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

This article was published in the following Dove Press journal:
Psychology Research and Behavior Management

Małgorzata Szcześniak
Grażyna Bielecka
Daria Madej
Elżbieta Pieńkowska
Wojciech Rodzeń

Institute of Psychology, University of
Szczecin, Szczecin 71-017, Poland

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,¹ 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 15.² Similar to other European states, Poland's population is ageing slowly but steadily.³ In 2018, the proportion of people aged 65 and over reached 17.5%.⁴ By 2030, the number of elderly in Poland is projected to reach 27%.³

As a result of the ageing process worldwide, the life satisfaction of elderly persons has been extensively investigated and discussed.^{5,6} Although life

Correspondence: Małgorzata Szcześniak
Email malgorzata.szczeniak@usz.edu.pl

satisfaction has a long research history in the field of gerontology, the findings are anything but conclusive.⁷ 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.⁸ Late adulthood has been considered a time of opportunities⁹ and psychological benefits.^{10,11} 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.^{12–14} There is empirical evidence of the absence of a negative age effect on subjective well-being¹⁵ when the elderly participate in recreational activities,¹⁶ are involved in volunteer work or learn new skills.¹⁷ In comparison with prior generations, nowadays older people are usually more active and healthier.¹⁸ Several studies, including longitudinal ones, have shown that medical progress, better health care and hygiene,¹⁹ physical activity and fitness,²⁰ and religious involvement²¹ may enhance normal longevity. On the other hand, on an individual level, wide inconsistency is perceived in different studies.^{22,23} 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.²⁴ They are more often alone or childless,²⁵ facing solitude, separation,²⁶ and the lack of a social network.¹⁸ Therefore, one of the essential indicators of life satisfaction among aging residents seems to be loneliness.²⁷

Loneliness, the subjective experience of social pain and isolation, is a great challenge in contemporary society.^{28,29} 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.²¹ As advanced by the discrepancy perspective of loneliness,³⁰ 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.²² Specifically, Dykstra³¹ 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,³² including heart disease,^{33,34} depression,^{35,36} diabetes,³⁴ cognitive^{37,38} and physical³⁹ impairment, daytime dysfunction,⁴⁰ fear,³⁶ psychiatric morbidity,³⁹ worse sleep,⁴¹ anxiety,⁴² low resilience,⁴³ increased inflammation,^{44,45} multimorbidity,⁴⁶ mortality,⁴⁷ and suicide outcomes.^{42,48} Loneliness often results in a decline in the subjective and psychological well-being of older adults,⁴⁹ and their increased hopelessness,⁵⁰ and distress.⁴²

A literature review shows⁵¹ 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.³¹ 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^{52,53} and well-being.⁵⁰ Smith et al⁵⁴ 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 al⁵⁵ 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,⁵⁶ 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.⁵⁷ Since self-esteem reflects people's overall subjective appraisal of their personal value and worth,⁵⁸ 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,⁵⁹ 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.⁶⁰ For instance, according to sociometer theory,⁶¹ 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.⁶² Therefore, it can be inferred that self-esteem can be influenced by loneliness²⁹ and considered as its consequence.⁶³ Consistent with this theoretical perspective, Cacioppo et al²⁹ 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.⁶⁴ Zhao et al⁶⁵ 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.⁶⁶

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.⁶⁷ Rosenberg et al⁵⁸ 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.⁶⁸ Beutel et al⁶⁹ have found that life satisfaction in aged women and men relies on the balance of resources and high self-esteem. Other researchers,^{68,70} 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.⁷⁰ Borg et al⁵⁶ 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 Çivitci⁷¹ have found that self-esteem acted as a mediator in the relationship between loneliness and life satisfaction in adolescents. Similarly, Kong and You⁷² 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 syndromes⁷³ and life satisfaction.⁷⁴ Self-esteem acted as a mediator between social support and well-being.⁷⁵ 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.⁷⁶

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),^{77,78} playing a new instrument,⁷⁹ or using a computer and the Internet, scored higher in life satisfaction⁸⁰ and in overall quality of life.⁸¹ 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.^{82,83} In fact, several studies^{84–87} 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,⁸⁸ 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,⁸⁹ 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 Kamphuis⁹⁰ and adapted into Polish by Grygiel et al.⁹¹ 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 al⁹² and adapted into Polish by Juczyński⁹³ 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 α coefficient of 0.87 for the SWLS and a two month test-retest stability coefficient of 0.82.⁹² In the present study, the alpha was also 0.87.

