



Role of Social Network on Life Satisfaction among Older Persons in Delhi, India: a Structural Equation Modelling

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Accepted: 30 April 2021 / Published online: 5 May 2021

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Abstract

The percentage of older persons in India is projected to rise to 11 percent of the total population by 2025 and to 19 percent by 2050. Available literature suggests that life satisfaction of older persons depends extensively on their social network. Young people in urban areas have a busy lifestyle and little time for older family members. The present study aims to explore the role of social networking and the support from these networks on life satisfaction of the older people in India. Primary data from 530 households were collected between November 2014 and March 2015. Descriptive statistics, chi square test and Berkman's theoretical model were partially used. Structural equation modelling (SEM) was applied to examine the association between the social network and life satisfaction, arbitrated by different types of social support. Different types of social network act differently on the perception of life satisfaction among the older person. Findings show that networks with family, neighbours, friends and close ones were significantly associated with life satisfaction of the older people in urban area. Support derived from different social networks is important for life satisfaction at later ages. Having a strong confidant social network is significant in promoting life satisfaction among older persons. The main characteristic of this network support is trust between the support provider and old people.

Keywords Older persons · Structural Equation Modelling · Social Network · Social Support and Life Satisfaction

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Introduction

At every stage of life, support from family and friends plays an important role in overall well-being. Support from different sources is known to be an important predictor of life satisfaction. It is a well-known and well documented fact that social network and support have positive effects on life satisfaction (Chan et al., 2006; Lim & Putnam, 2010; Litwin et al., 2015). Generally, at older ages, social network is supposed to be strong because old people have enough time to connect with family members and spend time with friends and relatives. But evidence suggests that size, quality and type of support from different sources of network have different effects on cognitive ability and life satisfaction of the elderly (Berg et al., 2006; Donovan et al., 2017). Many studies have also found that at older ages, networking with friends is more important than contact with children, frequency and quality of social contacts is more significant than the number of networks for life satisfaction (Pinquart & Sorensen, 2000; Courtin & Knapp, 2017).

However, life satisfaction also varies with the socioeconomic and demographic status of older people. According to a study done by Li et al. (2015) age and financial support exchange significantly affect the life satisfaction of the older people in urban area compared to their rural counterparts (Li et al., 2015). Similarly, the perception of life satisfaction and loneliness is different for people living in urban areas than for people living in rural areas. Likewise, the level of autonomy and size of social network is larger among the rural elderly than among the urban, which results in a lower feeling of anxiety and positive attitude towards the aging process (Paul et al., 2003).

Apart from living conditions and autonomy, poor health at later ages plays an important role in defining life satisfaction of the elderly. Problems associated with memory are always seen as geriatric impairment but there is scientific evidence that suggests that though there is certainly a strong correlation of functional loss with age, the level of functional impairment among the elderly is not only a natural process, but one that must be evaluated at the individual level (Manton, 1989). Many studies depicted that social factors have a great effect on physical health as well (Andrews et al., 1978; VanderVoort, 1999). Loneliness, isolation, stresses and anxiety have an immense effect on the functioning of the hormonal system of the body, through which it affects physical health (Cohen & Herbert, 1996). Berkman et al. (2000) demonstrate that social network influences people's health through behavioural factors (Berkman et al., 2000). People with larger social networks were found to be more physically active than those with smaller social networks or people living alone who needed more caregiving services and utilized more health care than those who were living close to their children or other social networks (Shelton et al., 2019; Shiovitz-Ezra & Litwin, 2012). Thus, social factors influence not only mental or psychological well-being but also affect the physical health of an individual and to fill this gap, the present study aims to examine the role of social networking on life satisfaction among the older persons in Delhi, India.

Data and Methods

Data sources and sample size determination

The cross-sectional research design was followed and primary survey was conducted for data collection in West Delhi. The West Delhi was purposefully selected for this study due to heavy concentration of older persons in urban areas than the other districts of Delhi. According to Census 2011, West Delhi had highest number, 5.0 percent of older population (65+) and 99.75 percent of population were urban.

$$n = \frac{1.962 * p * q(1 + R)(deff)}{d^2}$$

n = the estimated sample size.

p = percent of 65 and above population of West Delhi district, which is 5.03 percent (INDIA P., 2011).

q = (1-p) = 0.95.

R = non-response rate 10 percent (R = 1.1).

deff = the design effect (deff = 1.25).

d = margin of error (d = 0.05).

After putting all the values together, the estimated sample size was 528 which was rounded up and the final sample was 530 respondents.

Study Design

A cross-sectional research design was adopted for this study to examine the effect of social network and social support along with health status on the life satisfaction of the older persons who living in urban areas in Delhi, India.

Study Setting

This survey was carried out in Delhi, which is the world's second highest populous city with 25 million inhabitants and West Delhi was selected, which has 99.7 percent urban population. Different factors act differently for urban and rural people. Many studies have focused on the condition of rural people but few have explored the condition of the elderly living in urban areas. This study is designed in such a way that it can exclusively explore the determinants of life satisfaction of the older persons living in urban area considering their social network and support.

Sampling Strategy

The survey applied a multistage stratified sampling method and Census 2011 served as a sampling frame. At the first stage, districts with the highest 65+ population were selected purposefully, in the second stage, three wards were selected randomly and households with at least one older person were selected at the third stage. To

ensure that the selected households had at least one older person, a systematic house listing was undertaken from the three selected wards. The ultimate sampling units were households with one individual aged 65 years and above co-residing with family members at the time of survey. The inclusion criteria of the respondent in case of more than two 65+ respondent in selected household, older persons were selected. And subject with terminally ill, bed ridden or serious medical condition were excluded from the study. This study used kish table for selection the one respondent if more than one respondent found in the one household (Kish L., 1949). The total number of estimated sample size was 530 respondents and this sample was proportionally distributed among three selected wards (Table 1).

