

Family support, health outcomes and the management of geriatric conditions among older adults in Lahore, Pakistan: A cross- sectional study

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Research Article

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**Family support, health outcomes and the management of geriatric
conditions among older adults in Lahore, Pakistan: A cross-
sectional study**

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Abstract

Background: Population ageing is accelerating in urban Pakistan, where the family remains the main source of care for older people. Yet family support has rarely been measured as a health determinant in this setting. This study examined the associations between family support, health outcomes and the management of geriatric conditions among older adults in Lahore.

Methods: A cross-sectional survey of 325 adults aged 60 years and older was conducted between June and December 2025 in households, community settings, religious gatherings and residential care facilities across the four zones of Lahore. An interviewer-administered questionnaire assessed functional ability and work history, social support and caregiving, health status, and emotional and psychological impact (Cronbach's $\alpha = 0.800$). Analyses comprised descriptive statistics, chi-square tests, exploratory factor analysis, structural equation modelling (SEM) and binary logistic regression.

Results: Factor analysis yielded 14 dimensions across the four domains (KMO 0.724–0.847; Bartlett's test $p < 0.001$; 60.5–61.6% of variance explained). In the SEM, health status was associated with functional ability ($B = 1.10$, $SE = 0.165$, $p < 0.001$) and emotional and psychological state ($B = 0.95$, $SE = 0.156$, $p < 0.001$); its association with social support and caregiving was weaker ($B = 0.22$, $SE = 0.126$, $p = 0.081$). Lack of social support and loneliness was the most frequently reported concern of later life (24.3%). Feeling isolated ($OR = 1.97$), feeling that others did not wish to talk ($OR = 1.55$), higher education ($OR = 1.74$) and part-time or voluntary work ($OR = 1.51$) were associated with higher odds of naming loneliness as the principal concern, whereas living with family ($OR = 0.59$), frequent family communication ($OR = 0.66$) and visual difficulty ($OR = 0.58$) were associated with lower odds. The model correctly classified 84.6% of cases. Over half (53.5%) had delayed medical care because of cost.

Conclusions: Functional independence and emotional wellbeing were the strongest correlates of health in later life, and co-residence and regular communication with family were associated with lower odds of loneliness. Family-centred geriatric policy, together with financial protection for older people's healthcare, is warranted in urban Pakistan.

Keywords: Family support, Older adults, Geriatric care, Loneliness, Structural equation modelling, Logistic regression, Pakistan

Background

Population ageing is one of the defining demographic changes of this century. The number and proportion of people in later life are rising faster than those of any other age group, and longer survival brings a higher burden of chronic disease, cognitive decline and functional disability [1]. These conditions require sustained daily care as well as clinical treatment. In Pakistan, the Senior Citizens Act 2021 defines a senior citizen as a person aged 60 years or older [2], and this study uses this threshold.

In Pakistan, particularly in Lahore, families provide daily care for older people. Cultural and religious norms place a strong obligation of respect and support on the household; older people usually live with their children, and caregiving tasks often fall to sons and daughters-in-law [3]. Family support in this context goes beyond physical assistance to include emotional comfort, financial provision, social inclusion and participation in health decisions. At the same time, urbanisation, rising healthcare costs and migration are placing these traditional arrangements under pressure.

Care relationships in later life have health consequences for those who give care as well as for those who receive it. Family members caring for a relative with dementia report more depressive and physical symptoms than non-caregivers, with the strongest associations among spouses [4], and meta-analytic evidence indicates that informal caregivers have poorer physical

health than non-caregivers [5]. For older adults themselves, social engagement appears protective: in the Americans' Changing Lives study, volunteering was associated with better self-rated health, fewer depressive symptoms and less functional dependency [6]. Social isolation and loneliness have been linked to diabetes, hypertension and heart disease among older Mexican Americans [7], and older people in the United States who were satisfied with their social support were more than twice as likely to report good health (OR = 2.4, 95% CI 1.7–3.4) [8].