Self-Esteem

The Rosenberg Self-Esteem Scale (RSES) was designed by Rosenberg⁵⁸ and adapted into Polish by Łaguna, Lachowicz-Tabaczek and Dzwonkowska.⁹⁴ 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 Hayes⁹⁵ 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,⁹⁶ model 8 was used to analyze this model, compliant with Hayes' PROCESS macro.⁹⁵ 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 ± 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 3,⁹⁶ 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 others⁹⁷ 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.⁹⁸ Elderly people from Turkey who declared being lonely showed lower quality of life, as well.⁹⁹ Conversely, when feelings of sense of loneliness were reduced, older adults from Hong Kong were more likely to have greater life satisfaction.¹⁰⁰ 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,^{101,102} but also among visually impaired elderly participants.¹⁰³ Loneliness has also been found to diminish self-esteem.¹⁰⁴ Adults in the older age group who experienced being lonely displayed lower belief in themselves and their own value.⁶⁵

With respect to the second aim, our results also corroborate former studies. Orth et al⁷⁰ 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,¹⁰⁵ and as a central aspect of well-being in a sample of older adults.¹⁰⁶ Similar results have been obtained among Chinese community dwellers living in Hong Kong, aged 55 years or older. Leung et al⁶⁷ found not only a medium correlation between self-esteem and life satisfaction, but that life satisfaction was predicted by self-esteem. Abu-Bader et al⁵ 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.¹⁰⁷ 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.¹⁰⁸ More specifically, at the individual level, participating in the courses of the U3A

and lifelong learning may contribute to building confidence, self-esteem,¹⁰⁹ and self-efficacy.¹¹⁰ In fact, literacy is considered to have a deep impact on people's self-worth and life satisfaction.¹¹¹ Since, there is some evidence that self-esteem is a decisive aspect of the adaptive processes in late adulthood,¹¹² and a relatively stable component of personality both across the life span^{112,113} and after age 60,¹¹⁴ 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 ($M = 28.23$),¹¹⁵ 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).¹¹⁶

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 al¹¹⁷ 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 reports¹¹⁸ 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.

Acknowledgment

The authors thank the study participants.

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.

References

1. United Nations Publications. World Population Ageing. 2015. Available from: https://www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2015_InfoChart.pdf. Accessed December 5, 2020.
2. Lunenfeld B. An aging world – demographics and challenges. *Gynecol Endocrinol*. 2008;24(1):1–3. doi:10.1080/09513590701718364
3. Leszko M, Zając-Lamparska L, Trempala J. Aging in Poland. *Gerontologist*. 2015;55(5):707–715. doi:10.1093/geront/gnu171
4. Sobczak E, Bartniczak B, Raszkowski A. Aging society and the selected aspects of environmental threats: evidence from Poland. *Sustainability*. 2020;12:11. doi:10.3390/su12114648
5. Abu-Bader SH, Rogers A, Barusch AS. Predictors of life satisfaction in frail elderly. *J Gerontol Soc Work*. 2003;38(3):3–17. doi:10.1300/j083v38n03_02
6. Han X, Yang Y, Li F, Li Y. Adding life to years: the influence of Internet use and appearance management on life satisfaction among the elderly. *Soc Indic Res*. 2020. doi:10.1007/s11205-020-02342-7

