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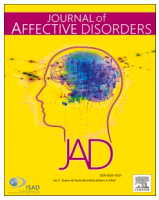

Research paper

Determinants of loneliness among Brazilian college students: Structure and correlates

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ABSTRACT

Loneliness is a subjective, and unpleasant experience. This paper aimed at investigating the psychometric features of the short version of the Revised UCLA Loneliness Scale (ULS-6), and its correlates in a Brazilian sample. To achieve this purpose two studies were conducted.

The first study examined the factor structure of the ULS-6, its internal consistency and measurement invariance (MI) by gender. The sample included 252 participants aged 18–28 years. They completed the ULS-6 and socio-demographic factors. The fit of the unidimensional model of the ULS-6 to the data was good, and reliability was adequate. Measurement invariance across genders was supported. Gender had no direct effect on loneliness. The second study explored the relationships between socio-demographic factors, personality traits and loneliness. Furthermore, this study evaluated the mediating role of body appreciation in the relationship between satisfaction with love life (SWLL) and loneliness. Financial security, conscientiousness, extraversion, and neuroticism were significant predictors of loneliness. The findings also demonstrated that higher levels of satisfaction with love life contributed to reduced loneliness, and that body appreciation mediated the relationship of SWLL with loneliness. Suggestions for future investigation are provided.

1. Introduction

Humans are social beings with a fundamental need for belonging (Baumeister and Leary, 1995). When our social needs are not met, we may experience loneliness. Loneliness has been recognized as a significant public health risk around the world (Surkalim et al., 2022). This paper aims at investigating the psychometric features of the short version of the Revised UCLA Loneliness Scale (ULS-6), and its correlates in a Brazilian sample. To achieve this purpose two studies were conducted. The first study examines the structure of the ULS-6, its internal consistency and measurement invariance (MI) by gender. The second study highlights antecedents of loneliness, such as socio-demographic factors and personality traits. Furthermore, this research investigates whether body appreciation (BA) mediates the relationship between SWLL and loneliness.

1.1. Loneliness

Aligned with a widely accepted conceptualization (Perlman and Peplau, 1981), loneliness arises when one perceives a discrepancy between their desired and actual social connections in terms of quality and/or quantity. The quality rather than the quantity of social relationships is a stronger determinant of loneliness (Hawkley et al., 2008). Loneliness is a subjective experience of social isolation, rather than an objective condition. Social isolation was defined as "a state in which the individual lacks a sense of belonging, lacks social engagement with others, has a minimal number of social contacts, and experiences deficient and unfulfilling relationships" (Nicholson Jr., 2009, p. 1346). Social isolation is an objective lack of contact with others, but it is important to note that socially isolated people do not inevitably experience loneliness, and vice versa.

About 15–30 % of individuals feel persistent loneliness (Heinrich and Gullone, 2006). Loneliness can occur at any stage of life, even in 5-year-old children (Cassidy and Asher, 1992). Loneliness is highly prevalent in most modern societies and varies across different cultures (Rokach and Neto, 2005). For example, individuals in Southern Europe tend to report higher levels of loneliness than those in Northern Europe (Yang and Victor, 2011).

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Loneliness poses a major health risk (Lim et al., 2020). It is associated with various adverse physical health problems such as obesity and elevated blood pressure (Cacioppo et al., 2015), and negative mental health outcomes such as increased depressiveness, general anxiety, social anxiety, suicidal thoughts, and aggressiveness (Kristensen et al., 2023; Mahon et al., 2006; Neto, 2021; Rokach and Patel, 2024; Wang et al., 2024). It is also linked to a higher likelihood of developing dementia (Holwerda et al., 2014), and an increased risk of early death (Holt-Lunstad et al., 2015).

Measures for reducing loneliness are currently being developed by academics (Kall et al., 2021; Lai et al., 2020) and politicians. For instance, the U.K and Japan have appointed ministers specifically focused on alleviating loneliness; in 2018 for the U.K., and in 2021 for Japan (The Lancet, 2023). These government strategies involve shifting potential interventions from the individual to the community contexts where people can connect. The World Health Organization (2023) has recently declared loneliness as a pressing global health threat. It highlighted the importance of social connection. Therefore, to prevent negative health consequences it is essential to identify factors that can protect against loneliness. Stavrova et al. (2022), who noted, on page 347 of their paper, that "while research on the consequences of loneliness has been prolific, the antecedents of loneliness have received much less empirical attention".