Family involvement can also shape the course of care. Older adults depend on relatives for a wide range of intensive care tasks, and the caregiving experience varies considerably between families [9]. Family involvement continues after admission to residential long-term care and influences residents' wellbeing [10]. In a randomised trial of 309 hospitalised patients aged 80 years and over, advance care planning reduced stress, anxiety and depression among the relatives of patients who died and improved satisfaction among patients and families [11], while depression care management in primary care was associated with a 24% lower long-term mortality among older adults with major depression [12].

The burden of geriatric conditions is considerable. Among 350 older homeless adults in Oakland, California, 38.9% had difficulty with activities of daily living, 33.7% reported recent falls, 25.8% had cognitive impairment, 45.1% reported visual difficulty and 48% reported urinary incontinence [13]. In rural Korean communities, the prevalence of frailty was 17% by Cardiovascular Health Study criteria and 27% by the Korean FRAIL scale [14], and frailty frequently goes unrecognised in primary care because it resembles normal ageing [15].

Multivariate and structural models have increasingly been used to examine these relationships. Social support was positively correlated with quality of life among 108 Turkish older adults and was higher among those living with family [16]. Path analysis in 604 community-dwelling older adults showed that social support linked physical ability to mental health, while

functionality mediated the effect of age on physical quality of life [17]. Among 151 older adults with chronic disease, each one-unit increase in activity restriction raised the odds of depression by 7% (OR = 1.07, 95% CI 1.01–1.13), whereas each point on a functional social support scale reduced them (OR = 0.40, 95% CI 0.23–0.70) [18]. Multigroup SEM among family caregivers in Tokyo showed that access to home-visit nursing increased the positive aspects of caregiving [19], and in Israel emotional support reduced conflict between hospitalised older adults and their families ($\beta = -0.105$), whereas primary caregiving ($\beta = 0.159$) and the number of visitors ($\beta = 0.125$) increased it [20].

Evidence from South Asia is limited but consistent in direction. In four villages of District Gujrat, Pakistan, family support (financial, moral, emotional and nutritional) was positively associated with the health status of older people, most of whom lived with and were financially supported by their children [3]. In a sample of 213 older people, education, gender, financial independence and family support were identified as the major determinants of health and quality of life [21].

Together, these studies show that family and social support are associated with health in later life and that factor-analytic and structural approaches are suitable for modelling these associations. The available Pakistani evidence, however, is descriptive and drawn from small rural samples. To our knowledge, no study has quantified the association between family support and health outcomes in a large South Asian city, where the family remains the main care institution and formal geriatric services are limited. This study therefore aimed to: (i) quantify the association of family support with health outcomes and the management of geriatric conditions among older adults in Lahore; (ii) describe how families support older members through healthcare access, medication assistance, emotional support and caregiving; (iii) identify demographic factors (age, gender, marital status, living arrangement, source of

income and education) associated with support received and with health outcomes; and (iv) model these relationships using factor analysis, SEM and binary logistic regression.

Methods

Study design and setting

We conducted a quantitative cross-sectional survey in Lahore, the second largest city in Pakistan, covering its northern, southern, eastern, and western zones. Data were collected between June and December 2025. The study is reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cross-sectional studies [22].

Participants and sampling

The target population was adults aged 60 years and older living in Lahore. Participants were recruited purposively through household visits, local communities, religious gatherings and residential care facilities (old-age homes), so that both family-dwelling and institutionally supported older adults were represented. The sample size was calculated using Cochran's formula [23], with $z = 1.28$ (90% confidence), an anticipated proportion of 0.218, and a margin of error of 3%, giving a minimum requirement of approximately 310. A total of 325 older adults were interviewed, which exceeded this requirement and the minimum of 200 cases commonly recommended for SEM [24].

Questionnaire and data collection

Data were collected through face-to-face interviews using a structured 65-item questionnaire developed for this study. In addition to demographic items, the questionnaire contained four domains: functional ability and work history (13 items), social support and caregiving (12 items), health status (21 items), and emotional and psychological impact (10 items). Domain items were rated on a five-point Likert scale (never, rarely, sometimes, often, always).

Interviews were conducted by trained interviewers because a high proportion of respondents had no formal education.

