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Research Article

Measurement Invariance of the Short UCLA Loneliness Scale in Spanish and Peruvian Old People: Latent Mean Differences and Evidence for Differential Effects on Perceived Health

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Abstract

The objectives of this study are to evaluate the measurement invariance of the University of California Los Angeles Loneliness Scale (UCLA-LS) three-item version (UCLA-LS-3) in older adults in Peru and Spain, to compare the latent means of loneliness, and to evaluate the psychometric properties of the scale with Item Response Theory (IRT) models, and evaluate the possible moderating effects of the country on loneliness-health relationships. Peruvian sample

was composed of 235 old adults from the city of Lima. The Spanish sample was composed of 443 old adults. The three-factor structure of RUCLA-3 anchored to the health measure fitted the data reasonably well in Spain and Peru. The R-UCLA-3 may be considered invariant for these two samples. The latent means of loneliness are different, the Peruvian average of loneliness being greater than that of Spain. The R-UCLA-3 is an invariant measure in older adults in Peru and Spain, with adequate psychometric properties through IRT models.

Keywords: invariance; loneliness; older adult; Spain; Peru.

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Improved living conditions and increased life expectancy have led to an increase in the older adult population, making the population aging is an important economic, social and health challenge in the 21st century (Bandari et al., 2019). It is estimated that by the year 2050, people over 60 years of age will represent 22% of the world population (Christensen et al., 2009). During old age, social relationships are of paramount importance for health and wellbeing (Holt-Lunstad et al., 2010). However, this is a stage of life that is particularly vulnerable to feelings of loneliness (Hawkley & Kocherginsky, 2018). Loneliness is commonly defined as a subjective phenomenon, resulting from a discrepancy between the quantity or quality of the social relationsships a person wishes versus the ones he/she actually has (de Jong Gierveld, 1987). This definition suggests that people may have few social contacts but not feel lonely if the quantity or quality of their relationships matches what they want; whereas, people with many social relationships may feel lonely if the quantity or quality of these relationships is not what they expected (Newall & Menec, 2019). Evidence suggests that loneliness is a risk factor for

physical and mental health, increasing mortality rates, which are slightly higher in men than in women. Likewise, loneliness is associated with increased blood pressure and cardiovascular disease, decreased cortisol, dementia and cognitive impairment, depression, suicidal behaviors, or poor quality of life, among others (Ong et al., 2016).

It has been estimated that between 20 and 35% of people between 65 and 79 years of age report feelings of loneliness, a percentage that can reach 50% in those over 80 years of age (Dykstra, 2009). Particularly in Peru, between 41.7% and 54.9% of old people indicate that they feel lonely sometimes or that they feel lack of companionship frequently (Caycho-Rodríguez et al., 2020). A study in 11 European countries showed that loneliness prevalence was 13.8% in old adults 65 years old or older (Vozikaki et al., 2018). A recent study reported that 30.9% of older adults in Madrid (Spain) felt lonely (Cuesta-Lozano et al., 2020). Prevalence of loneliness as well as its severe effects on health make it a public health problem (Lena et al., 2019). Nevertheless, all these are estimates depending on the type of sample gathered and the measure of loneliness employed (Ong et al., 2016).

In view of this scenario, it is useful to have reliable and valid instruments to assess loneliness (Faustino et al., 2019). There are several instruments developed to measure loneliness, such as the De Jong Gierveld Loneliness Scale (de Jong Gierveld, & Kamphuis, 1985), the Diferential Loneliness Scale (Schmidt, & Sermat, 1983), the Social and Emotional Loneliness Scale for Adults (SELSA; DiTommaso, & Spinner, 1993), among others. One of the most widely used instruments in loneliness studies is the University of California Los Angeles Loneliness Scale (UCLA; Russell et al., 1978). The UCLA was developed to assess loneliness in adults; however, it has also been commonly used in studies with older adults due to the simplicity of its items (for example, Faustino et al., 2019). The UCLA is a one-dimensional measure of experiences of loneliness that are not restricted to a specific social context. The one-dimensional measures allow a global evaluation of loneliness and greater simplicity in the interpretation of the results (Xu et al., 2018).

Initially, the UCLA (Russell et al., 1978) consisted of 20 items, written in a negative way. This possibly generated a systematic bias in the participants' responses, in addition to not showing adequate discriminant validity. Therefore, seeking to overcome these limitations, a revised version of UCLA was developed that contained both positively and negatively worded items (R-UCLA, Russel et al., 1980). Psychometric studies on the R-UCLA raised doubts about its structure and number of items, suggesting abbreviated versions such as the 3-item version

(Hughes et al., 2004) or the presence of unifactorial structures, two, three, four and even five factors (Dodeen, 2015; Zarei et al., 2016). It has been suggested that the length of the UCLA (20 items) may not be adequate to assess older adults or patients with depressive symptoms. (Wongpakaran, et al., 2020). Specifically, the three-item version (UCLA-LS-3; Hughes et al., 2004) was developed to reduce the time needed to answer the R-UCLA (Igarashi, 2019), also reducing the number of response options from four to three (Saito et al., 2019). In addition, brief measures, such as UCLA-LS-3, allow savings in related costs (Kemper et al, 2019), increase the participation in studies (Edwards et al., 2004), and decrease negative reactions of the participants, such as fatigue, which could be associated with a lower quality of the data (Credé et al., 2012).

The UCLA-LS-3 was validated from its association with other indicators, such as the R-UCLA score, depression, perceived stress, neuroticism, extraversion, agreeableness, marital status, social support networks, living conditions, among others (Abdellaoui et al., 2019; Hughes et al., 2004; Igarashi, 2019; Saito et al., 2019). Additionally, the UCLA-LS-3 has shown positive correlations in the range .52 to .82 with the UCLA of 20 items (Hughes et al., 2004; Igarashi, 2019; Saito et al., 2019). The one-dimensionality of the UCLA-LS-3 has been tested and confirmed with confirmatory factor analysis, and all items had factor loadings larger than .70, the single factor explained 81% of variance and Cronbach's alpha was .81 (Igarashi, 2019). Another study with the Japanese version of the scale concluded, this time with exploratory factor analysis, that the three items of the reduced UCLA group into a single factor that explains 77% of the variance, with factor loadings ranging between .81 and .91, and with a large alpha of .84. Alphas for the aforementioned studies were even larger than the one reported in the original study (alfa =.72; Hughes et al., 2004). A recent study estimated Item Response Theory (IRT) models in the Japanese version of the scale and found evidence of one-dimensionality and also that was able to discriminate people with different degrees of loneliness (Igarashi, 2019).

The UCLA-LS-3 has been used in different studies with older adults (Abedini et al., 2020; Domènech-Abella et al., 2017; Hanratty et al., 2018), but its measurement invariance has not been sufficiently studied, and it has never been studied between Latin American and European cultural contexts. Nevertheless, a previous study indicated that UCLA-LS-3 was invariant between older adults in the United States and Germany (Hawkley et al., 2015). In the last decades, researchers are more aware than ever that stablishing measurement equivalence is needed when culturally different groups have to be compared, and in general when two

populations have to be compared (Kern et al., 2019). In this sense, measurement invariance allows us to suggest that the same construct is measured in the same way in different groups, which is important for the adequate interpretation of the differences observed between the groups (Van de Schoot et al., 2012). Therefore, comparisons between different cultural groups are appropriate only if measurement invariance is confirmed first (Davidov et al., 2014). In other words, the UCLA-LS-3 should be found equivalent before cultural differences in loneliness have to be tested (Boer et al., 2018).