7. Chen C. Aging and life satisfaction. *Soc Indic Res.* 2001;54(1):57–79. doi:10.1023/A:1007260728792
8. Ardelit M. Wisdom and life satisfaction in old age. *J Gerontol B Psychol Sci Soc Sci.* 1997;52B(1):15–27. doi:10.1093/geronb/52B.1.P15
9. Bauer I, Wrosch C. Making up for lost opportunities: the protective role of downward social comparisons for coping with regrets across adulthood. *Pers Soc Psychol Bull.* 2011;37(2):215–228. doi:10.1177/0146167210393256
10. Pavot W, Diener E. The subjective evaluation of well-being in adulthood: findings and implications. *Ageing Int.* 2004;29(2):113–135. doi:10.1007/s12126-004-1013-4
11. Homan KJ. Secure attachment and eudaimonic well-being in late adulthood: the mediating role of self-compassion. *Ageing Ment Health.* 2018;22(3):363–370. doi:10.1080/13607863.2016.1254597
12. Carpentieri JD, Elliott J, Brett CE, Deary IJ. Adapting to aging: older people talk about their use of selection, optimization, and compensation to maximize well-being in the context of physical decline. *J Gerontol B Psychol Sci Soc Sci.* 2016;72(2):gbw132. doi:10.1093/geronb/gbw132
13. Nimrod G. Aging well in the digital age: technology in processes of selective optimization with compensation. *J Gerontol B Psychol Sci Soc Sci.* 2020;75(9):2008–2017. doi:10.1093/geronb/gbz111
14. Wahl HW. Aging successfully: possible in principle? Possible for all? Desirable for all? *Integr Psychol Behav Sci.* 2020;54:252–268. doi:10.1007/s12124-020-09513-8
15. Schilling O. Development of life satisfaction in old age: another view on the “paradox”. *Soc Indic Res.* 2006;75(2):241–271. doi:10.1007/s11205-004-5297-2
16. Erickson J, Johnson GM. Internet use and psychological wellness during late adulthood. *Can J Aging.* 2011;30(2):197–209. doi:10.1017/S0714980811000109
17. Ho HC. Elderly volunteering and psychological well-being. *Int Soc Work.* 2015;60(4):1280–1291. doi:10.1177/0020872815595111
18. Kemperman A, van den Berg P, Weijs-Perrée M, Uijtdewillegen K. Loneliness of older adults: social network and the living environment. *Int J Env Res Public Health.* 2019. 16(3):406. doi:10.3390/ijerph16030406
19. Brown RT, Miao Y, Mitchell SL, et al. Health outcomes of obtaining housing among older homeless adults. *Am J Public Health.* 2015;105(7):1482–1488. doi:10.2105/AJPH.2014.302539
20. McPhee JS, French DP, Jackson D, Nazroo J, Pendleton N, Degens H. Physical activity in older age: perspectives for healthy aging and frailty. *Biogerontology.* 2016;17:567–580. doi:10.1007/s10522-016-9641-0
21. Malone J, Dadswell A. The role of religion, spirituality and/or belief in positive ageing for older adults. *Geriatrics.* 2018;3(2):28. doi:10.3390/geriatrics3020028
22. Pinquart M, Sörensen S. Influences on loneliness in older adults: a meta-analysis. *Basic Appl Soc Psychol.* 2001;23(4):245–266. doi:10.1207/s15324834basps2304_2
23. Wilson RS, Beckett LA, Barnes LL, et al. Individual differences in rates of change in cognitive abilities of older persons. *Psychol Aging.* 2002;17(2):179–193. doi:10.1037/0882-7974.17.2.179
24. Błażnio A, Buliński L. Securing health: social rehabilitation and wellbeing in late adulthood. *Acta Neuropsychol.* 2013;11(3):239–248.
25. Zhang W, Liu G. Childlessness, psychological well-being, and life satisfaction among the elderly in China. *J Cross-Cult Gerontol.* 2007;22(2):185–203. doi:10.1007/s10823-007-9037-3
26. Ong AD, Uchino BN, Wethington E. Loneliness and health in older adults: a mini-review and synthesis. *Gerontology.* 2016;62:443–449. doi:10.1159/000441651
27. Goodwin R, Cook O, Yung Y. Loneliness and life satisfaction among three cultural groups. *Pers Relatsh.* 2001;8(2):225–230. doi:10.1111/j.1475-6811.2001.tb00037.x
