



# The Role of Self-Esteem in the Relationship Between Loneliness and Life Satisfaction in Late Adulthood: Evidence from Poland

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**Background:** The life satisfaction of elderly persons has been extensively investigated and discussed. However, a literature review shows that relatively few studies have focused on the effect of loneliness on the life satisfaction of older adults. Some researchers have acknowledged that the character of the relationship between loneliness and life satisfaction is still unclear, and this association is much more complex than it appears to be. Therefore, the main purpose of the current study was to understand how loneliness is associated with satisfaction, and whether self-esteem and educational involvement in the University of the Third Age (U3A) courses can affect this relationship among elderly people.

**Methods:** The research was conducted on a group of 179 elderly adults (65% women). We measured loneliness, satisfaction, and self-esteem. The data were collected via the paper-and-pencil format through convenience sampling, just before the COVID-19 pandemic began.

**Results:** The results obtained show that loneliness correlated negatively with self-esteem and life satisfaction. Self-esteem was associated positively with life satisfaction. Self-esteem acted as a suppressor between loneliness and life satisfaction. The participation of older adults in U3A moderated the strength of the relationship between loneliness and life satisfaction (direct effect) and between loneliness and life satisfaction mediated by self-esteem (indirect effect).

**Conclusion:** The mediatory role of self-esteem and the moderating role of educational activities in the relationship between loneliness and life satisfaction in late adulthood have important developmental and social implications. It appears that although feelings of loneliness and social isolation have a negative association on the life satisfaction of older adults, this relationship may be altered by empowering seniors' self-esteem through their involvement in lifelong learning. Such a solution supports the functioning of older people also at the social level.

**Keywords:** self-esteem, loneliness, life satisfaction, late adulthood, University of the Third Age, U3A, lifelong learning

## Introduction

As reported by the United Nations,<sup>1</sup> almost all countries in the world are subjected to an increase of the number of older people in their population. The estimates denote that by 2050, there will be more persons over the age of 65 than under age of 15.<sup>2</sup> Similar to other European states, Poland's population is ageing slowly but steadily.<sup>3</sup> In 2018, the proportion of people aged 65 and over reached 17.5%.<sup>4</sup> By 2030, the number of elderly in Poland is projected to reach 27%.<sup>3</sup>

As a result of the ageing process worldwide, the life satisfaction of elderly persons has been extensively investigated and discussed.<sup>5,6</sup> Although life

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satisfaction has a long research history in the field of gerontology, the findings are anything but conclusive.<sup>7</sup> On the one hand, several studies have suggested that many seniors accomplish a sense of fulfillment, feeling contented despite their decreasing strength and other age-related difficulties.<sup>8</sup> Late adulthood has been considered a time of opportunities<sup>9</sup> and psychological benefits.<sup>10,11</sup> Available data support that those elderly who report using selective optimization with compensation engage in different activities that help them maximize gains and minimize losses despite frailty and morbidity.<sup>12-14</sup> There is empirical evidence of the absence of a negative age effect on subjective well-being<sup>15</sup> when the elderly participate in recreational activities,<sup>16</sup> are involved in volunteer work or learn new skills.<sup>17</sup> In comparison with prior generations, nowadays older people are usually more active and healthier.<sup>18</sup> Several studies, including longitudinal ones, have shown that medical progress, better health care and hygiene,<sup>19</sup> physical activity and fitness,<sup>20</sup> and religious involvement<sup>21</sup> may enhance normal longevity. On the other hand, on an individual level, wide inconsistency is perceived in different studies.<sup>22,23</sup> In fact, a large body of research has also revealed that some older adults experience frustration and dissatisfaction related to their decreasing health, physical and social effectiveness, and independence.<sup>24</sup> They are more often alone or childless,<sup>25</sup> facing solitude, separation,<sup>26</sup> and the lack of a social network.<sup>18</sup> Therefore, one of the essential indicators of life satisfaction among aging residents seems to be loneliness.<sup>27</sup>