There is evidence that some factors, such as physical mobility, marriage, or living together are protective against loneliness, but the effects of culture are not entirely clear, despite the fact that the levels of loneliness reported in older adults vary according to the context in which the person develops (Yang, & Victor, 2011). Establishing measurement invariance of the UCLA-LS-3 among culturally different countries is even more important if we have in mind that loneliness feeling evolve not only from individual experiences but also in a cultural context of values, norms and practices (Rokach et al., 2002). The values and meanings of interpersonal relationships vary between different cultures (Barreto et al., 2021). For example, in collectivist societies, where interpersonal ties are important, the absence of these ties is likely to increase feelings of loneliness (Lykes & Kemmelmeier, 2014). On the other hand, in more individualistic societies, where people give less importance to their relationships, and there is a lack of real contact or meaningful relationships, the feeling of loneliness may follow a different path (Heu et al., 2019). However, some studies suggest that it is not clear which of the types of cultures (individualistic or collectivist) have a higher prevalence of loneliness (Barreto et al., 2021). Therefore, the economic, social and cultural context of every country may differently affect loneliness feelings (Garza-Sánchez et al., 2020). These differences may be the product of the theoretical and methodological complexity inherent in cross-cultural comparisons (Barreto et al., 2021). Furthermore, it is suggested that there are different patterns of loneliness associated with age among cultures that attribute different values to social relationships (Jopling & Sserwanja, 2016; Liu et al., 2015; Victor et al., 2005; Yang & Victor, 2011).

Likewise, an ecological model of loneliness has been recently proposed in which culture is an important factor for a better understanding of the relationship between loneliness and health (Holt-Lunstad, 2018). Culture is presumed to play a key role in the development of loneliness and a moderator effect on the loneliness-health relation (Beller & Wagner, 2020). However, there is a relative absence of studies comparing loneliness across countries (Dahlberg et al.,

2018) and even less of studies using properly validated instruments. There are two studies comparing loneliness in Latin American countries (México & Colombia) with Spain, and they did not report evidence of measurement invariance of the scales used (Garza-Sánchez et al., 2020; Herrera et al., 2011).

The aims of this study are threefold. First, to assess measurement invariance of the UCLA-LS-3 in old adults from Peru and Spain, and after stablishing invariance to compare their latent means of loneliness. Second, to evaluate psychometric properties of the scale with IRT models. And third, to offer evidence on potential moderator effects of country on the loneliness-health relations.

Method

Design, Participants and Procedure

This is a cross-sectional survey (Ato et al., 2013) following the recommendations from Helsinki's Declaration. In addition, it received the approval of the Ethics Committee of the Universidad Privada del Norte (registry number: 20213002). Participants were old adults from Lima (Peru) and Valencia (Spain), and the sampling scheme was non-probabilistic. The inclusion criteria were: a) being 60 years old or older; (b) no mental or physical disability; and (c) the subject had to give informed consent to participate in the study. Peruvian sample was composed of 235 old adults from the city of Lima, with ages ranging from 61 to 91 years (M = 72.69, SD= 6.68). 84.7% were women and 15.3% were men. On the other hand, the Spanish sample was composed of 443 old adults, with a minimum age of 60 years and a maximum of 80 years (M = 66.11, SD = 1.64). 64.2% were women and the rest (35.8%) were men.

Participants were fully informed of the aims of the study, the anonymity of their responses and that they could exit the study at any time. They had no economical compensation and they all gave their informed consent. Answering the surveys took 20 to 30 minutes.

Instruments

UCLA-LS three items (UCLA-LS-3; Hughes et al., 2004). This scale measures loneliness derived from subjective feelings of social isolation. The three items deal with lack of companionship, feeling left out and being isolated from others. The response categories are hardly ever (1), some of the time (2), and often (3).

Additionally, it was also used a single indicator of self-perceived health (In general, would you say your health is?) that ranges from a minimum of 1 (poor health) to 5 (excellent health). This

single item has been shown to be valid, reliable and sensitive enough to detect variations in perceived health for research purposes (see Macias et al., 2015). Single items have been widely used to assess self-perception of constructs such as health and well-being in general (Bush et al., 2010). Therefore, using a single item to measure general self-reported health may be a good alternative compared to multi-item measures that are often time-consuming, expensive, and difficult to collect information (DeSalvo et al., 2006).

Statistical analyses

Since UCLA-LS-3 has always been used as a single measure of loneliness, the factor structure to be tested is a one-factor model underlying the three items. However, three indicators for a single factor estimated via Confirmatory Factor Analysis (CFA) would lead to zero degrees of freedom, or in other terms, to a just-identified model (see Bollen, 1989). Therefore, the three-factor structure has been "anchored" to the health measure to obtain degrees of freedom and goodness-of-fit indices, as it can be seen in Figure 1. The CFAs and the measurement routine have been estimated in Mplus 8.4 (Muthén & Muthén, 1998-2011) with WLSMV (Weighted Least Square Mean and Variance corrected) because items were ordinal and lacked multivariate normality. Model fit to the data was assessed with the statistics and indexes available for this method of estimation: the chi-square, the CFI, SRMR and RMSEA. Cut-off criteria for adequate fit were: CFI above .90 (better if above .95) and RMSEA and SRMR below .08 (Marsh et al., 2004). The robustness and interpretability of the parameter estimates was also considered in evaluating model fit.

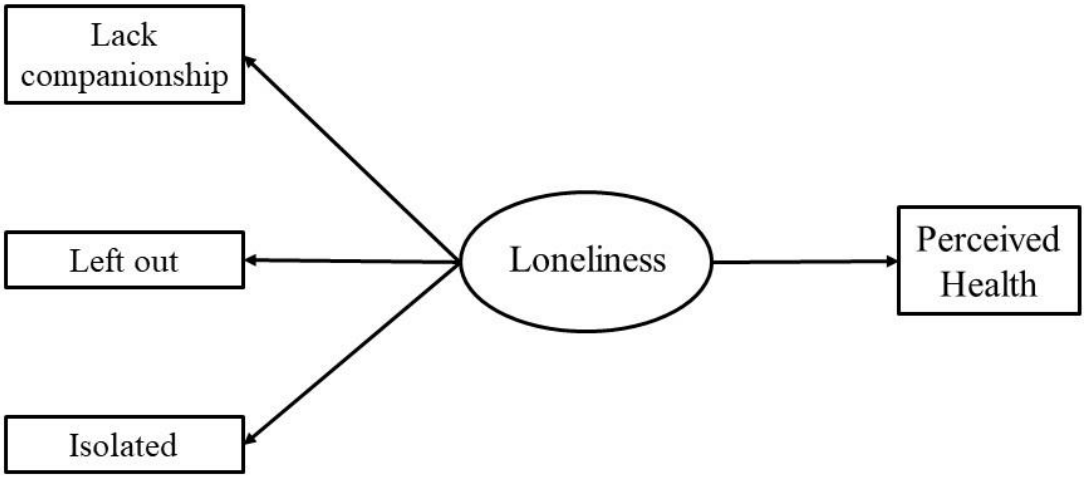


Figure 1. *Theoretical Model*

Internal consistency was estimated with the Composite Reliability Index (CRI), an index based on the confirmatory results that overcomes some of the shortcomings of Cronbach's alpha (Raykov, 2001). Additionally, Average Variance Extracted (AVE) was also calculated in both samples.

