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Research Article

The Importance of the Risk of Suffering Violence and Negative Affects as Predictors of Loneliness in the Elderly People: The Explanation by the Gamma Model

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Abstract

Loneliness is very common among the elderly people, whether in institutions or in the community, and with great emphasis in today's societies.

Objective: The aim of this study is to analyze whether age, cognitive functioning, risk of violence, affects and social support are predictors of loneliness.

Materials and Methods: This study included a sample of 92 elderly people, with a mean age of 77.05(±8.56) years. To assess the variables, the study protocol consisted of a sociodemographic

questionnaire, the University of California, Los Angeles Loneliness Scale, Lubben Social Network Scale, Positive and Negative Affect Schedule, Mini Mental State Examination and Arvini Range Test.

Results: The adjusted model revealed that the risk of suffering violence and negative affects are predictors of loneliness in the elderly people.

Conclusions: Negative affects and the invasion of painful feelings, as well as the experience of situations that bring greater risk of violence, tend to increase the loneliness of the elderly people. These situations must be present in the daily actions of the competent authorities, as well as being the target of preventive actions by institutions and professional support teams for the elderly people.

Abbreviations

LSNS - Lubben Social Network Scale
MMSE - Mini Mental State Examination
PANAS - Positive and Negative Affect Schedule
UCLA - The University of California, Los Angeles Loneliness Scale
WHO - World Health Organization

Introduction

Loneliness, as a social indicator of the health status of the elderly people, has not deserved its due importance, reaching, in some societies, one in three older people [1]. Loneliness is defined as a subjective state that derives from the inexistence of close and significant affective relationships with family members or friends [2] and in which the overcoming of personal, social and relational needs does not seem to have been achieved [3]. Loneliness has been considered common in older adults and may stem from psychological, social, and physical health conditions [4]. Many elderly people assume that they feel alone, with less attachment, a sense of reliable alliance and the obtaining of guidance [5]. Loneliness can arise at different ages. In the study by Abella *et al.* [6] this feeling was highlighted in women aged between 50 and 65 years, with different marital status. In the study by Chen *et al.* [7], participants aged ≥ 80 years were more loneliness than younger ages, however, the difference between age groups was not significant. This points to the fact that there may be other sociodemographic variables that better explain the significant differences found in loneliness, such as previous occupation, the economic level or residential area (rural or urban).

In addition, a lower functioning of cognitive abilities can also be associated with a higher probability of elderly people experiencing loneliness over time [8]. Lara *et al.* [9] found that lower cognitive functioning (e.g., verbal fluency, backward digit span or immediate and delayed recall) is significantly associated with loneliness. When people feel loneliness, they experience emptiness and negative emotions [5]. Negative emotions are evident when people are deprived of physical contact with those who are significant to them (e.g., confinement due to the COVID-19 pandemic situation) and also when they feel fear or sadness [10].

In institutionalized elderly people with depression, negative affects and loneliness tend to increase and positive affects to decrease [11]. These situations make the elderly people more fragile and vulnerable, including the risk of suffering violence [12]. When experiences of violence are present in people's lives, loneliness may occur and the perception of social support from friends may decrease [13]. However, the presence of social support (e.g., personal relationships, neighborhood relations, participation in the community) can have positive effects on feelings of loneliness, helping to decrease other risk factors for the elderly people [14]. The effects of effort-reward imbalance on loneliness may be partially mediated by social support [15]. Otherwise, a smaller social network, more functional limitations and low involvement in significant activities are associated with higher levels of loneliness [16]. Studies that have studied the predictive effect of all these factors together in relation to loneliness in the elderly people are rare. Thus, this study aims to analyze whether age, cognitive functioning, risk of suffering violence, affects and social support are predictors of loneliness in the elderly people.

Materials and Methods

Participants

The sample of this study consists of 92 Portuguese participants, with a mean age of 77.05 (±8.56) years. 60 participants are female and 32 male. Most participants are widowed (60.2%). 51.6% are institutionalized in nursing homes whose average time of institutionalization is 3.64 (±3.71) years. Subjects who are not institutionalized live in the community and the majority (34.4%) live in their own home with other family members (e.g., husband or wife). As inclusion criteria, subjects over 65 years of age were considered in the study. Subjects with severe mental disorders that prevented them from responding to the study protocol were not included.

