

The Factor Structure of the Spiritual Well-Being Scale in Veterans Experienced Chemical Weapon Exposure

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Abstract This study aimed to determine the factor structure of the spiritual well-being among a sample of the Iranian veterans. In this methodological research, 211 male veterans of Iran–Iraq warfare completed the Paloutzian and Ellison spiritual well-being scale. Maximum likelihood (ML) with oblique rotation was used to assess domain structure of the spiritual well-being. The construct validity of the scale was assessed using confirmatory factor analysis (CFA), convergent validity, and discriminant validity. Reliability was

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evaluated with Cronbach's alpha, Theta (θ), and McDonald Omega (Ω) coefficients, intra-class correlation coefficient (ICC), and construct reliability (CR). Results of ML and CFA suggested three factors which were labeled "relationship with God," "belief in fate and destiny," and "life optimism." The ICC, coefficients of the internal consistency, and CR were $>.7$ for the factors of the scale. Convergent validity and discriminant validity did not fulfill the requirements. The Persian version of spiritual well-being scale demonstrated suitable validity and reliability among the veterans of Iran–Iraq warfare.

Keywords Factor analysis · Spiritual well-being · Veteran · Validity · Reliability

Introduction

The 8-year Iran–Iraq war (1980–1988) was one of the most important events in contemporary Iranian history that it has been identified as one of the major military catastrophes of twentieth-century human history (Sharif Nia et al. 2015a). It is estimated that between 188,015 and 217,489 people were killed during the war and 398,587 people from the two countries were veterans by the end of the war (Sharif Nia et al. 2014). Like other wars, this war had also imposed demographic, social, economic, and political effects and consequences for Iranian society (Sharif Nia et al. 2016). War can cause extensive psychological trauma, and the resultant stress factors can result in severe problems and disorders among veterans, such as depression and mood disorders (Frueh et al. 2000), anxiety (Masoumi et al. 2008), death anxiety, fear, hopelessness, helplessness (Sharif Nia et al. 2015a), aggression, incompatible and maladaptive behavior, suspicion and cynicism (Akhund and Madarshahian 2004; Rahimi and Smael Tabar 2007), and post-traumatic stress disorder (PTSD) (Sayers et al. 2009). These factors cause difficulties in the reactions of the veterans regarding social, psychological, physical, and familial aspects of their life (Hajloo 2009).

Spirituality is one of the most important factors which affect veterans' health in Iran (Sharif Nia et al. 2015b). Based on the definition by the World Health Organization (WHO), health has physical, psychological, social, and spiritual dimensions (Altimus et al. 2017). Among them, the spiritual dimension has a special significance. This dimension of health is the most important aspect of human existence, and it is placed in the center of life as a strong force support. It is associated with creating a sense of peace, well-being, and recovery (Lou 2015). Spiritual health is considered as having a sense of acceptance, positive emotions, and communication with a ruler and a superior power or having a relationship with oneself and others (Abbasi 2013). Moreover, it can also be defined as a sense of connection with others, having a sense of meaning and purpose in life, and having a relationship with a higher power (Soleimani et al. 2016).

Spiritual health is influenced by factors such as personality characteristics (such as age, marital status, economic status, and social responsibility), family support (spouse, parents, or children), lifestyle, and anxiety (Livneh et al. 2004; Mahbobi et al. 2012; Moghimiyan et al. 2011; Rezaei et al. 2009). Furthermore, the concept of spiritual health is affected by the culture of each country (Gouveia et al. 2012). This means that spirituality and beliefs of the peoples have a close relationship with their health and measures to protect their health

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(Du Gas 1983). Physical problems, especially chronic diseases and conditions, are also other factors that may affect the spiritual health of a person (Hojjati et al. 2010). Therefore, spiritual health can be an effective factor against psychological trauma caused by war (Mahbobi et al. 2012).