Measuring Social Network

The effects of social isolation on physical and mental health cannot be undermined. The World Health Organization (WHO) recognizes that prevention of social isolation is important for good health (Kalache, A & Gatti A, 2003). Poor and negative social ties often lead to illness, depression, risky health behaviour, which directly affect the overall well-being of older people. A positive social network provides the base of the primary and necessary support system to older people. While there are many instruments to measure social network, the Lubben Social Network Scale-18 (LSNS-18) has been used in this study to assess the integrated and comprehensive social network across the population. This scale has very good validity and reliability with the sample of older people and has been translated into many languages and applied to older populations across different countries and ethnic groups (Brown et al., 2009; Burnette & Myagmarjav, 2013; Cacioppo et al., 2003). This scale is a self-reported measure of social engagement with family, neighbours and friends.

Originally, there were six questions in all three domains that captured both the size of the network and frequency of the contacts. The main reason to use this scale was to assess the size as well as the frequency of the network.

1. How many family members or relatives do you see or hear from at least once a month?
2. How often do you see or hear from the relative with whom you have the most contact?

Table 1 Proportionally distribution of sample by the total number of households in the selected Wards, West Delhi

| Ward Number | Number of Household | Selected number of households |
|-------------|---------------------|-------------------------------|
| Ward No 74 | 304 | 12 |
| Ward No 118 | 650 | 35 |
| Ward No 150 | 6220 | 483 |
| Total (N) | 7174 | 530 |

3. How many family members, relatives do you feel at ease with that you can talk about private matters?
4. How many family members, relatives are you close to, such that you could call on them for help?
5. When one of your relatives has an important decision to make, how often does he/she talk to you about it?
6. How often is one of your relatives available for you to talk to when you have an important decision to make?

Each domain has six questions on a 6-point scale from 0 to 5, where 0=none 1=one, 2=two, 3=three or four, 4=five to eight and 5=nine or more. The higher score reflects the greater number and stronger networks on the respective scale. Further, for analytical purposes, these responses are combined and coded into 1 as “low”, 2 and 3 as “medium”, 4 and 5 as “high”. Similarly, a composite scale from family, friends and neighbours has been created and named as ‘all network’. In this study, only five questions each on the family and friends’ network has been used and three questions for neighbours, the remaining question was removed after pretesting because many older people considered their neighbours friends, which overlaps and we got repetitive responses. Many scales were used to measure the social network, since they cannot be assessed through direct questions. Different domains of social network, that is, family, friends, neighbours and significant others or confidant was created to capture a possible source for support. For family network, the Cronbach alpha’s values were 0.803, for friends 0.852 and for neighbours it was 0.673. The Cronbach value for ‘all network’ was 0.885.

Measuring Social Support

There are various scales to measure social support of the older population. In this study, we used a multidimensional scale to measure perceived social support of the elderly. Originally, this consisted of 12 items on a 7-point scale, four items each in three domains, namely family, friends and significant others or confidant were there. The items on this scale were divided into factor groups relating to the sources of social support from each domain. This scale was developed by Zimet GD, Dahlem NW, Zimet SG, Farley GK in 1988 (Zimet et al., 1988). Since then it has been used extensively for older people to assess their perceived social support (Ficker et al., 2014; Melchiorre et al., 2013). It is an easy-to-use, self-explanatory and distinguished perceived social support from three sources, that is, family, friends and significant others or confidant (Zimet et al., 1988). Four questions for each source were designated to assess perceived social support. In this study, we have included four questions for each family and confidant, but for the friend only three questions were added because there was an overlap between two questions, that is, “I have friends with whom I can share my joys and sorrows” and “I can talk about my problem with my friends”. During pre-testing, a respondent said that there were no different sets of people with whom you could share joy and sorrow and discuss your problems, both are the same, and we also got similar answers for both the questions. That is why in the final data collection, we retained only

three questions. To assess support from neighbours, we asked three questions, similar to those for friends in the perceived social support scale. The Cronbach alpha value of support from family, friends, neighbours and confidant was 0.715, 0.598, 0.752, 0.762 and 0.819 respectively. However, it was 0.819 for all support.

Measuring Life Satisfaction

This five-item scale has been designed to measure global cognitive judgment of one's life satisfaction. The Satisfaction with Life Scale (SWLS) was developed to assess satisfaction with the respondent's life as a whole. It does not measure positive or negative life satisfaction. Respondents indicated how much they agree or disagree with each item on the scale, they indicated their judgment on a 7-point scale that ranges from 1 "strongly disagree" to 7 "strongly agree". For purposes of analyses, the scale was further converted on a three point, "low", "medium" and "high". Convergent validity of this scale is better than that of other existing scales that assess subjective well-being. The reliability coefficient of this scale is 0.832 which indicates the good internal consistency of the scale. This scale was developed by Diener et al. (1985) and widely used by social scientists (Suh et al., 1996; Diener, E., Suh, E., & Oishi, S. (1997; Kuppens et al., 2008; Diener & Ryan, 2009).

Data Analytic Procedures

We used descriptive statistics, bivariate and multivariate estimates to meet the objectives of the study. In the first step of the analysis, we carried out the confirmatory factor analysis (CFA) with the weighted least square (WLS) to construct a social network and to check the validity and reliability of the scale used. In the second step, we carried out bivariate analysis to examine the association between life satisfaction and social network, social support and socioeconomic characteristics for the elderly. We applied one-way analysis of variance (F test) if the independent variable was more than 2 category and independent sample t-test (t test) if the independent variable has 2 categories, to understand the extent of association between dependent and independent variable. In the third step of the analysis, we carried out multivariable linear regression analysis to observe the net effect of the social network on life satisfaction of the elderly. Four models fitted for multivariable linear regression to know the varying nature of the association between life satisfaction and social network, included social support, socioeconomic variables, and others health related variables. Model I present only social network variables, while Model II presents social network and social support. Model III presents social network, social support and socioeconomic variable, and Model IV, social network, social support and socioeconomic including health related variables. The multivariable model contains a range of explanatory variables; hence variables were checked for multicollinearity by using variance inflation factor (VIF). The VIF estimates how much the variance of a regression coefficient is inflated due to multicollinearity in the model. A study done by Yoo, W et al. (2014) highlighted that VIF value greater than 10 may be harmful for model results (Yoo et al., 2014). However, the maximum VIF was found to be 2.30 for the family network. In the fourth

step of the analysis, we performed structural equation modelling (SEM) to examine the association between social network and life satisfaction, arbitrated by social support by using the SEM builders in Stata. The analyses were conducted using Stata version 13.0 (StataCorp, 2013).

