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AN EVALUATION OF CONFIRMATORY FACTOR ANALYSIS OF RYFF'S PSYCHOLOGICAL WELL-BEING SCALE IN A PERSIAN SAMPLE

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ABSTRACT: *This paper examines the construct validity and reliability of the Psychological Well-Being Scale (PWBS) according to the Persian culture and language. Participants (N=577) from a population study of university students were chosen. Confirmatory factor analysis using AMOS software was performed in two steps. In step one, 18 models derived from 3-, 9-, and 14-item forms that emphasized gender differences in addition to first and second order constructs were compared. In step two, the 9-and 14-item forms were compared aiming modification. In step one only the 3-item form achieved reasonable indices. Allowing for gender differences did not result in a model fit in the 9-and 14-item forms. To achieve a model fit with additional items, in step two, models that used the 9- and 14-item forms with a second order factor structure regardless of gender differences was performed for modification. This modification allowed for greater potential for comparison with other models in order to achieve good indices. The results in step two indicated that after deleting of some items from the two models, the 14-item model showed better construct validity and reliability compared to the model based on the 9-item form in the Persian culture*.
KEYWORDS: Confirmatory factor analysis, Psychological well-being, Measurement, Persian sample

INTRODUCTION

During recent years, Ryff and Singer (2008) have effectively constructed a model of psychological well-being rooted in ancient philosophy. The model includes six dimensions: autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance. Not surprisingly, this model has been widely accepted worldwide (See: Kalantarkousheh & Navarbafi, 2012; Karasawa, et al., 2011; Şimşek, 2009). To evaluate the constructs of the model, Ryff formulated a 20-item form (C.D. Ryff, 1989b). Based on the original 20 items per construct version, different versions of the PWBS have been developed. In one study, Ryff and colleagues (1994) used a 14-item form. Additionally, a very short version (3 items per scale) was formulated by Ryff and Keyes (1995). Confirmatory factor analysis with the 3-item construct indicated that the model has best fit with six dimensions by a second-order factorial model (C. Ryff & Keyes, 1995). There are numerous psychometric evaluations about PWBS with different results being reported (See: Kalantarkousheh & Navarbafi, 2011; C D Ryff & Singer, 2006; Springer & Hauser, 2006). Dierendonck(2004) tested the constructs with 3-, 9-, and 14-items of the PWBS Dutch version among 77 (33%) male and 156 (67%) female students with a mean age of 22 years (S.D.=6). Dierendonck (2004) indicated that the factorial validity of the psychometric quality of PWBS was only acceptable for the 3-item construct, which confirmed findings of Ryff and Keyes (1995). Nevertheless, he emphasized that the 3-item version's internal consistency suffered from poor Cronbach's alpha coefficients. In total, there are numerous and different

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findings about the psychometric quality of PWBS justifying more psychometric research surrounding PWBS in unlike sample as well as culture.

High correlations among factors other than cross-loading of some items on more than one factor, which impacts the model's fit, have been reported (Kafka & Kozma, 2002; Kalantarkousheh & Navarbafi, 2012). In some studies, a high correlation among four subscales (environmental mastery, personal growth, purpose in life, and self-acceptance) of the PWBS have led to these four dimensions being regarded as one dimension (Springer & Hauser, 2006). In one research, the second order factor was chosen as a solution for the psychometric problem (e.g., Abbott, et al., 2006; Burns & Machin, 2009). Additionally, some psychological researches of PWBS have indicated that gender (Cheng & Chan, 2005; Kalantarkousheh & Navarbafi, 2011; Maier & Lachman, 2000; Marks & Lambert, 1998) and culture (Cheng & Chan, 2005; C.D. Ryff, Keyes, & Hughes, 2004; van Dierendonck, Díaz, Rodríguez-Carvajal, Blanco, & Moreno-Jiménez, 2008) affect PWBS. This study aims to determine a fit model of PWBS among the Iranian population. The research is based on a recent discussion in the literature regarding the number of items for each PWBS scale in comparison to the 3-, 9-, and 14-item versions. The present research compares single and second order factor models in all three versions in addition to studying differences in psychological well-being between Iranian males and females.