Measures

In this study, a sociodemographic questionnaire was used to collect information from the participants. The Mini Mental State Examination (MMSE; Portuguese version by Guerreiro *et al.*) [17]. was applied to assess cognitive functioning. The results obtained in this instrument vary between 0 and 30 points. The possible presence of cognitive impairment is attributed to taking into account the level of education of the participants. The authors found good reliability and validity within and between observers. The Positive and Negative Affect Schedule (PANAS; Portuguese version by Galinha and Ribeiro) [18], consisting of 20 items, assessed two major dimensions: positive affects (10 items) and negative affects (10 items). This instrument has a Cronbach's Alpha of 0.86 for positive affects and 0.89 for negative affects. The University of California, Los Angeles (UCLA) Loneliness Scale (Portuguese version of Pocinho *et al.*) [19] was used to assess subjective loneliness in the elderly people. Scores on the instrument range from 16 to 64 points and are assessed using two factors: social isolation and affinities. The higher the score obtained, the greater the subjective feelings of loneliness among the elderly people. The authors admit a good internal consistency of the scale, with a Cronbach's Alpha of 0.905. The Lubben Social Network Scale (LSNS-6) (Portuguese version by Ribeiro *et al.*) [20], was applied to assess the social support received and perceived by the elderly from their social network. This reduced version consists of 6 items whose score varies between 0 and 30

points. The internal consistency of the instrument is considered by the authors as adequate, with a Cronbach's Alpha of 0.798. Finally, the Arvini Range Test (Portuguese version of Mendes and Gemito, 2017 cit. by Mendes *et al.*) [21], was applied to assess the risk of violence on elderly people. The scale score is obtained through the sum of all 27 items that assess the risk of physical, psychological, sexual and financial violence. The instrument's internal consistency reveals an acceptable Cronbach's Alpha with a value of 0.727.

Procedure

At first, the directions of nursing homes for the elderly people in Portugal were contacted and the objectives of the study were presented to them. After analyzing the protocol and the study objectives, the institutions agreed to collaborate in it. Institutionalized elderly people and/or their legal representatives were contacted. It was explained to them that their participation would be completely voluntary and without risk to the lives of the elderly people. Participants were informed of the ethical and deontological duties of the investigation and their participation in the study only took place after signing the informed consent. The application of the study protocol took place in a room of nursing homes designed for this purpose. The subjects who lived in the community were contacted in person and the protocol was only applied after signing the informed consent. The protocol was applied in a space of their residence where the privacy and confidentiality of the subjects were assured. As the moment of data collection took place during the COVID-19 pandemic, all prevention and safety measures required in the country were taken and respected.

Data Analysis

For data analysis, the statistical software R, R-Studio, was used. Descriptive statistics were performed to characterize the study participants and analyze means and standard deviations for quantitative variables and frequencies and percentages for nominal variables. To support the definition of the statistical model used, the assumptions of homogeneity and normality of the study data were verified. The Gamma Regression Model was used as an analysis model for the study of the response variable, with the logarithmic link function. The automatic selection of variables in the model was calculated using the R step function. The significance levels assumed in this study were $p<.05$.

Results

Prediction of Loneliness in the Elderly People

The following table (table 1) shows the coefficients of the explanatory variables of the loneliness of the elderly people.

Table 1: *Variable coefficients: age, cognitive functioning, risk of violence, social support, positive affects, negative affects*

	Estimated value	SE	t-value	p-value
Intercept	3.362	.399	8.414	$8.27e^{-13***}$
Age	-.004	.003	-1.203	.232
Cognitive functioning	-.008	.006	-1.280	.204
Risk of violence	.015	.011	1.327	.188
Social support	-.014	.007	-2.036	.044*
Positive affects	.037	.043	.867	.389
Negative affects	.204	.052	3.955	.000***

Note: SE= standard error; P = p-value (*.05; **.01; ***.001).

