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Research article

Validity and Invariance of Measurement of the Satisfaction with Love Life Scale in Older Adults

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Abstract

In recent years, interest in satisfaction with love life (SWLL) has increased. Empirical evidence demonstrated that SWLL favors subjective well-being, physical and mental health, marital quality and stability. In this regard, the study aimed to examine evidence based on the internal structure validity, reliability, and measurement invariance of the Peruvian version of the Satisfaction with Love Life Scale (SWLLS). The participants were 323 older adults recruited from the region of San Martin (Peru) with an average age of 68.73 years (*SD* = 7.17). The sample comprised of 49.5% women and 50.5% men. The results supported the one-dimensional model and adequate reliability of the SWLLS. A multi-group analysis

provided evidence of configural, metric, and scale invariance across genders. The findings verified the validity and reliability of the Peruvian version of the SWLLS, which can be used to measure SWLL.

Keywords: Invariance, love life satisfaction, older adults, reliability, validity

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According to the Instituto Nacional de Estadística e Informática (2016, 2018), the percentage of people in Peru aged over 60 years is estimated to increase from 11.9% in 2017 to 15.7% in 2050. This demographic trend creates the need to consider factors that lead to successful aging (Cosco et al., 2014). Studies focusing on the determinants of subjective well-being (SWB; Pavot & Diener, 2008) become important in this context. SWB is characterized by the presence of positive emotions, the absence of negative emotions, and a cognitive judgment of satisfaction (Lee Duckworth et al., 2005). Such a definition identifies two components of SWB, namely affective, which is divided into positive and negative effects, and cognitive.

Among these components, satisfaction with life (SWL) pertains to a person's assessment in terms of quality of life (Diener & Ryan, 2009; Diener & Suh, 1997; Rodgers et al., 2017). SWL is not a permanent trait of the individual but a variable state associated with the present context and occurs based on personal criteria. This last point leads to consider SWL as an alternative to other objective measures for gauging well-being. It consists of a set of individual standards for satisfaction (Hultell & Gustavsson, 2008). For example, in the United States, SWL is used with indicators to measure the effectiveness of public health policies that seek to improve quality of life and well-being (Kobau et al., 2010; Veenhoven, 2002).

Moreover, SWL is an indicator of successful aging (Diener, 2000; Lim et al., 2017; Banjare et al., 2015) due to its relationship to physical health, psychological health, mortality, and

morbidity (Collins et al., 2009; Kimm et al., 2012; Lacruz et al., 2011). Recent studies reported that older adults who are dissatisfied with life experience have health problems, depressive disorders, and suicide attempts (Chioqueta & Stiles, 2007; Chou & Chi, 2002; Nes et al., 2013).

SWL also refers to evaluating specific life domains, such as work, family, friends, and sex life (Huebner et al., 2006). Within these domains, satisfaction with love life (SWLL) was defined as a personal cognitive and overall assessment of love life based on individual perspectives or criteria (Neto, 2005; Neto & Pinto, 2015a). In this regard, the study considers that, similar to SWL, SWLL varies according to age group (Hultell & Gustavsson, 2008). Thus, although SWLL is essential and beneficial to any stage of the life cycle, how older adult experiences love life differed from that of other age groups (Cerquera et al., 2012).

In addition to age differences, the literature suggests that gender differences exist in the expression of love and satisfaction with romantic relationships (Swidler, 1980). The sources of SWLL may differ according to gender and be linked to traditional gender roles. Vangelisti & Daly (1997) demonstrated that satisfaction with love relationships among women is linked to the presence of positive affective behaviors, safety, support, communication, and comfort. Alternatively, men who value independence and competition tend to organize intimate relationships around shared activities, where playing a protective role becomes important (Caldwell & Peplau, 1982; Swidler, 1980). Longitudinal studies illustrated that satisfaction with instrumental activities among men, such as the division of housework, is a predictor of variations of love for wives. In contrast, satisfaction with communication predicts changes in women's love for husbands (Vangelisti & Huston, 1994). Although little information about refers to satisfaction with romantic relationships, the results suggest an approach to the subject. Conversely, previous research indicated no significant differences between women and men regarding SWLL (Neto, 2005; Neto & da Conceição Pinto, 2015; Neto & Dimitrova, 2017).

