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Original Article

Factors Affecting Loneliness in Older Adults: Evidence from Ardakan Cohort Study on Aging (ACSA)

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ABSTRACT

Introduction: Elderly people usually feel lonely that can have adverse health effects. The purpose of current paper is to determine the loneliness score in the elderly population of the Ardakan Cohort and the factors affecting it.
Methods: This is a cross sectional study using data from the Ardakan Cohort Study on Ageing (ACSA). Loneliness was measured using a 6-item De Jong Gierveld short scales. The 11-item Duke Social Support Index (DSSI) was used to measures social support of aging. living arrangement, demographic factors and self-rated health was also collected using a checklist. Linear regression was used to examine the relationship between loneliness and predictor factors. The data was analyzed with Stata software version 17 and a p-value of 0.05 was considered as a significant level.
Results: Among the 5,188 participants, 48.13% were male and most of the participants were over 60 years old. Total score of loneliness was 3.27±1.45(95% CI: 3.24 to 3.31). Among covariates, age (p value=0.000), sex (p value=0.000), marital status (p value=0.046), education (p value=0.001) and economic status (p value=0.001) have significant association with loneliness score. People with good self-rated health had a lower loneliness score (p value<0.001). The score of social support has an inverse association with the score of loneliness (p value<0.001). Adults who lived with others had a higher loneliness score (p value<0.001).
Conclusion: According to the results, elderly people who have more social support and have better self-rated health feel less lonely.

Introduction

Elderly people usually have a limited social network due to reduced physical and cognitive functions. The narrowing of social networks can have significant effects on the health of the elderly.[1] Maintaining a robust social network can have a profound impact on the physical health, mental health, cognitive functioning, well-being, and longevity of the elderly.[2, 3]

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Staying socially active and engaged in activities also helps to prevent depression.[4] In addition, social networks are a source of support and contribute to health and well-being.[5] Moreover, Having more and better relationships is associated with longevity, while having fewer and poorer relationships is associated with risk of lower longevity.[6]

Most common definition of loneliness is an internal, unpleasant subjective experience that begins when an individual's social network undergoes a qualitative or quantitative decline and the emotional support received from others decreases.[7-9] Both social and emotional dimensions of loneliness have adverse consequences for the elderly. Emotional loneliness is associated with an increased risk of all-cause mortality and social loneliness associated with depression and aimlessness which lower quality of life in older adults.[10] Loneliness has been linked to cognitive decline and Alzheimer's disease and these disorders can lead to poor health outcomes and increased mortality.[11] Besides, Loneliness can lead to a weakened immune system, making an individual more susceptible to diseases. Emotional and social loneliness has been linked to higher risks for heart disease, high blood pressure, and obesity which can lead to various health complications and increased mortality.[12-14]

There are different tools with various reporting methods to measure loneliness[15] and reporting methods are mostly in the form of percentages and scoring.[16-18] Previous cohort studies of aging demonstrated that degree of loneliness varies between 8.4% and 16%.[19, 20] In Iran, the mean score of loneliness feeling among participants was 17.29 measured by Social and Emotional Loneliness Scale for Adults (SELA-S).[21] The derived score indicates an unfavorable state of loneliness among the elderly population in Iran, underscoring its significance as a pressing health and social concern within the nation. The gravity of this issue necessitates an in-depth exploration of the extent and facets of loneliness experienced by the elderly in Iran, as well as an examination of the influencing factors. This is crucial in devising effective strategies to address and mitigate this problem at a national level.

The risk factors of loneliness may be different in the cultural, social, political and economic contexts of each society, but generally, the most important risk factors mentioned in the elderly are: not being married, partner loss, a low level of social activity, poor self-rated health, depression, age and household income.[22-24] In addition, the level of education, retirement status and total number of diseases were also associated with loneliness in older adults.[21] Table below presents a classification of these risk factors.