Results

Profile of the Respondents

The socioeconomic and demographic characteristics of the elderly are presented in Table 2. Around 61 percent of the elderly belonged to age group 65–69 and the rest were in the age-group, 70 and above. More than half (54.7%) of the surveyed elderly were female and majority of the elderly were widowed (56.0%) in the sample. Nearly 53.6 percent were illiterate. Almost 50 percent of the older persons never worked, more than one-fifth (22.3%) were working during the survey period, while 26.4 percent who had worked earlier were not working at the time of survey. Majority, that is 83.6 percent of the older persons belonged to the Hindu religion and more than half, 55.9 percent were from Other Castes (other than Others Backwards Classes and Scheduled Castes/Scheduled Tribes castes). The results show that 21.3 percent of the older persons were residing with their spouse and 22.5 percent with their children/grandchildren. Among the survey population, more than half (56.2%) of the older persons were living with children in-laws at the time of the survey.

Socioeconomic Differentials in Life Satisfaction

Next, we present the difference in the mean score of life satisfaction (Table 3). Findings from the analysis indicates that sex, marital status, educational status, working status, caste, household income status and types of caregivers of the older persons were significantly associated with life satisfaction. The mean score of life satisfaction (Mean=20.08, Std. Dev=4.74) was higher among the male older persons than among the female older persons (Mean=18.05, Std. Dev=4.56) ($t=4.99$; $p=0.000$). The mean score of life satisfaction (Mean=19.80, Std. Dev=4.76,) was higher among currently married older persons compared to single/widowed older persons (Mean=18.32, Std. Dev=4.64) ($t=3.60$; $p=0.000$). The mean score of life satisfaction (Mean=20.69, Std. Dev=4.73) was higher among the older persons with secondary and above education, while it was lower among the illiterate (Mean=18.82, Std. Dev=4.69) ($F=1.02$; $p=0.433$). The older persons whose caregiver was the spouse recorded the highest mean score of life satisfaction (Mean=20.95, Std. Dev=4.29), followed by children in-laws (Mean=18.60, Std. Dev=4.79) and children/grandchildren (Mean=18.00, Std. Dev=4.56) ($F=1.76$; $p=0.012$).

Table 2 Profile of the respondents

| Background characteristics | n | % |
|----------------------------------|-----|------|
| Age | | |
| 65 to 69 years | 325 | 61.3 |
| 70 and above | 205 | 38.7 |
| Sex | | |
| Male | 240 | 45.3 |
| Female | 290 | 54.7 |
| Marital status | | |
| Currently Married | 233 | 44.0 |
| Single/ widow | 297 | 56.0 |
| Education | | |
| No education | 284 | 53.6 |
| Primary Completed | 149 | 28.1 |
| Secondary and above | 97 | 18.3 |
| Current working status | | |
| Currently not working | 140 | 26.4 |
| Currently working | 118 | 22.3 |
| Never work | 272 | 51.3 |
| Household size | | |
| Up to 4 | 155 | 29.3 |
| Five | 166 | 31.3 |
| Six and above | 209 | 39.4 |
| Religion | | |
| Hindu | 443 | 83.6 |
| Other than Hindu | 87 | 16.4 |
| Caste | | |
| Others caste | 296 | 55.9 |
| Other Backword Classes | 133 | 25.1 |
| Scheduled Caste/Scheduled Tribes | 101 | 19.1 |
| Households Income | | |
| Poor | 177 | 33.4 |
| Middle | 179 | 33.8 |
| Rich | 174 | 32.8 |
| Activities of Daily Living | | |
| Low | 398 | 75.1 |
| Medium | 89 | 16.8 |
| High | 43 | 8.1 |
| Caregiver | | |
| Spouse | 113 | 21.3 |
| Children/Grand children | 119 | 22.5 |
| Children In-laws | 298 | 56.2 |
| Diagnosed chronic disease status | | |
| No disease | 110 | 20.7 |
| Any one disease | 215 | 40.6 |

Table 2 (continued)

| Background characteristics | n | % |
|----------------------------|-----|------|
| Two or more | 205 | 38.7 |
| Total | 530 | 100 |

Differentials in Life Satisfaction by Social Network

This study explores the bivariate analysis of the effect of social network on life satisfaction among the older persons (Table 4). Results from the analysis show the significant association between social network and life satisfaction of the older persons. Findings show that networks with family, neighbours, friends, and close-ones were significantly associated with life satisfaction of the older persons ($p=0.000$). The results indicate that the mean score of life satisfaction (Mean=20.30, Std. Dev=3.32) was higher for those older persons whose friends' network was higher compared to the older persons who had a lower network of friends (Mean=18.54, Std. Dev=4.79) ($F=2.06$; $p=0.001$). The mean score of life satisfaction (Mean=21.70, Std. Dev=4.16) was considerably higher for the older persons whose confidant network was greater compared with those who had a low confidant network (Mean=17.94, Std. Dev=4.64) ($F=3.21$; $p=0.000$). Moreover, the mean score of life satisfaction was less among the older persons with a low family network (Mean=18.51, Std. Dev=4.91), compared with the older persons who had a medium family network (Mean=19.71, Std. Dev=4.55). As regards the total network, the results show that the mean score of life satisfaction was high among those older persons who had a larger total network (Mean=21.19, Std. Dev=4.17) than among those who had a low total network (Mean=18.46, Std. Dev=4.98) ($F=1.56$; $p=0.039$).

