate the adjustment model, statistical chi-squared, the Goodness-of-fit index (GFI), the standardized root mean square residual (SRMR) and the root mean square error of approximation (RMSEA) were used as absolute adjustment measures. Adjusted goodness of fit index (AGFI) the Tucker-Lewis Index (TLI), the comparative fit index (CFI) as measures of increasing adjustment. The chi-squared divided by degrees of freedom (CMIN/GL) and the Akaike Information Criterion (AIC) were used as Parsimony fit indices (Byrne, 2010; Gelabert et al., 2011).

Subsequently, following the recommendations of Abalo et al. (2006), an analysis of the factorial invariance of the questionnaire for the subsamples was made based on the best measurement model obtained in the previous stage.

Finally was calculated the reliability of each of the dimensions, of the measurement models obtained in each subsample, through Cronbach's alpha (Elosua & Zumbo, 2008; Nunnally & Bernstein, 1995) and Omega coefficient (Revelle & Zinbarg, 2009; Sijtsma, 2009).

Results

Exploratory factor analysis (first and second factorial solutions).

The descriptive analysis and the discrimination indexes (correlation element-Total corrected) of each of the 21 items of the questionnaire showed that in the subsample 1 responses to all items obtained mean scores between 4.08 and 8.33, and the standard deviation showed in all cases, values greater than 1.60 (within a range of response between 0 and 10). With the exception of items 5, 14 and 18, all values of skewness and kurtosis were within the range ± 1.50, so it is inferred that the variables fit reasonably to a normal distribution. As for the discrimination indexes, of the 21 items on the questionnaire, 18 satisfactorily discriminate and the remaining 3 (1, 4 and 10) did below 0.30 (Brzoska & Razum, 2010).

In the subsample 2, responses to all items reflected mean scores ranging between 4.04 and 8.43, and the standard deviation was, in all cases, values greater than 1.60 (within a response range between 0 and 10). With the exception of items 2 and 8, all of skewness and kurtosis values were within the range ± 1.50, so it is inferred that the variables fit reasonably to a normal distribution. Regarding the discrimination indexes of the 21 items of the questionnaire, 19 discriminated satisfactorily and the remaining 2 (4 and 10) below .30 (Brzoska & Razum, 2010).

After a varimax rotation (Costello & Osborne, 2005), the exploratory factor analysis for both subsamples of the 19 items with a satisfactory discrimination indexes, revealed a three-factor structure: sense of purpose (items 2, 9 and 21), purposeful personal expressiveness (items 5, 8, 13, 14, 15, 17 and 18) and effortful engagement (items 3, 7, 12, 19 and 20), eliminating 4 of the 19 items analyzed. The set of the selected factors explained 58.55% of the variance in the first subsample and 58.63% of the variance in the second subsample.

The factors resulting in the exploratory factor analysis of both subsamples obtained internal consistency values equal to or above .70 in both samples, demonstrating adequate internal consistency for these subscales, particularly considering the small number of items.

Confirmatory factor analysis for subsamples 1 and 2

The global results of the confirmatory factor analysis in the subsample 1 (GFI 0.838; RMSEA 0.090 CFI 0.818) and the subsample 2 (GFI 0.856; RMSEA 0.085; CFI 0.818) for the M3 indicate that the measurement model, in both subsamples, is not acceptable (Table 1).

The set of the three factors in model M3 explains approximately 52% of the variance in both subsamples. On the other hand, only 9 of the 21 items showed saturations equal to or higher than 0.70 in its intended dimension (items 6, 9, 13, 14, 15, 17, 18, 19 and 20) in the subsample 1 and 10 in the subsample 2 (items 2, 6, 9, 13, 14, 15, 17, 18, 19 and 20). It was also observed in both subsamples moderate intercorrelations among the factors demonstrating adequate discriminant validity between them.

The global results of the confirmatory factor analysis in the first (GFI 0.870; RMSEA 0.092, CFI 0.855) and second subsample (GFI 0.872; RMSEA 0.091, 0.856 IFC) of the second model tested (M3b), which corresponds to a three-dimensional structure of the questionnaire without the items (1, 4 and 10) of the lowest discrimination index, indicated that this measurement model although better than the previous model its fit is not acceptable (Table 1). The three factors of this model, together explained approximately 57% of the variance in both subsamples. In addition, only 9 of the 18 items obtained saturations equal or higher than .70 in its intended dimension (items 6, 9, 13, 14, 15, 17, 18, 19 and 20) in the subsample 1 and 10 in the subsample 2 (items 2, 6, 9, 13, 14, 15, 17, 18, 19 and 20). It was also observed in both subsamples, moderate intercorrelations among the factors demonstrating adequate discriminant validity between them.

