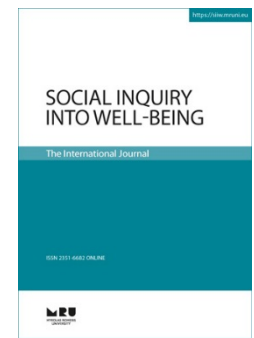




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Measurement Invariance of the Satisfaction with Life Scale in Argentina, Mexico and Nicaragua

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Abstract

The Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985) is one of the most widely used scales for the measurement of well-being. Nevertheless, its measurement invariance and factor structure have not been investigated simultaneously across culturally diverse samples in Latin America. The current paper evaluates the factorial structure and measurement invariance of SWLS (the degree to which the scale measurements conducted across different populations exhibit identical psychometric properties) as to provide solid and accurate basis for cultural group comparisons. We apply measurement invariance testing procedures using multigroup confirmatory factor analysis (MGCFA) to investigate the factorial structure and invariance of the scale across three cultural groups from Argentina, Mexico and Nicaragua. We also estimate and compare latent means of life satisfaction across groups. Participants were 921 adults (mean age 29.66, $SD = 11.48$) from Argentina ($n = 192$), Mexico ($n = 421$) and Nicaragua ($n = 302$). First, confirmatory factor analyzes (CFA) conducted separately for each cultural group provided support for the one-factor structure of the instrument. Second, the MGCFA showed good configural, metric and scalar invariance models, indicating similar patterns and strengths in factor loadings, means and intercepts across cultural samples. Third, latent mean comparisons did not show group differences in life satisfaction. We conclude that the SWLS is a brief and valid measure of life satisfaction that can be used for cross-cultural comparison with samples from Argentina, Mexico and Nicaragua.

Keywords: Measurement Invariance, Confirmatory Factor Analysis, SWSL, Argentina, Mexico, Nicaragua

1. Introduction

There is an increasing interest in research on well-being as to provide a better understanding of what makes people feel well about their own values and standards (Diener, Oishi, & Lucas, 2003). This interest has also mirrored current guidelines of the World Health Organization (WHO) urging today's research to adopt positively oriented perspective and shift from a deficit health classification (World Health Organization, 2013). Moving away from psychology's traditional focus on negative outcomes, such as depression and anxiety, a growing body of research has focused on positive psychological outcomes with most prominent evidence on experience of subjective well-being.

Subjective well-being is generally conceptualized as multifaceted construct with both affective (positive and negative affect) and cognitive components (life satisfaction) (Diener, Suh, Lucas, & Smith, 1999). A major component of subjective well-being, life satisfaction has been identified as

a distinct construct of a cognitive and global evaluation of the quality of one's life as a whole (Pavot & Diener, 1993). With this conceptualization in mind, significant research progress has been made over the past three decades with a major achievement of the development of scientific measures of life satisfaction.

The Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985) is one of the most widely used scales for the measurement of global life satisfaction. Being one of the central constructs of well-being, the scale has also been of great interest to cultural psychologists (Diener et al., 2003). In fact, research applications of the SWLS have documented good psychometric properties in various countries including Germany (Glaesmer, Grande, Braehler, & Roth, 2011), Norway (Vitterso, Biswas-Diener, & Diener, 2005), the Netherlands (Arrindell, Meeuwesen, & Huyse, 1991), Spain (Atienza, Pons, Balaguer, & Garcia-Merita, 2000), the Czech Republic (Lewis, Shevlin, Sme'kal, & Dorahy, 1999), Israel (Anaby, Jarus, & Zumbo, 2010), Lebanon (Ayyash-Abdo & Alamuddin 2007),

Bulgaria, Germany and Israel (Ponizovsky, Dimitrova, Schachner, & van de Schoot, 2012), China (Bai, Wu, Rui-Zheng, & Ren, 2011) and the United States (Pavot & Diener, 1993).

The psychometric properties of the SWLS in samples from Argentina, Mexico and Nicaragua have not been extensively examined. Although the SWSL has been translated and administered in Nicaragua (Cox, 2012), Argentina (Zubieta, & Delfino, 2010) and Mexico (Garduño, López-Fuentes, van Barneveld, & Domínguez, 2012) and psychometric properties have been shown to be good on those populations separately, they have not been tested simultaneously across these populations. Measurement invariance, the factor structure being the same across groups has not been investigated in samples from Argentina, Mexico and Nicaragua, although they have been included in large international and cross-national comparisons of well-being (Park, Peterson & Ruch, 2009; Seligman, 2002).