To measure the construct of loneliness, Russell et al. (1980) developed the Revised UCLA Loneliness Scale (R-UCLA). The R-UCLA consists of 20 items. A recent development in the measurement field is the changing of constructs that have many items to shorter tools. Neto (2014a) developed a short-form scale of the R-UCLA including 6 items (ULS-6). The ULS-6 showed a unidimensional structure, adequate reliability, and validity in Portugal (Neto, 2014a). The Arabic (Nazzal et al., 2017), English and French (Rapoport et al., 2023) forms of the ULS-6 demonstrated adequate psychometric properties.

2. Study 1

2.1. Factor validity, reliability, and measurement invariance of the ULS-6 in a Brazilian sample

This study aims to obtain further empirical support concerning the psychometric features of the ULS-6 in the Brazilian context. We, therefore, investigate the factorial validity and reliability of the ULS-6 using confirmatory factor analysis, invariance analysis across gender, and reliability estimates. Our hypothesis was that the one factor model would exhibit good fit with the collected data. Ensuring measurement invariance across distinct groups, such as men and women, is crucial for performing meaningful group comparisons (Han et al., 2019). Our expectation is that the measurement properties of the test are independent of the characteristics of the groups. Lastly, in terms of reliability, we anticipate an adequate internal consistency of the model.

2.2. Methodology

2.2.1. Participants

The sample comprised 252 participants (56 % women), aged 18 to 28 (M = 21.27, SD = 2.29) from the Universidade Estadual Vale do Acaraú, Brazil. Its size was determined based on the criteria specified by Muthén and Muthén (2002), who suggest that 150–300 participants are sufficient to carry out scaling psychometric studies with a one-dimensional structure.

The mean age of the participants by gender did not show significant differences, $F(1, 251) = 2.91$, $p = .09$. Most of them (90 %) were single. Regarding financial security, 64 % indicated less security relative to other individuals of their own age in their country of residence, 33 % equal security, and 3 % more security.

2.2.2. Measures

2.2.2.1. Loneliness (ULS-6). This measure used the short version of the Revised UCLA Loneliness Scale (Neto, 1992; Neto, 2014a; Russell et al., 1980). The ULS-6 includes six items (e. g., "People are around me but not with me"). Ratings ranged from 1 ("Never") to 4 "Often"). A high score indicates greater loneliness.

2.2.2.2. Socio-demographics. Information on gender, age, civil status, nationality, and financial security was obtained from the study respondents. In accord with past research (Swami et al., 2020), respondents indicated how financially secure they felt relative to other individuals of their own age in their nation of residence (1 = less secure, 2 = same, 3 = more secure).

2.2.3. Procedure

The study data was collected online between September and December 2023 using the online survey platform Google Forms. The survey was shared via social networks (i.e., WhatsApp, Facebook, and Twitter) and promoted by college centers. Inclusion criteria were being ≥18 years of age, college student, a resident and citizen of Brazil. We used listwise deletion to handle missing values.

This research was conducted in accordance with the ethical principles established by Resolution 466/2012 of the National Health Council, guaranteeing the protection of the participants and the integrity of the data collected. All the guidelines and principles of this resolution were strictly followed to ensure respect for the dignity, autonomy and privacy of the participants (Brasil, 2012). All participants were duly informed about the objectives of the research, the procedures involved, the potential risks and benefits, as well as the right to withdraw at any time, without explanation. Participants provided digital consent, ensuring that participation was voluntary and based on an informed decision. To ensure the confidentiality and privacy of the participants, all data was anonymized and stored securely, preventing any individual identification. Furthermore, the research was planned in such a way as to minimize any risks to those involved, strictly observing good scientific and ethical practice.

2.2.4. Data analysis

Data analysis included descriptive statistics, confirmatory factor analyses (CFA), internal consistency tests, and analysis of variance. Descriptive statistics of the measures were performed. To evaluate the validity of the internal structure of the ULS-6, CFA was carried out. The following indexes are used in CFA: $\chi 2/df$ ratio, comparative fit index (CFI), goodness of fit index (GFI), standardized root mean square residual (SRMR), and root mean squared error of approximation (RMSEA). A $\chi 2/df < 5$, SRMR ≤0.06, RMSEA ≤0.08, CFI, and GFI ≥ 0.90 are cutoffs for an acceptable model fit in the analysis of factorial structures (Brown, 2006; Hu and Bentler, 1999). The internal consistency of the scales was checked via Cronbach's α, and McDonald's ω. Analysis of variance was conducted to examine the effect of gender on loneliness. The analyses were performed with IBM SPSS and AMOS statistical software (version 29.0). The criterion for statistical significance was set at 0.05.