This model reveals that there are two significant covariates, namely, social support and negative affects. Residual deviations range from -.47 to .54, and the calculated value of the residual deviation is 4.0056 for 85 degrees of freedom. The measure of the quality of this adjustment, given by the Akaike Information Criterion (AIC), is 592.68. Table II shows the values of the new gamma model fit, calculated from the covariates that were automatically selected for the model.

Table 2: *Variable coefficients: risk of violence, social support, negative affects*

	Estimated value	SE	t-value	p-value
Intercept	2.853	.153	18.652	$2.e^{-16***}$
Risk of violence	.020	.010	1.941	.055
Social support	-.011	.006	-1.720	.089
Negative affects	.198	.050	3.985	.000***

Note: SE= standard error; P = p-value (*.05; **.01; ***.001).

Three covariates, specifically, age, cognitive functioning and positive affects, were eliminated from this new adjusted model. Negative affects remain a significant covariate. This new adjustment presents residual deviation values range between -0.45 and 0.48. The residual deviation value is 4.1304 with 88 degrees of freedom. The measure of the quality of this adjustment given by the AIC is 589.53, lower than the value of the AIC found in the previous model. By analyzing the suitability of the model and p-value =1, it means that the suitability of this model is accepted (and it is a better model than the previous one).

The effectively influential observations in the model were also verified through the calculation of Cook's distance (figure 1). Three effectively influential observations were identified, namely observations 2, 75 and 80. As these observations have effects on predicted values, any modification or exclusion in these observations can cause significant changes in the estimates of the parameters of the calculated model.

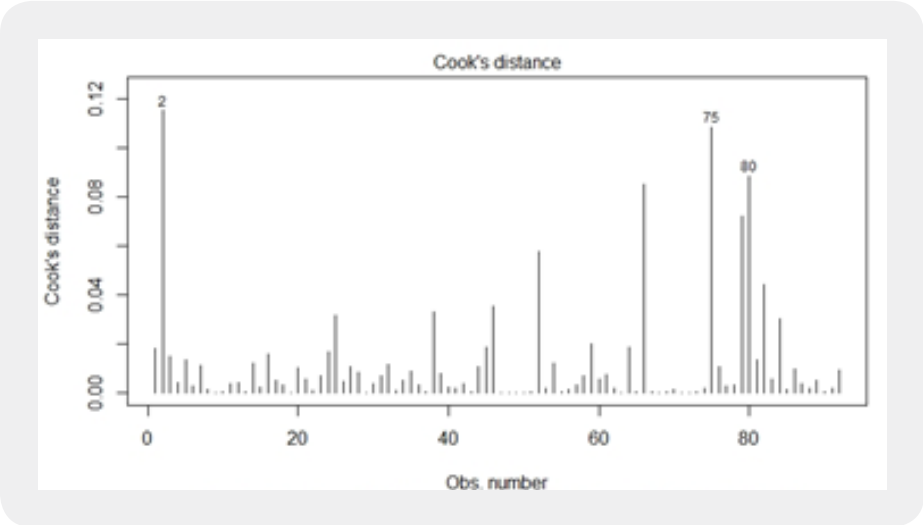

Figure 1: *Cook's distance*

In the following analysis, these three observations were removed from the model and the gamma model (table III) was calculated again, now with a sample of 89 participants.

Table 3: *Variable coefficients: age, cognitive functioning, risk of violence, social support, positive affects, negative affects*

	Estimated value	SE	t-value	p-value
Intercept	3.001	.401	7.484	$7.29e^{-11***}$
Age	-.002	.004	-.493	.623
Cognitive functioning	-.007	.006	-1.208	.231
Risk of violence	.023	.011	2.132	.036*
Social support	-.006	.007	-.767	.446
Positive affects	.013	.040	.323	.748
Negative affects	.205	.049	4.152	$8.03e^{-05***}$

Note: SE= standard error; P = p-value (*.05; **.01; ***.001).