Statistical analysis

Data were coded and analysed in SPSS version 27 and AMOS version 26 (IBM Corp., Armonk, NY, USA). Descriptive statistics (frequencies, percentages and modes) were used to characterise the sample. Chi-square tests of independence were used to examine associations between categorical items, with statistical significance set at $p < 0.05$.

Exploratory factor analysis (EFA) with principal component extraction and Varimax rotation was performed separately within each of the four domains to reduce the items to interpretable dimensions. Sampling adequacy was assessed using the Kaiser–Meyer–Olkin (KMO) measure and Bartlett’s test of sphericity, and items with communalities below 0.40 were considered for exclusion. Internal consistency was assessed using Cronbach’s α .

Structural equation modelling (SEM) was then used to estimate the relationships among the four latent constructs. The measurement model (confirmatory factor analysis) was evaluated before the structural model. Model fit was assessed using the chi-square statistic and its ratio to degrees of freedom (CMIN/df), the comparative fit index (CFI), the Tucker–Lewis index (TLI) and the root mean square error of approximation (RMSEA), interpreted against conventional thresholds [25].

Finally, binary logistic regression was used to identify correlates of the principal concern of later life, dichotomised as “lack of social support and loneliness” versus any other concern. Model fit was assessed using the omnibus chi-square test, Cox and Snell and Nagelkerke R^2 , the Hosmer–Lemeshow test and classification accuracy [26]. Because this part of the analysis was exploratory, a significance level of $\alpha = 0.10$ was used.

Results

Sample characteristics

Of the 325 respondents, 57.5% were women. Most were in the younger old-age groups: 30.2% were aged 60–64 years, 24.3% 65–69 years, and 22.2% 70–74 years, while 2.5% were aged 85–89 years and 0.9% were 90 years or older (Table 1). Respondents were recruited from northern (43.3%), southern (29.3%), western (14.5%), and eastern (12.9%) Lahore.

Educational attainment was low: 25.2% had no formal education, 20.9% had primary or secondary schooling, 19.4% had college education, 10.8% had a university degree, and 2.8% had a postgraduate qualification. Most respondents were married (59.4%); 20.3% were widowed, 8.0% single, 4.6% separated, and 3.7% divorced. By former occupation, 40.9% had been housewives, 22.5% had worked in private employment, 15.1% in regular jobs, 10.5% had been self-employed, and 8.0% were day labourers.

Nearly three-quarters of respondents (71.7%) lived with their families, 11.1% lived in residential care, and 9.5% lived with a spouse only. Family and relatives were the principal source of income for 59.7%, compared with 30.2% who received a pension and 10.2% who lived on fixed deposits. Asked to name the main concern of their ageing years, the largest group (24.3%) identified lack of social support and loneliness, followed by declining physical health and mobility and difficulty accessing healthcare (16.6% each), the high cost of medical and long-term care (14.5%) and the reduced purchasing power of retirement income (7.7%).

Health and functional profile

Most respondents were independent in basic self-care: 65.5% never had difficulty bathing, 68.0% never had difficulty dressing, 66.8% never had difficulty eating and 64.4% never had difficulty using the toilet. Dependence was greater for instrumental activities: 28.3% sometimes and 24.3% always had difficulty walking or moving around, and 25.8% sometimes had difficulty cleaning. Three-quarters (75.1%) never used a wheelchair or walking stick.

Chronic conditions were common. Almost half of respondents (45.8%) were taking medication for high blood pressure and 37.5% for diabetes; 48.6% always had knee pain limiting daily activity, and 48.3% always had joint pain; 33.2% reported visual difficulty and 19.4% hearing difficulty. More than half (53.5%) had delayed or avoided medical care because of financial concerns.

Regarding social and emotional wellbeing, 57.2% always communicated with family members, 52.6% described their family relationships as always good and 45.5% felt that their family was always genuinely interested in their wellbeing. However, 41.5% felt that they were a burden on their family because of their health, 35.1% had experienced hopelessness and 36.3% felt isolated or disconnected from others.