Differentials in Life Satisfaction by Social Support

This study explores the association between social support and life satisfaction of the older persons (Table 5). The findings show that the mean score of life satisfaction of the older persons was significantly associated with the social support received by them, including family support, neighbour support, friend support, confidant support and total support ($p=0.00$). The mean score of life satisfaction was considerably better among the older persons with higher support from family (Mean=20.21; Std. Dev=4.29), while it was lower among those who had less support from family members (Mean=15.38; Std. Dev=4.57) ($F=3.05$; $p=0.00$). Similarly, the results indicate that the mean score of life satisfaction was highest for those older persons who reported higher support from neighbours (Mean=20.96; Std. Dev=4.37) while lesser mean life satisfaction score was observed among those who had less support from neighbours (Mean=18.85; Std. Dev=4.80). The mean life satisfaction score was better among those older persons who reported higher support from friends (Mean=20.35; Std. Dev=4.25), compared with those who reported lesser support from friends (Mean=17.23; Std. Dev=4.99) ($F=1.74$; $p=0.013$). Considering

Table 3 Mean and standard deviation for the Life Satisfaction Index (LSI) among older persons by selected socioeconomic and demographic characteristics, in Delhi, India

| Background characteristics | Mean | Standard deviation |
|----------------------------------|------------------------|--------------------|
| Age | $t = 0.75; p = 0.224$ | |
| 65 to 69 years | 19.09 | 4.55 |
| 70 and above | 18.77 | 5.05 |
| Sex | $t = 4.99; p = 0.000$ | |
| Male | 20.08 | 4.74 |
| Female | 18.05 | 4.56 |
| Marital status | $t = 3.60; p = 0.000$ | |
| Currently Married | 19.80 | 4.76 |
| Single/ widow | 18.32 | 4.64 |
| Education | $F = 1.02; p = 0.433$ | |
| No education | 18.82 | 4.69 |
| Primary Completed | 18.12 | 4.60 |
| Secondary and above | 20.69 | 4.73 |
| Current working status | $F = 2.06; p = 0.001$ | |
| Currently not working | 19.42 | 5.31 |
| Currently working | 20.58 | 4.17 |
| Never work | 18.04 | 4.46 |
| Household size | $F = 1.360; p = 0.110$ | |
| Up to 4 | 18.08 | 4.59 |
| Five | 18.96 | 4.61 |
| Six and above | 19.63 | 4.88 |
| Religion | $t = -2.50; p = 0.99$ | |
| Hindu | 18.74 | 4.76 |
| Other than Hindu | 20.13 | 4.54 |
| Caste | $F = 1.70; p = 0.014$ | |
| Others caste | 18.84 | 4.54 |
| Other Backword Classes | 19.06 | 4.81 |
| Scheduled Caste/Scheduled Tribes | 19.23 | 5.25 |
| Households Income | $F = 2.06; p = 0.001$ | |
| Poor | 19.05 | 4.94 |
| Middle | 18.17 | 4.59 |
| Rich | 19.70 | 4.60 |
| Activities of Daily Living | $F = 3.02; p = 0.000$ | |
| Low | 19.55 | 4.50 |
| Medium | 17.74 | 4.74 |
| High | 16.14 | 5.54 |
| Caregiver | $F = 1.76; p = 0.012$ | |
| Spouse | 20.95 | 4.29 |
| Children/Grand children | 18.00 | 4.56 |
| Children In-laws | 18.60 | 4.79 |

Table 3 (continued)

| Background characteristics | Mean | Standard deviation |
|----------------------------------|-----------------------|--------------------|
| Diagnosed chronic disease status | F = 1.00; $p = 0.462$ | |
| No disease | 19.44 | 4.27 |
| Any one disease | 18.90 | 4.68 |
| Two or more | 18.79 | 5.05 |
| Total | 18.97 | 4.75 |

* p value based on one-way analysis of variance (F test if independent is more than 2 category)

** p value based on independent sample t-test (t test if independent is two category)

support from confidants, the results indicate that the mean life satisfaction score was much better (Mean = 19.75; Std. Dev = 5.00) among those older persons who reported more support from confidants than by those who had medium confidant support (Mean = 19.39; Std. Dev = 4.52) or those with less support (Mean = 15.74; Std. Dev = 4.05) ($F = 2.33$; $p = 0.000$). The findings from this analysis show that the mean score of life satisfaction among the older persons increases with the increase

Table 4 Mean and standard deviation for the Life Satisfaction Index (LSI) among older persons by specific and total social network, Delhi, India

| Background characteristics | Mean | Standard deviation |
|----------------------------|-----------------------|--------------------|
| Family network | F = 1.31; $p = 0.139$ | |
| Low | 18.51 | 4.91 |
| Medium | 19.71 | 4.55 |
| High | 19.33 | 4.27 |
| Neighbour network | F = 1.73; $p = 0.014$ | |
| Low | 19.18 | 4.95 |
| Medium | 18.72 | 4.59 |
| High | 18.88 | 4.00 |
| Friend network | F = 2.06; $p = 0.001$ | |
| Low | 18.54 | 4.97 |
| Medium | 19.33 | 4.66 |
| High | 20.30 | 3.32 |
| Confidant network | F = 3.21; $p = 0.000$ | |
| Low | 17.94 | 4.60 |
| Medium | 20.01 | 4.58 |
| High | 21.70 | 4.16 |
| Total network | F = 1.56; $p = 0.039$ | |
| Low | 18.46 | 4.98 |
| Medium | 19.39 | 4.21 |
| High | 21.19 | 4.17 |
| Total | 18.97 | 4.75 |

p value based on one-way analysis of variance (using F test if independent variables have more than 2 categories)