In this new gamma model, there are now two significant covariates at the usual significance levels, which are the risk of suffering violence and negative affects. Residual deviations range between -0.42 and 0.44. The measure of the quality of this adjustment verified by the AIC is 557.38 and the value of the residual deviation is 3.3264 for 82 degrees of freedom. The suitability analysis of this model shows a p-value=1, which means that it is an adequate model. Covariates were automatically selected again from the calculation of a new fit of the gamma model for 89 participants. Table IV shows the values obtained with the new fitted model.

Table 4: *Variable coefficients: risk of violence, social support, negative affects*

	Estimated value	SE	t-value	p-value
Intercept	2.596	.103	25.133	$<2.e^{-16***}$
Risk of violence	.028	.010	2.924	.004**
Negative affects	.221	.042	5.286	$9.33e^{-07***}$

Note: SE= standard error; P = p-value (*.05; **.01; ***.001)

In this adjusted model, four covariates were eliminated: age, cognitive functioning, social support and positive affects. The risk of suffering violence and negative affects remain as significant covariates. Residual deviations range between -0.41 and 0.46. The measure of the quality of this adjustment given by the AIC is 551.58 and the value of the residual deviation is 3.4090 with 86 degrees of freedom. Comparing the AIC value of this adjusted model with the AIC value of the previous model, this model turns out to be better. The value of p-value=1 and shows that this model is adequate.

Discussions

The main objective of this study was to verify whether age, cognitive functioning, risk of violence, social support and affects were predictors of loneliness in the elderly people. Our results showed that the risk of suffering violence and negative affects are predictors of loneliness in the elderly people.

According to the study by Grover *et al.* [22] it was also found that the loneliness of the elderly people was predicted by violence, as well as the presence of generalized anxiety, diabetes mellitus and hypertension. Jiang and Jiang [23] showed that emotional violence suffered by the elderly people was associated with a high level of loneliness, causing a negative impact on the elderly's life satisfaction. This makes it clear that exposure to violence reduces people's well-being [24]. Furthermore, Xing *et al.* [25] showed that a higher risk of fraud against the elderly people is related to the social loneliness they feel. Regarding the predictive effect of negative affects obtained in this study, it is corroborated by the study by Serra *et al.* [26] who also demonstrated that negative affects are predictors of loneliness in the elderly people. In the study by Vicente *et al.* [11] with 83 elderly people, aged between 60 and 100 years, who were institutionalized, it was found that when the elderly people also suffered from depression, there was also more negative affects and loneliness. As time goes by, negative affects and loneliness get worse. The presence of depression, where negative affects predominate (e.g., fear, guilt), conflicts that the elderly have with their family and friends, among other factors, are also indicators of violence against elderly aged ≥ 65 years [27].

Regarding the explanatory variables that were automatically eliminated from the model or that did not prove to be significant, in fact, the age groups may not show significant differences in relation to loneliness, as shown by Chen *et al.* [7]. With regard to cognitive functioning, Donavan *et al.* [8] also demonstrated that cognitive functioning was not a predictor of loneliness over time, although Cacioppo & Hawkley [28] highlighted that cognitive decline is associated with loneliness.

Finally, in this study, social support did not prove to be a significant explanatory variable for loneliness. The same was proven in the study by Rezaeipandari *et al*. [29] in which social participation among the elderly people was not a statistically significant predictor of loneliness. In the investigation by Chen *et al*. [30] social support showed a significant negative relationship with negative coping, which helped to predict symptoms of loneliness. Chen *et al*. [7] proved that there is a negative and significant relationship between overall social support and loneliness, not forgetting that loneliness can be more prevalent in people with a smaller social support network, less social interactions and even with major depression [6]. This study has limitations, namely, it did not allow us to know the predictive effect of the explanatory variables in the various types of loneliness or to know the intensity and regularity of the risk of violence, types of violence and types of negative affects on loneliness in the elderly people. Future studies will be able to assess the risk effects of various types of violence, and other risk factors, on the loneliness of the elderly people and identify what happens at different ages, genders and cultures over time. Finally, this research may help to create guidelines for professional teams to help identify and act on the loneliness of the elderly people.

Conflicts of Interests

There are no conflicts of interest in this study.

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