28. de Jong Gierveld J, van Tilburg TG, Dykstra PA. The De Jong Gierveld short scales for emotional and social loneliness: tested data from 7 countries in the UN generations and gender surveys. *Eur J Ageing.* 2010;7(2):121–130. doi:10.1007/s10433-010-0144-6
29. Cacioppo JT, Hawkley LC, Ernst JM, et al. Loneliness within a nomological net: an evolutionary perspective. *J Res Pers.* 2006;40(6):1054–1085. doi:10.1016/j.jrp.2005.11.007
30. Menec VH, Newall NE, Mackenzie CS, Shooshitari S, Nowicki S. Examining social isolation and loneliness in combination in relation to social support and psychological distress using Canadian Longitudinal Study of Aging (CLSA) data. *PLoS One.* 2020;61(3):e0230673. doi:10.1371/journal.pone.0230673
31. Dykstra PA. Older adult loneliness: myths and realities. *Eur J Ageing.* 2009;6(2):91–100. doi:10.1007/s10433-009-0110-3
32. Jakobsson U, Hallberg IR. Loneliness, fear, and quality of life among elderly in Sweden: a gender perspective. *Aging Clin Exp Res.* 2005;17(6):494–501. doi:10.1007/bf03327417
33. Lauder W, Mummery K, Sharkey S. Social capital, age and religiosity in people who are lonely. *J Clin Nurs.* 2006;15(3):334–340. doi:10.1111/j.1365-2702.2006.01192.x
34. Tomaka J, Thompson S, Palacios R. The relation of social isolation, loneliness, and social support to disease outcomes among the elderly. *J Aging Health.* 2006;18(3):359–384. doi:10.1177/0898264305280993
35. Adams KB, Sanders S, Auth EA. Loneliness and depression in independent living retirement communities: risk and resilience factors. *Ageing Ment Health.* 2004;8(6):475–485. doi:10.1080/13607860410001725054
36. Aylaz R, Aktürk Ü, Erci B, Öztürk H, Aslan H. Relationship between depression and loneliness in elderly and examination of influential factors. *Arch Gerontol Geriatr.* 2012;55(3):548–554. doi:10.1016/j.archger.2012.03.006
37. Zhou Z, Mao F, Zhang W, Towne SD, Wang P, Fang Y. The association between loneliness and cognitive impairment among older men and women in China: a nationwide longitudinal study. *Int J Env Res Pub Health.* 2019;16:16. doi:10.3390/ijerph16162877
38. Hajek A, König HH. Which factors contribute to loneliness among older Europeans? Findings from the survey of health, ageing and retirement in Europe: determinants of loneliness. *Arch Gerontol Geriatr.* 2020;89:e104080. doi:10.1016/j.archger.2020.104080
39. Bowling AP, Edelmann RJ, Leaver J, Hoekel T. Loneliness, mobility, well-being and social support in a sample of over 85 year olds. *Pers Individ Differ.* 1989;10(11):1189–1192. doi:10.1016/0191-8869(89)90085-8
40. Hawkley LC, Preacher KJ, Cacioppo JT. Loneliness impairs daytime functioning but not sleep duration. *Health Psychol.* 2010;29(2):124–129. doi:10.1037/a0018646
41. Luanaigh CÖ, Lawlor BA. Loneliness and the health of older people. *Int J Geriatr Psychiatry.* 2008;23(12):1213–1221. doi:10.1002/gps.2054
42. Beutel ME, Klein EM, Brähler E, et al. Loneliness in the general population: prevalence, determinants and relations to mental health. *BMC Psychiatry.* 2017;17(1):97. doi:10.1186/s12888-017-1262-x
43. Zebhauser A, Hofmann-Xu L, Baumert J, et al. How much does it hurt to be lonely? Mental and physical differences between older men and women in the KORA-age study. *Int J Geriatr Psychiatry.* 2014;29(3):245–252. doi:10.1002/gps.3998
44. Vingeliene S, Hiyoshi A, Lentjes M, Fall K, Montgomery S. Longitudinal analysis of loneliness and inflammation at older ages: english longitudinal study of ageing. *Psychoneuroendocrinology.* 2019;110:e104421. doi:10.1016/j.psyneuen.2019.104421