Spiritual health assessment is carried out using numerous instruments such as the spiritual well-being scale (SWBS) (Ellison 1983), Spiritual Orientation Inventory (Elkins et al. 1988), Mental, Physical, and Spiritual Well-Being Scale (Vella-Brodrick and Allen 1995), and the Spiritual Assessment Inventory (Hall and Edwards 1996). The SWBS was designed in 1982 by Paloutzian and Ellison. It is one of the most useful tools of spiritual health study (Genia 2001). Most of the tools regarding spirituality have not considered religious well-being as a subscale; however, this concept has been addressed in the SWBS (Khorami et al. 2014). Furthermore, the main advantage of this tool is that it is not created based on a particular ideological or religious orientation; it can be used for different religious beliefs and also for those individuals who are religious or non-religious (Genia 2001). There has been widespread use of this tool, and its validity and reliability have been approved in some studies (Bufford et al. 1991; Ellison and Smith 1991). However, there are studies that have not confirmed the factor analysis of the structural strength of the subgroups (Ledbetter et al. 1991; Miller et al. 1998). Moreover, there is evidence to show that this tool has a negative slant and requires a review of its construct validity with different groups (Genia 2001).

Given the increasing importance of the field of spirituality and its relation to the concept of health, further psychometric evaluations should be conducted on the SWBS in different societies and groups (Unterrainer et al. 2012). Since veterans are mostly exposed to death and dying, they may experience different degrees of anxiety disorders (Sharif Nia et al. 2014). Thus, they may apply spirituality as a key factor to adapt to and reduce their anxiety (Ebadi et al. 2009). Spiritual health, as a buffer, has a notable role in reducing death anxiety, increasing adaptation (Kumar and Parashar 2015), as well as reducing anxiety and stress (Taheri-Kharameh et al. 2016), especially in chronic diseases such as long-term physical disorders and life events. Furthermore, based on the survey of scientific databases, although many studies have been conducted using the SWBS in Iran (Hashemian and Khademi 2015; Mahbobi et al. 2012; Nabatian et al. 2013), none of them have assessed factor structure of this scale among veterans. Therefore, the aim of this study was to determine the factor structure of the spiritual well-being scale in veterans experienced chemical weapon exposure.

Methods

This methodological study was conducted in 2015. A demographic questionnaire and the SWBS were used for data collection. We employed the backward translation technique for translating the scale from English into Persian. Accordingly, two English–Persian translators were invited to independently translate the SWBS. An expert panel consisting of the authors of this paper and the two translators assessed and unified the two translations and produced a single Persian translation of SWBS. The SWBS includes twenty items that consist of two subscales, which are religious well-being (RWB) and existential well-being (EWB) subscales. Ten items are designed to measure RWB and contain the word “God” and ten items measure EWB and ask such things as life satisfaction and direction. The SWBS scored on a six-point Likert scale from one (completely disagree) to six (completely

agree). Consequently, the total score of the scale ranges from 20 to 160. Lower scores show lower levels of spiritual well-being, and also items 1, 5, 9, 12, 13, 15, and 18 are reverse scored (Ellison 1983).

The study sample consisted of all veterans of the Iran–Iraq war who are living in the city of Amol, Iran (Amol, which is in the north of Iran, has a population of around one million people). The inclusion criteria included males who participated in the Iran–Iraq war between 1980 and 1988, who have war-related disabilities (minor or severe), the ability to communicate in order to complete the questionnaire, having no clinically validated psychiatric disorders which could restrict participation in the study (such as schizophrenia, PTSD, dementia, major depressive disorder). The minimum sample size for conducting factor analysis is equal to 5–10 times more than the number of the items of the intended instrument (Kellar and Kelvin 2012). Consequently, 211 veterans were recruited.