MATERIALS AND METHODS

Participating individuals and procedure

Population and Sample

Population of this research was the young, well-educated males and females of the Iranian. The sample consisted of 577 university students at Islamic Azad University, Karaj Branch, Karaj, Iran. The students were from different faculties, namely Engineering, Science, Agriculture, Veterinary Studies, Foreign Language, Management, Law, Theology, Nursing, Physical Education, and Psychology (Table 1). As seen in Table 1, participants' ages ranged from 18 to 36 years. There were 264 male and 313 female participants. The mean age was 21.60 years (SD = 2.93) for males and 22.63 for females (SD = 4.05).The research was presented as a study on health related to psychology. Participating individuals voluntarily and unknowingly were requested to complete the test. Participants received no additional instructions. After its completion, the test was scored for statistical purposes.

Table 1: Participants' demographics (N=577)

Gender					
Male (n= 264)			Female (n=313)		
Ages	Faculty	Percentage	Ages	Faculty	Percentage
	Agriculture	3.2		Agriculture	0
	Engineering	32.0		Engineering	8.3
	Foreign Language	3.9		Foreign Language	19.8
	Management	6.0		Management	3.2
	Low	8.8		Low	3.0

18-36 M= 22.63	Nursing	3.9	18-31 M=22.60	Nursing	6.7
	Physical Education	5.3		Physical Education	6.7
	Psychology	7.1		Psychology	33.1
	Science	10.4		Science	14.9
	Theology	9.4		Theology	0
	Veterinary Studies	9.9		Veterinary Studies	4.4

Measures

Psychological Well-being Scales (PWBS)

In the present research, the psychological questionnaire developed by Ryff (1989a) that consisted of 6 subscales with 14items for each subscale was used. The autonomy dimension assesses self-determination and independence, and the ability to resist social pressure. The environmental mastery dimension measures the ability to control and manage environmental complexes. The personal growth dimension evaluates self-growth. The positive relations with others dimension assesses the ability to have warm, pleasing and trusting relations with others. The purpose in life's dimension is to measure one's sense of having meaning and purpose in life. Finally, the self-acceptance dimension assesses one's sense of attitude toward oneself, by acknowledging and accepting the multiple aspects of self, which include good and bad qualities. Participants responded using a six-point format that ranged from strongly disagree (1) to strongly agree (6) with minimum and maximum means of 2.33 and 14, respectively, for each subscale.

Questionnaire translation

In the present study the PWBS was translated into Persian by two academicians from the English Language Department. The content of the translated version was discussed among university students to ensure that the version was clear and understandable. Subsequently, an academician from the English Language Department back-translated it into English and examined for consistency between the Persian and English versions of the questionnaire.

RESULTS

In this part, some descriptive statistics and internal reliability were discussed. Additionally, the factorial validity of PWBS was tested with confirmatory factor analysis using AMOS 18 software. Confirmatory factor analysis was performed in two steps. The first step was a comparison among several models of the Persian version of the PWBS in addition to descriptive statistics for each model. The second step was modification of an activity among some of the models which showed criteria near a model fit. The intent was to find an even better model fit for the Persian version of the PWBS.

Step one: Comparison of several models

Factor analytic models were specified according to regard and regardless of gender differences' for each of the 3-, 9-, and14-item forms. Additionally, since in many evaluations of PWBS single and second order factor differently impacted the findings, the second and single models were used in all 3-,9-, and 14-item forms. Therefore, the models in the present

study were addressed as follows: (1) six- factor model which supposes a three-item load on each factor for all; (2) six-factor model, which supposes a three-item load on each factor for men; (3) six-factor model, which supposes a three-item load on each factor for women; (4) six-factor model which supposes a nine-item load on each factor for all; (5) six-factor model, which supposes a nine-item load on each factor for men; (6) six-factor model, which supposes a nine-item load on each factor for women; (7) six-factor model which supposes a14-item load on each factor for all; (8) six-factor model, which supposes a14-item load on each factor for men; (9) six-factor model which supposes a14-item load on each factor for women. All of these models were divided into two types of models, namely, single and second structural models. Therefore, this study compared 18 models with each other.