Additional to the CFAs and CRIs, the scale was analyzed via IRT models. Specifically, the Graded Response Model (GRM, Samejima, 1997), an extension of the 2-Parameter Logistic Model (2-PLM) for ordered polytomous, items were used (Hambleton et al., 2010). Two parameters are estimated for each item: discrimination (a) and difficulty (b). The discrimination parameter determines the slope on which responses to the items change as a function of the level in the latent variable. Item difficulties determine how challenging the item is. In items with three categories of response, two difficulty parameters, one per threshold, are estimated. These estimates indicate the level of the latent variable at which an individual has a 50% chance of scoring at or above a particular response category. Item and Test Information Curves were also calculated, to estimate the accuracy (reliability) of the scale across the range of values in the latent variable.

Results

Measurement Invariance models

Previous to test for measurement invariance, the structure shown in Figure 1 was separately tested in both Peru and Spain. Model fitted the data reasonably well in Spain ($\chi^2(2) = 1.006$, $p = .604$, CFI= 1.00, SRMR= .003, RMSEA= .000 [.000 - .029]) and Peru ($\chi^2(2) = 5.432$, p = .066, CFI= .997, SRMR= .180, RMSEA= .085 [.000 - .176]). Although in the Peruvian sample the values of SRMR and RMSEA were higher than recommended, this is expected in factorial models with few degrees of freedom, such as the one evaluated in this study, where both indices tend to present low performances, even if the model is properly specified (Kenny et al., 2015; Taasoobshirazi & Wang, 2016). Therefore, it would be a mistake to discard factor models that have high RMSEA values and small degrees of freedom without considering other information, such as those derived from the other fit indices or the factor loadings of the model.

Table 1.
Goodness-of-fit indexes for the measurement invariance routine.

Model	χ^2	df	*p*	CFI	RMSEA[10% CI]	SRMR	$\Delta\chi^2$	df	*p*
Configural	6.083	4	.146	1	.021[.000-.176]	.006	--	--	--
Metric	8.820	6	.183	1	.017[.000-,039	.007	2.05	2	.35
Scalar	23.36	8	.002	.999	.035[.019-.051]	.010	12.50	2	.002
Scalar + equal mean	111.1	9	<.001	.992	.083[.070-.097]	.024	53.33	1	<.001
Scalar + equal effect	51.62	9	<.001	.997	.054[.040-.068]	.018	15.81	1	<.001

Once a good model fit has been stablished separately in both samples, the routine for measurement invariance was applied. Goodness-of-fit indices for the set of estimated models may be seen in Table 1. When the three models of invariance are considered in conjunction, it can be seen that the worsening in fit of the metric and scalar models is minimum. Indeed, if we carefully look at the scalar model, the chi-square differences test was statistically significant (p= .002), but differences in terms of practical fit (CFI, RMSEA and SRMR) are of a minimum amount. Therefore, the R-UCLA-3 may be considered scalar invariant for these two samples. Standardized factor loadings for this scalar model and discrimination and difficulty parameter estimates are presented, for both samples in Table 2.

Table 2.
Standardized factor loadings, discrimination and difficulty parameters in Spain and Peru.

	Peru				Spain			
Item	λ	a	b1	b2	λ	a	b1	b2
1	.86	2.5	-0.2	4.5	.78	2.2	1.5	3.7
2	.95	11.8	3.7	11.8	.94	5.6	5.4	10.3
3	.87	2.8	1.4	4.4	.94	5.3	5.6	10.1

Notes: λ = factor loadings; a= discrimination parameters; b= difficulty parameters

Two additional models have been estimated and tested. The first one adds a constraint on lonely factor means across samples. This further constrained model deteriorates model fit (see Table 1), and accordingly latent means of loneliness may be considered different, being

Peruvian mean of loneliness larger than that in Spain (Mean difference = .892, $p < .001$, d = .945). The second one, constrains the effect of the factor of loneliness on health for both samples. Again, in this case, there is a worsening in the fit (See Table 1), both in terms of chi-square differences ($p < .001$) as well as in the practical fit indices. Figure 2 shows that while the effect of loneliness on health in Spain was negative (β = -.41, R-square= .168), this effect is also negative in Peru but larger (β = -.56, R-square = .313).

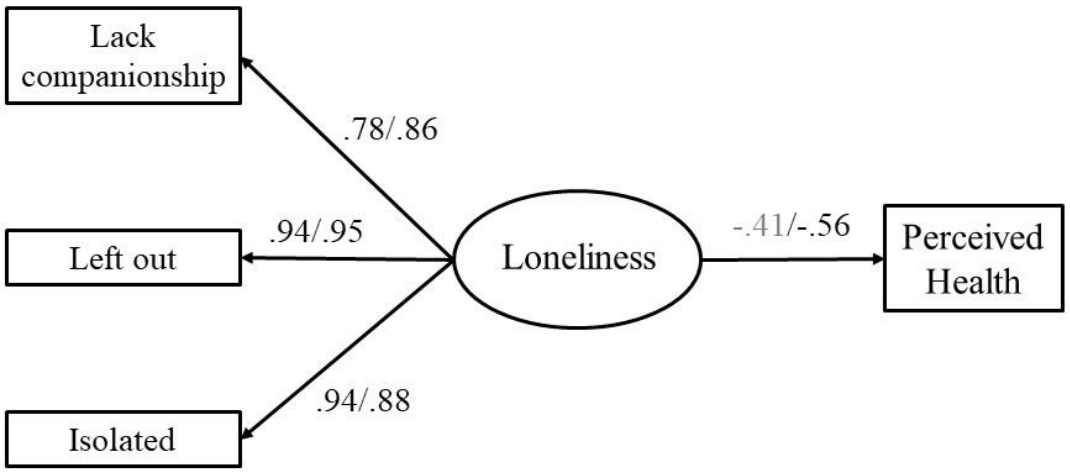


Figure 2. *Model in both Spain and Peru*

Internal consistency estimates and convergent validity

In order to estimate the internal consistency and convergent validity of the items, the results of the Confirmatory Factor Analysis have been chosen as an alternative to more "classical" measures, such as alpha, due to the known problems of this coefficient (Raykov, 2001) and the small number of items that make up the scale. Specifically, it has been chosen to estimate the CRI and the AVE for the scale in both the Spanish and Peruvian samples. The CRI for the Spanish sample was very satisfactory (= .923), as was the case for the Peruvian sample (= .929). For its part, the AVE clearly exceeds the value of 0.5 (Fornell & Lacker, 1981) indicative of adequate convergent validity, with a value of 0.80 in the Spanish sample and 0.813 in the Peruvian sample.