Loneliness, the subjective experience of social pain and isolation, is a great challenge in contemporary society.<sup>28,29</sup> It is a condition consisting of an intense sense of emptiness, inadequacy, absence of control, and internal threat as a consequence of a deficit of contact, especially from a lack of satisfying close family bonds and/or friendship ties.<sup>21</sup> As advanced by the discrepancy perspective of loneliness,<sup>30</sup> feeling lonely occurs when there is an inconsistency between the quality and/or quantity of social connections that an individual experiences against what they crave for. Accordingly, a person could be lonesome regardless of having a considerable social network, or be socially isolated and not feel abandoned. Although loneliness does not occur only in old age, the available studies show that up to one-third of seniors report feeling lonely to some degree.<sup>22</sup> Specifically, Dykstra<sup>31</sup> has observed, on the results of longitudinal data, that very old adults (80+) especially tend to experience higher loneliness. Besides, ageing research has demonstrated

that a state of solitude may lead to severe health-related consequences,<sup>32</sup> including heart disease,<sup>33,34</sup> depression,<sup>35,36</sup> diabetes,<sup>34</sup> cognitive<sup>37,38</sup> and physical<sup>39</sup> impairment, daytime dysfunction,<sup>40</sup> fear,<sup>36</sup> psychiatric morbidity,<sup>39</sup> worse sleep,<sup>41</sup> anxiety,<sup>42</sup> low resilience,<sup>43</sup> increased inflammation,<sup>44,45</sup> multimorbidity,<sup>46</sup> mortality,<sup>47</sup> and suicide outcomes.<sup>42,48</sup> Loneliness often results in a decline in the subjective and psychological well-being of older adults,<sup>49</sup> and their increased hopelessness,<sup>50</sup> and distress.<sup>42</sup>

A literature review shows<sup>51</sup> that relatively few studies have focused on the effect of loneliness on the life satisfaction of older adults. Nevertheless, it should be emphasised that there is considerable agreement about the specifics of this relationship. From a theoretical point of view, loneliness has been viewed a basic constituent of the quality of life in elderly adults.<sup>31</sup> The unpleasant experience of subjective loneliness generally worsens people's evaluations of their lives. Likewise, empirical evidence has shown that greater loneliness was often related to lower life satisfaction<sup>52,53</sup> and well-being.<sup>50</sup> Smith et al<sup>54</sup> have reported that feelings of loneliness were the strongest predictor ( $\beta = -0.29$ ) of life satisfaction in a group of more than 500 English elderly participants. In a similar study, Gow et al<sup>55</sup> found that an individual's level of loneliness emerged as the largest risk factor for life dissatisfaction, accounting for 12% of the variance of life satisfaction. According to Borg et al,<sup>56</sup> the perceived quality of a person's social network was the marker most strongly associated with life satisfaction in 4 of the 6 country samples.

Additionally, some researchers have acknowledged that the character of the relationship between loneliness and life satisfaction is still unclear, and this association is much more complex than it appears to be.<sup>57</sup> Since self-esteem reflects people's overall subjective appraisal of their personal value and worth,<sup>58</sup> and is perceived as one of the most decisive factors in the life of the elderly and helps them to cope more effectively with negative experience,<sup>59</sup> we chose it as a potential mediator between loneliness and satisfaction.

With respect to the relationship between loneliness and self-esteem, the literature provides some theoretical grounds for this association.<sup>60</sup> For instance, according to sociometer theory,<sup>61</sup> people who do not feel like they are part of supportive groups and caring relationships, in other words have sense of isolation or interpersonal rejection, tend to display lower self-esteem. Viewed in this way, self-

esteem is an inner and personal indicator that represents the evaluation of one's relational value to other people.<sup>62</sup> Therefore, it can be inferred that self-esteem can be influenced by loneliness<sup>29</sup> and considered as its consequence.<sup>63</sup> Consistent with this theoretical perspective, Cacioppo et al<sup>29</sup> have provided some empirical evidence confirming that higher loneliness predicted lower self-esteem even when this relationship was controlled by the set of six personality factors correlated with loneliness (urgency, emotional stability, agreeableness, conscientiousness, shyness, and sociability). Likewise, individuals who declared higher quality relationships also tended to have higher levels of self-esteem.<sup>64</sup> Zhao et al<sup>65</sup> have reported that older people who experienced lower loneliness, tended to declare higher self-esteem. However, there are also some other studies that report an inverse approach to the association between both constructs. For example, there is some evidence that a reduced level of self-esteem may be a predictor of loneliness, considering that people who do not evaluate themselves favorably do not feel comfortable in social interactions.<sup>66</sup>