Table 1. Risk factors of loneliness in older adults

Risk factors	Examples
Physical	Chronic Diseases, Poor self-rated health, age, Mobility Issues, Sensory Impairments, Poor Physical Health
Mental	Psychiatric or Depressive Disorder, Depression, Cognitive Decline, Suicidality and self-harm
Social	Living Alone, Not being married, Loss of Loved Ones, Partner loss, Social Isolation, low level of social activity, level of education, lack of social support
Economical	Retirement, Low income
Cultural	Absence of subsequent matrimonial union, Migration, Marginalization or Discrimination, Challenges to Accessing Resources

Considering that loneliness affects the quality of life in the elderly, it is very important to determine the state of loneliness in the elderly population and identify the factors affecting it. Therefore, the purpose of this study was to determine the average score of loneliness in the elderly population of Ardakan Cohort Study on Ageing (ACSA)and the factors affecting it.

Methods

Design and Population

The ACSA (Ardakan Cohort Study on Ageing) is a population-based longitudinal cohort study of adults aged ≥50 years began in 2020. ACSA is a subset of the Persian cohort named The Iranian Longitudinal Study on Ageing (IRLSA).[25] ACSA was conducted in Ardakan city, a city in the center of Iran. A stratified random sampling method was used to select the household and thus 5196 participants were included in the study. The study was approved by the university of social welfare and rehabilitation research ethics committee with the code of ethics IR.USWR.REC.1394.190.
In addition to being over 50 years old, the most important inclusion criteria in ACSA were living in the designated area and with Iranian citizenship. Elders who are unable to communicate, such as physically and mentally disabled people, were excluded from the study. The inclusion and exclusion criteria in our study were exactly according to the ACSA.

Tools and Measurements
Baseline characteristics

A checklist was used to collect baseline characteristics through interviews with participants. Age, sex (male, female), marital status (single, married, widowed, divorced, other), total years of education, occupation, and income are the covariates that were measured in the study.

Loneliness

Loneliness was measured using a 6-item De Jong Gierveld short scale for emotional and social loneliness.[23] The query items were questions such as “I experience a general sense of emptiness”, “I miss the pleasure of the company of others” and “There are enough people I feel close to” with response options of ‘yes’, ‘sometimes’ and ‘no’. People who answered “yes” and “sometimes” get 1 point and people who answered “no” get no points.
Questions 1,5 and 6 were related to emotional loneliness and questions 2,3 and 4 to social loneliness. The questionnaire’s total score comprised the sum of 2 scores of the sub scales and the loneliness score was considered valid only if all the questions had been answered or at most one question remained unanswered. The scale showed good internal consistency, with a Cronbach’s alpha of 0.698.[26] The loneliness score was between 0 and 6, the latter indicating the highest score.

Social support

The 11-item Duke Social Support Index (DSSI) was used to measure multiple dimensions of social support of aging.[12] The DSSI examines four major dimensions: social network, social interaction, subjective support, and instrumental support. The DSSI includes both a subjective evaluation of the adequacy of support received as well as a more objective evaluation

of the type and number of social interactions. The reliability of this questionnaire has been confirmed by Cronbach's alpha coefficient of 0.69.[27] The score of social support is in the range of 13 to 33, a higher score indicating a greater level of social support.

living arrangements

The traveling team visited the homes of participants and asked questions related to living arrangements using a checklist. The first question determined whether the person lived alone or not. If the elderly did not live alone, he was asked who he or she lived with (spouse, children, relatives). Finally, they were asked the size of the household.

Self-rated health

To assess the level of self-rated health one question was asked from participants: In general, how do you evaluate your health situation? The answers ranged from very good to very bad.

Statistical analysis

To describe the quantitative variables, mean and standard deviation were presented, and for the qualitative variables, frequency and percentage were used. Linear regression was used to examine the association between loneliness and predictive factors. In the univariable stage, 0.2 significance level was considered, then multivariable analysis was performed using the backward method and p-value of 0.05 was considered as a significant level. The data was analyzed with Stata software version 17.

Results

The baseline data of the participants is shown in Table 2. Among the 5195 participants, 48.4 were male and most of the participants were over 60 years old, married and with elementary school education. More than 50% of the participants stated that they are in good health. The highest average score of loneliness was observed in people who considered their self-rated health to be very bad and bad, were single and expressed that their economic level was medium to low. People who were unemployed had a higher loneliness score than employed people. Most of our studied population were the first children in the family and their parents were not alive. Total score of social support was 26.20±3.05 (95% CI: 26.12 to 26.29).