Graded response models

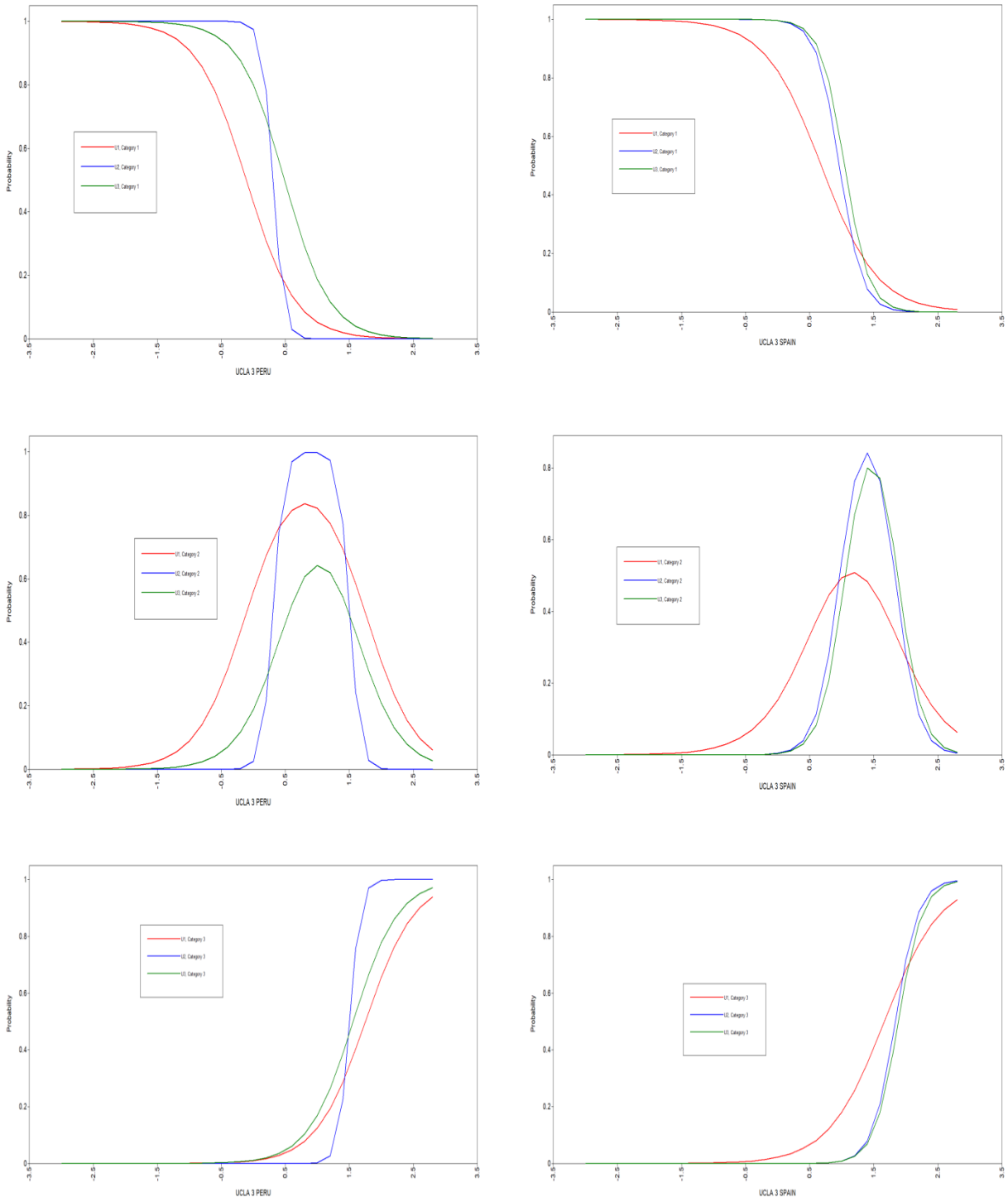
Two-parameter logistic IRT models for ordinal items (graded response models) were fitted to the data. These two-parameter models were chosen because the assumption of a constant discriminant parameter across items in the same dimension is not tenable according to the results in the CFA models, as discrimination parameters in the IRT models are analytically similar to factor loadings in the CFA (Ferrando, 1996; Widaman & Reise, 1997). Table 3 shows fit indices for the IRT models in both countries.

Table 3.
Fit indices for the 2-parameter logistic graded response models for the UCLA-3 in Spain and Peru.

Model	AIC	BIC	ABIC
2PL model Peru	986.877	1018.013	989.487
2PL model Spain	8419.857	8473.329	8444.733

Note:AIC = Akaike's information criterion; BIC = Bayesian information criterion, ABIC = adjusted BIC

As can be seen in this table, all the discrimination parameters are above the value of 1 usually considered as good discrimination in both samples (Hambleton et al., 2010). Item 2 is extremely discriminant in the Peruvian sample. Regarding difficulty parameters, estimates of the ordered thresholds monotonically increased, as expected, and items have, in general large difficulties, which means that only very lonely people will take the higher points in the scale. The discrimination and difficulty parameters may be seen graphically for all items and both samples in Figure 3, as this figure shows the Item Characteristic Curves.



Notes: In the left column, Peruvian functions, in the right column, Spanish ones; each row shows one item category; Item 1 in red colour, item 2 in blue and item 3 in green.

Figure 3. *Item Characteristic Curves (ICC) for the three items.*

An important function in the graded response models is the Item Information Curve, which offers the reliability (precision) of items across the range of values of the latent variable it measures.

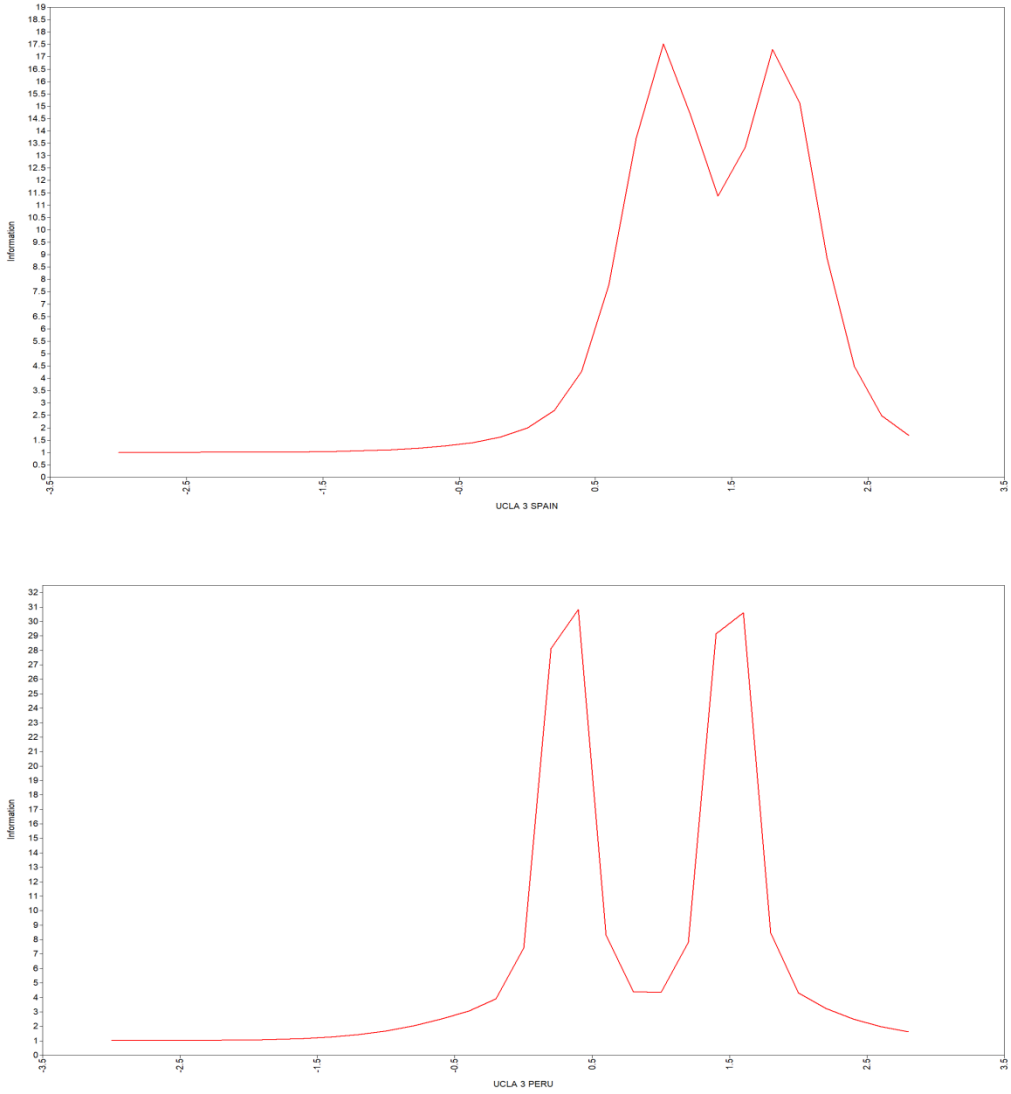


Figure 4. *Test Information Curves for Peru and Spain.*

Figure 4 shows the Test Information Curves for both countries. These Test Information Curves show that the R-UCLA-3 gives more information (is more precise) in the range of 1 to 2.2. in the z-scale of loneliness for Spain, whereas in Peru information function has two peaks, one in the range 0 to 0.5 and also in the range 1 to 1.75.