Construct Validity Assessment

The construct validity of the Persian SWBS was assessed by (1) conducting maximum likelihood exploratory factor analysis (EFA) with oblique rotation by SPSS 22 (SPSS Inc., Chicago, IL, USA). The Kaiser–Meyer–Olkin (KMO) test and the Bartlett’s test of sphericity were used to check the appropriateness of the study sample and the factor analysis model (Genia 2001; Scott et al. 1998). The number of factors was determined based on eigenvalues and scree plot. Items with absolute loading values of .3 or greater were regarded as appropriate (Saggino and Kline 1996), (2) conducting confirmatory factor analysis (CFA) with AMOS 21, and (3) evaluating convergent validity and discriminant validity for construct validity assessment (Baumgartner and Homburg 1996). Convergent validity and discriminant validity were assessed by estimating average variance extracted (AVE), maximum shared squared variance (MSV) and average shared squared variance (ASV). To establish convergent validity, the AVE of constructs should exceed .50. For discriminant validity, both MSV and ASV should be less than AVE (Fornell and Larcker 1981).

To assess the model fit, several fit indices such as χ^2 goodness-of-fit index per degree of freedom ($\text{CMIN}/df < 5$), root-mean-square error of approximation ($\text{RMSEA} < .08$), standardized root-mean-square residual ($\text{SRMR} < .1$), goodness-of-fit index ($\text{GFI} > .9$), comparative fit index ($\text{CFI} > .9$), and incremental fit index ($\text{IFI} > .9$) were used (Hooper et al. 2008; Schreiber et al. 2006).

Reliability Assessment

The internal consistency of the Persian SWBS was assessed through evaluating Cronbach’s alpha (α), Theta (θ), and McDonald Omega (Ω) coefficient for absolute agreement for the individual items and domains (Sb and Gudaganavar 2011). Coefficients of the internal consistency .7 or greater show satisfactory internal consistency (Hair et al. 2013). Intra-class correlation coefficient (ICC) was used to establish the test–retest reliability of the SWBS over an interval of 2 weeks using two-way mixed intra-class correlation coefficient (ICC) for absolute agreement at the level of individual items. Its results were interpreted as follows: 0–.2 as low, .21–.40 as fair, .41–.60 as moderate, .61–.80 as substantial, and .81–1 as almost perfect (Landis and Koch 1977). To assess the suitable sample size for the test–retest reliability, power analysis was performed. The power analysis identified that a sample of 15 veterans was required to have power of .80 to detect a test–retest correlation of .90 at a significance level of .05 (Cohen 1992; Walter et al. 1998). Next, the construct reliability (CR) of the factors was assessed (Hair et al. 2010). CR of the model was

determined whereby values more than .7 can be accepted providing other indicators are good (Hair et al. 2013).

Multivariate Normality and Outliers

Univariate distributions were examined for outliers and skewness and kurtosis. Multivariate distributions were evaluated for normality and multivariate outliers. Multivariate normality can be evaluated through the use of Mardia's coefficient of multivariate kurtosis. A Mardia's coefficient greater than 8 was an indication of violation kurtosis (Raoprasert and Islam 2010). Multivariate outliers can be evaluated through evaluation of Mahalanobis distance (Harrington 2008). Mahalanobis distance was specified typically by a $P < .001$ (Tabachnick and Fidell 2013). Missing values were replaced with the mean. P values of less than .05 were considered as statistically significant.

Ethical Considerations

The study was approved by the Ethics Committee of Mazandaran University of Medical Sciences, Sari, Iran (Code: IR.MAZUMS.REC.94). Veterans were informed about the study aims and procedures. Moreover, they were ensured that participation was voluntary and that it would not affect the course of their treatments. The confidentiality of veterans' information was guaranteed.

Results

Table 1 describes the demographic profiles of the respondents. The respondents were predominantly married (93.8%), with a mean age of 49.71 years, and 34.61% indicated that they had a disability. Ninety-one percentage of the respondents acknowledged receiving average or above average social support from their family and friends. Among them, 44.5% received good social support followed by 24.2% who received excellent support.

Table 2 reports the results of EFA on SWBS. The scree plot showed that a three-factor solution, which accounts for 48.20% of the variance, was the best fit. After inspection of the factors items, the three extracted factors were labeled *relationship with God*, *Belief in fate and destiny*, and *life optimism*.