Confirmatory factor analysis

The goodness of model fit was evaluated using relative and absolute indices addressed as follows: (1) The ratio of chi-square to degrees of freedom (CMIN/DF)'s value close to 1.0 indicates good fit; between 2.0 and 3.0 is indicative of reasonable fit (Ho, 2006); (2) Standardized root mean-square residual (SRMR) values less than 0.10 are generally considered favorable (Kline, 2010). A value approximately 0.80 is regarded as a relatively good fit (Hu & Bentler, 1999). For the Comparative Fit Index (CFI), Goodness Fit Index (GFI), Adjusted Goodness Fit Index (AGFI)and Tucker-Lewis Index (TLI) values, results greater than 0.90 imply absolute fit whereas a value of 0.8 or less is indicative of relative goodness-of-fit(Ho, 2006).

The best fitting model, as indicated in Table 2, among 18 models was the model with a single factorial structure with three items for each subscale regardless of gender differences. This finding confirmed the results indicated by Ryff and Keyes (1995) and Dierendonck(2004) that the factorial validity of the psychometric quality of the PWBS was acceptable for the 3-item per construct. However, Cronbach's alpha was poor for the Persian version of this model.

Internal consistency and descriptive data for PWBS subscales

Cronbach's alpha coefficients for the entire sample of the 14-item scale was 0.93,for the 9-item scales it was0.89, and for the 3-item scales it was 0.73which showed that the increase in numbers of items raised the Cronbach's alpha coefficients. However, as has been shown in Table 3, Cronbach's alpha coefficient in the 3-item version for each subscale ranged from 0.23 (Environmental mastery) to 0.53 (Autonomy) which showed poor Cronbach's alpha for the Persian version compared with other versions that ranged from 0.80 (Positive relation with others) to 0.57 (Environmental mastery). The poor Cronbach's alpha for the version with three items for each subscale was more revealing when the alpha values were broken down according to gender subgroups (Table 3), particularly for women

Table 3 also indicates the means and standard deviations for the three versions of the measure employed in this research. The means and standard deviations for the three versions of PWBS were almost identical, as follows: M = 4.28, SD = 0.537 for the 14-item subscale, M = 4.27, SD = 0.547 for the 9-item subscale, and M = 4.32, SD = 0.597 for the 3-item subscale.

Table. 2. Confirmatory Factor Analyses, Goodness-Of-Fit Indices, Eighteen Models												
Model	**First –Order Factor**						**Second –Order Factor**					
	/DF	SRMR	CFI	GFI	AGFI	TLI	/DF	SRMR	CFI	GFI	AGFI	TLI
Items for each Scale												
l	2.334	.0669	.646	.670	.652	.636	**2.361**	**.0672**	**.638**	**.664**	**.647**	**.629**
ales	1.753	.0753	.620	.615	.594	.609	1.760	.0753	.616	.640	**.626**	.605
males	2.008	.0790	.550	.592	.570	.537	2.026	.0794	.540	.588	.567	.528
tems for each Scale												
l	1.776	.0712	.681	.725	.701	.664	2.515	**.0639**	**.682**	**.774**	**.755**	**.668**
ales	1.761	.0710	.687	.729	.704	.671	1.781	.0719	.675	.721	.698	.661
males	2.057	.0768	.609	.709	.683	.589	2.062	.0775	.605	.707	.683	.588
tems for each Scale												
l	2.964	.0547	.806	.931	.902	.753	3.067	.0563	.781	.923	.897	.740
ales	1.857	.0775	.828	.913	.876	.781	1.870	.0633	.813	.905	.874	.778
males	2.389	.0681	.752	.899	.856	.683	2.504	.0702	.711	.886	.848	.657