Table 5 Mean and standard deviation for the Life Satisfaction Index (LSI) among older persons by specific and total social support in Delhi, India

| Background characteristics | Mean | Standard deviation |
|----------------------------|--------------------|--------------------|
| Family support | F= 3.05; $p=0.00$ | |
| Low | 15.38 | 4.57 |
| Medium | 18.62 | 4.78 |
| High | 20.21 | 4.29 |
| Neighbour support | F= 1.11; $p=0.319$ | |
| Low | 18.85 | 4.80 |
| Medium | 18.86 | 4.71 |
| High | 20.96 | 4.37 |
| Friend support | F= 1.74; $p=0.013$ | |
| Low | 17.23 | 4.99 |
| Medium | 18.81 | 4.74 |
| High | 20.35 | 4.25 |
| Confidant support | F= 2.33; $p=0.000$ | |
| Low | 15.74 | 4.05 |
| Medium | 19.39 | 4.52 |
| High | 19.75 | 5.00 |
| Total support | F= 2.80; $p=0.000$ | |
| Low | 17.16 | 4.74 |
| Medium | 19.80 | 4.41 |
| High | 20.12 | 4.66 |
| Total | 18.97 | 4.75 |

p value based on one-way analysis of variance (F test if independent is more than 2 category)

in social support. For example, the mean score of life satisfaction was much higher (Mean=20.12; Std. Dev=4.66) among those older persons who had higher total social support, followed by those older persons who reported middle-level total support (Mean=19.80; Std. Dev=4.417) and those who informed less total support (Mean=17.16; Std. Dev=4.74) (F=2.80; $p=0.000$).

Correlation Matrix for Predictor and Outcome Variables

Our study analyses the relationships between socioeconomic variables and outcome variable, that is, life satisfaction (Table 6). The correlation matrix manifests several significant correlations between the independent variables and the dependent variable among the older persons in Delhi. Education, household size and religion were significant and positively correlated with the life satisfaction score of the older persons ($p < 0.01$). The relationship of sex of older persons, marital status, current working status, types of caregivers and Activities of Daily Living (ADL) with life satisfaction score of the older persons was found to be negative and statistically significant ($p < 0.01$). The significant relationships

Table 6 Correlation matrix for Socioeconomic with Life satisfaction

| Variables | Y | X 1 | X 2 | X 3 | X 4 | X 5 | X 6 | X 7 | X 8 | X 9 | X 10 | X 11 | X 12 |
|-----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|-------|
| Y Life satisfac-tion | 1.000 | | | | | | | | | | | | |
| X 1 Age | -0.033 | 1.000 | | | | | | | | | | | |
| X 2 Sex | -0.212** | 0.045 ns | 1.000 | | | | | | | | | | |
| X 3 Marital status | -0.155** | 0.212** | 0.409*** | 1.000 | | | | | | | | | |
| X 4 Education | 0.107** | -0.059 ns | -0.239*** | -0.238*** | 1.000 | | | | | | | | |
| X 5 Working status | -0.149*** | -0.074* | 0.801*** | 0.220*** | -0.276*** | 1.000 | | | | | | | |
| X 6 HH size | 0.134** | 0.095** | 0.044 ns | -0.108*** | -0.036 ns | 0.015 ns | 1.000 | | | | | | |
| X 7 Religion | 0.108*** | -0.017 ns | 0.106*** | 0.033 ns | 0.038 ns | 0.074* | 0.112*** | 1.000 | | | | | |
| X 8 Caste | 0.033 ns | 0.012 ns | -0.108*** | -0.028 ns | -0.093** | -0.033*** | -0.050 ns | -0.254*** | 1.000 | | | | |
| X 9 Households Income | 0.055 ns | -0.123*** | -0.263*** | -0.160*** | -0.193*** | -0.108*** | -0.056 ns | -0.078* | 0.281*** | 1.000 | | | |
| X 10 Caregivers | -0.164** | 0.136*** | 0.468*** | 0.500*** | -0.114*** | 0.279*** | 0.094** | 0.010 ns | -0.104** | -0.330*** | 1.000 | | |
| X 11 Chronic disease | -0.047 ns | 0.244*** | 0.010 ns | 0.044 ns | -0.070* | -0.008 ns | -0.002 ns | -0.018 ns | 0.077** | 0.067 ns | -0.022 ns | 1.000 | |
| X 12 ADL | -0.227*** | 0.352*** | 0.179*** | 0.208*** | -0.025 ns | 0.084** | 0.086** | 0.011 ns | -0.010 ns | -0.165*** | 0.248*** | 0.230*** | 1.000 |

Levels of significance: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$; ns not significant

Table 7 Correlation matrix for Social network, social support with Life satisfaction

| Variables | Y | X 1 | X 2 | X 3 | X 4 | X 5 | X 6 | X 7 | X 8 | |
|-----------|-------------------|-----------|----------|----------|----------|----------|----------|----------|----------|-------|
| Y | Life satisfaction | 1.000 | | | | | | | | |
| X 1 | Family network | 0.091** | 1.000 | | | | | | | |
| X 2 | Neighbour network | -0.039 ns | 0.647*** | 1.000 | | | | | | |
| X 3 | Friend network | 0.127*** | 0.631*** | 0.600*** | 1.000 | | | | | |
| X 4 | Confidant network | 0.304*** | 0.290*** | 0.092** | 0.269*** | 1.000 | | | | |
| X 5 | Family support | 0.238*** | 0.190*** | 0.098** | 0.101** | 0.236*** | 1.000 | | | |
| X 6 | Neighbour support | 0.057 ns | 0.455*** | 0.516*** | 0.440*** | 0.190*** | 0.112*** | 1.000 | | |
| X 7 | Friend support | 0.201*** | 0.156*** | 0.045 ns | 0.143*** | 0.184*** | 0.293*** | 0.127*** | 1.000 | |
| X 8 | Confidant support | 0.220*** | 0.170*** | 0.138*** | 0.090** | 0.175*** | 0.404*** | 0.114*** | 0.247*** | 1.000 |

Levels of significance: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$; ns not significant