We choose to compare Argentina, Mexico and Nicaragua because these are the largest Spanish speaking countries of their respective geographic zones (North, Center and South) in Latin America accounting for nearly 220 million people (Population Reference Bureau, 2015). The three chosen countries share historical roots, and have similar political systems, but more importantly they score similarly on the Happy Planet Index (HPI, The New Economics Foundation, 2012) which is a measure of sustainable well-being (Nicaragua, 57.1; Argentina, 54.1 and Mexico, 52.9), despite their different score in the Human Development Index (HDI, Nicaragua, .614; Mexico, .756; Argentina, .808) (United Nations, 2013). Among the key influences shaping the quality of life in Latin America today are the experiences of life satisfaction and well-being. There is also consistent evidence that life satisfaction of the young people (less than thirty years old) has risen over time in the last decade in these countries. The proportion of Latin Americans who say they are very satisfied with their life is gradually increasing (Krueger, 2009). Therefore, providing solid instruments for valid cross-cultural comparisons is of utmost importance to document well-being in these under researched countries.

The focus of the present study is the cognitive component of subjective well-being, i.e., life satisfaction, more specifically the measurement invariance of the construct across three cultural contexts hardly investigated in prior work. The purpose is to test the original factor structure, and then test for measurement invariance of SWSL across samples from these three countries. If measurement invariance could be shown, then the SWLS factor structure would be common across cultural groups, indicating that participants in all these countries respond in the same way (Dimitrov, 2010; van de Schoot, Lugtig, & Hox, 2012). Provided that measurement invariance could be shown, we therefore compared mean scores on the SWLS factor for samples in Argentina, Mexico and Nicaragua.

2. Measurement Invariance of SWLS

Although the SWLS is extensively studied across nations and shows good psychometric properties including factorial validity, internal consistency, and test-retest reliability (Diener et al., 1985; Pavot, Diener, Colvin, & Sandvik,

1991; Lucas, Diener, & Suh, 1996; Pavot, & Diener, 1993) an important issue regards the invariance of the scale. The issue of measurement invariance is crucial for studies that investigate group differences and specifically for purposes of cross-cultural comparisons as done in the present study. Meaningful (cultural) group comparisons assume invariance of the elements of the measurement structure of a measure (i.e., SWLS factor loadings and measurement errors) (van de Vijver & Leung, 1997).

Measurement invariance refers to the degree to which scale (SWLS) measurements conducted across groups exhibit identical psychometric properties (Meade, Johnson & Braddy, 2008). The presence of measurement invariance indicates that the same underlying construct of interest (life satisfaction) is measured across the relevant comparison groups (i.e., Argentina, Mexico, and Nicaragua). Therefore, the invariance ensures that group (cultural) differences can be interpreted in terms of group differences in the underlying construct. Failure to provide measurement invariance indicates that group comparisons may not be valid and the subsequent interpretations and conclusions incorrect.

Invariance test across groups is usually performed by means of a multigroup confirmatory factor analyses (MGCFA) (Billiet, 2002; Jöreskog, 1971). This method tests invariance by setting cross-group constraints and comparing more restricted with less restricted models. To this aim, three levels of invariance are examined: configural invariance (all items are associated with SWLS), metric invariance (all items are associated with SWLS in the same way), and scalar invariance (the regression function linking item scores to SWLS has the same intercept in all groups) (van de Vijver & Leung, 1997). This paper illustrates the application of invariance testing to the SWLS using this method across three cultural groups in Argentina, Mexico, and Nicaragua.

3. Cultural Differences in Life Satisfaction

As indicated in the previous section, cross-cultural comparisons of well-being require an examination of the factor structure of measures in different cultural settings (Diener et al., 2003). Provided that invariance of the SWLS factor structure can be shown, then meaningful cultural group comparisons might be conducted. Comparing life satisfaction across cultures is important because perceptions of well-being may differ across nations due to the countries' characteristics, societal values, and political climates (Diener et al., 2003). In fact, the relevance of measuring psychological well-being across and within nations has been emphasized in recent years, and life satisfaction and happiness have been proposed as indicators of national well-being (Diener, 2000; Diener, Kesebir, & Lucas, 2008).