Although the research on SWLL is extensive (Bardo & Yamashita, 2014), interest from the scientific community has increased in recent years because of its essential role as a predictor of SWB (Neto, 2005; Neto & da Conceição Pinto, 2015, Neto & Dimitrova, 2017), promoter of better physical and mental health (Villar et al., 2005), and an adequate predictor of marital quality and stability (Neto, 2005).

To determine a general measure of SWLL, Neto (2005) designed the Satisfaction with Love Life Scale (SWLLS), which is adapted from the Satisfaction with Life Scale (SWLS; Diener et

al., 1985). The SWLLS aims to globally assess satisfaction with love life and integrate its various specific facets into the evaluation (Neto, 2005). Thus, the scale seeks to overcome certain limitations observed in other scales used only in the context of marital relationships (Glenn & Weaver, 1978, Spanier, 1976).

Regarding the psychometric properties of the SWLLS, only three studies analyzed whether the SWLLS can provide valid, reliable, and invariant interpretations when comparing among entity groups. In a first study, which included 230 students from the University of Porto (Portugal), Neto (2005) reported that five items from the SWLLS formed a single dimension that explained 73.7% of the items' variance. However, the author provided satisfactory reliability estimated from internal consistency (item-total Cronbach's alpha, α = .91 and corrected correlations of each top item at .60). Besides, the result indicated that SWLLS is significantly correlated with other measures of love and interest variables, such as sex and religious participation. Otherwise, the subject may not be in love. In another study, Neto & da Conceição Pinto (2015) examined the psychometric properties of the SWLLS in a sample covering the entire adult life stages, including the elderly. The explanatory factorial analysis results indicated that the items of SWLLS grouped under one factor accounted for 78.97%, 71.97%, and 72.04% of the variance in young adults, adults, and older adults, respectively. Subsequently, confirmatory factor analysis (CFA) of the total participants reported a satisfactory fit for the dimensional model (*GFI* = 0.98, *CFI* = .99, *RMR* = 0.02, *RMSEA* = .08). Cronbach's alpha coefficients higher than α = .90 were obtained in all age groups (young adults, adults, and older adults). Moreover, Nazzal et al. (2019) investigated the psychometric properties of the SWLLS among university students in Palestine. The SWLLS presented satisfactory psychometric properties and adequate internal consistency.

Finally, Neto & Dimitrova (2017) evaluated the measurement invariance (MI) of SWLLS in samples of adults from Angola, Brazil, East Timor, Macao, and Portugal. Multi-factor analysis indicated a suitable adjustment of the SWLLS dimensional model in the five comparative cultural groups, acceptable internal consistency, and appropriate partial invariance. In other words, the SWLLS is considered a useful research tool across cultural contexts.

A review of the factorial structure of the SWLLS reported that specific procedures of CFA in previous studies were deemed appropriate given the nature of the psychological variables. The estimation method of maximum likelihood (ML) assumes that the observed variables are continuous, normally distributed, and multivariate (Bollen, 1989; Satorra, 1990). Although estimation via ML was used frequently in CFA (Beauducel & Herzberg, 2006), it is seemingly less appropriate for psychological research, where variables are ordinal and generally

deviate from a multivariate normal distribution, thus pointing to misleading conclusions (Beauducel & Herzberg, 2006; Li, 2016). In this sense, the literature suggested using the robust method of weighted least squares mean and variance adjusted (WLSMV) estimation to obtain a better estimate using ordinal data (Li, 2016).

Although many studies compared the SWLLS among adults from different countries, those that considered MI according to sex are lacking. MI evaluates whether a scale provides similar results across groups (Caycho, 2017). The lack of certainty that SWLLS is invariant between men and women poses an issue because determining whether differences in scores observed between groups is due to differences in the groups` structure is difficult (Brown, 2006). Only empirical evidence that men and women similarly comprise items that assess a latent trait (in this case, the SWLL) provides results with confidence to express differences according to sex. Thus, the MI must be a procedure that precedes any comparison scores of the scale between groups. Finally, the literature reported high-reliability estimates for SWLLS (Neto, 2005). Although these studies were conducted with participants across ages, acceptable reliability estimates are expected for age groups composed of older adults.