The global results of the confirmatory factor analysis in the first (GFI 0.965; RMSEA 0.055, CFI 0.970) and second subsample (GFI .967; RMSEA 0.053, 0.971 IFC) of the third model tested (M3c), which corresponds to a three-dimensional structure according to the results of the exploratory factor analysis of the items of the questionnaire, indicated that this measurement model was better than the previous and that its setting is optimal (Table 1). The three factors of this model, in both subsamples together explained more than 52% of the variance and only 4 of the 15 items saturated below .70 in its intended dimension (items 2, 8, 12 and 21) in the subsample 1 and 3 (item 8, 12 and 21) in the subsample 2. It was also observed moderate intercorrelations among the factors, demonstrating adequate discriminant validity between them.

The global results of the confirmatory factor analysis in the first (GFI 0.984; RMSEA 0.038, CFI 0.990) and second subsample (GFI 0.980; RMSEA 0.047, 0.985 IFC) for the fourth and final model tested (M3d), that corresponds to a three-factor structure of the previous model by removing the items that were not well enough explained, they indicated that this measurement model was better than the previous one and that its setting is optimal (Table 1). The three factors of this model together explain about 70% of variance in both subsamples.

According to the results in Table 2, only 2 of the 10 items saturated below 0.70 in its intended dimension (items 2 and 12) in the first sub-sample and one (item 12) in the second subsample. Moderate intercorrelations were also observed among the factors, demonstrating adequate discriminant validity between them.

Invariance of the factor structure between subsamples

The fit indexes obtained (Table 3) allow to accept the equivalence of the basic measuring models between the two subsamples. Although the value of Chi-squared exceeds to that required to accept the hypothesis of invariance, the CFI=0.980, RMSEA=0.030 y AIC=239.512 indexes contradict this conclusion, allowing us to accept the base model invariance (unrestricted model).

Adding to the base model restrictions on factorial loads the metric invariance was characterized. The values shown in Table 3 allow accepting this level of invariance. The goodness of fit index (GFI 0.982) and root mean square error of approximation (RMSEA 0.028) continue to provide convergent information in this direction. Also, the Akaike Information Criterion (AIC 229.233) and Bentler comparative fit index (CFI 0.983) do not suffer large variations over the previous model. Using the criteria for the evaluation of the nested models proposed by Cheung and Rensvold (2002), who suggest that if the calculation of the difference of the CFI of both nested models diminish in .01 or less, the restricted model is taken for granted therefore the compliance of the factorial invariance; the difference of the CFIs obtained allows to accept the metrical invariance model. We can conclude up to this point that factorial charges are equivalent in the two subsamples.

Having demonstrated the metric invariance between the samples, we evaluate the equivalence between intercepts (strong factorial invariance). The Indices (Table 3) show an acceptable adjustment of this model, evaluated independent as well as analyzed toward nesting with the metric invariance model. The difference between the two comparative indices of Bentler was 0.003; and the general fit index was 0.978 and the root mean square error of approximation was 0.027. Accepted then the strong invariance, the two evaluated models are equivalent toward the factorial coefficients and the intercepts.

The factors obtained in the confirmatory factor analysis reach, mostly, internal consistency values higher than 0.75 in both subsamples showing an adequate internal consistency for this type of subscales, particularly when considering the small number of items (Table 4).

Conclusion

The aim of the study was to provide empirical support to the factorial division of the Spanish version of QEWB proposed by Schutte et al. (2013) in a sample of men and women Mexican adults. The analysis carried out showed that the M3D model with a three-factor structure: (a) sense of purpose, with two items (2 and 9); (B) purposeful personal expressiveness, with five items (13, 14, 15, 17 and 18); and (c) effortful engagement, with three items (12, 19 and 20), it is a valid and viable instrument for the Spanish version of QEWB applied to Mexican adults of both sexes. The factors of both subsamples showed adequate reliability and high congruence between pairs of factors, particularly considering the small number of items in each, resulting in a fully confirmatory model. However, the model obtained does not match fully with that proposed by Schutte et al. (2013) because to achieve a better fit and greater discrimination capability, items were removed according to the modification indexes and their theoretical justification.