Table 8 Multicollinearity evaluation results: Variation Inflation Factor (VIF) for predictor variables

| Variables | VIF | Variables | VIF |
|----------------------------|------|-------------------|------|
| Family network | 2.30 | Age | 1.28 |
| Neighbour network | 2.57 | Sex | 4.04 |
| Friend network | 2.03 | Marital status | 1.63 |
| Confidant network | 1.29 | Education | 1.26 |
| Family support | 1.32 | Working status | 3.25 |
| Neighbour support | 1.53 | Household size | 1.12 |
| Friend support | 1.20 | Religion | 1.14 |
| Confidant support | 1.29 | Caste | 1.19 |
| Chronic disease | 1.17 | Households Income | 1.62 |
| Activities of Daily Living | 1.29 | Caregivers | 1.79 |
| Mean VIF: 1.72 | | | |

Sources: Author's Computation

among independent (socioeconomic and health related) variables were also assessed (Table 5). Similarly, the correlations between social network, social support and life satisfaction score of the older persons are revealed in Table 6. It was clear from the analysis that the friend network ($p < 0.05$), confidant network ($p < 0.01$), family support ($p < 0.01$), neighbour support ($p < 0.10$), friend support ($p < 0.01$), confidant support ($p < 0.01$) was significant, and positively correlated with the life satisfaction score of the older persons. The significant relationships among independent (social network and social support) variables were also assessed (Table 7).

Multicollinearity Analysis

This study carried out the multicollinearity analysis to check the collinearity within the predictor variables (Table 8). The Variance Inflation Factor of all predictor variables was less than 5. Therefore, it could be considered that there was no multicollinearity among the predictor variables and all predictor variables were included in the multivariable regression model.

Determinants of Life Satisfaction

A multivariable regression analysis was carried out with the life satisfaction score (Table 9). Four models fitted for multivariable linear regression to study the varying nature of the association between life satisfaction and social network included social support, socioeconomic variables, and other health related variables. Model I present only social network variables to know the specific effect of social network on life satisfaction score of the older persons, while Model II includes social support variables to know the adjusted effect of social network with social support on life satisfaction of the older persons. In Model III, we included socioeconomic variables along with social network and social

Table 9 Multivariable regression model to examine the effect of specific social networks on life satisfaction for older persons in Delhi, India

| Background characteristics | Model I | Model II | Model III | Model IV |
|--|----------------------|----------------------|----------------------|----------------------|
| Family network | | | | |
| Low @ | | | 0.811[-0.315–1.937] | 0.813[-0.297–1.922] |
| Medium | 1.127[-0.040–2.294] | 0.729[-0.409–1.866] | 0.193[-1.313–1.699] | 0.093[-1.397–1.582] |
| High | 0.388[-1.203–1.979] | -0.011[-1.54–1.519] | | |
| Neighbour network | | | | |
| Low @ | | | -0.962[-2.147–0.222] | -0.952[-2.117–0.214] |
| Medium | -1.922[-2.997–0.847] | -2.136[-3.213–1.059] | -0.699[-2.687–1.29] | -0.54[-2.512–1.431] |
| High | -1.933[-3.888–0.021] | -1.672[-3.619–0.275] | | |
| Friend network | | | | |
| Low @ | | | 0.823[-0.284–1.929] | 0.591[-0.512–1.694] |
| Medium | 0.835[-0.326–1.996] | 0.823[-0.306–1.953] | 1.763[0.284–3.241] | 1.426[-0.034–2.885] |
| High | 1.524[-0.029–3.077] | 1.584[0.08–3.087] | | |
| Confidant network | | | | |
| Low @ | | | 1.294[0.317–2.271] | 1.309[0.349–2.268] |
| Medium | 1.943[0.925–2.960] | 1.45[0.454–2.445] | 2.135[1.023–3.247] | 2.301[1.201–3.401] |
| High | 3.429[2.300–4.559] | 2.625[1.517–3.733] | 0.284 | 0.317 |
| R-squared | 0.120 | 0.210 | | |
| Adj R-squared | 0.106 | 0.185 | 0.238 | 0.267 |
| Model I: Unadjusted results for each network | | | | |
| Model II: Controls for children support, relatives support, friends support and confidant support | | | | |
| Model III: Controls for age, sex, Marital status education work status, HH size, religion, caste, income status, Caregiver and in addition all variables mentioned in Model II | | | | |
| Model IV: Controls for chronic illness, ADL and in addition to all variables mentioned in Model II and III | | | | |

support, while in Model IV, health-related variables have been included with social network, social support and socioeconomic variables to see the net effect of the social network on life satisfaction score among the older persons. It can be clearly seen in Model IV that confidant network is a significant reason explaining life satisfaction among the older persons even after controlling for social support, socioeconomic and health-related predictors. For instance, the older persons with the highest network of confidants were highly satisfied ($\beta = 2.301$; 95% CI = 1.201–3.401, $p = 0.00$) with their life than those who had a lower confidant network. Similarly, those older persons who reported a middle-level confidant network were also found to be more satisfied ($\beta = 1.309$; 95% CI = 1.201–3.401, $p = 0.01$) compared with those older persons who reported lower confidant network. Findings also suggest that the older persons with a higher network with friends were more satisfied ($\beta = 1.426$; 95% CI = -0.034–2.885, $p = 0.05$) with life than those older persons who had a lower network with friends.

Direct and Indirect Association

Figure 1 shows the pathway of the life satisfaction index model obtained from the Structural Equation Model (SEM). The results from the analysis suggest a direct positive association of support from family, friends, neighbours, and confidants with life satisfaction. Support from family and confidant was found to be directly associated with life satisfaction ($\beta = 1.20$, p -value, 0.001), ($\beta = 1.02$, p -value, 0.005), ($\beta = 0.97$, p -value, 0.004) respectively. This implies that a network with relatives can indirectly influence life satisfaction among the older persons through the provision of support. Table 10 represents the direct and indirect association of variables on the Life Satisfaction Index, Urban Delhi, India. Results show the direct positive association between family support, confidant support and life satisfaction of the older persons. Table 11 shows the path coefficients of the Life Satisfaction Index (LSI) model among older persons. The results indicate that support from family, friends, neighbours and confidants increases as the network increases.