As previously discussed, a small number of available studies suggest that SWLLS presents adequate psychometric properties. However, such studies did not analyze the psychometric properties of the SWLLS in the Latin American context and even less in older adults. Therefore, the present study poses the following question: Does the SWLLS maintain its adequate psychometric evidence in a sample of older adults in Peru? To answer this question, the study examined the psychometric properties of the SWLLS. Specifically, evidence-based internal structure validity, reliability, and MI were analyzed according to gender.

Methods

Participants

A total of 323 older adults from the San Martin region in Peru were recruited (women = 160, 49.5%, men = 163, 50.5%). The age ranged from 60 to 99 years (M = 68.73, SD = 7.17). The average ages of men (M = 68.91, SD = 7.12) and women (M = 68.54, SD = 7.23) do not differ in terms of statistics $t(321) = -.46$, p = 64 and practicality d = 0.05, 95% confidence interval [CI]:−.17, 27. The majority of the participants were married (51.1%), cohabiting (23.8%), widowed (17.6%), and divorced (7.4%). Similarly, at the time of the study, the

participants lived with spouses (41.2%), children (16.1%), or both (29.4%), whereas a small percentage lived alone (7.4%) or with other relatives (5.9%).

Instrument

The SWLL of older adults was assessed using the SWLLS (Neto, 2005). Initially, the SWLLS was adapted from the SWLS (Diener et al., 1985). However, the terms were changed to reflect "love" with "life" (e.g., "I am satisfied with my love life"). The present study has been built on the study of Neto (2005) and modified the items of the SWLS to suit the context of older adults in Peru (Caycho-Rodríguez et al., 2018). The scale consists of five items rated on a 5-point Likert-type scale ranging from 1 = strongly disagree to 5 = strongly agree. High scores represent high levels of SWLL. Appendix A provides the items of the SWLLS.

Procedure

The participants completed the SWLLS through a series of visits to health centers, centers for the elderly, and meetings of the board in Tarapoto, Lamas, Juanjui, Moyobamba, and Rioja and Nueva Cajamarca in the San Martin region (northeastern Peru). The instruments were administered collectively in some instances and individually in others. The absolute anonymity of the participants was guaranteed during information gathering. Furthermore, the study emphasized that the collected information will only be used for academic purposes. Participation was voluntary and written informed consent was obtained. The participants were informed of their rights with an appropriate description of the study's objective and data processing.

Statistical Analyses

Structural Equation Models (SEM), Confirmatory Factor Analyses (CFA) were conducted in order to analyze the factor structure of the SWLLS. To estimate the models, Diagonally Weighted Least Squares with Mean and Variance corrected (WLSMV), adequate for ordinal and non-standard data was used (Brown, 2006; Finney & DiStefano, 2013; Flora & Curran, 2004; Li, 2016). All structural models were estimated in Mplus 8.3 (Muthén & Muthén, 1998-2012).

First, one factor CFA model was estimated for the whole sample, then a series of measurement invariance routines by gender. The measurement invariance routine set an increasingly restricted CFA model to test specific relevant psychometric parameters' equality. Statistical differences among this set of CFA models were tested with either a statistical or a practical fit comparison (van de Schoot et al., 2012). Specifically, there were three steps in

the invariance routine: configural, metric, and scalar invariance. Firstly, a so-called configural model was tested. This model set the same factor structure for all groups, but the estimation of each group's parameters was free. This model fit is used as a baseline goodness-of-fit against which other (more restrictive) models are compared. Secondly, factor loadings were constrained to be equal across groups. This constrained model tested for metric or weak invariance. If this model fits the data and the configural model, it does mean that respondents across groups attribute the same meaning to the latent construct under study. Thirdly, scalar, or strong invariance was tested. This model constrained factor loadings and items' intercepts, which implies that the meaning and the levels of the underlying items (intercepts) are equal across groups, and accordingly, groups may be compared on their scores on the factor.

Model fit has been assessed using several indices from different families and rationales. The goodness-of-fit indexes were:

The chi-square statistic, the Comparative Fit Index (CFI);

The Root Mean Squared Error of Approximation (RMSEA) and,

The Standardized Root Mean Square Residual (SRMR).