The discrepancies observed between QEWB Schutte et al. (2013) and the structure proposed in this study could be attributed to social and cultural differences of the participants, as the case of being university students in the area of physical activity, an issue that we highlight as a possible limitation of the study. In any case, the validation of a questionnaire is a slow and continuous process, so that future research should compare these findings in larger samples (Holgado, Soriano, & Navas, 2009).

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Table 1 Absolute, incremental and Parsimony fit indexes for the generated models. Subsamples 1 and 2.

	Absolute indexes				Incremental Indexes			Parsimony Idexes	
Model	χ^2	GFI	RMSEA	SRMR	AGFI	TLI	CFI	CMIN/DF	AIC
First factor solution (subsample 1)									
M3	1344.637*	.838	.090	.092	.799	.794	.818	7.229	1434.637
M3b	978.671*	.870	.092	.082	.832	.832	.855	7.714	1056.671
M3c	167.300*	.965	.055	.035	.946	.961	.970	3.268	221.300
M3d	61.245*	.984	.038	022	.970	.984	.990	2.112	113.245
Second factor solution (subsample 2)									
M3	1122.549*	.856	.085	.084	.821	.817	.838	6.035	1212.549
M3b	902.564*	.872	.091	.083	.834	.833	.856	6.838	980.564
M3c	150.973*	.967	.053	.034	.949	.963	.971	2.960	204.973
M3d	74.267*	.980	.047	.027	.962	.976	.985	2.561	126.267

Note: * $p < .05$; GFI = goodness of fit index; RMSEA = root mean square error of approximation; SRMR = Standardized Root Mean Square Residual; AGFI = adjusted goodness of fit index; TLI = Tucker-Lewis index; CFI = comparative fit index; CMIN/DF = chi-squared fit index divided by degrees of freedom; AIC = Akaike information criterion

Table 2 Standardized solutions confirmatory factor analysis for the Model M3d. Subsamples 1 and 2.

	subsample 1			subsample 2		
Item	F1	F2	F3	F1	F2	F3
Factor weights						
2 I think I've discovered who I really am	.67			.74		
9 I can say that I found the purpose of my life	.73			.81		
13 I think it's important to know that what I do is in accordance with the purposes that are worth pursuing		.80			.78	
14 I usually know what I should do, because there are certain actions that I consider correct		.78			.81	
15 When I engage in activities that involve my best qualities, I have this feeling of being truly alive.		.75			.76	
17 I find that many of the things I do, represent me as the person that I am		.81			.72	
18 For me it is important to feel satisfied with the activities that I get involved		.76			.74	
12 I do not understand why some people work a lot in the things that they do			.61			.61
19 If something is very difficult, probably is not worth doing it			.79			.79
20 I find it hard to invest much in the things that I do			.74			.74
Correlations between factors						
F1	-			-		
F2	.69	-		.67	-	
F3	.29	.45	-	.24	.49	-

Note: F1 = sense of purpose, *F2* = purposeful personal expressiveness, *F3* = effortful engagement

Table 3 Goodness of fit indexes of each of the models tested in the factorial invariance.

Model	Fit Indexes						
	$\chi 2$	gl	GFI	NFI	CFI	RMSEA	AIC
Model without restrictions	135.512*	58	.982	.978	.980	.030	239.512
Metric Invariance	139.233*	65	.982	.978	.983	.028	229.233
Strong factor invariance	144.604*	71	.981	.977	.985	.027	222.604

Note: * p < .05; GFI = goodness of fit index; NFI = normed fit index; CFI = comparative fit index; RMSEA = root mean square error of approximation; AIC = Akaike information criterion

Table 4 Coefficient omega and alpha for the factors obtained in confirmatory factor analysis subsamples 1 and 2.

	subsample 1		subsample 2	
Factor	Ω	α	Ω	α
Sense of purpose	.658	.660	.751	.752
Purposeful personal expressiveness	.886	.889	.874	.874
Effortful engagement	.759	.757	.759	.758