As shown in Table 3, the correlation between the first and second factor was .35. The first factor correlated with the third factor at .19. The correlation between the second factor and the third factor was .22. Using Cronbach's alpha, reliability coefficients for F1, F2, and F3 were .84, .76, and .71 respectively, which indicates good reliability. A high degree of reliability was found between SWBS measurements. The average measure ICC was .908 with a 95% confidence interval from .723 to .965 ($F(15) = 12.74, p < .001$).

Subsequently, this study examined the factor structure obtained from the EFA using CFA. The results showed that the initial model does not have a good fit ($\chi^2(df) = 541.25(167)$, $\chi^2/df = 3.24$, GFI = .80, CFI = .74, IFI = .75, RMSEA (90% C.I.) = .10 (.09–.11)). The final model was arrived at after removing items with factor loadings less than .50 (item 2 (.45), item 6 (.42), item 12 (.47), item 16 (.32), and item 18 (.46)) as well as reviewing model modification indices for sources of model misfit (Fig. 1). Based on the modification indices, six pairs of measurement errors between measured items of the first factor were allowed to freely covary. As a result, the final model fit improved considerably

Table 1 Characteristics of the veterans

Characteristic	N (%) or mean (SD)
Age (n = 211)	49.71 (4.61)
Disability percentage (n = 211)	34.61 (15.81)
Disability term (n = 211)	27.46 (4.42)
Years since injury (n = 85)	20.62 (5.09)
War term (n = 113)	12.59 (13.00)
Chemically affected organs (n = 81)	
Pulmonary	36 (44.4%)
Ocular	3 (3.7%)
Dermal	1 (1.2%)
Mixed	41 (50.6%)
Marital status (n = 211)	
Single	13 (6.2%)
Married	198 (93.8%)
Education (n = 211)	
Diploma or less	96 (45.5%)
College or degree	81 (38%)
Master or PhD	34 (16.1%)
Economic condition (n = 211)	
Poor	20 (9.5%)
Average	147 (69.7%)
Good	44 (20.9%)
Insurance coverage (n = 211)	
Yes	206 (97.63%)
No	5 (2.37%)
Perceived social support (n = 211)	
Poor	13 (6.2%)
Fair	6 (2.8%)
Average	47 (22.3%)
Good	94 (44.5%)
Excellent	51 (24.2%)

($\Delta\chi^2$ (Δdf) = 345.41(86)). The final model factor loadings were greater than .50 and significant (z-values range from 5.74 to 8.77). Moreover, the model showed a good fit (model fit: $\chi^2(df)$ = 195.83(81), χ^2/df = 2.42, GFI = .90, CFI = .90, IFI = .90, RMSEA (90% C.I.) = .08 (.07–.10)). As given in Table 4, coefficient of Theta, McDonald Omega and the construct reliability of all F1, F2, and F3 were greater than .70 which indicates good reliability. As shown in Table 4, the AVE, MSV, and ASV of constructs did not fulfill the requirements of convergent validity and discriminant validity.

Discussion

This present study was conducted with the aim of translating and evaluating the reliability and validity of the 20-item SWBS in Persian among the veterans of the Iran–Iraq war. In the EFA, factor analysis was based on the correlation of the items using a diagonal rotation.