2.3. Results

2.3.1. Descriptive statistics

Descriptive statistics for the 6 items of the ULS-6 were computed. Skewness (between −0.12 and 1.14) and kurtosis (between −1.01 and 0.52) coefficients suggested that univariate normality was met in all cases (Field, 2017). Mardia's multivariate kurtosis for the statements was 6.56 ($p < .001$). There was therefore no strong deviation from normality (Bollen, 1989; Kline, 2005).

2.3.2. Dimensionality

CFA of the ULS-6 was examined with a unidimensional model on the basis of the original study of Neto (2014a). CFA was performed on the raw data of the ULS-6 (correlation matrix, maximum likelihood estimation). The one-factor model of the ULS-6 revealed a good fit to the data ($\chi 2 = 21.97$, df = 9, $\chi 2/df = 2.44$, CFI = 0.98, GFI = 0.97, SRMR = 0.04, RMSEA = 0.07, 90 % CI [0.03, 0.11]). All estimates (λ) of the statements were significant at $p < .001$, ranging between 0.55 (statement 2) and 0.91 (statement 4), with an average of 0.71.

2.3.3. Reliability estimation

The ULS-6 revealed an α of 0.86 (CI 95 % 0.83–0.88) and an ω of 0.86. Item-test correlation estimates were ≥ 0.48 and alpha-if-item-deleted values were > 0.79. These results indicate satisfactory reliability in this population.

2.3.4. Measurement invariance by gender

The expected unidimensional model was performed for each gender (Table 1). The fit was good for both genders. Configural, metric, and scalar invariance were examined afterwards. Metric and scalar invariance across gender groups was evidenced.

Therefore, we can conclude that the ULS-6 is invariant, indicating that loneliness presents the same meaning in gender groups. Thus, averages obtained in the latent variable between the gender groups considered can be compared. Findings showed no gender differences in the ULS-6 scores, $F(1, 251) = 3.72$; $p = .06$.

3. Study 2

3.1. Correlates of the ULS-6 in a Brazilian sample

There are several factors that can influence loneliness (Lim et al., 2020). This study aims at understanding the connections between two groups of antecedents (i.e., socio-demographics, and personality) of loneliness among Brazilian college students. Additionally, this study investigates the potential mediating role of body appreciation in the relationship between SWLL and loneliness. Thus, the objectives of the present study are two-fold.

The first objective of this work was to further examine the relationships between loneliness, socio-demographic factors, and personality traits. The literature shows some inconsistencies regarding the relationships of socio-demographic factors such as gender, age, and financial security (a proxy of socioeconomic status) with loneliness (Lim et al., 2020; Neto, 2014b).

Females tend to score higher than males on direct assessments of loneliness, but this difference often disappears when indirect assessments are used (Borys and Perlman, 1985). The ULS-6 measures loneliness indirectly, and studies using this tool generally do not find gender differences (Nazzal et al., 2017; Neto, 2014b; Neto et al., 2022).

Loneliness can affect individuals of all ages. However, evidence about the relationship between age and loneliness is complex. There is research indicating a U-shaped relationship of age with loneliness, with the highest levels of loneliness reported in young and old age, as well as loneliness decreasing linearly with age or increasing with age (Barjaková et al., 2023).

Financial security is considered as a proxy for socioeconomic status (Swami et al., 2020), as socioeconomic disadvantages can create barriers to forming and maintaining social interactions. A recent literature review confirmed a mainly negative relationship between higher financial security and loneliness (Barjaková et al., 2023).

Besides socio-demographic variables, the Big Five personality traits, which comprise openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism (i.e., a long-term tendency to experience negative emotions) are also relevant to understanding loneliness (Buecker et al., 2020; Mund and Neyer, 2018). Personality traits are "dimensions of individual differences in tendencies to show consistent patterns of thoughts, feelings, and actions" (McCrae and Costa Jr., 2003, p. 25). According to a meta-analysis conducted by Buecker et al. (2020, p. 8) "few studies have directly focused on the association between loneliness and broader personality traits".

Personality traits might be associated with loneliness given that they capture typical thoughts, feelings, and behaviors by definition (McCrae and Costa Jr., 2003). Buecker et al. (2020) reported bivariate correlations of loneliness with personality traits: extraversion ($r = -0.37$), agreeableness ($r = -0.24$), conscientiousness ($r = -0.20$), openness ($r = -0.11$), and neuroticism ($r = 0.36$). These findings indicate that the five traits are weakly to moderately related to loneliness. Furthermore, the traits except for openness remained significantly connected to loneliness when the traits were controlled.