Step two: Modification

In order to achieve better internal consistency reliability for the Persian version of the PWBS, the present study compared the 9- and 14-item subscales. The intent was to attain a model fit that had more than three items for each subscale. The results indicated that the second order factors with 9 and 14 items for each scale regardless of gender differences had more potential to reach values of indices suggestive for a fit model. Table 4 shows the modified versions of the 9- and 14-item scales that have used AMOS software. As can be inferred from Table 4, based on the abovementioned indices, the deletion of some items from the two models enabled both to be within the suggested thresholds for a fit model. After deletion of some of the items, there were 35 items left in the subscales of the model based on 14 items per subscale:8 items for autonomy; 6 items each for purpose in life and self acceptance; and 5 items each for positive relations with others, environmental mastery, and personal growth. There were 28 items left in the subscales in the model based on 9 items for each subscale: 7 items for environmental mastery; 5 items for self-acceptance; and 4 items each for positive relations with others, autonomy, personal growth, and purpose in life. Interestingly, in addition to the difference in number of items left after modification compared with the original versions, there was also a difference in the number of items between the subscales. Both models have the previously mentioned criteria for a reasonable model fit. Therefore, in both models values were attained for SRMR, GFI, and AGFI; TLI was almost reached. In a comparison between both models, it was observed that the first model had more fit than the second model because the SRMR value, CFI value, and TLI value of the first model was more reasonable than the second model.

Reliability for the modified models

Internal consistency reliability coefficient alphas of the modified models were calculated for all items and each of the subscales. The values ranged from 0.85 (first model) to 0.32 (second model) as seen in Table 5. Of note, the scales in the first model when compared with the second model showed good reliability, which was more evident when all items were used together.

Table 3 Cronbach's alpha internal consistency reliability of the Psychological Well-being Scale (PWBS)

	± SD	lpha		
		ıll	ale	emale
-Item Scales				
ll items	28 ±0.537	93	32	25
ıbscales				
ɔsitive relations with others	48 ±0.744	0	22	82
utonomy	91 ±0.639	63	62	65
nvironmental Mastery	21±0.671	34	46	26
ersonal Growth	61±0.638	25	50	02
ırpose in Life	46±0.744	01	26	80
elf Acceptance	02±0.715	73	67	74
Item Scales				
ll items	271±0.574	9	92	84
ıbscales				
ɔsitive Relations with others	47±0.825	47	70	27
utonomy	09±0.724	18	06	28
nvironmental Mastery	19±0.668	71	13	37
ersonal Growth	37±0.712	97	34	59
ırpose in Life	41±0.760	81	29	37
elf Acceptance	08±0.736	66	57	68
Item Scales				
ll items	32±0.597	73	50	10
ıbscales				
ɔsitive relationship with others	44±0.989	60	0	27
utonomy	15±0.880	20	51	71
nvironmental Mastery	25±0.866	39	13	61
ersonal Growth	52±0.923	25	62	95
ırpose in Life	29±0.908	07	30	88
elf Acceptance	30±1.037	39	55	39

Table. 4. Confirmatory Factor Analyses, Goodness-Of-Fit indices, Two Models (After Modification)

Model	**Second –order factor**					
	/DF	SRMR	CFI	GFI	AGFI	TLI
ırst Model (Based on 14 items version)	1.673	.044	.901	.913	.901	.893
econd Model (Based on 9 items version)	1.779	.044	.827	.928	.915	.860

Table 5:Cronbach's alpha internal consistency reliability of the Psychological Well-being Scales (PWBS) following modification.

irst Model (based on 14 items version)	**lpha**
ll items	51
ıbscales	
ɔsitive relations with others, Items: 3,6,8,10,13	25
utonomy, Items:2,3,5,7,9,11,12,14	75
nvironmental Mastery, Items: 1,4,7,10,14	34
ersonal Growth, Items:2,3,5,9,13	93
ırpose in Life, Items:1,2,4,10,12,13	75
elf Acceptance, Items: 2,5,6,8,12,13	14
cond Model (based on 9 items version)	
ll items	93
ıbscales	
ɔsitive relations with others, Items: 1, 4,7,9	29
utonomy, Items: 2,3,9,14	10
nvironmental Mastery, Items: 1,4,5,7,10,12,14	29
ersonal Growth, Items: 5,11,13,14	94
ırpose in Life, Items: 2,9,10,11	96
elf Acceptance, Items: 2,6,10,12,13	27