Table 2 Maximum likelihood exploratory factor analysis for the SWBS in veterans

Factors	Items	Loading	h^2	% of variance	Eigenvalues
Relationship with God	Q3. I believe that God loves me and cares about me	.75	.62	30.31	3.39
	Q15. My relationship with God helps me not to feel lonely	.72	.67		
	Q11. I believe that God is concerned about my problems	.69	.58		
	Q4. I feel that life is a positive experience	.66	.42		
	Q17. I feel most fulfilled when I'm in close communion with God	.63	.44		
	Q7. I have a personally meaningful relationship with God	.63	.41		
	Q19. My relationship with God contributes to my sense of well-being	.63	.54		
	Q1. I don't find much satisfaction in private prayer with God	.46	.34		
Belief in fate and destiny	Q9. I don't get much personal strength and support from my God	.66	.51	9.39	2.65
	Q12. I don't enjoy much about life	.65	.55		
	Q6. I feel unsettled about my future	.61	.39		
	Q5. I believe that God is impersonal and not interested in my daily situations	.53	.44		
	Q13. I don't have a personally satisfying relationship with God	.51	.45		
	Q16. I feel that life is full of conflict and unhappiness	.49	.49		
	Q2. I don't know who I am, where I came from, or where I'm going	.48	.30		
	Q18. Life doesn't have much meaning	.46	.29		
Life optimism	Q10. I feel a sense of well-being about the direction my life is headed in	.76	.75	8.49	1.51
	Q14. I feel good about my future	.72	.61		
	Q8. I feel very fulfilled and satisfied with life	.65	.50		

h^2 : Communalities

Table 3 Correlation between extracted factors

	Factor 1	Factor 2	Factor 3
Factor 1	1.00		
Factor 2	.35	1.00	
Factor 3	.19	.22	1.00

Accordingly, three factors were extracted with respect to an eigenvalue of higher than one and scree plot that explained 48.20% of the total variance. Therefore, the SWBS is not a single dimension tool in the present population. It seems that the extracted statements in

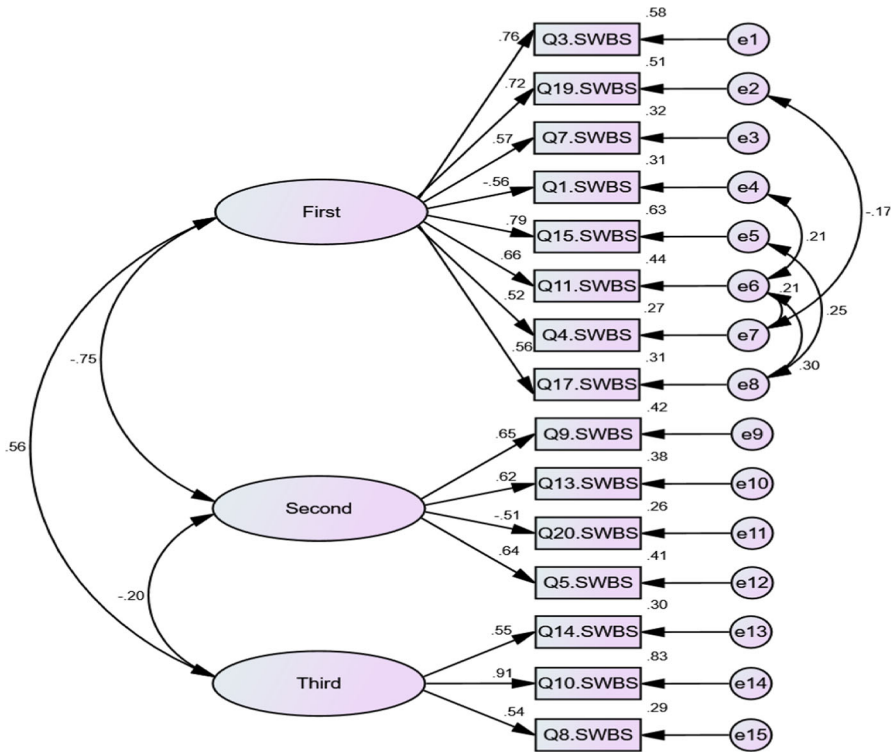


Fig. 1 Hypothesized model of the factor structure of the spiritual well-being scale in veterans experienced chemical weapon exposure