There is a gap in the loneliness field since investigation has mainly scrutinized the direct effects of diverse factors on loneliness and underestimated the indirect effects that underlie the relationship between predictors. The second objective of this work is to explore the mediating role of body appreciation in the relationship between SWLL and loneliness. Satisfaction with love life is one of the particular domains of satisfaction with life (Neto et al., 2023). It has been defined as "a judgmental process in which individuals assess the quality of their love lives on the basis of their own set of criteria" (Neto, 2005, p. 4). Satisfaction with love life touches most people (Hatfield et al., 2020) and it is related to optimal physical and mental health outcomes as well as healthy social relationships, among others (Graham, 2011; Neto, 2005). It has also been shown to correlate negatively with perceived loneliness (Neto and Pinto, 2015; Soares et al., 2020). SWLL appeared as the strongest predictor of loneliness among Palestinian college students

Table 1
Confirmatory factor analysis fit statistics by gender and measurement invariance.

Model		Goodness-of-fit statistics					Model comparison		
		χ^{2a}	df[a]	CFI[a]	SRMR	RMSEA [90 % CI][a]	ΔCFI	ΔSRMR	ΔRMSEA
Gender									
CFA by group	Women	15.97	9	0.985	0.034	0.075 [0.000;0.133]			
	Men	14.47	9	0.974	0.056	0.074 [0.000;0.141]			
Measurement invariance	Configural	30.44	18	0.982	0.056	0.053 [0.015;0.084]			
	Metric	37.63	22	0.977	0.077	0.053 [0.021;0.082]	−0.005	0.021	0.000
	Scalar	45.01	27	0.973	0.078	0.052 [0.022;0.078]	−004	0.001	−0.001

[a] χ^2 = Chi-Square; *df* = degrees of freedom; CFI = Comparative fit index; SRMR = Standardized root mean square residual; RMSEA = Root mean square error of approximation; CI = Confidence interval; ΔCFI, ΔSRMR and ΔRMSEA = change in fit indices between contiguous nested models.

(Nazzal et al., 2021). As far as we know, no work has examined the relationship between SWLL and BA.

Body appreciation, a facet of positive body image, was defined as "accepting, holding favorable opinions toward, and respecting the body, while also rejecting media-promoted appearance ideals as the only form of human beauty" (Tylka and Wood-Barcalow, 2015, p. 53). Linardon et al. (2022) conducted a systematic review of this construct and its psychological correlates in a total of 240 papers. In this broad study there is no reference to any research examining the relationships between body appreciation, SWLL, and loneliness. However, this review reported that body appreciation was related to greater adaptive psychological constructs (e.g., general wellbeing, positive affect, self-esteem, and sexual satisfaction), and lower levels of psychopathology (e.g., anxiety symptoms, and depressive symptoms). Therefore, in line with previous results, we can expect a positive association of body appreciation with SWLL and a negative association of body appreciation with loneliness.

The idea of body appreciation as a mediator is based on three lines of reasoning: (1) while previous studies have not examined the association between SWLL and body appreciation, such relationship seems plausible based on research literature showing that people with higher well-being reported significantly higher BA (Gillen, 2015; Linardon et al., 2022; Swami et al., 2023); (2) high levels of body appreciation have been found to be associated with lower loneliness (Zhao et al., 2025); and (3) body appreciation has previously been researched as a mediator (Mushtaq et al., 2024; Rahme et al., 2023). For instance, body appreciation played a partial mediating role in the relationship between bedtime procrastination and sleep quality (Wang et al., 2025).

Based on prior results, our expectation was that BA would mediate the relationship between SWLL and reduced loneliness. The increasing prevalence of loneliness (Astell-Burt et al., 2022) highlights the necessity to better understand the complex mechanisms by which SWLL can decrease feelings of loneliness. As far as we know, body appreciation has not yet been explored as the mediator between SWLL and loneliness. Hence, the present work fills this gap by exploring the mediating role of BA in the relationship between SWLL and loneliness. The current work may provide novel insights into existing research and give empirical support that could be utilized to reduce loneliness.

Based on the aforementioned research, we hypothesized: (1) higher financial security would be associated with lower loneliness; (2) one or more of the personality traits would be associated with loneliness beyond socio-demographic factors; (3) SWLL would be associated with perceived loneliness beyond socio-demographic factors, and (4) body appreciation would mediate the relationship between SWLL and loneliness.

3.2. Methodology

3.2.1. Participants

The sample was the same used in Study 1.