Discussion

In psychological research measurement invariance is a prerequisite for group comparisons (Byrne & Watkins, 2003). However, most transcultural studies about loneliness have not explicitly made this kind of analysis. At most they have replicated the factor structure in the different cultural groups (Maes et al., 2016). Thus, this study assessed measurement invariance of the UCLA-LS-3 in Spanish and Peruvian old adults, compared latent means between the two groups, and offered evidence of moderator effects of country on the loneliness-health relationship. Additionally, items in the scale were analyzed with IRT models.

The measurement invariance routine was made anchoring the measure of perceived health to the three items of loneliness in order to have an overidentified, and therefore testable, model. Results showed that the UCLA-LS-3 is scalar invariant across countries, and therefore that all comparisons between the two countries are meaningful, no matter if at the structural or mean levels.

Once measurement invariance has been established, latent loneliness means were compared and Peruvian older adults reported higher levels of loneliness than Spaniards. Different studies have pointed out that levels of loneliness vary across societies, where culture is significantly related with the ways people express and cope with loneliness (Fokkema et al., 2012; Hansen & Slagsvold, 2016; Rokach, 2018; Rokach & Neto, 2005; Van Staden, & Coetzee, 2010). Cultural differences about the role older adults play, and family experiences may generate variations in how old adults experience loneliness (World Health Organization, 2015). As an example, a study reported that old Peruvians had a strong family support, living with their partner and sons, while in Spain old adults reported feeling lonely (Velázquez et al., 2002). This result is related with Peruvian studies indicating that older adults with feeling of being left out by their family experience greater loneliness and less life satisfaction than the ones do not feel left out (Aranda & Horna, 2006). In this sense, people from cultures that emphasize strong family and community ties can prevent the presence of loneliness by promoting social integration (Hansen & Slagsvold, 2016). However, these same high expectations can increase levels of loneliness if they are not met (Rokach, 2018). In Spain, instrumental support, that is, help in activities of daily living or situations of need, is valued positively, so its absence can cause Spanish older adults to experience loneliness (Rodrigues, et al., 2014). On the other hand, the number of European older adults who live alone or in institutions is greater than those who live with other members of

the family, therefore, the potential risk of loneliness would increase (Lykes & Kemmelmeier, 2014). This is observed in Spain, where there is a rapid increase in the lonely life of older adults, which has received attention from the Spanish media, who have come to dramatize the cases of those people who died alone and were not treated in a timely manner (Sundström et al., 2009). Likewise, the different levels of prevalence of loneliness among Peruvian and Spanish older adults are also related to health and living conditions (Sundström et al., 2009).

Results also point out the negative effects of loneliness on perceived health of older adults in both countries, which is supported by previous cross-sectional and longitudinal studies and systematic reviews (Cacioppo & Cacioppo, 2014; Hawkley & Cacioppo, 2010; Luo et al., 2012; Martín-María et al., 2020). In this sense, these findings reaffirm considering loneliness as an important public health problem (Gerst-Emerson & Jayawardhana, 2015). Although there are different theoretical models that explain the effects of loneliness on the health of older adults (Hawkley & Cacioppo, 2010), the mechanisms underlying this relationship are not entirely clear (Hawkley & Cacioppo, 2010; Martín-María et al., 2020; Ong et al., 2016). On one hand, scientific literature suggests that the link between loneliness and health status is related to a decreased immune response to stress in lonely people. On the other hand, genomic explanations are provided, where problems in glucocorticoid regulation are associated with an increased risk of inflammatory disorder in those with chronic loneliness (Cole et al., 2007). Similarly, high levels of loneliness in older adults are related to poor executive functioning, which increases sensitivity to negative social stimuli, and the presence of unhealthy behaviors, such as excessive consumption of alcohol and tobacco, poor quality of sleep and eating habits, among others (Cacioppo & Hawkley, 2009).

Additionally, items' discrimination and difficulty parameters were estimated under the graded response (IRT) model. The discrimination parameters of items 2 and 3 were large in both samples, especially item 2 of the Peruvian sample, which indicates an adequate capacity of the items to discriminate between Peruvian and Spanish older adults with high and low levels of loneliness. This result is also supported by the presence of two different peaks in the Test Information Curves of both samples, which indicate that the UCLA-LS-3 has enough information to identify lonely older adults versus those who are not. Likewise, the difficulty parameters were large and with thresholds ordered monotonically in ascending order, which means that people who perceive themselves as very lonely will obtain the highest scores on the UCLA-LS-3. On the other hand, the discrimination and difficulty parameters of item 1 were low compared to the

other two items, which indicates a low capacity of the item to discriminate between older adults with high and low levels of loneliness. Therefore, it is possible that those older adults with low levels of loneliness could classify themselves as lacking companionship, which is the characteristic measured by item 1. Similar results have been observed in a recent study that adapted and evaluated the validity and reliability of UCLA-LS-3 in people aged 13 to 80 years in Japan (Igarashi, 2019).

Study limitations

This study is not free of limitations. First, the samples were not randomly selected from the overall population of old adults, and therefore lack representativeness of the overall Peruvian and Spanish older populations. Therefore, new research in representative samples of these (and others) populations is highly recommended. Furthermore, a large number of participants in different countries representing diverse cultures can also be sampled. This would provide greater confidence that the findings are truly associated with a particular cultural difference (Barreto et al., 2021). Second, sample size is uneven in both countries, which can further limit conclusions, as it has been suggested that sample size differences in multigroup analyses may somehow bias results (Brown, 2006). However, despite the different sample size, results seem robust when compared to existing evidence. Third, loneliness and perceived health were both measured with self-administered questions, which may lead to common method bias. However, it has been suggested that UCLA-LS-3 avoids the presence of the stigma associated with loneliness and its subsequent underestimation, because it avoids using the term “loneliness” (Luo et al., 2012). Other sources of information such as peers and family assessment, observational studies or in-depth interviews would be of great utility to frame self-reported results. Future studies in different samples with self-reported measures of loneliness will also allow for analyzing the robustness of the results. Fourth, the cross-sectional nature of this research does not allow for the causal interpretation of the relationship between loneliness and perceived health. Longitudinal studies must shed light in this regard. recent studies have shown that different levels of loneliness as related to health problems over time (Martín-María et al., 2020). Fifth, gender and age moderating effects were not studied in these samples. Some recent research indicates important gender differences in prevalence of loneliness and in the relations of loneliness with quality of life and health (Dong & Chen, 2017; Zhou et al., 2018).

Furthermore, it is suggested that culture affects loneliness differently according to age (Barreto et al., 2021).