Discussion

This study adopts the structural equation modelling approach to examine the role of social networking on life satisfaction among the older persons living in urban India by using the primary data that was collected between November 2014 and February 2015 in West Delhi in India. It examines the exact effect of social network on life satisfaction adjusting with other predictors using multivariable regressions analysis. These are some notable findings.

First, the socioeconomic background of the older persons like, sex, marital status, educational status, working status, caste, household income status and types

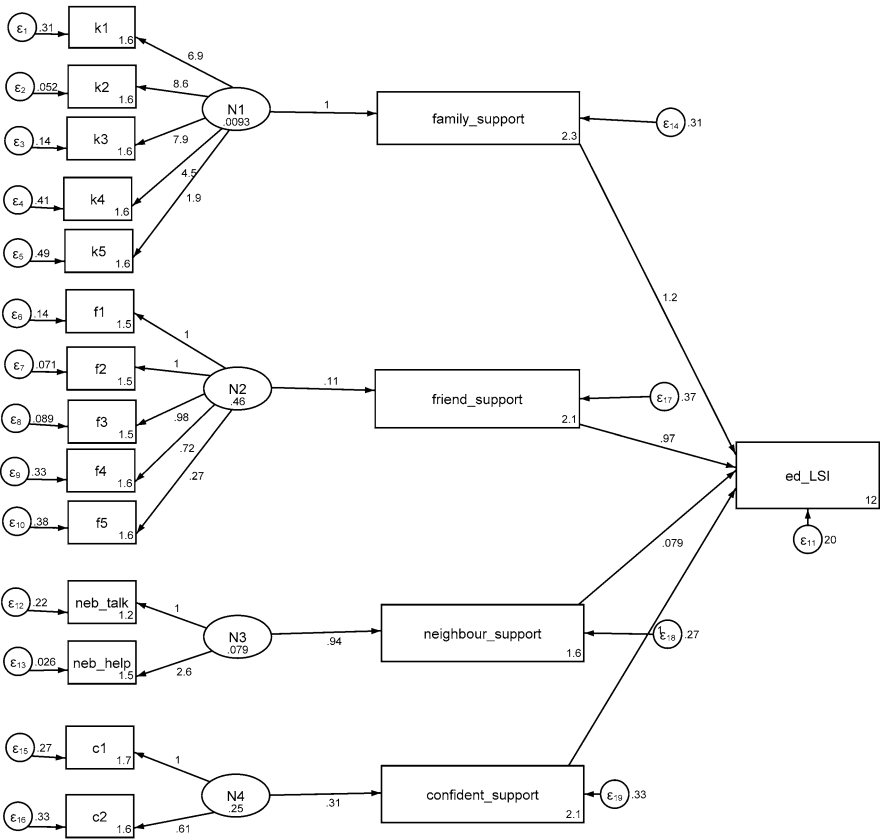


Fig. 1 Pathway of the Life Satisfaction Index model obtained from the Structural Equation Model (SEM)

of caregiver was significantly associated with life satisfaction among the older persons who were residing in urban Delhi. The mean score of life satisfaction was higher among male older persons, currently married older persons, older persons with secondary education and above, and older persons whose caregiver was their spouse.

Table 10 Direct and indirect association of variables on the Life Satisfaction Index, among older persons Delhi, India

| Variables | Direct | Indirect | P-Value |
|-------------------|--------|----------|---------|
| Family network | | 1.24 | 0.001 |
| Friends network | | 0.11 | 0.047 |
| Neighbour network | | 0.07 | 0.817 |
| Confidant network | | 0.32 | 0.048 |
| Family support | 1.20 | | 0.001 |
| Friends support | 0.97 | | 0.004 |
| Neighbour support | 0.08 | | 0.817 |
| Confidant support | 1.02 | | 0.005 |

Table 11 Path coefficients of the Life Satisfaction Index (LSI) model among older persons in Delhi, India

| Variables | Path coefficient | P-Value | 95% CI |
|--|------------------|---------|----------------|
| LAMBDA-Y | | | |
| Family support: physical/financial/emotional support | 1.000 | 0.000 | [3.342–10.401] |
| Friends support: physical/financial/emotional support | 1.000 | 0.000 | [4.224–13.057] |
| Neighbour support: physical/financial/emotional support | 1.000 | 0.000 | [3.897–12.002] |
| Confidant support: physical/financial/emotional support | 1.000 | 0.000 | [2.151–6.894] |
| Lambda-X | | | |
| Family network: number of family members or relative see or hear once a month | 6.871 | 0.000 | [3.342–10.401] |
| Family network: number of family members or relative which whom you talk about personal matter | 8.641 | 0.000 | [4.224–13.057] |
| Family network: number of family members or relative you can call for help | 7.950 | 0.000 | [3.897–12.002] |
| Family network: how often family members or relative see or hear once a month | 4.523 | 0.000 | [2.151–6.894] |
| Family network: how often family members or relative discusses about their personal matter | 1.898 | 0.001 | [0.744–3.051] |
| Friends network: number of friends see or hear once a month | 1.000 | 0.000 | [0.968–1.096] |
| Friends network: number of friends which whom you talk about personal matter | 1.032 | 0.000 | [0.921–1.047] |
| Friends network: number of friends you can call for help | 0.984 | 0.000 | [0.634–0.799] |
| Friends network: how often friends see or hear once a month | 0.716 | 0.000 | [0.188–0.35] |
| Friends network: how often friends discusses about their personal matter | 0.269 | 0.000 | [0.188–0.35] |
| Neighbour network: number of neighbours see or hear once a month | 1.000 | 0.000 | [1.785–3.459] |
| Neighbour network: number of close neighbours who can come for help | 2.622 | 0.000 | [1.785–3.459] |
| Neighbour network: frequency of discussing important matter/decisions (family/relative) | 1.000 | 0.000 | [1.785–3.459] |
| Confidant network: are friends discuss their important matter/decisions with you | 0.607 | 0.005 | [0.182–1.032] |
| BETA | | | |
| Family support: LSI | 1.242 | 0.001 | [0.482–2.002] |
| Friends support: LSI | 0.968 | 0.004 | [0.3–1.635] |
| Neighbour support: LSI | 0.079 | 0.817 | [-0.592–0.751] |
| Confidant support: LSI | 1.022 | 0.005 | [0.301–1.743] |
| GAMMA | | | |