The cut-off criteria, flexibly used, are those in Hu & Bentler (1999): a CFI of at least .90, and a RMSEA and SRMR less than .08. Additionally, models in the invariance routine are nested and may be compared through two different rationales: the statistical and the modeling (or practical) one. The statistical rationale uses $\chi 2$ differences ($\Delta\chi 2$) to compare constrained to unconstrained models, with non-significant values suggesting multi-group equivalence. When WLSMV is used to DIFFTEST must be calculated for $\chi 2$ differences (Muthén & Muthén, 1998-2012). However, this statistical rationale has been criticized, and a much more practical (or modeling) approach has been advocated (Cheung & Rensvold, 2002). The modeling approach uses differences in fit indices to compare models. Usually, CFI differences (ΔCFI) are used to evaluate measurement invariance. Differences CFI lower than .01 (Cheung & Rensvold, 2002) are employed as evidence to retain the constrained (more parsimonious) model.

The average variance extracted (AVE; Fornell & Larker, 1981) was estimated. AVE values ≥ .50 indicate evidence of convergent construct validity (Hair et al., 2014).

Reliability for latent variables was estimated with omegas (ω; McDonald, 1999) and their confidence intervals (95% CI) by the method of bootstrapping (Ventura-León, 2017). The coefficient ω was calculated using the R package MBESS (Kelley & Lai, 2012). Conventionally, the coefficient ω is acceptable when its value is above .70 (Ventura-Leon &

Caycho-Rodriguez, 2017). Additionally, Cronbach's coefficient alpha (α) with 95% CI was calculated as an estimate of reliability. Lower limit values of 95% above .70 indicate adequate reliability (Dominguez-Lara, 2016). Complementing this information, alphas from the current study and those from the study by Neto & da Conceição Pinto (2015) were compared with confidence intervals. The coefficients will not be statistically different if the interval includes zero (Dominguez-Lara et al., 2018).

Results

Preliminary analysis of the items

Table 1 provides the descriptive statistics of the items. The study observed that for women, items 4 (*M* = 3.39) and 5 (*M* = 3.41) obtained have the highest arithmetic means, whereas the lower half the item has two (*M* = 3.11). In terms of variability, items 1 (*SD* = 1.15) and 3 (*SD* = 1.15) displayed the highest dispersion. For the male participants, item 3 (*M* = 3.31) obtained the highest average, whereas item 2 (*M* = 3.13) presented the lowest average. The study considered skewness and kurtosis. For both groups, all values fluctuated by less than ± 1.5 values. In other words, the distribution of the items approximates a multivariate normal distribution (Pérez & Medrano, 2010).

Table 1.

Preliminary analysis of the items in the SWLLS, gender differences by means, standard deviations, asymmetry and kurtosis.

Items	Women (*n* = 160)				Males (*n* = 163)			
	M	*SD*	*g1*	*g2*	*M*	*SD*	*g1*	*g2*
1	3.18	1.15	−.41	−.69	2.98	1.28	−.2. 3	−1.11
2	3.11	1.11	−.28	−.78	3.13	1.09	−.26	−.82
3	3.26	1.15	−.31	−.70	3.31	1.18	−.52	−.67
4	3.39	1.06	−.28	−.62	3.29	1.15	−.19	−.86
5	3.41	1.01	−.57	−.22	3.23	1.21	−.37	−.72

Note: M = Average; *SD* = Standard Deviation; g1 = Asymmetry; g2 = Kurtosis

Dimensionality

CFA was tested with a one-factor structure based on the first study of Neto (2005). The one-factor structure indicated very good fit to the data (c2 = 21.86, *df* = 5, *p* = 0.0006, *CFI* = 0.99, *RMSEA* = 0.102 [95% CI: 0.061, 0.148], and *SRMR* = 0.016). The standardized factor loadings (*λ*) of the items ranged from 0.566 to 0.875, and were statistically significant (*p* <.01)

with a mean value of .77, which exceeds the recommended cut-off of .70 (Hair et al., 2014). Figure 1 presents the standardized loadings of the SWLLS.