45. Walker E, Ploubidis G, Fancourt D. Social engagement and loneliness are differentially associated with neuro-immune markers in older age: time-varying associations from the english longitudinal study of ageing. *Brain Behav Immun*. 2019;82:224–229.
46. Kristensen K, König HH, Hajek A. The association of multimorbidity, loneliness, social exclusion and network size: findings from the population-based German Ageing Survey. *BMC Public Health*. 2019;19:1. doi:10.1186/s12889-019-7741-x
47. Holt-Lunstad J, Smith T, Layton JB. Social relationships and mortality risk: a meta-analytic review. *PLoS Med*. 2010. doi:10.1371/journal.pmed.10000316
48. Calati R, Ferrari C, Brittner M, et al. Suicidal thoughts and behaviors and social isolation: a narrative review of the literature. *J Affect Disord*. 2019;245:653–667. doi:10.1016/j.jad.2018.11.022
49. Tiwari SC. Loneliness: a disease? *Indian J Psychiatry*. 2013;55(4):320–322. doi:10.4103/0019-5545.120536
50. Golden J, Conroy RM, Bruce I, et al. Loneliness, social support networks, mood and wellbeing in community-dwelling elderly. *Int J Geriatr Psychiatry*. 2009;24(7):694–700. doi:10.1002/gps.2181
51. Musich S, Wang SS, Hawkins K, Yeh CS. The impact of loneliness on quality of life and patient satisfaction among older, sicker adults. *Gerontol Geriatr Med*. 2015;23(3):S168–S169. doi:10.1016/j.jagp.2014.12.176
52. Mellor KS, Edelmann RJ. Mobility, social support, loneliness and well-being amongst two groups of older adults. *Pers Individ Differ*. 1988;9(1):1–5. doi:10.1016/0191-8869(88)90024-4
53. Borg C, Hallberg IR, Blomqvist K. Life satisfaction among older people (65) with reduced self-care capacity: the relationship to social, health and financial aspects. *J Clin Nurs*. 2006;15(5):607–618. doi:10.1111/j.1365-2702.2006.01375.x
54. Smith AE, Sim J, Scharf T, Phillipson C. Determinants of quality of life amongst older people in deprived neighbourhoods. *Ageing Soc*. 2004;24(5):793–814. doi:10.1017/s0144686x04002569
55. Gow AJ, Pattie A, Whiteman MC, Whalley LJ, Deary IJ. Social support and successful aging: investigating the relationships between lifetime cognitive change and life satisfaction. *J Individ Differ*. 2007;28(3):103–115. doi:10.1027/1614-0001.28.3.103
56. Borg C, Fagerström C, Balducci C, et al. Life satisfaction in 6 European countries: the relationship to health, self-esteem, and social and financial resources among people (aged 65–89) with reduced functional capacity. *Geriatr Nurs*. 2008;29(1):48–57. doi:10.1016/j.gerinurse.2007.05.002
57. Swami V, Chamorro-Premuzic T, Sinniah D, et al. General health mediates the relationship between loneliness, life satisfaction and depression. A study with Malaysian medical students. *Soc Psychiatry Psychiatr Epidemiol*. 2007;42(2):161–166. doi:10.1007/s00127-006-0140-5
58. Rosenberg M, Schooler C, Schoenbach C, Rosenberg F. Global self-esteem and specific self-esteem: different concepts, different outcomes. *Am Sociol Rev*. 1995;60(1):141. doi:10.2307/2096350
59. Moos RH, Brennan PL, Schutte KK, Moos BS. Older adults' coping with negative life events: common processes of managing health, interpersonal, and financial/work stressors. *Int J Aging Hum Dev*. 2006;62(1):39–59. doi:10.2190/ENLH-WAA2-AX8J-WRT1
60. Mamun MA, Hossain S, Moonajilin S, Masud MT, Misti JM, Griffiths MD. Does loneliness, self-esteem and psychological distress correlate with problematic Internet use? A Bangladeshi survey study. *Asia Pac Psychiatry*. 2020;12(2):e12386. doi:10.1111/1ppy.12386
61. Leary MR. Responses to social exclusion: social anxiety, jealousy, loneliness, depression, and low self-esteem. *J Soc Clin Psychol*. 1990;9(2):221–229. doi:10.1521/jscp.1990.9.2.221