3.2.2. Measures

In this study, we employed the socio-demographic questions implemented in Study 1, along with the ULS-6, and additionally we utilized the following scales:

3.2.2.1. Personality. Each item of the Five-Item Personality Inventory (FIPI; Gosling et al., 2003) assesses one of the Big Five personality traits of Openness ("I see myself as open to new experiences"), Conscientiousness ("as dependable and self-disciplined"), Extraversion ("as extroverted and enthusiastic"), Agreeableness ("as warm and sympathetic to others"), and Neuroticism ("anxious and easily upset"). Ratings ranged from 1 ("*Strongly disagree*") to 5 ("*Strongly agree*"). The Portuguese form of the FIPI (Swami et al., 2020) was applied.

3.2.2.2. Satisfaction with Love Life Scale (SWLLS). This scale (Neto, 2005) consists of five statements (e.g., "The conditions of my love life are excellent"). Ratings ranged from 1 ("*Strongly disagree*") to 7 ("*Strongly agree*"). A high score indicates greater SWLL. The SWLLS showed good psychometric characteristics (Caycho-Rodriguez et al., 2020; Nazzal et al., 2019; Neto, 2005; Neto and Dimitrova, 2017). In the present study, the unidimensional model of the SWLLS displayed a good fit to the data ($\chi2 = 10.58$, df = 4, $\chi2/df = 2.64$, CFI = 0.99, GFI = 0.98, SRMR = 0.01, RMSEA = 0.08, 90 % CI [0.02, 0.14]) (Hu and Bentler, 1999). To achieve this model, a correlation between two items' errors (items 4 and 5) was established. All estimates (λ) of the statements were significant at $p < .001$, ranging between 0.78 (statement 5) and 0.96 (statement 3), with a mean of 0.87. The internal consistency was very high (α = 0.94, and ω = 0.94).

3.2.2.3. Body Appreciation Scale-2 (BAS-2). The BAS-2 (Tylka and Wood-Barcalow, 2015) comprises 10 statements (e. g., "I respect my body") measuring positive body image. Ratings ranged from 1 ("*Never*") to 5 ("*Always*"). Higher values reflect higher body appreciation. The BAS-2 comprises one dimension with good reliability (Tylka and Wood-Barcalow, 2015; Swami et al., 2023). In the present study, the unidimensional model of the BAS-2 showed a good fit to the data ($\chi2 = 116.80$, df = 35, $\chi2/df = 3.34$, CFI = 0.95, GFI = 0.91, SRMR = 0.04, RMSEA = 0.08, 90 % CI [0.02, 0.14]). All estimates (λ) of the items were significant at $p < .001$, ranging between 0.60 (item 8) and 0.86 (item 6), with a mean of 0.75. The internal consistency was very high (α = 0.93, and ω = 0.93).

3.2.3. Procedure

The procedure is the same used in Study 1.

3.2.4. Data analysis

Besides descriptive statistics, CFA, internal consistency tests, and analysis of variance used in the first study, we included one-sample *t*-tests, Pearson's correlations, hierarchical regression, and path analyses. A one-sample *t*-test was performed to give a global portrait of the level of loneliness. Pearson's correlations were used to find the associations among the scales. A sequence of linear regression analyses was conducted to scrutinize potential relationships among socio-demographic factors, personality traits, SWLL, and loneliness. Lastly, path analysis was performed to scrutinize the mediation role of body appreciation on the relationship between SWLL and loneliness. The analyses were performed with IBM SPSS and AMOS statistical software (version 29.0). The criterion for statistical significance was set at 0.05.

3.3. Results

Table 2 reports descriptive statistics for the scales used. The difference between the mean value of loneliness ($M = 2.24$; $SD = 0.72$) and the neutral midpoint of the scale (2.50) was significant, [$t(251) = 5.64$, $p < .001$, [95 % CI = (−0.35, −0.17)]. Therefore, this finding indicates that participants felt a relatively mild level of loneliness.

Table 2
Descriptive statistics of the personal variables ($N = 252$).

	Mean	Standard Deviation	Range	Skewness Statistic	Kurtosis Statistic
Loneliness	2.24	0.72	1–4	0.34	−0.56
Openness	4.00	1.08	1–5	−0.97	0.38
Conscientiousness	3.69	1.07	1–5	−0.65	0.01
Extraversion	3.47	1.25	1–5	−0.36	−0.87
Agreeableness	4.02	0.99	1–5	−1.03	0.99
Neuroticism	3,46	1.34	1–5	−0.40	−0.1.03
Body appreciation	3.48	0.80	1–5	−0.28	−0.06
Satisfaction with love life	4.31	2.03	1–7	−0.22	−0.1.30

3.3.1. Testing of associations

Correlation coefficients were calculated to assess bivariate relationships among the psychological measures. Table 3 presents these findings. Importantly, all associations between loneliness and other psychological measures were statistically significant.