With regard to the association between self-esteem and life satisfaction in late adulthood, self-esteem has been listed as one of the key dispositional constructs associated with old age.<sup>67</sup> Rosenberg et al<sup>58</sup> have noted that self-esteem is related to the psychological well-being of children, adolescents, adults, and the elderly, although only a few studies have focused on the development of self-esteem in old age.<sup>68</sup> Beutel et al<sup>69</sup> have found that life satisfaction in aged women and men relies on the balance of resources and high self-esteem. Other researchers,<sup>68,70</sup> through longitudinal studies of generations, have found rather a sharp drop of self-esteem in old age. At the same time, self-esteem was related to higher levels of different dimensions of satisfaction.<sup>70</sup> Borg et al<sup>56</sup> have verified that self-esteem, together with feeling worried, was an important predictor of life satisfaction of people aged 65–89 in 6 European countries.

Finally, although there is not enough research on this topic among elderly adults, Çivitci and Çivitci<sup>71</sup> have found that self-esteem acted as a mediator in the relationship between loneliness and life satisfaction in adolescents. Similarly, Kong and You<sup>72</sup> observed that low social support may influence the way people perceive themselves and, consequently, their well-being, as well. Furthermore, there are some studies which have confirmed that self-esteem has a positive impact as an intervening factor on the relationship between variables with related conceptual meaning such as well-being and its

dimensions. For example, self-esteem has been found to mediate the association between loneliness, and both depressive syndromes<sup>73</sup> and life satisfaction.<sup>74</sup> Self-esteem acted as a mediator between social support and well-being.<sup>75</sup> The bases for such a relationship may be founded on some theoretical evidence. Self-esteem affects one's attitude toward life, influences persistence and competence, and stimulates one's strengths.<sup>76</sup>

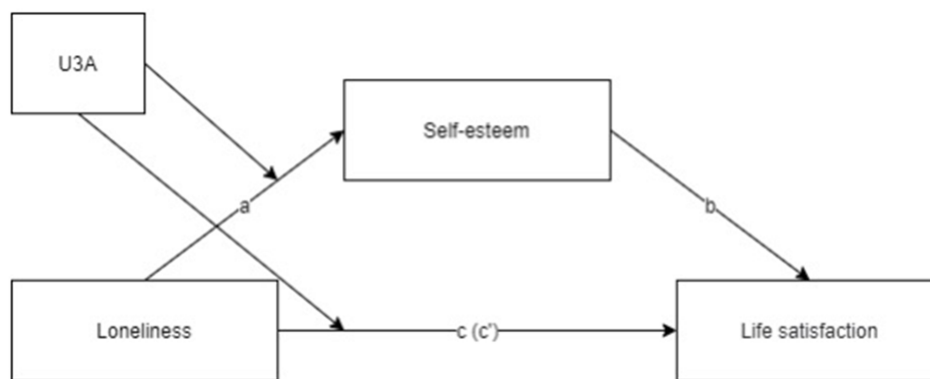
Additionally, different studies have showed that older adults who participate in the University of the Third Age (U3A) and master new skills through diverse initiatives (eg learning a foreign language),<sup>77,78</sup> playing a new instrument,<sup>79</sup> or using a computer and the Internet, scored higher in life satisfaction<sup>80</sup> and in overall quality of life.<sup>81</sup> This educational adult movement stems from an international initiative to include older people in the lifelong learning system with an aim to improve their quality of life.<sup>82,83</sup> In fact, several studies<sup>84–87</sup> have shown that active engagement in educational activities has a positive impact on successful ageing. Since the U3A is a way of making elderly people active,<sup>88</sup> we assumed that participating in the U3A might play a moderatory role in the relationship between loneliness and life satisfaction. Since there is a considerable gap on this topic in the European literature,<sup>89</sup> including Poland and other Central and Eastern countries, the main purpose of the current study was to understand how loneliness is associated with satisfaction among elderly Polish people, and whether self-esteem and educational involvement in U3A courses can affect this relationship.