Table 3 shows 6 items of the loneliness questionnaire along with the frequency and percentage of answers. People who answered “yes” and “sometimes” get 1 point and people who answered “no” get no s. About 12% of people felt emptiness. 37% stated that they did not have many people to rely on. 23.5% and 14.8 of participants did not have anyone they can trust; nor had they enough people they felt close to. More than 60% of the participants declared that they miss the pleasure of the company of others, 7 % felt rejected.

Table 4 represents the average scores of loneliness by living arrangements and two types of loneliness; social and emotional. Total score of loneliness was 3.27±1.45 (95% CI: 3.24 to 3.31). For social and emotional loneliness these total scores were 1.89±0.99 (95% CI: 1.89 to 1.92) and 1.38±0.85 (95% CI: 1.36 to 1.40), respectively.

As shown in Table 4, Living arrangements were divided into 4 groups. Most people

Table 2. Basic characteristics and independent factors of participants

Variables n:5195	n (%)	Loneliness score mean (SD)
Age (≥50) (mean (SD)) (years)	62.24 (7.7)	-
Age-categorical		
<60	2156 (41.5)	3.3 (1.5)
60=<	3033 (58.5)	3.2 (1.4)
Sex		
Male	2497 (48.13)	3.0 (1.4)
Female	2691 (51.87)	3.5 (1.5)
Marital status		
Single*	9 (0.17)	3.7 (1.4)
Married	4718 (90.94)	3.2 (1.4)
Widowed	439(8.46)	
Divorced	22(0.42)	
Educational status		
Illiterate	731(14.13)	3.6 (1.5)
Elementary school	2476 (47.85)	3.3 (1.4)
Middle school	753 (14.55)	3.3 (1.5)
High school	622 (12.0)	3.1 (1.5)
College	592 (11.4)	2.9 (1.4)
Current occupational status		
Retired or disabled or Jobless	3356 (64.86)	3.3 (1.5)
Employed (part/full time)	1102 (21.30)	3.2 (1.4)
Other	716 (13.84)	3.4 (1.5)
Self-rated health		
Very good	205 (3.97)	2.5 (1.3)
Good	1517 (29.35)	2.8 (1.4)
Fair	2966 (57.39)	3.4 (1.4)
Bad	396 (7.66)	4.0 (1.5)
Very bad	84 (1.63)	4.3 (1.4)
Self-expressed economic level		
High	22 (0.44)	2.9 (1.5)
Medium to high	351 (7.02)	2.7 (1.5)
Medium	2458 (49.13)	3.1 (1.4)
Medium to low	1243 (24.85)	3.4 (1.4)
Low	927 (18.53)	3.7 (1.4)
Number of people in the house (mean (SD))	2.69 (1.0)	-
Birth order		-
First child	1063 (20.57)	
Second child	919 (17.78)	
Third child	928 (17.96)	
Fourth child	824 (15.94)	
Fifth child	621 (12.02)	
After fifth child	799 (15.40)	
Living arrangements		
Alone	279 (5.49)	3.6 (1.4)
With spouse	2391 (47.08)	3.34 (1.5)
With spouse and children	2368 (46.62)	3.13 (1.4)
Others	41 (0.81)	3.8 (1.4)
Alive parents		
At least one	435 (8.42)	3.3 (1.5)
Non	1473 (28.50)	3.3 (1.4)
Social support score (mean (SD)) (range: 13-33)	26.20 (3.1)	-

*Includes never married, widowed, divorced

Table 3. Loneliness score, De Jong Gierveld Scale and the distribution of responses

Items	Yes (%)	Sometimes (%)	No (%)
1. I experience a general sense of emptiness	616 (11.8)	1190 (22.9)	3382 (65.1)
2. There are plenty of people I can lean on when I have problems	1114 (21.4)	2153 (41.5)	1921 (37.0)
3. There are many people I can trust completely	1494 (28.8)	2473 (47.6)	1221 (23.5)
4. I miss the pleasure of the company of others	3421 (65.9)	838 (16.1)	929 (17.9)
5. There are enough people I feel close to	3124 (60.2)	1293 (24.9)	771 (14.8)
6. I often feel rejected	363 (7.0)	766 (14.7)	4059 (78.2)