Conclusion

Despite the limitations, the present research expands the current information on loneliness by finding evidence of MI from the UCLA-LS-3 for older adults from two different cultural groups. In addition, the presence of differences in loneliness of older adults from different cultural contexts was confirmed and that the negative effect of loneliness on health was greater in Peru than in Spain. Results may help researchers and professionals to measure loneliness and to better understand its predictors and effects, both universal and specific. Likewise, the findings are important in countries that are concerned about the rapid aging of their population, which makes them vulnerable to loneliness and its consequences on general health (Hawkley et al., 2015). Future cross-cultural research with the R-UCLA-3 will allow an in-depth look at how their response patterns may vary between different countries.

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References

Abdellaoui, A., Chen, H. Y., Willemsen, G., Ehli, E. A., Davies, G. E., Verweij, K. J., ... & Cacioppo, J. T. (2019). Associations between loneliness and personality are mostly driven by a genetic association with neuroticism. *Journal of Personality, 87*(2), 386-397. https://doi.org/10.1111/jopy.12397

Abedini, N. C., Choi, H., Wei, M. Y., Langa, K. M., & Chopra, V. (2020). The relationship of loneliness to end-of-life experience in older americans: a cohort study. *Journal of the American Geriatrics Society, 68*(5), 1064-1071. https://doi.org/10.1111/jgs.16354

Aranda, J. I., & Horna, A. V. (2006). Factores asociados a la satisfacción de vida de adultos mayores de 60 años en Lima-Perú. [Factors associated to life satisfaction in adults over 60 years old in Lima-Peru]. *Universitas Psychologica, 5*(3), 475-485.

Ato, M., López-García, J. J., & Benavente, A. (2013). Un sistema de clasificación de los diseños de investigación en psicología. [A classification system for research designs in psychology]. *Anales de Psicología, 29*(3), 1038-1059.

Bandari, R., Khankeh, H. R., Shahboulaghi, F. M., Ebadi, A., Keshtkar, A. A., & Montazeri, A. (2019). Defining loneliness in older adults: protocol for a systematic review. *Systematic Reviews, 8*(1), 1-6. https://doi.org/10.1186/s13643-018-0935-y

Barreto, M., Victor, C., Hammond, C., Eccles, A., Richins, M. T., & Qualter, P. (2021). Loneliness around the world: Age, gender, and cultural differences in loneliness. *Personality and Individual Differences, 169*, 110066. https://doi.org/10.1016/j.paid.2020.110066

Beller, J., & Wagner, A. (2020). Loneliness and health: the moderating effect of cross-cultural individualism/collectivism. *Journal of Aging and Health*. https://doi.org/10.1177/0898264320943336

Boer, D., Hanke, K., & He, J. (2018). On detecting systematic measurement error in cross-cultural research: a review and critical reflection on equivalence and invariance tests. *Journal of Cross-Cultural Psychology, 49*(5), 713-734. https://doi.org/10.1177/0022022117749042

Bollen, K. A. (1989). *Structural equation modeling with latent variables*. John Wiley & Sons.

Brown, T. A. (2006). *Confirmatory factor analysis for applied researchers*. New York, Guilford Press.

Bush, S. H., Parsons, H. A., Palmer, J. L., Li, Z., Chacko, R., & Bruera, E. (2010). Single-vs. multiple-item instruments in the assessment of quality of life in patients with advanced cancer. *Journal of Pain and Symptom Management, 39*(3), 564-571. https://doi.org/10.1007/s10880-015-9436-5

Byrne, B. M., & Watkins, D. (2003). The issue of measurement invariance revisited. *Journal of Cross-Cultural Psychology, 34*(2), 155-175. https://doi.org/10.1177/0022022102250225

Cacioppo, J. T., & Cacioppo, S. (2014). Social relationships and health: the toxic effects of perceived social isolation. *Social and Personality Psychology Compass, 8*(2), 58-72. https://doi.org/10.1111/spc3.12087

Cacioppo, J. T., & Hawkley, L. C. (2009). Perceived social isolation and cognition. *Trends in Cognitive Sciences, 13*(10), 447-454. https://doi.org/10.1016/j.tics.2009.06.005

Caycho-Rodríguez, T., Carbajal-León, C., & Noé-Grijalva, M. (2020). Loneliness, sex and general health perception in Peruvian older adults. *Revista Española de Geriatría y Gerontología, 55*(3), 187-188. https://doi.org/10.1016/j.regg.2020.02.005

Christensen, K., Doblhammer, G., Rau, R., & Vaupel, J. W. (2009). Ageing populations: the challenges ahead. *The Lancet, 374*(9696), 1196-1208. https://doi.org/10.1016/S0140-6736(09)61460-4

Cole, S. W., Hawkley, L. C., Arevalo, J. M., Sung, C. Y., Rose, R. M., & Cacioppo, J. T. (2007). Social regulation of gene expression in human leukocytes. *Genome Biology, 8*(9), R189. https://doi.org/10.1186/gb-2007-8-9-r189

Credé, M., Harms, P., Niehorster, S., & Gaye-Valentine, A. (2012). An evaluation of the consequences of using short measures of the Big Five personality traits. *Journal of Personality and Social Psychology, 102*(4), 874-888.

Cuesta-Lozano, D., Simón-López, L. C., Mirón-González, R., García-Sastre, M., Bonito-Samino, D., & Asenjo-Esteve, Á. L. (2020). Prevalence rates of loneliness and its impact on lifestyle in the healthy population of Madrid, Spain. *International Journal of Environmental Research and Public Health, 17*(14), 5121. https://doi.org/10.3390/ijerph17145121

Dahlberg, L., Andersson, L., & Lennartsson, C. (2018). Long-term predictors of loneliness in old age: results of a 20-year national study. *Aging & Mental Health, 22*(2), 190-196. https://doi.org/10.1080/13607863.2016.1247425

Davidov, E., Meuleman, B., Cieciuch, J., Schmidt, P., & Billiet, J. (2014). Measurement equivalence in cross-national research. *Annual Review of Sociology, 40*, 55-75. https://doi.org/10.1146/annurev-soc-071913-043137

de Jong Gierveld, J., & Kamphuls, F. (1985). The development of a Rasch-type loneliness scale. *Applied Psychological Measurement, 9*(3), 289-299. https://doi.org/10.1177/014662168500900307

de Jong-Gierveld, J. (1987). Developing and testing a model of loneliness. *Journal of Personality and Social Psychology, 53*(1), 119-128.

De Jong-Gierveld, J., & Kamphuls, F. (1985). The development of a Rasch-type loneliness scale. *Applied Psychological Measurement, 9*(3), 289-299. https://doi.org/10.1177/014662168500900307

DeSalvo, K. B., Fisher, W. P., Tran, K., Bloser, N., Merrill, W., & Peabody, J. (2006). Assessing measurement properties of two single-item general health measures. *Quality of Life Research, 15*(2), 191-201. https://doi.org/10.1007/s11136-005-0887-2

DiTommaso, E., & Spinner, B. (1993). The development and initial validation of the Social and Emotional Loneliness Scale for Adults (SELSA). *Personality and Individual Differences, 14*(1), 127-134. https://doi.org/10.1016/0191-8869(93)90182-3

Dodeen, H. (2015). The effects of positively and negatively worded items on the factor structure of the UCLA loneliness scale. *Journal of Psychoeducational Assessment, 33*(3), 259-267. https://doi.org/10.1177/0734282914548325

Domènech-Abella, J., Lara, E., Rubio-Valera, M., ... & Haro, J. M. (2017). Loneliness and depression in the elderly: the role of social network. *Social Psychiatry and Psychiatric Epidemiology, 52*(4), 381-390. https://doi.org/10.1007/s00127-017-1339-3

Dong, X., & Chen, R. (2017). Gender differences in the experience of loneliness in US Chinese older adults. *Journal of Women & Aging, 29*(2), 115-125. https://doi.org/10.1080/08952841.2015.1080534

Dykstra, P. A. (2009). Older adult loneliness: myths and realities. *European Journal of Ageing, 6*(2), 91-100. https://doi.org/10.1007/s10433-009-0110-3

Edwards, P., Roberts, I., Sandercock, P., & Frost, C. (2004). Follow-up by mail in clinical trials: does questionnaire length matter? *Controlled Clinical Trials, 25*(1), 31-52. https://doi.org/10.1016/j.cct.2003.08.013

Faustino, B., Lopes, P., Oliveira, J., Campaioli, G., Rondinone, M., Bomfim, H., & Germano, L. (2019). Psychometric and rash analysis of the UCLA loneliness scale-16 in a Portuguese sample of older adults. *Psychological Studies, 64*(2), 140-146. https://doi.org/10.1007/s12646-019-00483-5

Ferrando, P. J. (1996). Calibration of invariant item parameter in a continuous item response model using the extended LISREL measurement submodel. *Multivariate Behavioral Research, 31*, 419–439.