Based on the literature reviewed above, the following hypotheses were specified: (1) Loneliness negatively correlates with life satisfaction and self-esteem; (2) Self-esteem is positively associated with life satisfaction; (3) Self-esteem mediates the relationship between loneliness and life satisfaction in late adulthood; (4) Participation in the University of the Third Age moderates the relationship between loneliness and self-esteem/life satisfaction (moderated mediation) (Figure 1). When the elderly are members of the U3A, the relationship between loneliness and self-esteem/life satisfaction is weaker. When the elderly are not members of the U3A, this relationship is stronger.

## Methods

### Participants

The research was conducted on a group of 179 elderly adults (65% women). The mean age of the respondents was  $M = 70.95$  with  $SD = 6.16$  (range = 60–89 years).



**Figure 1** Moderated mediation model of U3A membership and the mediating role of self-esteem in the effect of loneliness on life satisfaction.

Around 67% of participants declared being engaged in presentational lectures, seminars, and practical workshops organised by University of the Third Age.

## Data Collection

In this study, the data were collected via the paper-and-pencil format through convenience sampling, just before the COVID-19 pandemic began in Poland. University students of psychology were asked if their older family members would like to participate in the research. This type of sampling was chosen because of its simple, inexpensive, and efficient implementation. All of the seniors were informed of the purpose of the study and assured about the privacy protection policy. Those who decided to take part in the study were presented with a comprehensive description about its aim and provided fully informed written consent. After agreeing to participate in the research, the elderly were invited to fill out a set of questionnaires. The study protocol was approved by the Bioethics Committee of the Institute of Psychology at the University of Szczecin and carried out in accordance with the Declaration of Helsinki.

## Measurement

### Loneliness

The De Jong Gierveld Loneliness Scale (DJGLS) was developed by de Jong Gierveld and Kamphuls<sup>90</sup> and adapted into Polish by Grygiel et al.<sup>91</sup> It is an 11-item scale which contains two subscales. The emotional loneliness subscale (six negatively worded items), and the social loneliness subscale (five positively worded items). Respondents endorse each item by using 5-point Likert scale ranging from “1 = strongly agree” to “5 = strongly disagree”. The total possible score can range from a minimum of 11 to a maximum of 55. The higher the

total score, the higher the feeling of loneliness. The Cronbach’s alpha reliability coefficient in the adapted Polish version was 0.89. In the present study, the alpha was 0.87.

### Satisfaction with Life

The Satisfaction With Life Scale (SWLS) originated by Diener et al<sup>92</sup> and adapted into Polish by Juczyński<sup>93</sup> is a short, 5-item scale designed to measure global cognitive judgements of one’s life satisfaction (not a measure of either positive or negative affect). Participants indicate how much they agree or disagree with each of the 5 items using a 7-point Likert scale ranging from “7 = strongly agree” to “1 = strongly disagree”. The items are summed to find a total score, with the possible range being between 5 and 35. The higher the final score, the higher the sense of satisfaction with life. By interpreting the results on a sten scale, values from 1 to 4 sten are treated as low scores, from 7 to 10 sten as high, and results of 5 and 6 sten are treated as average. The studies reported a Cronbach’s  $\alpha$  coefficient of 0.87 for the SWLS and a two month test-retest stability coefficient of 0.82.<sup>92</sup> In the present study, the alpha was also 0.87.

### Self-Esteem

The Rosenberg Self-Esteem Scale (RSES) was designed by Rosenberg<sup>58</sup> and adapted into Polish by Łaguna, Lachowicz-Tabaczek and Dzwonkowska.<sup>94</sup> It is a 10-item scale which measures positive self-esteem (example item: “On the whole, I am satisfied with myself”) and negative self-esteem (example item: “At times I think I am no good at all”). Respondents assess their level of agreement with each of 10 statements by using a 4-point Likert scale that ranges from “1 = strongly agree” to “4 = strongly disagree”. Five statements are positively worded

and the other five are negatively worded. The possible total score can range from a minimum of 10 to a maximum of 40. The higher the final score, the better the self-esteem. The Cronbach's alpha reliability coefficient of the original English version of the questionnaire was 0.86. In the adapted Polish version, in different age groups, Cronbach's alpha was from 0.81 to 0.83. In the present study, the alpha was 0.94.