Table 4. Loneliness scores by living arrangements

Living arrangements	Mean (SD)		
	Total score (0-6)	Social loneliness (0-3)	Emotional loneliness (0-3)
Living alone	3.6 (1.4)	2.0 (0.9)	1.5 (0.8)
Living with spouse and children	3.3 (1.4)	1.9 (1.0)	1.4 (0.8)
Living with spouse only	3.1 (1.4)	1.8 (0.9)	1.3 (0.8)
Living with others	4.1 (1.2)	2.4 (0.6)	1.6 (1.0)

lived with spouse only. People who lived with others had the highest score of loneliness (3.8). People who lived only with their spouses had the lowest social loneliness score (1.8) and people who lived alone had the highest score of emotional loneliness. Mean social and emotional loneliness scores of those living with spouses and children together were 1.9 and 1.4, respectively.

Table 5 represents the factors affecting the loneliness score. According to Table 5, among baseline characteristics, age (p value=0.014) and sex (p value<0.001) had statistically significant association with loneliness score. According to the results, the level of loneliness of a person decreases with increasing age. Females felt lonelier than males. Single people felt lonelier compared to the married, but the difference was not statistically significant (p value=0.990).

Older adults who were illiterate and those having middle school education felt lonelier (p value=0.001, p value=0.002). Occupation had no significant association with loneliness. Elders with a medium to high economic level had a lower loneliness score (p value=0.001). While participants with low and medium to low economic levels had a higher score (p value<0.001).

People who expressed that their health status is very good or good had a lower loneliness score (p value<0.001) while those, who perceived their health status as very bad and bad had a higher loneliness score (p value=0.014, p value<0.001).

The score of social support has an inverse association with the score of loneliness. The higher the score of social support, the lower the loneliness score (p value<0.001).

Adults who lived with others had a higher loneliness score (p value <0.001). People who live alone also had a higher loneliness score, but this relationship was not statistically significant (p value=0.093).

Figure 1 shows the average score of loneliness by different types of loneliness (emotional, social and total) and living arrangements. As seen in Figure 1, people who live with others (relatives, etc.) or alone have the highest loneliness score. In the same way, these people have the highest

level of social and emotional loneliness. Adults who live with their spouses have the lowest score of social and emotional loneliness.

Discussion

Table 5. Linear regression of factors associated with loneliness score (n:5195)

Covariates (baseline level)	Univariable (α<0.2)			Multivariable (α<0.05)		
	β	95% CI	P-value	β	95% CI	P-value
Age	-0.10	-0.18, -0.02	0.008	-0.011	-0.016, -0.005	0.000
Sex (female)	-0.44	-0.52, -0.37	0.001>	-0.25	-0.31, -0.13	0.000
Marital status (single)	0.40	0.27, 0.52	0.001>	-0.14	-0.27, 0.00	0.046
Educational status (elementary)			0.001>			
Illiterate	0.35	0.23, 0.47	0.001>	0.23	0.11, 0.35	0.000
Middle school	0.03	-0.08, 0.14	0.615	0.18	0.07, 0.29	0.001
High school	-0.20	-0.31, -0.07	0.002	0.10	-0.01, 0.23	0.084
College	-0.34	-0.47, -0.21	0.001>	0.16	0.03, 0.29	0.013
Occupational status (not working)			0.014			
Employed	-0.09	-0.19, -0.001	0.047	-0.08	-0.17, 0.01	0.097
Other	0.09	-0.01, 0.21	0.215	-0.09	-0.21, 0.02	0.112
Economic level (medium)			0.405			
High	-0.25	-0.85, 0.34	0.000	0.11	-0.44, 0.67	0.68
Medium to high	-0.39	-0.55, -0.24	0.001>	-0.25	-0.40, -0.10	0.001
Medium to low	0.33	0.23, 0.42	0.001>	0.22	0.13, 0.31	0.000
Low	0.58	0.48, 0.69	0.001>	0.30	0.20, 0.41	0.000
Self-rated health (fair)						
Very good	-0.92	-1.11, -0.72	0.001>	-0.55	-0.74, -0.35	0.001>
Good	-0.59	-0.68, -0.51	0.001>	-0.39	-0.48, -0.30	0.001>
Bad	0.55	0.40, 0.70	0.001>	0.35	0.20, 0.49	0.001>
Very bad	0.81	0.50, 1.11	0.001>	0.37	0.07, 0.66	0.014
Birth order	0.000	-0.000, 0.000	0.828	-	-	-
Alive parents (At least one)	-0.001	-0.026, 0.024	0.927	-	-	-
Social support	-0.16	-0.17, -0.15	0.001>	-0.12	-0.13, -0.10	0.001>
living arrangements (spouse)						
Alone	0.46	0.28, 0.64	0.001>	0.15	-0.01, 0.33	0.093
Spouse and children	0.20	0.12, 0.29	0.001>	0.20	0.12, 0.28	0.001>
Others	0.67	0.47, 0.87	0.001>	0.31	0.13, 0.51	0.001>
			Final Model p-value: 0.001>			