Fokkema, T., De Jong Gierveld, J., & Dykstra, P. A. (2012). Cross-national differences in older adult loneliness. *The Journal of Psychology, 146*(1-2), 201-228. https://doi.org/10.1080/00223980.2011.631612

Fornell, C. & Larcker, D. F. (1981). Evaluating Structural Equation Models with unobservable variables and measurement error. *Journal of Marketing Research, 18*, 39-50.

Garza-Sánchez, R. I., González-Tovar, J., Rubio-Rubio, L., & Dumitrache-Dumitrache, C. G. (2020). Soledad en personas mayores de España y México: un análisis comparativo. [Loneliness in older people from Spain and Mexico: a comparative analysis]. *Acta Colombiana de Psicología, 23*(1), 106-116. http://dx.doi.org/10.14718/acp.2020.23.16

Gerst-Emerson, K., & Jayawardhana, J. (2015). Loneliness as a public health issue: the impact of loneliness on health care utilization among older adults. *American Journal of Public Health, 105*(5), 1013-1019. https://doi.org/10.2105/AJPH.2014.302427

Hambleton, R. K., van der Linden, W. J., & Wells, C. S. (2010). IRT models for the analysis of polytomously scored data: Brief and selected history of model building advances. In M. L. Nering & R. Ostini (Eds*.), Handbook of polytomous item response models* (pp. 21–42). Routledge.

Hanratty, B., Stow, D., Collingridge Moore, D., Valtorta, N. K., & Matthews, F. (2018). Loneliness as a risk factor for care home admission in the English longitudinal study of ageing. *Age and Ageing, 47*(6), 896-900. https://doi.org/10.1093/ageing/afy095

Hansen, T., & Slagsvold, B. (2016). Late-life loneliness in 11 European countries: Results from the generations and gender survey. *Social Indicators Research, 129*(1), 445-464. https://doi.org/10.1007/s11205-015-1111-6

Hawkley, L. C., & Cacioppo, J. T. (2010). Loneliness matters: a theoretical and empirical review of consequences and mechanisms. *Annals of Behavioral Medicine, 40*(2), 218-227. https://doi.org/10.1007/s12160-010-9210-8

Hawkley, L. C., & Kocherginsky, M. (2018). Transitions in loneliness among older adults: A 5-year follow-up in the national social life, health, and aging project. *Research on Aging, 40*(4), 365-387. https://doi.org/10.1177/0164027517698965

Hawkley, L. C., Duvoisin, R., Ackva, J., Murdoch, J. C., & Luhmann, M. (2015). *Loneliness in older adults in the USA and Germany: Measurement invariance and validation* (NORC Working Paper Series No. 2015– 002). NORC at the University of Chicago.

Herrera, R. R., Córdoba, A. M. C., Mejía, R. M., & Benavides, E. A. P. (2011). Concepciones populares sobre soledad de los adultos mayores de España y Bucaramanga, Colombia [Popular conceptions on loneliness of the elderly people of Spain and Bucaramanga, Colombia]. *Diversitas: perspectivas en psicología, 7*(2), 307-319.

Heu, L. C., van Zomeren, M., & Hansen, N. (2019). Lonely alone or lonely together? a cultural-psychological examination of individualism–Collectivism and loneliness in five European countries. *Personality and Social Psychology Bulletin, 45*(5), 780-793. https://doi.org/10.1177/0146167218796793

Holt-Lunstad, J. (2018). Why social relationships are important for physical health: A systems approach to understanding and modifying risk and protection. *Annual Review of Psychology, 69*, 437-458. https://doi.org/10.1146/annurev-psych-122216-011902

Holt-Lunstad, J., Smith, T. B., & Layton, J. B. (2010). Social relationships and mortality risk: a meta-analytic review. *PLoS Medicine, 7*(7), e1000316. https://doi.org/10.1371/journal.pmed.1000316

Hughes, M. E., Waite, L. J., Hawkley, L. C., & Cacioppo, J. T. (2004). A short scale for measuring loneliness in large surveys: Results from two population-based studies. *Research on Aging, 26*(6), 655-672. https://doi.org/10.1177/0164027504268574

Igarashi, T. (2019). Development of the Japanese version of the three-item loneliness scale. *BMC Pychology, 7*(1), 20. https://doi.org/10.1186/s40359-019-0285-0

Jopling K, Sserwanja I (2016) *Loneliness across the life course: a rapid review of the evidence*. Calouste Gulbenkian Foundation.

Kemper, C. J., Trapp, S., Kathmann, N., Samuel, D. B., & Ziegler, M. (2019). Short versus long scales in clinical assessment: Exploring the trade-off between resources saved and psychometric quality lost using two measures of obsessive–compulsive symptoms. *Assessment, 26*(5), 767-782. https://doi.org/10.1177/1073191118810057

Kenny, D. A., Kaniskan, B., & McCoach, D. B. (2015). The performance of RMSEA in models with small degrees of freedom. *Sociological Methods & Research, 44*(3), 486-507. https://doi.org/10.1177/0049124114543236

Kern, M. L., Zeng, G., Hou, H., & Peng, K. (2019). The Chinese version of the EPOCH measure of adolescent well-being: testing cross-cultural measurement invariance. *Journal of Psychoeducational Assessment, 37*(6), 757-769. https://doi.org/10.1177/0734282918789561

Lena, M. M. L., Luna-Bazaldúa, D., & Shneidman, L. A. (2019). Loneliness in the elderly in Mexico, challenges to the public policies. *The Journal of Chinese Sociology, 6*(1), 16. https://doi.org/10.1186/s40711-019-0106-0

Liu, J., Li, D., Purwono, U., Chen, X., & French, D. C. (2015). Loneliness of Indonesian and Chinese adolescents as predicted by relationships with friends and parents. *Merrill-Palmer Quarterly*, *61*(3), 362-382. https://doi.org/10.13110/merrpalmquar1982.61.3.0362

Luo, Y., Hawkley, L. C., Waite, L. J., & Cacioppo, J. T. (2012). Loneliness, health, and mortality in old age: A national longitudinal study. *Social Science & Medicine, 74*(6), 907-914. https://doi.org/10.1016/j.socscimed.2011.11.028

Lykes, V. A., & Kemmelmeier, M. (2014). What predicts loneliness? Cultural difference between individualistic and collectivistic societies in Europe. *Journal of Cross-Cultural Psychology, 45*(3), 468-490. https://doi.org/10.1177/0022022113509881