Reliability and factor structure

Internal consistency was acceptable (Cronbach's $\alpha = 0.800$). Sampling adequacy was satisfactory in all domains (KMO 0.724–0.847), and Bartlett's test of sphericity was significant in every case ($p < 0.001$). Fourteen factors were extracted in total, explaining 60.5–61.6% of the variance within their domains (Table 2).

In the functional domain, the first factor comprised basic activities of daily living: dressing (loading 0.871), bathing (0.863), toileting (0.848), eating (0.729), use of a walking aid (0.660) and cleaning (0.612); it was labelled daily self-care challenges. The second factor combined participation in religious gatherings (0.716) and community events (0.650) (social engagement), and the third combined part-time or voluntary work (0.661), independent financial management (0.597) and cooking (0.555) (post-retirement activity).

In the social support domain, the strongest factor combined quality of family relationships (0.852), frequency of family communication (0.847), perceived family interest in wellbeing (0.805) and overall life satisfaction (0.685), indicating that these four items measure a single construct of family relationships and emotional wellbeing. The health domain yielded five

factors; the first combined dementia diagnosis (0.793), memory difficulty (0.776), hearing difficulty (0.622), and urinary incontinence (0.478) as sensory and cognitive limitations. In the emotional domain, anxiety (0.847) and hopelessness (0.822) loaded together as emotional challenges, whereas having a reliable person to turn to in distress loaded on a separate dimension (0.916).

Associations between domains

Chi-square tests showed significant associations within and across domains ($p < 0.05$). Retirement on health grounds was associated with difficulty in bathing, dressing, eating, toileting, cooking and cleaning, with use of a walking aid, and with participation in community and religious gatherings. Joint pain was associated with antihypertensive medication; visual, hearing and memory difficulty; delayed medical care for financial reasons; dementia diagnosis; urinary incontinence; falls; asthma; family participation in healthcare decisions; and diabetes medication. Feeling a burden on the family was associated with perceived family stress, hopelessness, anxiety, emotional wellbeing, isolation, disturbed sleep and the perception that others did not wish to talk to the respondent. Quality of family relationships was associated with receiving help with daily tasks, frequency of communication, financial support, power of attorney arrangements, caregiving-related conflict, and overall life satisfaction.

Structural equation model

The measurement model included four latent constructs (health status, social support and caregiving, functional ability, and emotional and psychological impact), each indicated by the factors extracted in the EFA. Indicators with weak loadings (HS3, SC1, and E_S3) were removed during respecification. The final measurement model showed acceptable fit ($\chi^2 = 59.594$, $p = 0.001$; CMIN/df = 2.055; CFI = 0.889; TLI = 0.828; RMSEA = 0.057). The structural model (Fig. 1) yielded $\chi^2 = 97.282$, $df = 39$, CMIN/df = 2.494, CFI = 0.833 and TLI = 0.765. CMIN/df below 3 and RMSEA below 0.08 indicate reasonable fit, but the incremental

indices were below the conventional threshold of 0.90 [25]; the model was therefore considered adequate rather than good.

Health status had significant positive paths to functional ability ($B = 1.095$, $SE = 0.165$, $C.R. = 6.651$, $p < 0.001$) and to emotional and psychological state ($B = 0.947$, $SE = 0.156$, $C.R. = 6.065$, $p < 0.001$) (Table 3). The path to social support and caregiving was smaller and significant only at the 10% level ($B = 0.220$, $SE = 0.126$, $C.R. = 1.744$, $p = 0.081$). The error terms of two indicator pairs (e2–e5 and e7–e8) were allowed to covary, reflecting shared method variance among items with the same response format. Overall, older adults with better health status also had greater functional independence and better emotional wellbeing, consistent with the interdependence suggested by the descriptive data.

Binary logistic regression

The logistic regression model for reporting lack of social support and loneliness as the principal concern of later life was statistically significant ($\chi^2 = 139.859$, $df = 64$, $p < 0.001$; Cox and Snell $R^2 = 0.350$; Nagelkerke $R^2 = 0.522$). The Hosmer–Lemeshow test was non-significant ($\chi^2 = 9.642$, $df = 8$, $p = 0.291$), indicating acceptable calibration. The model correctly classified 84.6% of cases overall: 93.1% of respondents who reported other concerns and 58.2% of those who reported loneliness. Sixteen predictors were significant at $\alpha = 0.10$ (Table 4).