A series of linear regression analyses was used to scrutinize potential relationships of the socio-demographic factors, personality traits, and SWLL with loneliness. Among the three groups of independent variables, loneliness was first regressed on socio-demographics (Model 1). This was followed by personality traits (Model 2), and satisfaction with love life (Model 3). Each group of variables was entered separately along with socio-demographic variables (Models 2–3).

Before carrying out regression analyses, collinearity diagnostics were tested in order to guarantee that the variance inflation factor (VIF) did not exceed 10 and the tolerance statistic was greater than 0.20 (Field, 2017). The largest correlation predictor was well below the 0.80 threshold suggested by Myers et al. (2006) (see Table 3). The findings presented no problems with collinearity.

Table 4 presents the results from the regression analyses. Gender, age, and financial security were introduced into the first model as socio-demographic control variables. These socio-demographic control measures accounted for 9 % of the variance in loneliness, $F(3, 248) = 7.83$, $p < .001$. Financial security ($\beta = -0.26$, $p < .001$) was significantly related to loneliness, with lower financial security linked to greater loneliness.

Baseline socio-demographic variables (Model 1) and personality traits (Model 2) together accounted for 32 % of the variance in loneliness, $F(8, 243) = 14.04$, $p < .001$. Financial security remained significant in this model, and conscientiousness ($\beta = -0.17$, $p = .006$), extraversion ($\beta = -0.26$, $p < .001$), and neuroticism ($\beta = 0.26$, $p < .001$) also were significantly related to loneliness. Lower levels of conscientiousness and extraversion, and greater levels of neuroticism were related to higher perceived loneliness.

Baseline socio-demographic characteristic variables and satisfaction with love life (Model 3) together accounted for 13 % of the variance in loneliness, $F(4, 247) = 9.26$, $p < .001$. Financial security remained significant in this model, and SWLL ($\beta = -0.21$, $p < .001$) also was significantly related to loneliness. Lower SWLL was associated with higher loneliness.

3.3.2. Mediating effect test

The findings of regression analysis examining the potential mediating role of body appreciation in the relationship between SWLL and loneliness are presented in Fig. 1. The findings indicated that SWLL was indirectly associated with loneliness via its relationship with body appreciation. SWLL was significantly related to body appreciation, $\beta = 0.29$, $p < .001$, and body appreciation was significantly related to loneliness, $\beta = -0.50$, $p < .001$. These results are consistent with the mediational hypothesis. SWLL was not significantly associated with loneliness after controlling for the mediator, body appreciation, $\beta = -0.06$, $p = .27$, in consonance with total mediation. About 28 % of the variance in loneliness was accounted for by the predictor measures. The indirect effect was calculated using a percentile bootstrap estimation approach with 1000 samples, conducted with IBM SPSS Amos. The results revealed that the indirect coefficient was significant, $\beta = -0.15$, $p < .001$, 95 % CI = −0.21, −0.09.

3.4. Discussion

The current work aimed to advance knowledge on loneliness among Brazilian college students by using a recently developed short measure of loneliness – the ULS-6 (Neto, 2014a; Russell et al., 1980). To this end we: scrutinized the psychometric features of the ULS-6 in this population; evaluated the relationships of socio-demographic factors with loneliness; examined the relationships of personality traits with loneliness over and above socio-demographic factors; and tested the mediating role of BA in the relationship between satisfaction with love life and loneliness.

As expected, the ULS-6, initially constructed from Portuguese samples (Neto, 1992; Neto, 2014a), demonstrated good psychometric properties on a new Brazilian sample of college students. Similar findings regarding the ULS-6 have been reported for various languages, such as Arabic (Nazzal et al., 2017), English and French (Rapoport et al., 2023) versions. Additionally, the measurement invariance test showed that this scale assessed the same concept for both genders. Despite documented emotional differences between men and women, they conceptualize and experience loneliness similarly.

Regarding the effect of socio-demographic variables, including gender, age, and financial security on loneliness, literature presents inconsistent results. Based on the ULS-6 scores, regression analysis identified financial security as significantly related to loneliness among the socio-demographic variables. No significant gender or age differences in loneliness scores were found. The method of measuring loneliness is crucial in detecting gender differences (Lim et al., 2020). Borys and Perlman (1985) observed that when loneliness is measured indirectly, gender differences are not generally evidenced. This absence of gender differences on loneliness was observed. A similar finding was also evident in Brazilian immigrants residing in Portugal (Neto et al., 2017). As regards age, as our sample consisted only of young adults, age-related differences were not observed.