Macias, C., Gold, P. B., Öngür, D., Cohen, B. M., & Panch, T. (2015). Are single-item global ratings useful for assessing health status? *Journal of Clinical Psychology in Medical Settings, 22*(4), 251-264. https://doi.org/10.1007/s10880-015-9436-5

Maes, M., Wang, J. M., Van den Noortgate, W., & Goossens, L. (2016). Loneliness and attitudes toward being alone in Belgian and Chinese adolescents: Examining measurement invariance. *Journal of Child and Family Studies, 25*(5), 1408-1415. https://doi.org/10.1007/s10826-015-0336-y

Marsh, H. W., Hau, K. T., & Wen, Z. (2004). In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes and dangers in overgeneralizing Hu and Bentler's (1999) findings. *Structural Equation Modeling: A Multidisciplinary Journal, 11*(3), 320–341. https://doi.org/10.1207/s15328007sem1103_2

Martín-María, N., Caballero, F. F., Miret, M., Tyrovolas, S., Haro, J. M., Ayuso-Mateos, J. L., & Chatterji, S. (2020). Differential impact of transient and chronic loneliness on health status. A longitudinal study. *Psychology & Health, 35*(2), 177-195. https://doi.org/10.1080/08870446.2019.1632312

Muthén, L. K., & Muthén, B. O. (1998-2011). *Mplus user's guide* (6th ed.). Authors.

Newall, N. E., & Menec, V. H. (2019). Loneliness and social isolation of older adults: Why it is important to examine these social aspects together. *Journal of Social and Personal Relationships, 36*(3), 925-939. https://doi.org/10.1177/0265407517749045

Ong, A. D., Uchino, B. N., & Wethington, E. (2016). Loneliness and health in older adults: A mini-review and synthesis. *Gerontology, 62*(4), 443-449. https://doi.org/10.1159/000441651

Raykov, T. (2001). Bias of coefficient alpha for fixed congeneric measures with correlated errors. *Applied Psychological Measurement, 25*, 69-76.

Rodrigues, M. S., De Jong Gierveld, J. E. N. N. Y., & Buz, J. (2014). Loneliness and the exchange of social support among older adults in Spain and the Netherlands. *Ageing & Society, 34*(2), 330-354. https://doi.org/10.1017/S0144686X12000839

Rokach, A. (2018). The effect of gender and culture on loneliness: A mini review. *Emerging Science Journal, 2*(2), 59-64. https://doi.org/10.28991/esj-2018-01128

Rokach, A., & Neto, F. (2005). Age, culture, and the antecedents of loneliness. *Social Behavior and Personality: An International Journal, 33*(5), 477-494. https://doi.org/10.2224/sbp.2005.33.5.477

Rokach, A., Orzeck, T., Moya, M. C., & Expósito, F. (2002). Causes of loneliness in North America and Spain. *European Psychologist, 7*(1), 70-79.

Russell, D., Peplau, L. A., & Cutrona, C. E. (1980). The revised UCLA Loneliness Scale: Concurrent and discriminant validity evidence. *Journal of Personality and Social Psychology, 39*(3), 472–480. https://doi.org/10.1037/0022-3514.39.3.472

Russell, D., Peplau, L. A., & Ferguson, M. L. (1978). Developing a measure of loneliness. *Journal of Personality Assessment, 42*(3), 290-294. https://doi.org/10.1207/s15327752jpa4203_11

Saito, T., Cable, N., Aida, J., Shirai, K., Saito, M., & Kondo, K. (2019). Validation study on a Japanese version of the three-item UCLA Loneliness Scale among community-dwelling older adults. *Geriatrics & Gerontology International, 19*(10), 1068-1069. https://doi.org/10.1111/ggi.13758

Samejima, F. (1997). Graded response model. In W.J. van der Linden & R.K. Hambleton (Eds.), *Handbook of modern item response theory* (pp. 85-100). Springer.

Schmidt, N., & Sermat, V. (1983). Measuring loneliness in different relationships. *Journal of Personality and Social Psychology, 44*(5), 1038–1047. https://doi.org/10.1037/0022-3514.44.5.1038

Sundström, G., Fransson, E., Malmberg, B., & Davey, A. (2009). Loneliness among older Europeans. *European Journal of Ageing, 6*(4), 267. https://doi.org/10.1007/s10433-009-0134-8

Taasoobshirazi, G., & Wang, S. (2016). The performance of the SRMR, RMSEA, CFI, and TLI: An examination of sample size, path size, and degrees of freedom. *Journal of Applied Quantitative Methods, 11*(3), 31-39.

Van de Schoot, R., Lugtig, P., & Hox, J. (2012). A checklist for testing measurement invariance. *European Journal of Developmental Psychology, 9*(4), 486-492. https://doi.org/10.1080/17405629.2012.686740

Van Staden, W. C., & Coetzee, K. (2010). Conceptual relations between loneliness and culture. *Current Opinion in Psychiatry, 23*(6), 524-529. https://doi.org/10.1097/YCO.0b013e32833f2ff9

Velázquez, L. C., Benites, M. V., Torres, E. F., Moreno, P. P., López, L. F., & Clavijo, M. V. (2002). Estudio comparativo de la calidad de vida en personas mayores de las ciudades de Iquitos (Perú) y Sevilla (España) [Comparative study about quality of life in an elderly sample from the city of Seville (Spain) and the city of Iquitos (Peru)]. *Revista de Enfermería, 15*, 5-11.

Victor, C. R., Scambler, S., Bowling, A. N. N., & Bond, J. (2005). The prevalence of and risk factors for, loneliness in later life: a survey of older people in Great Britain. *Ageing and Society, 25*(6), 357-375. https://doi.org/10.1017/S0144686X04003332

Vozikaki, M., Papadaki, A., Linardakis, M., & Philalithis, A. (2018). Loneliness among older European adults: Results from the survey of health, aging and retirement in Europe. *Journal of Public Health, 26*(6), 613-624. https://doi.org/10.1007/s10389-018-0916-6

Widaman, K. F., & Reise, S. P. (1997). Exploring the measurement invariance of psychological instruments: Applications in the substance use domain. In K. J. Bryant, M. Windle, & S. G. West (Eds.). *The science of prevention* (pp. 281–324). American Psychological Association.

Wongpakaran, N., Wongpakaran, T., Pinyopornpanish, M., Simcharoen, S., Suradom, C., Varnado, P., & Kuntawong, P. (2020). Development and validation of a 6-item Revised UCLA Loneliness Scale (RULS-6) using Rasch analysis. *British Journal of Health Psychology, 25*(2), 233-256. https://doi.org/10.1111/bjhp.12404

World Health Organization. (2015). *World report on ageing and health*. World Health Organization.

Xu, S., Qiu, D., Hahne, J., Zhao, M., & Hu, M. (2018). Psychometric properties of the short-form UCLA Loneliness Scale (ULS-8) among Chinese adolescents. *Medicine, 97*(38). e12373. https://doi.org/10.1097/MD.0000000000012373

Yang, K., & Victor, C. (2011). Age and loneliness in 25 European nations. Ageing and Society, *31*(8), 1368-1388. https://doi.org/10.1017/S0144686X1000139X

Zarei, S., Memari, A. H., Moshayedi, P., & Shayestehfar, M. (2016). Validity and reliability of the UCLA loneliness scale version 3 in Farsi. *Educational Gerontology, 42*(1), 49-57. https://doi.org/10.1080/03601277.2015.1065688

Zhou, Z., Wang, P., & Fang, Y. (2018). Loneliness and the risk of dementia among older Chinese adults: gender differences. *Aging & Mental Health, 22*(4), 519-525. https://doi.org/10.1080/13607863.2016.1277976

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