Two groups of predictors were evident. The first related to social connection. Respondents who felt isolated from others had almost twice the odds of reporting lack of support as their principal concern ($OR = 1.97$, $p = 0.001$), and those who felt that people did not wish to talk to them had 55% higher odds ($OR = 1.55$, $p = 0.012$). Conversely, frequent communication with family members was associated with about one-third lower odds ($OR = 0.66$, $p = 0.071$), and living with family with about 41% lower odds ($OR = 0.59$, $p = 0.073$).

The second group related to capability and health. Part-time or voluntary work ($OR = 1.51$, $p = 0.003$), the ability to cook ($OR = 1.34$, $p = 0.034$) and higher education ($OR = 1.74$, $p =$

0.002) were associated with higher odds of naming loneliness as the principal concern, whereas difficulty with vision (OR = 0.58, $p = 0.001$), difficulty cleaning (OR = 0.64, $p = 0.011$), urinary incontinence (OR = 0.68, $p = 0.040$) and use of a walking aid (OR = 0.66, $p = 0.084$) were associated with lower odds. Family participation in healthcare decision-making was associated with higher odds (OR = 1.53, $p = 0.059$).

Discussion

This study quantified, in a large urban Pakistani sample, a relationship that is widely assumed but rarely measured. Four findings stand out.

First, the family was the main institution of geriatric care. Nearly three-quarters of respondents lived with family and almost 60% relied on relatives as their main source of income. This care environment differs markedly from those described in studies from the United States and Korea [13, 14], and implies that policy measures delivered through formal services elsewhere must work through the household in Lahore.

Second, health status was more strongly associated with functional ability and emotional state than with social support and caregiving. This pattern is consistent with Lima et al., who found that social support linked physical ability to mental health rather than acting directly on quality of life [17], and with Babić et al., who found that functional restriction and low social support were jointly associated with depression [18]. Because the model was cross-sectional and mediation was not formally tested, these results cannot show whether family support influences health through functional and emotional pathways. They do suggest, however, that family involvement may be most valuable when it helps maintain function, for example through assistance with instrumental activities, encouragement of physical activity and participation in health decisions.

Third, loneliness was the concern older adults named most often, and it was not randomly distributed. It was reported by 24.3% of respondents, more often than physical decline or

healthcare costs, and was associated with living apart from family, infrequent family communication, and feeling isolated or unwanted. These findings agree with earlier work on social isolation and health [7, 8] and extend it to an urban South Asian setting where isolation is often assumed to be uncommon. The positive associations with education, voluntary work and the ability to cook, together with the inverse associations with visual difficulty, incontinence and use of a walking aid, suggest that more capable respondents identify loneliness as a distinct concern, whereas those with visible physical limitations give priority to those limitations. The positive association with family participation in health decisions may reflect that such involvement is most visible in households where dependence is already recognised.

Fourth, 53.5% of respondents had delayed or avoided medical care because of cost. Since most respondents depended on relatives for income, the family appears to act not only as a source of emotional support but also as the main financing mechanism for healthcare. Out-of-pocket costs therefore place the burden of geriatric care on household resources and may directly affect clinical outcomes.

The descriptive data also point to a gender dimension. Women outnumbered men in the sample, had lower educational attainment, more often reported knee pain limiting daily activity and were more likely to perceive genuine family interest in their wellbeing. The role of family support in the mental health of older adults has been shown to differ by gender and marital status [27]. Older women in this sample appeared both more dependent and more embedded in family care, a combination that may leave them well supported where the family is intact and highly exposed where it is not.

These findings have practical implications. For families, regular communication, shared decision-making and inclusion of older members in health decisions were associated with better outcomes. For health providers, functional screening and brief assessment of emotional

state could accompany the management of chronic conditions in older patients. For policymakers, the high proportion of respondents who delayed care because of cost supports targeted subsidies for geriatric care and medicines in urban Punjab and formal recognition of family caregivers.