## Statistical Analysis

The IBM SPSS Statistics 25.0 software with the PROCESS macro (v3.2) was used to perform all analyses. The G\*Power v3.1.9.4 software was also used to estimate the size of the research sample a priori. All analyses were carried out with a 95% probability and minimum significance level at  $p < 0.05$ . The bootstrapping method was used with 5000 resamples. There was no missing data identified among the observations obtained.

The first step of the analysis was to determine the minimum size of the research sample necessary for the empirical verification of the tested mediation model. For this purpose, the G\*Power software was used with effect size  $f^2 = 0.15$  and power = 0.80 options. As a result, the total sample size was determined to be 86, and the criterion was met for the number of observations obtained ( $N = 179$ ).

Next, the variables of loneliness, satisfaction with life, and self-esteem were screened for skewness and kurtosis to assess the deviation of their distributions from normality. Using the Mahalanobis distance ( $p < 0.001$ ) and Cook's distance, and leverage measures, the data was checked to identify outliers. The criterion for rejecting observations was the failure to meet two of the three indicators of the distance measures used, the result being that no outliers were identified. To examine confounding variables, a hierarchical regression analysis was performed with age, sex, and participation in U3A classes. This was the premise to check the tested mediation model including U3A as a moderator. Before proceeding with the mediation analysis, all variables were checked for correlation with Pearson's  $r$ .

The first model tested concerned the relationship between the independent variable, loneliness and the dependent variable, life satisfaction mediated by self-esteem. All variables were quantitative, therefore model 4 of the PROCESS macro by Hayes<sup>95</sup> with the use of the bootstrapping method was used to analyze this model. The estimated conditional indirect effect was also tested using the bootstrapping method with the PROCESS macro. Due

to the fact that all variables in this model, excluding the moderating variable, were quantitative, in accordance with the basic assumptions of the bootstrapping procedure,<sup>96</sup> model 8 was used to analyze this model, compliant with Hayes' PROCESS macro.<sup>95</sup> The moderating variable was transformed into two several indicator variables. To confirm the direction of this interaction effect, we applied conventional procedures for plotting simple slopes at one standard deviation above and below the mean of the distributive justice measure. In the tested second model of moderated mediation, the role of the qualitative and dichotomic moderator as a participant in U3A (non-membership/membership) was checked for both the direct effect between the dependent variable, life satisfaction and the independent variable, loneliness, and indirect effect with the inclusion of a mediator, self-esteem.

## Results

### Descriptive Statistics and Initial Analysis

The values of mean, standard deviation, skewness, and kurtosis, and the Shapiro–Wilk test are reported in Table 1. Despite statistically significant ( $p < 0.001$ ) values of the normality test, the skewness and kurtosis values were in a relatively low range of  $\pm 1$ , therefore it was found that the deviation from the normal distribution is not meaningful and the variables of loneliness, satisfaction with life, and self-esteem were close to the normal distribution. In addition, the bootstrapping method used is resistant to breaking this criterion.

### Multicollinearity and Confounding

The Durbin–Watson test result obtained, in the range from 1 to 3,<sup>96</sup> confirmed the fulfillment of the assumption about the lack of correlation of random components ( $d = 1.65$ ), and the obtained Variance Inflation Factor value ( $VIF = 2.21$ ) and tolerance = 0.45 confirmed the low correlation of the predictors.

**Table 1** Descriptive Statistics for Loneliness, Life Satisfaction, and Self-Esteem ( $N = 179$ )

Variables	M	SD	Skewness	Kurtosis	W
Loneliness	20.51	7.67	0.85	0.20	0.932***
Satisfaction with life	24.18	5.35	-0.95	0.87	0.928***
Self-esteem	31.20	4.84	-0.69	0.32	0.955***

Note: \*\*\* $p < 0.001$ .

Abbreviations: W, Shapiro–Wilk test.