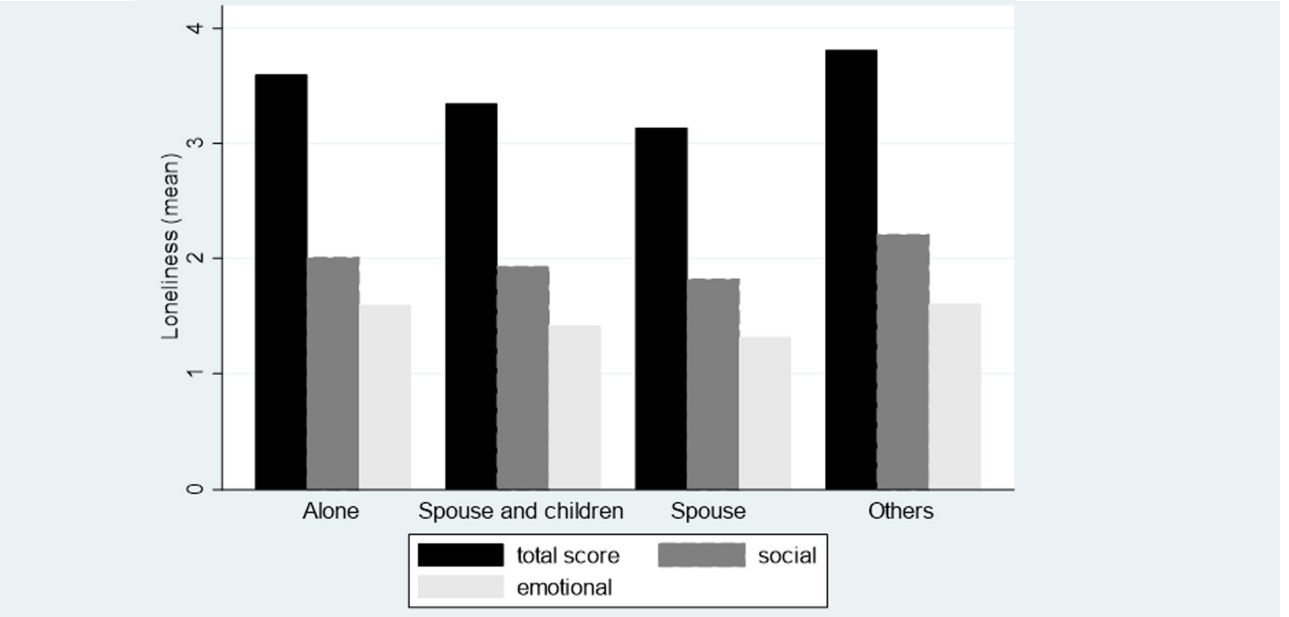

Figure 1. Mean loneliness score by social and emotional loneliness and living arrangements

Many factors affect the loneliness of the elderly. In this study emotional and social loneliness score in elderly was measured and association between loneliness with social support and self-rated health status and demographic factors were examined.

The results showed that total score of loneliness was 3.27 that for social and emotional loneliness these scores were less than 2 (1.89 and 1.3 respectively). Participants who considered their self-rated health to be bad and their economic status was low, felt the most alone. People who lived with others felt lonelier and older adults who live with their spouse have the lowest social and emotional loneliness score. The score of social support has an inverse association with the score of loneliness. Also, loneliness had significant statistical association with age, sex, marital status, education and economic status.