Lower financial security was associated with increased feelings of loneliness. This aligns with research indicating that “lower income, lower educational level, frequency of economic problems, and living in poor neighborhoods were associated with higher levels of loneliness” (Lim et al., 2020, p.786). Overall, lower socio-economic status is associated with greater loneliness (Barjaková et al., 2023).

As discussed earlier, prior studies have shown that loneliness is associated with personality traits to a higher or lesser degree. This work has confirmed that certain personality traits are significantly related to loneliness. Higher conscientiousness and extraversion, and lower neuroticism were associated with lower loneliness beyond socio-demographic factors. Extraversion and neuroticism presented the strongest associations with loneliness.

Table 3
Correlation matrix.

	1	2	3	4	5	6	7
1 Loneliness	–						
2 Openness	−0.19**	–					
3 Conscientiousness	−0.37***	0.35*** —	–				
4 Extraversion	−0.41***	0.36***	0.39***	–			
5 Agreeableness	-0.19**	0.28***	0.37***	0.42***	–		
6 Neuroticism	0.40***	−0.01	−0.27***	−0.26***	−0.08	–	
7 Body appreciation	−0.52***	0.29***	0.49***	0.33***	0.21***	−0.38***	–
8 Satisfaction with love life	−0.21***	−0.04	0.22***	0.07	0.09	.-0.13*	0.29***

* $p < .05$.
** $p < .01$.
*** $p < .001$.

Table 4
Socio-demographic factors, personality, satisfaction with love life, and loneliness (N = 252).*

Independent variables	Dependent variable: loneliness		
	Model 1 Standardized β	Model 2 Standardized β	Model 3 Standardized β
Socio-demographic factors			
Gender	0.09[−0.04, 0.31]	−0.02[−0.19, 0.13]	0.12[−0.01, 0.34]
Age	−0.10[−0.07, 0.01]	−0.03[−0.04, 0.02]	−0.08[−0.06, 0.01]
Financial security	−0.26***[−0.51, −0.88]	−0.15***[−0.35, −0.06]	−0.25***[−0.50, −0.18]
Personality			
Openness		−0.04[−0.10, 0.06]	
Conscientiousness		−0.17**[−0.20, −0.03]	
Extraversion		−0.26***[−0.22,- 0.07]	
Agreeableness		0.02-[−0.07, 0.10]	
Neuroticism		0.26***[0.08, 0.20]	
Satisfaction with love life			−0.21***[−0.12, 0.03]
R^2	0.09	0.32	0.13
R^2 change	0.09	0.23	0.04
F change	7.83***	16.32***	12.49***

Note: Values in square brackets indicate the 95 % confidence interval.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

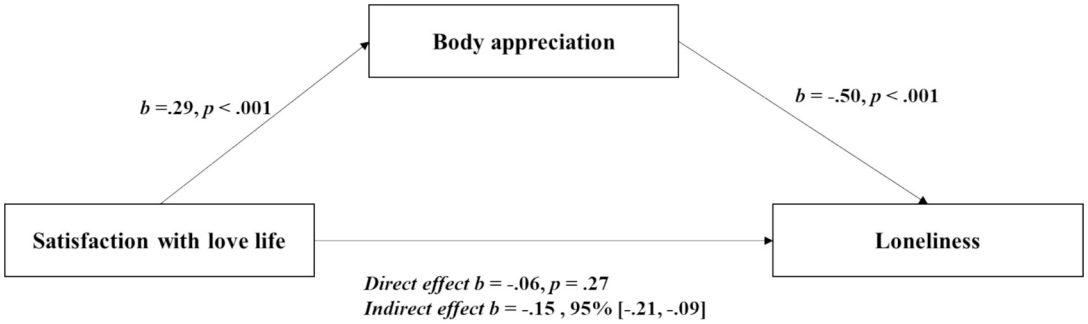

Fig. 1. Mediation model between satisfaction with love life and loneliness with body appreciation as mediator.

Extraversion, characterized by assertiveness and high levels of personal activity, played a key role in predicting loneliness. Extraverted people prefer to get involved and enjoy social interactions (Costa and McCrae, 1980). Prior work (e.g., Buecker et al., 2020; Teppers et al., 2013) also suggested that extraversion is inversely associated with loneliness.