The results obtained through a hierarchical regression analysis indicate that after adding the age, sex, and U3A membership as confounding variables, the predictors explained only an additional 2% of the variance of the dependent variable ( $R^2$  from 0.63 to 0.65): age ( $\beta = -0.02$ ,  $t = -0.47$ ,  $p = 0.639$ ), sex ( $\beta = 0.05$ ,  $t = 0.09$ ,  $p = 0.929$ ), and the U3A ( $\beta = 2.10$ ,  $t = 3.69$ ,  $p = 0.001$ ). The statistically significant value of the non-standardised regression coefficient for the U3A ( $p = 0.001$ ) indicates that this variable could be a confounding variable—in particular in the case of the self-esteem independent variable (change  $B$  from 0.43 to 0.33 and from  $-0.32$  to  $-0.33$  for loneliness).

## Correlations

The results obtained show that loneliness correlated negatively with self-esteem  $r(179) = -0.74$ ,  $p = 0.001$  and life satisfaction  $r(179) = -0.75$ ,  $p = 0.001$ . Self-esteem was associated positively with life satisfaction  $r(179) = 0.73$ ,  $p = 0.001$ .

## Mediation Analysis

The results of the mediation analysis using the bootstrapping method and PROCESS macro showed that the tested model explained 55% of the variance of the dependent variable, life satisfaction ( $R^2 = 0.55$ ), and was well-fitted to the data ( $F(1,177) = 214.28$ ,  $p < 0.001$ ). The obtained values of standardised regression coefficients are presented in Figure 2.

Statistically significant unstandardised regression values were found between the independent variable, loneliness, and the mediator, self-esteem (path a) ( $B = -0.47$ ,  $SE = 0.03$ ,  $t = -14.64$ ,  $p < 0.001$ ); the mediator and the dependent variable, life satisfaction (path b) ( $B = 0.43$ ,  $SE = 0.08$ ,  $t = 5.64$ ,  $p < 0.001$ ), and a direct effect between the dependent and independent variable (path c) ( $B = -0.52$ ,  $SE = 0.03$ ,  $t = -14.92$ ,  $p < 0.001$ ).

The total indirect effect for the entire model, including the intermediary variable, was Indirect =  $-0.20$  ( $SE = 0.04$ , 95%

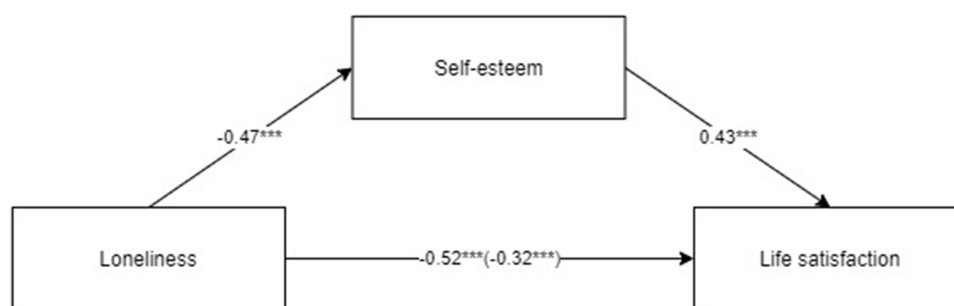
CI[ $-0.27$ ,  $-0.13$ ]). Summarising, the value of path c ( $-0.52$ ) after adding self-esteem (M) increased to  $B = -0.32$  (path c').

## Moderated Mediation Analysis

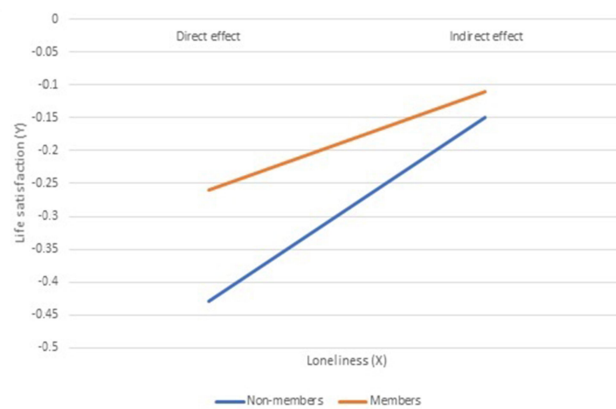
The index of the moderated mediation indicates a statistically significant conditional indirect effect (Index = 0.05,  $SE = 0.02$ , 95% CI[0.01, 0.10]) with the effect size for a direct effect (Direct =  $-0.11$ ) and indirect effect (Indirect =  $-0.15$ ) and pairwise contrasts = 0.05 ( $SE = 0.02$ , 95% CI[0.01, 0.10]).