Cross-cultural comparison studies have provided evidence that Northern European countries register higher life satisfaction than do Eastern European and African countries. Furthermore, nations in South America score high on life satisfaction and happiness than one would expect given that they are relatively less well-off nations, whereas nations in East Asia have low scores than one would expect given their relative good economic standing (Gallup Organization, 2007; Marks, Abdallah, Simms, & Thompson, 2006; Weiner, 2008; White, 2007). As prior work has not

provided comparative perspective on life satisfaction in Argentina, Mexico and Nicaragua, we do not foresee major differences in mean levels of SWLS among these countries.

4. The Present Study

This study set up to evaluate the factorial structure and measurement invariance of SWLS across three hardly investigated cultural groups and compare SWLS mean differences among samples in Argentina, Mexico, and Nicaragua. To the best of our knowledge, the current study presents the first effort to investigate this measure in a cross-cultural context of these samples. We set out to address the following research questions: 1) Examine if the SWLS factorial structure is invariant across contexts; 2) Evaluate if the SWLS shows mean similarities or differences in samples from Argentina, Mexico, and Nicaragua.

In line with the first research question and the purposes of the measurement invariance analyses, we treated SWLS as the latent variable and the five SWLS items as indicators that were examined at three levels of configural, metric and scalar invariance. We followed a measurement invariance

procedure (van de Schoot, Lugtig, & Hox, 2012) by first, specifying adequate model of the instrument for each group separately via confirmatory factor analyses (CFA; configural invariance). In a second step, we checked the adequacy of the best fitting model by testing whether the factor loadings are equal across groups (metric invariance), and whether the intercepts/thresholds are equal across groups. Next, we investigated whether both the factor loadings and intercepts/thresholds are similar across groups (scalar invariance). In line with the second research question, we compared SWLS scores across groups, provided that invariance of the SWLS underlying structure across groups is ensured.

5. Methods

Sample and Procedure. This study was carried out in a community setting as part of a larger cross-cultural study on well-being. Data were collected from 921 participants (age: $M = 26.66$ years, $SD = 11.48$, age range 15 to 74 years old) from Argentina ($n = 192$), Mexico ($n = 421$) and Nicaragua ($n = 302$) (Table 1).

Table 1
Samples

	Country				Comparisons
	Argentina ($n = 192$)	Mexico ($n = 427$)	Nicaragua ($n = 302$)	Overall ($n = 921$)	
Gender					
Male (%)	28	44	41	40	$\chi^2(N = 921) = 14.66^{***}$
Female (%)	72	56	59	60	
Age, M (SD)	35.89 (16.56)	26.06 (9.38)	21.62 (4.81)	26.66 (11.48)	$F(2,916) = 114.13^{***}$
SWLS, M (SD)	3.55 (.65)	3.63 (.79)	3.72 (.76)	3.65 (.75)	$F(2,916) = 1.01$
Cronbach's alpha	.77	.80	.70	.77	
McDonald's omega	.83	.84	.76	.83	

Note: SWLS = Satisfaction with Life Scale; Comparison is significant at $^{***} p < .001$

The sample consisted of emerging adult and adult respondents sampled from the general community in each country. Recruitment occurred via snow bowling sampling with the help of a team of local research assistants. Participants were approached via local university and major educational and vocational organizations and informed about the purpose and methods of the study. Upon their consent, study participants completed self-report measure on life satisfaction with the help of members of the research team where needed. Majority of the sample had a university degree (61%), followed by secondary school (21%), vocational education (9%), postgraduate education (7%), primary school (1%), and no education (0, 5%). Prior to data

collection, participants were informed about the purpose and methods of the study to acquire their consent and participation and asked to fill out the survey. Data collection took approximately 15 to 30 minutes with a high response rate of 98%. Cultural groups differed for distribution of age with Argentinians being ten years older than all other groups ($F(2,916) = 114.13$, $p < .001$). Cultural group differences emerged also with respect to gender ($\chi^2(N = 921) = 14.66$, $p < .001$) with more females in Argentina than the other samples. Subsequent analyses controlled for gender and age effects.

6. Measures

Sociodemographic data. All participants provided data on socio-demographic variables of nationality, gender, and age.