Strengths and limitations

The strengths of this study include a relatively large sample drawn from all four zones of Lahore, the inclusion of both family-dwelling and institutionalised older adults, and the use of complementary multivariate methods. Several limitations should also be considered. First, the cross-sectional design permits conclusions about association but not causal direction; the SEM tests a hypothesised structure and cannot establish whether family support improves health or whether healthier older adults maintain fuller family relationships. Second, recruitment was purposive rather than probability-based, so the sample may not be representative of all older adults in Lahore. Third, all measures were self-reported and interviewer-administered, with a risk of social desirability bias, particularly for questions on family conflict and feeling a burden. Fourth, the incremental fit indices of the structural model (CFI = 0.833; TLI = 0.765) were below the conventional threshold of 0.90, and the social support construct, measured by only two indicators, was weakly identified (SC2 loading 5.46, SE 3.137); the structural estimates should therefore be interpreted as indicative. Fifth, the logistic model included a large number of candidate predictors relative to the number of respondents reporting loneliness (approximately 79), and the liberal significance level of 0.10 increases the risk of type I error; these results should be confirmed in larger samples. Finally, the study was confined to a single city.

Conclusions

In this survey of 325 older adults in Lahore, health status was closely associated with functional ability and emotional wellbeing, and less strongly with social support and caregiving. Living with family and communicating with them regularly were associated with lower odds of reporting loneliness as the main difficulty of later life, whereas feeling isolated or unwanted was associated with higher odds. More than half of respondents had delayed medical care because of cost. These findings support family-centred geriatric policy, functional and emotional screening in primary care, and financial protection for older people's healthcare in urban Pakistan. Longitudinal and multilevel studies across Punjab are needed to establish the direction of these relationships.

Abbreviations

AMOS: Analysis of Moment Structures

CFA: Confirmatory factor analysis

CFI: Comparative fit index

CI: Confidence interval

CMIN/df: Chi-square divided by degrees of freedom

C.R.: Critical ratio

EFA: Exploratory factor analysis

KMO: Kaiser–Meyer–Olkin

OR: Odds ratio

RMSEA: Root mean square error of approximation

SE: Standard error

SEM: Structural equation modelling

SPSS: Statistical Package for the Social Sciences

STROBE: Strengthening the Reporting of Observational Studies in Epidemiology

TLI: Tucker–Lewis index

357 **Declarations**

358 *Ethics approval and consent to participate*

359 The study was conducted in accordance with the Declaration of Government College
360 University Lahore. Ethical approval was obtained, and informed consent was obtained from
361 all participants before the interview.

362 *Consent for publication*

363 Not applicable.

364 *Availability of data and materials*

365 The datasets generated and analysed during the current study are available from the
366 corresponding author on reasonable request.

367 *Competing interests*

368 The authors declare that they have no competing interests.

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370 “The authors received no specific funding for this study.”

371 *Authors’ contributions*

372 HK conceived and designed the study, supervised data collection, performed the statistical
373 analysis and drafted the manuscript. KA collected the data, contributed to data entry and
374 analysis, and reviewed the manuscript. All authors read and approved the final manuscript.

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377 **References**

- 378 1. World Health Organization. World report on ageing and health. Geneva: World Health
379 Organization; 2015.

380 2. Government of Pakistan. The Senior Citizens Act, 2021. Islamabad: Ministry of Human
381 Rights; 2021.

382 3. Shoaib M, Khan S, Khan MH. Family support and health status of elderly people: a case
383 study of District Gujrat, Pakistan. *Middle East J Sci Res*. 2011;10(4):519–25.

384 4. Baumgarten M, Battista RN, Infante-Rivard C, Hanley JA, Becker R, Gauthier S. The
385 psychological and physical health of family members caring for an elderly person with
386 dementia. *J Clin Epidemiol*. 1992;45(1):61–70.

387 5. Pinquart M, Sörensen S. Correlates of physical health of informal caregivers: a meta-
388 analysis. *J Gerontol B Psychol Sci Soc Sci*. 2007;62(2):P126–37.