The moderated indirect effect model explained 60% of the variance of the dependent variable ( $R^2 = 0.60$ ) and was well-matched to the data ( $F(3.175) = 116.44$ ,  $p < 0.001$ ), and the direct effect explained 67% of the variance ( $R^2 = 0.67$ ) and was also well-fitted ( $F(4.174) = 70.38$ ,  $p < 0.001$ ). In both cases, statistically significant indicators of standardised regression values for the analysed interactions were obtained ( $B = 0.16$ ,  $SE = 0.06$ ,  $t = 2.67$ ,  $p < 0.01$  for the indirect effect, and  $B = 0.17$ ,  $SE = 0.07$ ,  $t = 2.46$ ,  $p < 0.05$  for the direct effect). The differences obtained were illustrated using a simple slopes plot (Figure 3). Therefore, the outcomes showed that U3A (non-membership/membership) moderated both the direct and the indirect effect of loneliness on life satisfaction through self-esteem.

The plot shows that the difference in effect size between U3A members and non-members is greater for the direct effect between loneliness and life satisfaction ( $B = -0.43$  for non-members, and  $B = -0.26$  for members) than for the indirect effect including self-esteem as a mediator (Indirect =  $-0.15$  for members, and Indirect =  $-0.11$  for non-members). In other words, the regression value between the dependent and independent variable and the indirect effect size is significantly higher among U3A members than non-members.



**Figure 2** Values of the mediating role of self-esteem in the effect of loneliness on life satisfaction. \*\*\* $p < 0.001$ .



**Figure 3** Moderating impact of U3A membership on the mediating role of self-esteem in the effect of loneliness on life satisfaction.

## Discussion

The goal of the current study was quadruple. The first aim was to determine whether loneliness negatively correlates with life satisfaction and self-esteem. The second purpose was to investigate the link between self-esteem and life satisfaction. The third objective was to estimate if self-esteem mediates the relationship between loneliness and life satisfaction in late adulthood. The fourth aim was to verify if participation in the University of the Third Age would moderate the relationship between loneliness and self-esteem/life satisfaction. The latter goal constituted the novelty of the present study. All the hypotheses were supported.

In relation to the first goal, our findings are consistent with the majority of studies carried out in different cultural environments. For example, Perlman and others<sup>97</sup> observed that greater loneliness among senior citizens in Canada was linked with their lower life satisfaction. Loneliness also predicted subjective well-being in Irish community-dwelling elders.<sup>98</sup> Elderly people from Turkey who declared being lonely showed lower quality of life, as well.<sup>99</sup> Conversely, when feelings of sense of loneliness were reduced, older adults from Hong Kong were more likely to have greater life satisfaction.<sup>100</sup> At the same time, previous research reported that lower self-esteem was associated with a stronger feeling of being lonely not only in the general population of older people,<sup>101,102</sup> but also among visually impaired elderly participants.<sup>103</sup> Loneliness has also been found to diminish self-esteem.<sup>104</sup> Adults in the older age group who experienced being lonely displayed lower belief in themselves and their own value.<sup>65</sup>

With respect to the second aim, our results also corroborate former studies. Orth et al<sup>70</sup> confirmed that self-esteem had small-to-medium-sized effects on different life outcomes, including relationships and job satisfaction. Likewise, it predicted increases in positive affect and decreases in negative affect. In other studies, self-esteem has been recognised as an important cognitive variable that contributes to life satisfaction,<sup>105</sup> and as a central aspect of well-being in a sample of older adults.<sup>106</sup> Similar results have been obtained among Chinese community dwellers living in Hong Kong, aged 55 years or older. Leung et al<sup>67</sup> found not only a medium correlation between self-esteem and life satisfaction, but that life satisfaction was predicted by self-esteem. Abu-Bader et al<sup>5</sup> observed that personal traits, such as self-esteem, influenced life satisfaction among frail elders.