The Satisfaction with Life Scale. The Satisfaction with Life Scale (SWLS; Diener et al., 1985) was used to assess global life satisfaction. The scale consists of five items (“In most ways my life is close to my ideal”, “The conditions of my life are excellent”, “I am satisfied with my life”, “So far I have gotten the important things I want in my life”, and “If I could live my life over, I would change almost nothing”). Each item was answered on a five point Likert scale rated from 1 (*strongly disagree*) to 5 (*strongly agree*). An average score for SWLS factor is computed with higher scores indicating higher life satisfaction. The SWLS was translated from English into Spanish while adhering to the standard guidelines to ensure linguistic equivalence (van de Vijver & Leung, 1997). The English version of the SWLS was translated into Spanish by a bilingual research assistant. Another bilingual research assistant back-translated the Spanish version of the SWLS which was then compared with the original SWLS. The back-translation confirmed the accuracy of the translation.

The internal consistency coefficients of SWLS per group and overall sample were satisfactory (Table 1) (Cicchetti, 1994).

Table 2

Goodness-of-Fit Indexes for Each Country

	Argentina	Mexico	Nicaragua
χ^2 (df)	5.29 (5)	8.68 (5)	10.26 (5)
<i>p</i> value	.381 ns	.122 ns	.068 ns
RMSEA	.018	.042	.059
CFI	.998	.994	.978

Note: χ^2 = Chi square value; df = degrees of freedom; RMSEA = Root-Mean-Square Error of Approximation; CFI = Comparative Fit Index; ns = non-significant.

Second, we tested measurement invariance across groups by means of successive multi-group CFAs. To determine significant differences between models, we followed Chen’s (2007) recommendations according to which a Δ CFI \geq .010, supplemented by Δ RMSEA \geq .015 indicate non-invariance. A full scalar invariance was not established, although the fit of the measurement intercepts model was good (χ^2 (35, N = 921) = 65.06, p < .001, RMSEA = .033, CFI = .969). Therefore, we opted for partial invariance by releasing items two and three. The fit of this model was much improved and indicated that the structure of the scale and pattern of

7. Analytic Plan

First, we estimated three separate CFA models for each group in AMOS (Arbuckle, 2009) by including all five items in a unidimensional model of SWLS. Second, we tested this model in a MGCFA simultaneously across groups. We assessed goodness of fit for the models using the most widely applied absolute and relative Alternative Fit Indices (AFIs) (Meade et al., 2008). Absolute fit indice was the root-mean-square error of approximation (RMSEA; recommended < .08) and relative fit indice used was the comparative fit index (CFI) with recommended value greater than .95. Finally, model fit was tested by the change in CFI and RMSEA as important indicators for evaluating the suitability of successive models; a recommended change of less or equal to .010 is considered indicative of an acceptable model fit (Hu & Bentler, 1999).

8. Results

First, we tested a single factor model of SWLS as originally conceptualized by the authors separately in each group. The three CFAs showed good model fit for samples from Argentina, Mexico, and Nicaragua (Table 2).