62. Leary MR. Sociometer theory and the pursuit of relational value: getting to the root of self-esteem. *Eur Rev Soc Psychol*. 2005;16(1):75–111. doi:10.1080/10463280540000007
63. Marshall SL, Parker PD, Ciarrochi J, Heaven PCL. Is self-esteem a cause or consequence of social support? A 4-year longitudinal study. *Child Dev*. 2014;85(3):1275–1291. doi:10.1111/cdev.12176
64. Denissen JJA, Penke L, Schmitt D, van Aken MAG. Self-esteem reactions to social interactions: evidence for sociometer mechanism across days, people, and nations. *J Pers Soc Psychol*. 2008;95(1):181–196. doi:10.1037/0022-3514.95.1.181
65. Zhao L, Zhang X, Ran G. Positive coping style as a mediator between older adults' self-esteem and loneliness. *Soc Behav Pers*. 2017;45(10):1619–1628. doi:10.2224/sbp.6486
66. Baumeister RF, Campbell JD, Krueger JI, Vohs KD. Does high self-esteem cause better performance, interpersonal success, happiness, or healthier lifestyles? *Psychol Sci Public Interest*. 2003;4:1–44. doi:10.1111/1529-1006.01431
67. Leung BWC, Moneta GB, McBride-Chang C. Think positively and feel positively: optimism and life satisfaction in late life. *Int J Aging Hum Dev*. 2005;61(4):335–365. doi:10.2190/fqtb-ebaj-h9wp-lmya
68. Robins RW, Trzesniewski KH, Tracy JL, Gosling SD, Potter J. Global self-esteem across the life span. *Psychol Aging*. 2002;17(3):423–434. doi:10.1037/0882-7974.17.3.423
69. Beutel ME, Glaesmer H, Decker O, Fischbeck S, Brähler E. Life satisfaction, distress, and resiliency across the life span of women. *Menopause*. 2009;16(6):1132–1138. doi:10.1097/gme.0b013e3181a857f8
70. Orth U, Robins RW, Widaman KF. Life-span development of self-esteem and its effects on important life outcomes. *J Pers Soc Psychol*. 2012;102(6):1271–1288. doi:10.1037/a0025558
71. Çiviteci N, Çiviteci A. Self-esteem as mediator and moderator of the relationship between loneliness and life satisfaction in adolescents. *Pers Individ Differ*. 2009;47(8):954–958. doi:10.1016/j.paid.2009.07.022
72. Kong F, You X. Loneliness and self-esteem as mediators between social support and life satisfaction in late adolescence. *Soc Indic Res*. 2013;110:271–279. doi:10.1007/s11205-011-9930-6
73. Uba I, Yaacob SN, Juhari R, Talib MA. Effect of self-esteem on the relationship between depression and bullying among teenagers in Malaysia. *ASS*. 2010;6:12. doi:10.5539/ass.v6n12p77
74. Kapıkıran Ş. Loneliness and life satisfaction in Turkish early adolescents: the mediating role of self-esteem and social support. *Soc Indic Res*. 2013;111(2):617–632. doi:10.1007/s11205-012-0024-x
75. Yarcheski A, Mahon NE, Yarcheski TJ. Social support and well-being in early adolescents: the role of mediating variables. *Clin Nurs Res*. 2001;10(2):163–181. doi:10.1177/C10N2R6
76. Li J, Fang M, Wang W, Sun G, Cheng Z. The influence of grit on life satisfaction: self-esteem as a mediator. *Psychol Belg*. 2018;58(1):51–66. doi:10.5334/pb.400
77. Pfenninger S. Foreign language learning in the third age: a pilot feasibility study on cognitive, socio-affective and linguistic drivers and benefits in relation to previous bilingualism of the learner. *J Eur Second Lang Assoc*. 2018;2:1. doi:10.22599/jesla.36
78. Pot A, Porket J, Keijzer M. The bidirectional in bilingual: cognitive, social and linguistic effects of and on third-age language learning. *Behav Sci*. 2019;9:98. doi:10.3390/bs909098
79. Creech A, Hallam S, McQueen H, Varvarigou M. The power of music in the lives of older adults. *Res Stud Music Educ*. 2013;35(1):87–102. doi:10.1177/1321103X13478862
80. Zielińska-Więczkowska H, Kędziora-Kornatowska K, Ciernoczołowski W. Evaluation of quality of life (QoL) of students of the University of Third Age (U3A) on the basis of socio-demographic factors and health status. *Arch Gerontol Geriatr*. 2011;53(2):198–202. doi:10.1016/j.archger.2010.09.003