The third aim was associated with the mediatory role of self-esteem in the relationship between loneliness and life satisfaction in late adulthood. The findings might demonstrate that self-esteem acted as a suppressor between these two variables. In other words, the attitude toward oneself and one's evaluation of one's own thoughts and feelings may influence the enhancement of life satisfaction in elderly persons with tendency to higher levels of loneliness. Therefore, it may be presumed that an unpleasant lack of relationships or communication with others does not totally hinder a global assessment of life satisfaction among older adults if they try to sustain their personal feelings of self-esteem, competence and worthiness. Such a role of self-esteem can result from the theory of mental incongruity. According to this conceptual framework, higher self-esteem may be one of many potential opportunities for change.

Finally, the moderated mediation analyses demonstrated that the participation of older adults in the U3A moderated the strength of the relationship between loneliness and life satisfaction (direct effect) and between loneliness and life satisfaction mediated by self-esteem (indirect effect). In the first case, it seems that the association between loneliness and life satisfaction is stronger in the group of elderly involved in educational activities (members of the U3A) than those not involved. The same pattern of influence occurs in the case of the mediatory effect of self-esteem in the relationship between loneliness and life satisfaction. This is understandable if we consider that active ageing and involvement in different forms of social life reduces isolation and improves its quality.<sup>107</sup> The learning activities that the U3A proposes have been recognised as a human capital that provides many benefits, both for the individual and for society as a whole.<sup>108</sup> More specifically, at the individual level, participating in the courses of the U3A

and lifelong learning may contribute to building confidence, self-esteem,<sup>109</sup> and self-efficacy.<sup>110</sup> In fact, literacy is considered to have a deep impact on people's self-worth and life satisfaction.<sup>111</sup> Since, there is some evidence that self-esteem is a decisive aspect of the adaptive processes in late adulthood,<sup>112</sup> and a relatively stable component of personality both across the life span<sup>112,113</sup> and after age 60,<sup>114</sup> it seems important to cultivate it, also through education, during the whole life time. The current results show that the present sample of participants had quite a high level of self-esteem ( $M = 31.20$ ), in comparison to the elderly from Korea ( $M = 28.33$ ), and Ecuador ( $M = 28.23$ ),<sup>115</sup> although lower than among Iranian respondents ( $M = 35.63$ ) or participants from some Western and Northern European countries – all between  $M = 36.70$  (the UK) and  $40.60$  (Austria).<sup>116</sup>

## Implications

The mediatory role of self-esteem and the moderating role of educational activities in the relationship between loneliness and life satisfaction in late adulthood have important developmental and social implications. It appears that although feelings of loneliness and social isolation have a negative impact on the life satisfaction of older adults, this relationship may be altered by empowering seniors' self-esteem through their involvement in lifelong learning. Such a solution supports the functioning of older people also at the social level. In fact, Narushima et al<sup>117</sup> have reported that older adults' participation in non-formal courses and formal education programmes was related to their psychological well-being and health, even after taking into account different covariates.

## Limitations

Despite the importance of the outcomes, some limitations should be taken into account. Firstly, the use of convenience sampling which does not represent the target population may lead to biased results. Accordingly, in order to minimize the disadvantages of this type of sample and control the sources of sampling bias, it would be appropriate to extend the study, for example, to an Internet-based survey. Secondly, we did not include participants' education among the sociodemographic variables. In the future studies, it would be interesting to consider the level of literacy since previous empirical reports<sup>118</sup> show that education appears to be an important factor for both loneliness and life satisfaction. Thirdly, we assumed that self-esteem is an outcome in the relationship with loneliness. However, self-esteem can be considered a cause of loneliness. Hence, in future research, it would be valuable to examine the inverse approach.

## Conclusion

In spite of these limitations, the present study increases our understanding of the interaction among loneliness, self-esteem, and life satisfaction among the elderly. Furthermore, it provides significant support for the mediatory role of self-esteem between loneliness and life satisfaction, and the moderating effect of non-membership /membership of U3A. It appears that although feelings of loneliness and social isolation have a negative association on the life satisfaction of older adults, this relationship may be altered by empowering seniors' self-esteem through their involvement in lifelong learning. Such a solution also supports the functioning of older people at the social level.

## Data Sharing Statement

The data sets used during the current study are available from the corresponding author.

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## Author Contributions

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

## Disclosure

The authors report no conflicts of interest in this work.

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