Table 11 (continued)

| Variables | Path coefficient | P-Value | 95% CI |
|--------------------------------------|------------------|---------|----------------|
| Family network: Family support | 1.242 | 0.001 | [0.482–2.002] |
| Friends network: Friends support | 0.108 | 0.047 | [0.001–0.215] |
| Neighbour network: Neighbour support | 0.074 | 0.817 | [-0.555–0.704] |
| Confidant network: Confidant support | 0.316 | 0.048 | [0.003–0.63] |

Second, in keeping with the results of other studies (Berg et al., 2006; Borg et al., 2006; Harasemiw et al., 2019; Lou, 2010; Tomini et al., 2016) this paper shows that there is a significant association between the social network and life satisfaction of the older persons. Networks with family, neighbours, friends and confidants were significantly associated with life satisfaction of the older persons in urban area. The mean life satisfaction score was higher for the older persons whose network with, neighbours, friends and confidants were higher compared to those who had a lower network. The total network, mean score of life satisfaction was slightly high among those older persons who had a larger total network.

Third, life satisfaction of the older persons was significantly associated with the social support received by them, comprising family support, neighbour support, friend support, confidant support and total support. Our analysis indicated that the mean life satisfaction score was high among those older persons who had higher support from family, neighbours, friends and confidants. This finding was consistent with other studies (Shen & Yeatts, 2013; Yunong, 2012) which pointed out that, family support was a significant predictor of life satisfaction.

Fourth, the pathway of the life satisfaction index model obtained from the Structural Equation Model (SEM), analysis suggests a direct positive association of support from family, friends, neighbours, and confidants on life satisfaction of the older persons.

Fifth, this study also analyses the relationships between socioeconomic variables and outcome variable, that is, life satisfaction. The correlation matrix manifests a number of significant correlations between the independent variables and the dependent variable among the older persons in urban Delhi. Similarly, the correlations between social network, social support and life satisfaction score of the older persons are analysed. The significant relationships among independent (social network and social support) variables have been assessed.

Sixth, confidant network perceives a significant reason explaining life satisfaction among the older persons even after controlling for social support, socioeconomic and health-related predictors. This finding implies that having someone trustworthy can make a huge difference in one's perspective of life. A confidant network can be anyone—spouse, friend, neighbour, or any other family member with whom the elder is comfortable to talk about personal matters or rely on for taking important decisions. Having a confidant network gives a sense of belonging and positive feeling to the older persons, which is reflected in our findings.

Limitations of the Study

While this study has many strengths and explores several dimensions like, health status, social networking, social support, life satisfaction of the older persons residing in urban Delhi, India it suffers from some limitations too. First, this study covers only respondents living in urban areas; we are not able to know the situation of the same population residing in rural areas. It will be a good attempt to study the older persons population in rural areas to understand the difference

between urban and rural older persons life satisfaction. Second, retrospective responses were gathered from individuals about their diseases pattern, social networking, which might have been affected by recall lapse.

Conclusion

To conclude, the results suggest that specific social relationships may influence life satisfaction in later life. Having a strong social network, particularly family and confidant social network, is significant in promoting life satisfaction among older persons. Moreover, the size of the network is also important because as the size of the social network increases, chances of getting support from that network also increases and high social support is positively related to better life satisfaction. However, the present study was unable to include characteristics reflecting early life and childhood for instance, poverty, food deprivation, and so on. The study did not include older adults with mental disorders, which might result in a biased sample. Previous studies have shown that physical health is hardly relevant for older people's life satisfaction, whereas differences in mental health could distinguish between those with low and those with high life satisfaction.

Policy Recommendations

Despite the family being the primary network and support provider, with changes in the social and demographic scenario, there is need to adopt a new perspective to resolve issues related to the older persons. Since communication and interaction are very important for the health and well-being of the older persons, community level initiatives are important.

Future Research

This study focused exclusively on the social network and support from different sources and its association with life satisfaction of the older persons. However, it does not take into account the negative feelings of the older persons due to loss of spouse or loved ones, which could have a significant effect on life satisfaction. Similarly, it would be interesting if we could associate early life circumstances and their impact on later life satisfaction. Further, one can also study the sex composition of children and life satisfaction of the older persons because India has a strong son preference and the contact or communication with male and female children is different. Therefore, this may be associated with the life satisfaction of the older persons.

Author Contributions DK and JY conceived the idea for the study and developed the analysis plan. JY, DK and RV contributed to the data analysis. DK, VKK JY and RV wrote the initial draft and all authors were involved in commenting on subsequent revisions.

Declarations

Ethics Approval and Consent to Participate We have used primary data which considered the standard ethical consideration at every stage of study. First, the study obtained ethical consent from the review committee of the International Institute for Population Sciences (IIPS), Mumbai, India, before the survey. Second, before every interview, all aspects of the study were explained to the respondents and written consent was taken from them. Respondents were informed that whatever information they gave would be used for research purposes only, and they could quit the interview at any point of time if they chose to do so. Appropriate steps had been taken while dealing with sensitive issues, such as caregiving and receiving activities; caregivers and receivers were interviewed separately to maintain privacy. Proper information and definitions were provided during the interviews to avoid misunderstanding on specific issues.

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