Correlational analysis

Estimated correlations for both modified models, and six latent factors with second order factor are presented in Table 6. Environmental mastery showed high correlation with personal growth and self-acceptance in the first model and with purpose in life and self-acceptance in the second model. However, latent factor error variances in the present model were controlled; all factors were indicators of psychological well-being which assumed correlations from mediocre to high. Undoubtedly, factor analysis is only the first step in examining the validity of an instrument. Further, in an assessment by Ryff and Singer (2006), different studies have shown that no combinations of more than one PWBS dimension resulted in the same pattern of outcomes. Additionally, in the present study, a subscale such as autonomy had a lower correlation with environmental mastery, personal growth, purpose in life and self-acceptance in both models. Therefore, although there is some correlation between some subscales showing that as if there is one scale, there are some other subscales with normal correlation.

Table 6: Estimated correlations of latent variables with single second order factor

	1	2	3	4	5	6
Model one						
Positive relations with others	-					
Autonomy	.22	-				
Environmental Mastery	.36	.64	-			
Personal Growth	.46	.71	.93	-		
Purpose in Life	.32	.57	.86	.98	-	
Self Acceptance	.45	.69	.95	.92	.89	-
Second order factor	.42	.68	.95	1.00	.92	.97
Model two						
Positive relations with others	-					
Autonomy	.57	-				
Environmental Mastery	.73	.64	-			
Personal Growth	.46	.56	.79	-		
Purpose in Life	.56	.67	.98	.93	-	
Self Acceptance	.64	.72	.95	.72	.86	-
Second order factor	.67	.70	1.01	.83	.97	.93

CONCLUSION

The main purpose of this research was to determine if the Persian version of the PWBS identified by Ryff has good construct validity and reliability. Especially, interesting for studying psychological well-being in cross-cultural situations is growing up - showing the vitality of getting further info on the validity of PWBS which is the theoretical base in different countries and different languages. Confirmatory factor analytic procedures via AMOS software were employed in the present examination among 577 Iranian university students. For this purpose18 models of PWBS were compared. The 3-item form of PWBS showed a model fit. In the next step, as an important facet of the study, the possibility of receiving a fit model for longer versions, the 9- and14-item forms of the PWBS were examined. Modification via AMOS led to the fit indices suggestive of a model fit for both versions. Interestingly, the modified 14-item form reached more indices compared with the modified 9-item form, which indicated a better fit for the 14-item form. In general, this research was in line with the findings by Ryff and Singer (2006) who showed six dimensions for PWBS. However, the numbers of items for each subscale totally differed from the parent version developed by Ryff, which could be related to differences in culture and language. This claim was supported by a number of studies which stated that different cultures led to different results for the PWBS(Cheng & Chan, 2005; C.D. Ryff, et al., 2004; van Dierendonck, et al., 2008). Regarding gender differences, however, there is not any model fit in terms of gender differences indicating gender issues are not main concern in this research and population.

The first model based on the 14-item form yielded highly reliable scores compared to the second model that was based on the 9-item form, both before and after the modification. Of note, there was high reliability in the Persian version after modification of the first model

compared to the 3-item form which indicated that the modified model of the 14-item form showed greater reliability compared to the other models.

While the existing findings are viewed as a fit model of PWBS Persian version, duplication of these statistics with various samples drawn from other populations is reasonable to further examine the model's reliability and validity. As these results are promising, clinical and community samples with demographic variables can be used to reproduce the results.

References

Abbott, R. A., Ploubidis, G. B., Huppert, F. A., Kuh, D., Wadsworth, M. E. J., & Croudace, T. J. (2006). Psychometric evaluation and predictive validity of Ryff's psychological well-being items in a UK birth cohort sample of women. *Health and quality of life outcomes, 4*(1), 1-16.