Table 4 Reliability and validity of constructs, Fornell and Larcker approach

Factor	Index									
	α	θ	Ω	CR	AVE	MSV	ASV	Factor 1	Factor 2	Factor 3
Relationship with God	.84	.80	.79	.86	.43	.57	.43	.66		
Belief in Fate and Destiny	.76	.76	.72	.70	.37	.57	.30	.75	.61	
Optimism	.71	.81	.85	.72	.47	.29	.17	.53	.21	.85

α , Cronbach’s alpha coefficients; θ , Theta coefficient; Ω , McDonald Omega coefficient; CR, construct reliability; AVE, average variance extracted; MSV, maximum shared squared variance and ASV, average shared squared variance

the 1st–3rd factor, respectively, imply *relationship with God*, *Belief in fate and destiny*, and *optimism life*. In another study, the two existential and religious well-being factors were extracted from the above-mentioned questionnaire (Khorami et al. 2014). Other similar studies in different populations showed that this scale has two factors (Musa and Pevalin 2012), three factors (You and Yoo 2016) and even four factors (Gouveia et al. 2012). The majority of the factors found in this study and previous studies have indicated the relationship with God. In fact, with the promotion of spirituality and increase in the

relationship with God, the veterans psychosocial problems can be greatly reduced or controlled (Hajloo 2009).

The first factor was the *relationship with God*. This kind of relationship and spirituality is accompanied by higher life expectancy. This means that having a strong relationship with God can decrease anxiety, stress, and frustration and guarantee the peace in life and keep them safe through difficulties (Lyon et al. 2014). In Islam, the primary religion of Iran, religion and spirituality are considered inseparable and are a way of life. Religious beliefs may guide one's philosophy and judgment process during stressful situations, whereas spiritual development may contribute to a clear individual understanding of life's purpose (Sharif Nia et al. 2015a). Ebadi et al (2009) identified that a religious sense of duty and responsibility toward one's country is the key motivation for participation in war. According to these views, Iranian Iran–Iraq war veterans may also look at war service as a matter of honor for themselves and their families (Ebadi et al. 2009).

The second factor was the *Belief in fate and destiny*. Religious and spiritual beliefs can also create a sense of fatalism. Religious views can exert positive effects on well-being by acting as a source of inspiration, or negative impacts when they are related to guilt and punishment. This conception of an external source of control can have impact on well-being (Ismail et al. 2005).

The third factor was the *life optimism*. Optimism is defined as the generalized expectation that good things will happen (Brown et al. 2014). Optimism is an effective factor in human's well-being specially SWB. Ghodsbin et al (2015) showed that the positive thinking training can increase EWB and RWB of SWB (Ghodsbin et al. 2015). Also, the optimism is an important predictor of physical and psychological well-being and positive health outcomes in healthy individuals. Therefore, it is a compound characteristic with cognitive, emotional and motivational aspects (Avvenuti et al. 2016; Rasmussen et al. 2009).

The results showed that the first and third factors had the most correlation with one another. This means that a strong relationship with God and spirituality are associated with higher life expectancy. In other words, a strong relationship with God can eliminate any feelings of anxiety, stress, and frustration and give life a new meaning. In addition, this factor can create a feeling of security in individuals and that they can rely on a force that will keep them safe through difficulties and wants nothing but good for them. Therefore, people with chronic conditions, due to a strong relationship with God, will have higher satisfaction with life, and by depending on the power of God, they will have more hope in the future (Rezaie Shahsavarloo et al. 2015). Hope also strengthens the adjustment mechanisms in patients with chronic disease conditions and serves as a powerful potential factor (Herth 2000).

To assess the construct validity of the scale, CFA model was used. Data analysis confirmed the appropriate fit of the final model. You and Yoo (2016) examined the construct validity of Paloutzian's and Ellison's SWBS among 470 Koreans in training centers and universities using EFA and CFA. CFA results confirmed the appropriateness of the model (You and Yoo 2016). In the study by Shawn et al., CFA revealed that although previous studies had confirmed the structural fit of the mentioned model, in the African-American population of the study, the model did not have a suitable factor structure. Hence, the proposed model is questionable and debatable (Shawn et al. 2005). Gouveia et al. confirmed the validity of the SWBS using CFA. The final structure of the spiritual health model with four latent factors was assessed as appropriate; therefore, comparative fit index (CFI) = .90, goodness-of-fit index (GFI) = .83, and root-mean-square error of approximation (RMSEA) = .050 were satisfactory (Gouveia et al. 2012).