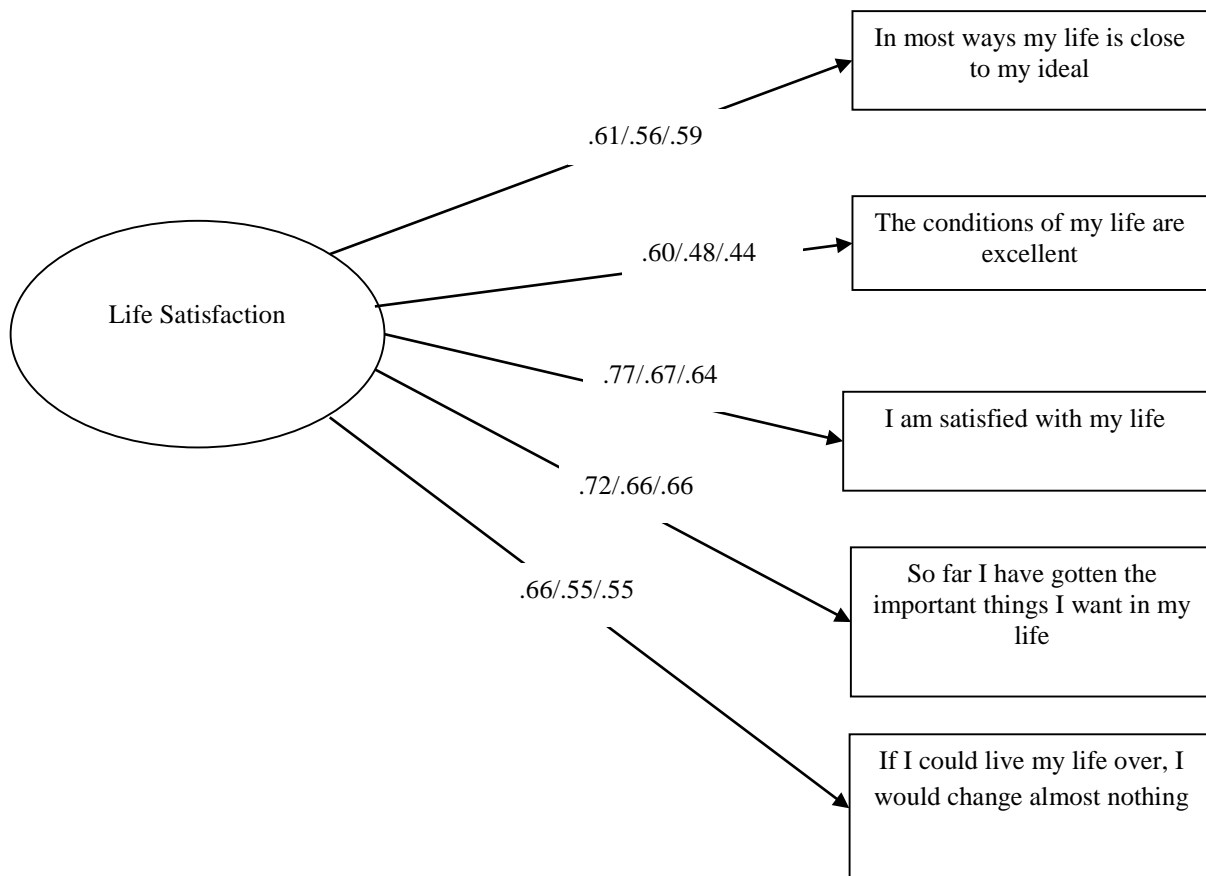
loadings is similar across groups, χ^2 (22, N = 921) = 37.18, p < .023, RMSEA = .027, CFI = .985. As shown in Table 3, Δ CFI and Δ RMSEA suggested non-invariance. Standardized factor loadings for each sample are reported in Figure 1. We also compared mean factor scores across groups by means of univariate analyses of covariance (ANCOVA) with group as independent variable and average scores of SWLS as dependent variable, age and gender as covariates. Results showed that cultural groups did not differ with respect to overall life satisfaction, F (2,916) = 1.01, p = .365 (Table 1).

Table 3
Invariance Models and Goodness-of-Fit Indexes of the Multigroup Analysis per Country

Model	Model fit				Model comparisons	
	χ^2 (df)	RMSEA	95 % CI RMSEA	CFI	Δ RMSEA	Δ CFI
Configural invariance	18.40 (12)	.024	.000-.045	.994	-	-
Metric invariance	26.68 (20)	.019	.000-.036	.993	.005	.001
Partial invariance	37.18 (22)	.027	.010-.042	.985	-.008	.008

Note: χ^2 = Chi-Square; df = degrees of freedom; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; 95 % CI = 95 % Confidence interval; Δ = Change in the parameter.

Figure 1
Standardized Solution of the One-factor Model of the SWLS



Note. All factor-loadings represent standardized coefficients for the measurement intercepts model and are significant at $p < .001$. First coefficient on the arrow refers to the Mexican sample, followed by second and third coefficients referring to samples from Nicaragua and Argentina, respectively.

9. Discussion

The current study set out to investigate the invariance of the SWLS across three under researched cultural contexts. We observed invariance across these contexts as we achieved partial measurement invariance, suggesting that the SWLS unidimensional model works well across samples in Argentina, Mexico, and Nicaragua. Moreover, in all countries, the internal consistency values were all above the acceptable cut-off, further confirming the unidimensional nature of the scale. Our study complements recent work on well-being in a cross-national comparison across twenty-seven nations (Park, Peterson & Ruch, 2009; Seligman, 2002) by testing measurement invariance in three countries in Latin America. Overall, these results indicate that the SWLS may be used in cross-country comparisons of life satisfaction and this is particularly valuable due to the growing need to understand the psychosocial well-being of populations in a variety of contexts. The evaluation of the psychometric properties and cross-cultural utility of the SWLS contributes not only in understanding the theoretical underpinnings of life satisfaction as a unidimensional construct, but also in providing researchers with useful information to guide their choice of good indicators to reliably test this construct.