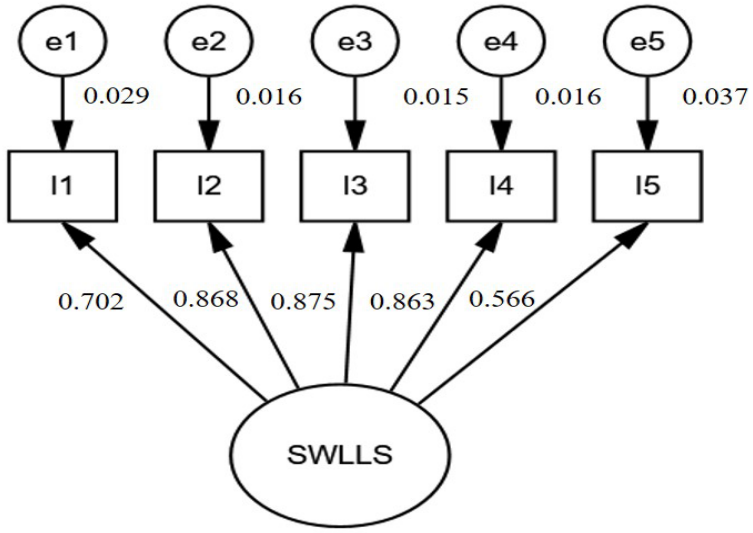

Figure 1. *Confirmatory Factor Analysis of the Unifactorial Model of the SWLLS*

The average variance extracted (AVE) was .615 (AVE > .50), which indicates the convergent validity of the scale. In other words, the items of the SWLLS measure the same construct (Fornell & Larcker, 1981).

Reliability

Reliability (*ω*) for the latent variables reached .89 (95% CI: .83–.88), whereas the Cronbach's alpha value of the scores was .86 (95% CI: .83–.89). The results indicate that the SWLLS has adequate reliability. To determine whether the estimation error is statistically different between two older adults' samples, the difference between the alpha coefficients reported in the present study and that on elderly Portuguese was calculated. An alpha coefficient value of .90 (95% CI: .87–.92) reported for the subsample of older adults in Neto & da Conceição Pinto (2015) was compared to that of the current study. The 95% CI of the differences between the alpha coefficients' values includes zero, which was non-statistically significant (95% CI: −.00–.08).

Measurement invariance

Invariance by gender (male and female) was analyzed. Table 2 presents the results of the model fit for configural, metric, and scalar invariance. Concerning the gender invariance,

statistically significant differences were observed between the configural and metric models with minimal differences in practical fit and a difference of less than .01 between the two CFIs. The RMSEA and SRMR values were very close. Differences between the metric and scalar models were non-statistically significant without differences in practical fit. Moreover, an improvement was noted in the RMSEA value. In summary, the SWLSS is scalar invariant by gender according to practical adjustment.

Table 2.

Set of hierarchical models to test for measurement invariance

Model	χ^2	df	$\Delta\chi^2$	Δdf	CFI	ΔCFI	RMSEA	SRMR
Gender invariance								
Configural	29.78	10			.994		.111	.021
Metric	52.04	14	20.39*	4	.989	.005	.130	.028
Scalar	68.22	28	23.29	14	.989	.000	.094	.034

Notes: *$p < 0.05$; χ^2 = Chi-square; df = degrees of freedom; and Δ = Differences.

Discussion

The study mainly aimed to analyze the psychometric properties of the SWLLS (Neto, 2005) in a sample of older adults in Peru. CFA results reported that the unidimensional model presents appropriate indices of goodness of fit. This finding is consistent with previous studies that suggested that SWLLS has a one-dimensional structure (Neto, & da Conceição Pinto, 2015; Neto & Dimitrova, 2017).

All items present significant factor loadings of more than 50 (Hair et al., 2014) and explain more than 50% of the variance. However, item 5 ("If I could live my love life again, I would not change anything") obtained the lowest loading factor. This finding is similar to that reported by Neto & da Conceição Pinto (2015) using the same scale. An explanation for this result is that item 5 is related to satisfaction with past achievements, whereas the other items are oriented toward the present (Sachs, 2003; Vautier et al., 2004). The observation suggests, similarly to SWL, SWLL is more associated with the assessment of life in the present than in the past (Desmyter & De Raedt, 2012).