81. Mitchell RA, Legge, Sinclair-Legge G. Membership of the University of the Third Age (U3A) and perceived well-being. *Disabil Rehabil.* 1997;19(6):244–248. doi:10.3109/09638289709166534
82. Zając-Gawlak I, Pośpiech D, Kroemeke A, et al. Physical activity, body composition and general health status of physically active students of the University of the Third Age (U3A). *Arch Gerontol Geriatr.* 2016;64:66–74. doi:10.1016/j.archger.2016.01.008
83. Patterson R, Moffatt S, Smith M, et al. Exploring social inclusivity within the University of the Third Age (U3A): a model of collaborative research. *Ageing Soc.* 2016;36:1580–1603. doi:10.1017/S0144686X5000550
84. Fisher JC. Participation in educational activities by active older adults. *Adult Educ Q.* 1986;36(4):202–210. doi:10.1177/0001848186036004002
85. Triadó C, Villar F, Solé C, Celdrán M, Osuna M. Daily activity and life satisfaction in older people living in rural contexts. *Span J Psychol.* 2009;12(1):236–245. doi:10.1017/S1138741600001645
86. Stevens R. Longstanding occupation: The relation of the continuity and meaning of productive occupation to life satisfaction and successful aging. *Activit Adapt Aging.* 2011;35(2):131–150. doi:10.1080/01924788.2011.574255
87. Noh JW, Kim KB, Lee JH, Kim MH, Kwon YD. Relationship of health, sociodemographic, and economic factors and life satisfaction in young-old and old-old elderly: a cross-sectional analysis of data from the Korean Longitudinal Study of Aging. *J Phys Ther Sci.* 2017;29(9):1483–1489. doi:10.1589/jpts.29.1483
88. Maniecka-Bryła I, Gajewska O, Burzyńska M, Bryła M. Factors associated with self-rated health (SRH) of a University of the Third Age (U3A) class participants. *Arch Gerontol Geriatr.* 2013;57(2):156–161. doi:10.1016/j.archger.2013.03.006
89. Hansen T, Slagsvold B, Veenstra M. Educational inequalities in late-life depression across Europe: results from generations and gender survey. *Eur J Ageing.* 2017;14(4):407–418. doi:10.1007/s10433-017-0421-8
90. de Jong Gierveld J, Kamphuis F. The development of a Rasch-Type Loneliness Scale. *Appl Psychol Meas.* 1985;9(3):289–299. doi:10.1177/014662168500900307
91. Grygiel P, Humenny P, Rebisz S. Validating the polish adaptation of the 11-item De Jong Gierveld loneliness scale. *Eur J Psychol Assess.* 2013;29(2):129–139. doi:10.1027/1015-5759/a000130
92. Diener E, Emmons RA, Larsen RJ, Griffin S. The satisfaction with life scale. *J Pers Assess.* 1985;49:71–75. doi:10.1207/s15327752jpa4901_13
93. Juczyński Z. *Narzędzia Pomiaru w Promocji I Psychologii Zdrowia.* Warszawa: Pracownia testów Psychologicznych; 2001.
94. Łaguna M, Lachowicz-Tabaczek K, Dzwonkowska I. The Rosenberg Self-Esteem Scale: polish adaptation of the scale. *Psychol Społ.* 2007;2(04):164–176.
95. Hayes AF. *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach.* New York: Guilford Press; 2017.
96. Field A. *Discovering Statistics Using SPSS.* London: Sage; 2009.
97. Perlman D, Gerson AC, Spinner B. Loneliness among senior citizens: an empirical report. *Essence.* 1978;2(4):239–248.
98. Mhaoláin AMN, Gallagher D, Connell HO, et al. Subjective well-being among community-dwelling elders: what determines satisfaction with life? Findings from the Dublin healthy aging study. *Int Psychogeriatr.* 2012;24(2):316–323. doi:10.1017/s1041610211001360
99. Arslantaş H, Adana F, Abacigil Ergin F, Kayar D, Acar G. Loneliness in elderly people, associated factors and its correlation with quality of life: a field study from Western Turkey. *Iran J Public Health.* 2015;44(1):43–50.
100. Bai X, Yang S, Knapp M. Sources and directions of social support and life satisfaction among solitary Chinese older adults in Hong Kong: the mediating role of sense of loneliness. *Clin Interv Aging.* 2018;13:63–71. doi:10.2147/cia.s148334
101. Tjihuis M. Changes in and factors related to loneliness in older men. The Zutphen Elderly Study. *Age Ageing.* 1999;28(5):491–495. doi:10.1093/ageing/28.5.491
102. Tian Q. Intergeneration social support affects the subjective well-being of the elderly: mediator roles of self-esteem and loneliness. *J Health Psychol.* 2014;21(6):1137–1144. doi:10.1177/1359105314547245