Neuroticism emerged as significantly and positively related to loneliness. Consistent with this result, research has shown that neuroticism is connected with experiencing negative affect (DeNeve and Cooper, 1998), and increased sensitivity to social rejection (Denissen and Penke, 2008). Therefore, it is not surprising that lower emotional stability was associated with higher loneliness in this sample.

Conscientiousness was significantly and negatively related to loneliness, as was found in previous studies (e.g., Mund and Neyer, 2018). However, there is also research reporting mixed findings between loneliness and conscientiousness (Buecker et al., 2020). For example, conscientiousness and loneliness have been reported as unrelated (Teppers et al., 2013), positively related (Teppers et al., 2013), or negatively related (van der Aa et al., 2009).

The combined impact of socio-demographic factors and personality traits on loneliness suggests that about one-third of the variation in loneliness among Brazilian students may be accounted for by those predictors. This shows that while the examined independent variables are relevant, additional unconsidered variables might also have substantial impacts on determining loneliness. Thus, in this work we also tested the mediating role of BA in the relationship between SWLL and loneliness.

As expected, SWLL was significantly and negatively related to perceived loneliness over and above socio-demographic factors. This is consistent the findings of previous research (Nazzal et al., 2021: Neto and Pinto, 2015; Soares et al., 2020). A lower level of SWLL was associated with increased risk of loneliness, suggesting that SWLL serves as a protective factor against loneliness. As anticipated, body appreciation fully mediated the relationship between SWLL and loneliness. Path analysis findings indicated that SWLL was indirectly associated with loneliness through body appreciation. This suggests that SWLL reduces loneliness both directly and indirectly via body appreciation. Young adults who experience higher SWLL tend to exhibit greater body appreciation, which in turn is related to lower loneliness. Greater SWLL scores were associated with more BA. This aligns with research indicating that higher well-being was significantly related to higher BA (e.g., Gillen, 2015; Swami et al., 2023).

Greater BA scores were associated with less loneliness. There is evidence that BA is negatively associated with negative emotions (Ramseyer et al., 2019), including loneliness (Zhao et al., 2025). This is consonant the findings of a meta-analytic study showing that BA was negatively correlated with general psychopathology (Linardon et al., 2022). Research suggests that BA may be an appropriate target for intervention (Linardon et al., 2021). Hence, the underlying association of SWLL with loneliness suggests that programs aimed at enhancing body appreciation among young adults could help alleviate their loneliness.

This research has limitations. First, the sample was one of convenience, consisting solely of university students and most of them reported low financial security. Future work should assess the robustness of these findings using more representative samples. Secondly, the cross-sectional design of the current work prevents attribution of causality; it allows only conclusions regarding correlation. For example, while

satisfaction with love life may conduce toward lower loneliness, satisfaction with love life may also result from lower loneliness. Future studies employing longitudinal designs are needed to explore the direction of the links. Third, this study was grounded on self-report evaluations that may be subject to inherent problems such as social desirability and recall bias. Fourth, there are limitations to assessing the personality traits by means of single items, although scores of the FIPI have presented "convergent and discriminant validity, test-retest reliability, patterns of external correlates, and convergence between self- and observer-ratings adequate convergent validity" (Gosling et al., 2003, p. 513). There are other short measures with satisfactory psychometric properties, such as the single-item self-esteem scale (Robins et al., 2001), and the single-item measure of life satisfaction (Jovanović, 2016).

Notwithstanding these limitations, this research offers important implications for interventions aimed at reducing loneliness. In terms of policy implications, financial security emerged as an important determinant of loneliness. Several psychosocial interventions have been developed to combat the detrimental consequences of loneliness (Masi et al., 2011). The present findings suggest that interventions which promote satisfaction with life and body appreciation might contribute to reducing loneliness. Linardon et al. (2022, p. 295) suggested that "consideration of body appreciation as a key intervention target in mental health and wellbeing programs may be appropriate". Interventions to alleviate loneliness which focus on traits such as conscientiousness, extraversion, and emotional stability may be effective, as evidence supports the potential for trait modification (Roberts et al., 2017). Hence, multifaceted interventions aimed at reducing loneliness may be used. Our findings align with Vanhlast et al. (2013, p. 1078) indicating that "clinical work could significantly benefit from extending current social skills training with interventions aimed at improving social cognitions and self-perceptions".

CRediT authorship contribution statement

Félix Neto: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Eliany Nazaré Oliveira:** Writing – review & editing, Investigation, Data curation, Conceptualization. **Joana Neto:** Investigation, Formal analysis, Conceptualization.

Consent to participate

The informed consent was taken from the participants.

Ethics statement

All procedures performed in studies involving human participants were in accordance with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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