According to our findings, less than 10% of participants considered their health status to be bad and very bad, feel lonelier. This finding is consistent with the results of other studies.[28-31] These studies also have concluded that loneliness increased with worsening self-rated health and good health was common among those who never felt lonely.[32] There are many physical, psychological and behavioral risk factors in people with poor self-rated health that make them feel lonelier including underlying diseases, stresses and depression, poor sleep quality and poor diet, physical inactivity and smoking.[33-35] Also poor self-rated health is associated with low income, not working, poor functional capacity in both men and women that all of these increase feelings of loneliness.[36]

In line with our study, other studies also achieved this association that social support has the strongest inverse association with loneliness ([37-39]). Liu et al research demonstrated that social support is a potential protective factor for lonely elderly persons.[37] Social support enhances the experience of feeling valued by others and delays the onset of ill health.[40]

In some studies, social support moderate relationship between poor self-rated health and loneliness in late adulthood.[31, 41] Older adults with high social support mostly are married and live with their children and spouse which makes them feel less alone.[42]

Most studies confirm that living with a spouse is associated with the lower feeling of loneliness.[43-46] Lack of a supportive person in life like spouse may cause emotional loneliness.[47] But in some studies, living with spouse increased loneliness. The most important reasons for the loneliness of the elderly in living with their spouses are cultural traditions, the reduction of expression of feelings and thoughts to share due to old age and lack of social support satisfaction.[48-51]

In fact, loneliness is the lack of relationship with other people who are important to a person like spouse and children.[52] It seems that many elders who live with others (not with spouse and children) have worse health, more cognitive impairment and frailty and more likely to be widows.[53, 54] It is possible that for the above reasons in our study, people who lived with others felt lonelier.

In many literatures loneliness increases with age[55, 56] but the result of our study showed the opposite. The trend of loneliness with increasing age is such that in the age of 50 to 79 years, the feeling of loneliness is less and with increasing age, especially above 80 years, the feeling of loneliness increases sharply[57, 58] which a U-shaped association between age and loneliness is identified.[8] But in a meta-analysis it was confirmed that there is no evidence of an increase in the prevalence of loneliness with age in the older population[59] . Besides, it has been shown that loneliness does increase with age, not because of age per se, but because of increasing disability and decreasing social integration.[60] In addition not all adults in older ages become more lonely because improvement in functional capacity and network expansion lead to less loneliness.[61] The late-life increase in loneliness could be explained by lower income levels, higher prevalence of functional limitations, and higher proportion of singles in this age group.[62] In our study, the majority of participants were married and had medium economic level, which might make them feel less lonely

Many studies similar to our findings demonstrated that females feeling lonelier.[63, 64] Gender, social, and cultural factors influence the experience of loneliness in older women. The most important reasons for the feeling of loneliness in women are their widowhood and their poor economic level.[65, 66] Older women from a lower socio-economic level experienced high level of emotional loneliness.[62, 67-69] Marital quality seems important for women so that poor quality marriages linked to poor physical and mental health outcomes among women.[70]

In the last word, an understanding of risk factors such as sex and gender that are unmodifiable, it is crucial for the development and implementation of effective interventions to alleviate loneliness in older adults.

Strengths and Limitations

This study used data from ACSA that is the first comprehensive longitudinal study of aging in the Iranian population. This longitudinal study possessed a large sample size and a high response rate.

The study had some limitations which can affect internal or external validity. ACSA excludes those in care homes where levels

of loneliness are higher than in the general population. However, to deal with this issue, we included a large population in our study to create useful data. The loneliness questionnaire is such that the interviewers should ask the questions without personal bias. To deal with this bias, the interviewers were well trained on how to pose the questions to the interlocutors so as not to induce the answer to the person.

Conclusion

Elderly people who have more social support and consider their self-rated health better feel less lonely. Older adults who lived only with their spouse had the lowest social loneliness and people who lived alone had the highest emotional loneliness. According to the results, age, sex, marital status, education and economic level were identified as loneliness predictors.

Conflict of interest

The authors report there are no competing interests to declare.

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