According to the final model of SWBS, there is a correlation between measurement errors of some items (Q30–Q29, Q22–Q24, Q18–Q19, Q37–Q45, Q43–Q44, and Q42–Q34). Munro (2005) stated that correlated measurement error occurs in the situation where variables have not been identified clearly or not measured directly, so such error can affect the answers to the items (Munro 2005). A latent variable that includes only the true scores of a construct's measurement error creates a problem (Jiang 2014). Measurement errors may result from the use of self-report data. On the other hand, measurement errors can also be the result of similar meaning or nuances in the meanings of words and phrases in both positive and negative statements.

In determining the validity and construct validity of the SWBS, in order to determine the correlation between each of the factors, convergent validity and divergent validity were used. To the best of our knowledge, the present study is one of the few studies that have evaluated the correlation patterns among the discovered factors. The results of the study showed that the scale does not have appropriate convergent validity and divergent validity. Furthermore, You and Yoo (2016) reported in their study that a high correlation did not exist between the two factors; therefore, divergent validity was reported in this study (You and Yoo 2016). In fact, when the items are not highly correlated with one another, convergent validity and divergent validity cannot be seen. This factor may be due to the nature of the questions, and it might be associated with the attitudes of the respondents.

The SWBS had a good reliability among veterans. The reliability of this scale was evaluated separately for each exploratory factor using construct reliability. In reviewing previous studies, no study was found that had examined the reliability of this scale using construct reliability in order to support the study findings. The reliability of the SWBS was evaluated in different studies using different methods. For example, in the study by Gouveia et al (2012), the internal consistency of the four discovered factors was examined separately and each hidden factor had an internal consistency of higher than .7 (Gouveia et al. 2012). Moreover, Paloutzian and Ellison assessed the internal consistency of the SWBS using Cronbach's alpha coefficient and the reliability was calculated as .88. In addition, the test–retest reliability coefficients for spiritual health, religious health, and health were .93, .96, and .86, respectively (Paloutzian and Ellison 1991). In a research conducted in Iran, the internal consistency was assessed as favorable through test–retest with a 2-week interval (Khorami et al. 2014). CR was calculated by the average variance extracted, and in this study, the AVE was suboptimal, which might be the reason for the reduction in this amount in each of the factors. Also, except Theta coefficient of the factor 3, Theta and McDonald Omega coefficient of the factors indicated good reliability of the present scale. To the best of our knowledge, no study has reported the reliability of the SWBS using Theta and McDonald Omega.

Implications and Limitations

As with other studies focusing on one geographical region, in this case Iran, wider generalizability may not be possible and these results should be viewed with cautions from that perspective. The study excluded participants who were receiving psychiatric treatment, and it could be argued that inclusion of this group may have altered the results. The study used a robust sample of size of 211 which adds strength to the findings of the study, thus emphasizing the importance of spirituality in psychological treatment programs for veterans of armed conflicts. The findings also provide very useful information vis-à-vis cognizance of the spiritual and religious belief systems of each individual person. If the

psychological practitioner is able to incorporate the spiritual belief system into the treatment program, this study has indicated that the chances of recovery may be stronger.

Conclusion

The results showed that the Persian version of the SWBS has an acceptable level of confidence and reliability and has a multi-dimensional structure. Extracted latent factors were labeled “*relationship with God, Belief in fate and destiny, and life optimism.*” As a result, this questionnaire can be used as an effective tool in Iranian veterans (other groups as well).

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Compliance with Ethical Standards

Conflict of interest All the authors declare that they have no conflict of interest.

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