Burns, R., & Machin, M. (2009). Investigating the Structural Validity of Ryff's Psychological Well-Being Scales Across Two Samples. *Social Indicators Research, 93*(2), 359-375.

Cheng, S. T., & Chan, A. (2005). Measuring psychological well-being in the Chinese. *Personality and Individual Differences, 38*(6), 1307-1316.

Dierendonck, D. v. (2004). The construct validity of Ryff's Scales of Psychological Well-being and its extension with spiritual well-being. [doi: 10.1016/S0191-8869(03)00122-3]. *Personality and Individual Differences, 36*(3), 629-643.

Ho, R. (2006). *Handbook of univariate and multivariate data analysis and interpretation with SPSS*: CRC Press.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1-55.

Kafka, G. J., & Kozma, A. (2002). The construct validity of Ryff's scales of psychological well-being (SPWB) and their relationship to measures of subjective well-being. *Social Indicators Research, 57*(2), 171-190.

Kalantarkousheh, S. M., & Navarbafi, F. (2011). Assessments of Psychological Well-being Reliability and Exploratory Factor Analysis Of the PWBQ's Persian Version.

Kalantarkousheh, S. M., & Navarbafi, F. (2012). Reliability and Exploratory Factor Analysis of Psychological Well-being in a Persian Sample. *Science Series Data Report, 4*(1).

Karasawa, M., Curhan, K. B., Markus, H. R., Kitayama, S. S., Love, G. D., Radler, B. T., et al. (2011). Cultural Perspectives on Aging and Well-Being: A Comparison of Japan and the United States. *The International Journal of Aging and Human Development, 73*(1), 73-98.

Kline, R. B. (2010). *Principles and practice of structural equation modeling*: The Guilford Press.

Maier, E. H., & Lachman, M. E. (2000). Consequences of early parental loss and separation for health and well-being in midlife. *International Journal of Behavioral Development, 24*(2), 183.

Marks, N. F., & Lambert, J. D. (1998). Marital status continuity and change among young and midlife adults. *Journal of Family Issues, 19*(6), 652.

Ryff, C., & Keyes, C. (1995). The structure of psychological well-being revisited. *Journal of Personality and Social Psychology, 69*, 719-719.

Ryff, C., & Singer, B. (2008). Know Thyself and Become What You Are: A Eudaimonic Approach to Psychological Well-being. *Journal of Happiness Studies, 9*(1), 13-39.

Ryff, C. D. (1989a). Beyond Ponce de Leon and life satisfaction: New directions in quest of successful ageing. *International Journal of Behavioral Development, 12*(1), 35.

Ryff, C. D. (1989b). Happiness is everything, or is it? Explorations on the meaning of psychological well-being *Journal of Personality and Social Psychology, 57*, 1069-1081

Ryff, C. D., Keyes, C. L. M., & Hughes, D. L. (2004). Psychological Well-Being in MIDL7S: Profiles of Ethnic/Racial Diversity and Life-Course Uniformity. *How healthy are we?: a national study of well-being at midlife*, 398.

Ryff, C. D., Lee, Y. H., Essex, M. J., & Schmutte, P. S. (1994). My children and me: Midlife evaluations of grown children and of self. *Psychology and Aging, 9*(2), 195.

Ryff, C. D., & Singer, B. H. (2006). Best news yet on the six-factor model of well-being. *Social Science Research, 35*(4), 1103-1119.

Şimşek, Ö. (2009). Happiness Revisited: Ontological Well-Being as a Theory-Based Construct of Subjective Well-Being. *Journal of Happiness Studies, 10*(5), 505-522.

Springer, K. W., & Hauser, R. M. (2006). An assessment of the construct validity of Ryff's Scales of Psychological Well-Being: Method, mode, and measurement effects. *Social Science Research, 35*(4), 1080-1102.

van Dierendonck, D., Díaz, D., Rodríguez-Carvajal, R., Blanco, A., & Moreno-Jiménez, B. (2008). Ryff's Six-factor Model of Psychological Well-being, A Spanish Exploration. *Social Indicators Research, 87*(3), 473-479.