103. Alma MA, Mei SF, Feitsma WN, Groothoff JW, Tilburg TG, Suurmeijer TP. Loneliness and self-management abilities in the visually impaired elderly. *J Aging Health.* 2011;23(5):843–861. doi:10.1177/0898264311399758
104. Hawkey LC, Cacioppo JT. Loneliness matters: a theoretical and empirical review of consequences and mechanisms. *Ann Behav Med.* 2010;40(2):218–227. doi:10.1007/s12160-010-9210-8
105. Agyar E. Life satisfaction, perceived freedom in leisure and self-esteem: the case of physical education and sport students. *Procedia Soc Behav Sci.* 2013;93:2186–2193. doi:10.1016/j.sbspro.2013.10.185
106. McAuley E, Elavsky S, Jerome GJ, Konopack JF, Marquez DX. Physical activity-related well-being in older adults: social cognitive influences. *Psychol Aging.* 2005;20(2):295–302. doi:10.1037/0882-7974.20.2.295
107. De Donder L, Brosens D, De Witte N, et al. Lifelong learning in old age: results from the Belgian Ageing Studies. *Procedia Soc Behav Sci.* 2014;116:513–517. doi:10.1016/j.sbspro.2014.01.250
108. Golinowska S, Sowa A, Deeg D, et al. Participation in formal learning activities of older Europeans in poor and good health. *Eur J Ageing.* 2016;13(2):115–127. doi:10.1007/s10433-016-0371-6
109. Escuder-Mollon P, Esteller-Curto R, Issakainen C, Lubkina V, Lozanova S. Pedagogical proposal to increase senior citizens' quality of life. *Procedia Soc Behav Sci.* 2014;116:3152–3159. doi:10.1016/j.sbspro.2014.01.725
110. Hammond C. Impacts of lifelong learning upon emotional resilience, psychological and mental health: fieldwork evidence. *Oxford Rev Educ.* 2004;30(4):551–568. doi:10.1080/0305498042000303008
111. Ji-Young A, Kyungh A, O'Connor L, Wexler S. Life satisfaction, self-esteem, and perceived health status among Korean women: focus on living arrangements. *J Transcult Nurs.* 2008;19(2):151–160. doi:10.1177/10436596007313070
112. Alaphilippe D. Self-esteem in the elderly. *Psychol Neuropsychiatr Vieil.* 2008;6(3):167–176. doi:10.1684/pnv.2008.013
113. Trzesniewski KH, Donnellan MB, Robins RW. Stability of self-esteem across the life span. *J Pers Soc Psychol.* 2003;84(1):205–220. doi:10.1037/0022-3514.84.1.205
114. Wagner J, Hoppmann C, Ram N, Gerstorf D. Self-esteem is relatively stable late in life: the role of resources in the health, self-regulation, and social domains. *Dev Psychol.* 2015;51(1):136–149. doi:10.1037/a0038338
115. Franak J, Alireza K, Malek M. Self-esteem among the elderly visiting the healthcare centers in Kermanshah-Iran (2012). *Glob J Health Sci.* 2015;7(5):352–358. doi:10.5539/gjhs.v7n5p352
116. Borg C, Fagerström BC, Burholt V, et al. Life satisfaction in 6 European countries: the relationship to health, self-esteem, and social and financial resources among people (aged 65-89) with reduced functional capacity. *Geriatr Nurs.* 2008;29(1):48–57. doi:10.1016/j.gerinurse.2007.05.002
117. Narushima M, Liu J, Diestelkamp N. Lifelong learning in active ageing discourse: its conserving effect on wellbeing, health and vulnerability. *Ageing Soc.* 2018;38(4):651–675. doi:10.1017/S0144686X16001136
118. Hansen T, Slagsvold B. Late-life loneliness in 11 European countries: results from the generations and gender survey. *Soc Indic Res.* 2016;129:445–464. doi:10.1007/s11205-015-1111-6

Psychology Research and Behavior Management**Dovepress****Publish your work in this journal**

Psychology Research and Behavior Management is an international, peer-reviewed, open access journal focusing on the science of psychology and its application in behavior management to develop improved outcomes in the clinical, educational, sports and business arenas. Specific topics covered in the journal include: Neuroscience, memory and decision making; Behavior modification and management; Clinical

applications; Business and sports performance management; Social and developmental studies; Animal studies. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/psychology-research-and-behavior-management-journal>