In line with our first research question, we examined invariance of the SWLS factorial structure across three cultural contexts. Results largely confirmed the presence of partial invariance across sample from Argentina, Mexico, and Nicaragua. These findings add to the increasing cross-cultural work testing for measurement invariance of life satisfaction across cultures by providing valuable data on samples in South America and Mexico. For instance, a current study in Europe and Israel, showed evidence for measurement invariance of SWSL across three immigrant groups from the Former Soviet Union (FSU) in Israel and from Turkey in Bulgaria and Germany (Ponizovksy et al., 2012). Similar results but within one country and one national/cultural group had also been reported for samples in Norway (Clench-Aas, Nes, Dalgard & Aarø, 2011), Sweden (Hultell & Gustavsson, 2008), Chile (Vera-Villaruel, Urzúa, Pavez, Celis-Atenas, & Silva, 2012), Nicaragua (Cox, 2012), Argentina (Zubieta, & Delfino, 2010) and Mexico (Garduño, López-Fuentes, van Barneveld, & Domínguez, 2012). The present study builds on this prior work by extending the issue of psychometric properties and testing for measurement invariance in three cultural contexts at once.

In line with our second research question, we evaluated mean level differences in the SWLS in samples from Argentina, Mexico, and Nicaragua. Our results failed to show any differences, meaning that cultural groups do not differ in their scores of life satisfaction. Prior research on cross-national comparison in twenty-seven nations indicates cultural differences in well-being, happiness and life satisfaction because there are different ways to be happy (Park, Peterson & Ruch, 2009; Seligman, 2002). Although this prior work did not examine measurement invariance, the authors suggest that populations in different countries may

differ with respect to their orientations to happiness, implying that a single ranking of nations misses an essential point about the complexity of psychological well-being. It is also important to pay attention to separate components of well-being that have been reported in results across nations. For example, samples from Mexico have been found to have the highest positive affect, those from Canada reported the lowest negative affect, whereas samples from Switzerland reported extremely high life satisfaction but neither particularly high positive nor particularly low negative affect (Kuppens, Ceulemans, Timmerman, Diener, & Kim-Prieto, 2006). We find more similarities than differences in life satisfaction among the samples investigated here and this should also be viewed in terms of a more balanced approach to well-being. For instance, it has been observed that cross-cultural research tends to emphasize differences over similarities, whereas a more balanced approach taking into account both similarities and differences to the study of well-being is desirable (Park et al., 2009).

Although this is the first study on measurement invariance of SWLS across samples in Argentina, Mexico, and Nicaragua, some limitations need to be acknowledged. First, potentially informative approach on national comparisons in life satisfaction may relate the average SWLS scores to country level characteristics such as education, affluence and opportunity, mode of government, concern with human rights, and religiousness (Inglehart, Foa, Peterson, & Weizel, 2008). Future studies may link experiences of life satisfaction with social, political and cultural features of nations (Diener & Suh, 2000). More work also needs to test the generalizability of findings in other samples with respect to age and gender. Although the results can be generalized with confidence to the population of interest in the three countries investigated, future studies, employing larger samples and evaluating measurement invariance regarding sex and age are necessary to further evaluate and achieve a more thorough understanding of the scale. We also missed the opportunity to capture a more nuanced picture of socio-economic status (SES) and occupation of our participants as these data were not available in the current dataset. Furthermore, this study was cross-sectional, leaving unaddressed the direction of causality and testing for longitudinal measurement invariance. As considerable change in life satisfaction may occur (Pavot & Diener, 1993), future investigations should assess the temporal stability of SWLS. Finally, an important area for research regards factors that contribute to experiences of life satisfaction and their effects on future behaviour and life outcomes. More work needs to incorporate predictive research designs (Pavot & Diner, 2008).

Despite these limitations, the present study is a step toward understanding psychological well-being in different under researched nations by demonstrating that the concept of life satisfaction applies to people in diverse nations in Latin America. We can therefore conclude that the SWLS is a brief and valid measure of life satisfaction that is suitable for use in samples from Argentina, Mexico, and Nicaragua. Our findings indicate that the scale is a valid asset to study

life satisfaction across groups and underrepresented cultural contexts. In addition, there is a great need to understand well-being domains in a variety of contexts. The evaluation of the psychometric properties and cultural utility of this scale provides researchers with useful tool for testing life satisfaction as a core component of subjective well-being.

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