Conversely, the study observed adequate reliability for the latent variables and scores. The coefficient ω was calculated because of the criticism surrounding the usage of Cronbach's

alpha for estimating reliability (Dunn, 2014; Iacobucci & Duhachek, 2003). Thus, doing so is more suitable for factor models and measurement for mass screening assessments (Dominguez-Lara & Merino-Soto, 2017). The results prove that SWLLS can be sufficiently used in the research setting (Dominguez-Lara & Merino-Soto, 2017), but not for decision-making in clinical settings, which require the reliability coefficients values to be greater than .90 (DeVellis, 2003; Nunnally & Bernstein, 1995; Rosenthal, 1994).

In addition, comparing the alpha coefficients enabled the study to obtain empirical evidence that SWLLS presents a similar estimated measurement error when applied to samples of older adults in Peru and Portugal. The results indicate the absence of bias in estimating the true scores of the SWLL compared between samples (Reynolds, 2000). The results are essential on a practical level as the likely presence of differences between the alpha coefficients' values can be a factor that introduces a bias in interpreting the results of cross-cultural, comparative, and predictive studies (Merino & Lautenschlager, 2003).

Lastly, the analysis of MI supported a single-factor structure of SWLLS between men and women. The result of the invariance of SWLLS by gender has important practical implications for the research on satisfaction among older adults. In this regard, configural invariance confirms that both sexes' older adults conceptualize SWLL in a one-dimensional structure. Evidence of the metric invariance indicates that the relationship between the items of the SWLLS and the latent constructs is invariant between the sexes. In other words, men and women responded to the items in the same manner. Finally, scale invariance established that the relationship between the observed and latent SWLLS scores is invariant compared to groups.

Limitations

The results should be interpreted with caution due to certain limitations. First, the participants were selected intentionally, which can introduce bias. Second, MI across age groups was not examined. Older adults of varying ages may hold different concepts about SWLL. Third, the sample is not representative of the elderly population in Peru because they live in developed cities in the San Martin region. In this regard, future studies should compare the SWLLS between rural and urban groups and consider different levels of income and education because these factors can lead to different conceptions of SWLL. The above-mentioned suggestions render the interpretation of the findings limited only to the study (country: Peru; region: San Martin; groups: sex). Thus, the study recommends that future research address

this limitation by including participants from different regions of Peru and recruiting more participants with heterogeneous characteristics to increase the results' external validity.

Fourth, the implementation of self-report measures may lead to present answers that are socially desirable. In this case, people tend to report greater SWL in general and in their specific domains, interacting directly with other people rather than an anonymous interview (Schwarz et al., 1991). Finally, another methodological limitation is the use of a crossover design, limiting the analysis since it offers an analysis of longitudinal MI.

Despite the limitations, the study provides preliminary evidence of the dimensional structure's invariance and the SWLLS among older adults of both sexes. In this sense, the results contribute to the limited literature on the IM SWLL measures, with evidence of validity and reliability, particularly for elderly populations of Peru.

Conclusion

The study supported the usefulness of the SWLLS as an essential tool for measuring SWLL among older adults and verified its validity and reliability. Thus, the tool can be used to collect information about romantic relationships among older adults. Thus, it is useful not only in the research setting but also for other contexts, such as marital counseling (Neto, 2005), where the scales' brevity is an important feature.

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Competing interests

The authors declare no competing interests.

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Appendix A

Tabla 1

Escala de Satisfacción con la Vida Amorosa

1.	En la mayoría de los aspectos mi vida amorosa se acerca a mi ideal [In most ways my love life is close to my ideal].	1	2	3	4	5
2.	Las condiciones de mi vida amorosa son excelentes [The conditions of my love life are excellent].	1	2	3	4	5
3.	Estoy satisfecho/a con mi vida amorosa [I am satisfied with my love life].	1	2	3	4	5
4.	Hasta ahora, he logrado las cosas importantes que quería en mi vida amorosa [So far I have gotten the important things I want in love life]	1	2	3	4	5
5.	Si pudiera vivir mi vida amorosa otra vez, no cambiaría nada [If I could live my love life over, I would change almost nothing].	1	2	3	4	5

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