389 6. Morrow-Howell N, Hinterlong J, Rozario PA, Tang F. Effects of volunteering on the well-
390 being of older adults. *J Gerontol B Psychol Sci Soc Sci*. 2003;58(3):S137–45.

391 7. Tomaka J, Thompson S, Palacios R. The relation of social isolation, loneliness, and social
392 support to disease outcomes among the elderly. *J Aging Health*. 2006;18(3):359–84.

393 8. White AM, Philogene GS, Fine L, Sinha S. Social support and self-reported health status
394 of older adults in the United States. *Am J Public Health*. 2009;99(10):1872–8.

395 9. Roberto KA, Jarrott SE. Family caregivers of older adults: a life span perspective. *Fam*
396 *Relat*. 2008;57(1):100–11.

397 10. Gaugler JE. Family involvement in residential long-term care: a synthesis and critical
398 review. *Aging Ment Health*. 2005;9(2):105–18.

399 11. Detering KM, Hancock AD, Reade MC, Silvester W. The impact of advance care
400 planning on end of life care in elderly patients: randomised controlled trial. *BMJ*.
401 2010;340:c1345.

402 12. Gallo JJ, Morales KH, Bogner HR, Raue PJ, Zee J, Bruce ML, Reynolds CF 3rd. Long
403 term effect of depression care management on mortality in older adults: follow-up of
404 cluster randomized clinical trial in primary care. *BMJ*. 2013;346:f2570.

13. Brown RT, Hemati K, Riley ED, Lee CT, Ponath C, Tieu L, et al. Geriatric conditions in a population-based sample of older homeless adults. *Gerontologist*. 2017;57(4):757–66.
14. Jung HW, Jang IY, Lee YS, Lee CK, Cho EI, Kang WY, et al. Prevalence of frailty and aging-related health conditions in older Koreans in rural communities: a cross-sectional analysis of the Aging Study of Pyeongchang Rural Area. *J Korean Med Sci*. 2016;31(3):345–52.
15. Lee L, Heckman G, Molnar FJ. Frailty: identifying elderly patients at high risk of poor outcomes. *Can Fam Physician*. 2015;61(3):227–31.
16. Unsar S, Erol O, Sut N. Social support and quality of life among older adults. *Int J Caring Sci*. 2016;9(1):249–57.
17. Lima S, Teixeira L, Esteves R, Ribeiro F, Pereira F, Teixeira A, et al. Spirituality and quality of life in older adults: a path analysis model. *BMC Geriatr*. 2020;20:259.
18. Babić D, Železnik D, Završnik J, Milošević M, Kamenečki G. Functional independence and social support as mediators in the maintenance of mental health among elderly persons with chronic diseases. *Coll Antropol*. 2022;46(1):37–45.
19. Sugihara Y, Sugisawa H. Influence of medical care tasks on subjective burden and gain among older adults' family caregivers. *BMC Geriatr*. 2023;23:628.
20. Shulyaev K, Zisberg A, Gur-Yaish N. Risk and protective factors of conflicts between hospitalized older adults and their family members: structural equation modeling. *Behav Sci (Basel)*. 2025;15(4):405.
21. Kaur H, Kaur H, Venkateshan M. Factors determining family support and quality of life of elderly population. *Int J Med Sci Public Health*. 2015;4(8):1049–53.
22. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)

429 statement: guidelines for reporting observational studies. *Lancet*. 2007;370(9596):1453–
430 7.

431 23. Cochran WG. Sampling techniques. 3rd ed. New York: John Wiley & Sons; 1977.

432 24. Kline RB. Principles and practice of structural equation modeling. 4th ed. New York:
433 Guilford Press; 2016.

434 25. Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis:
435 conventional criteria versus new alternatives. *Struct Equ Modeling*. 1999;6(1):1–55.

436 26. Hosmer DW, Lemeshow S, Sturdivant RX. Applied logistic regression. 3rd ed. Hoboken:
437 John Wiley & Sons; 2013.

438 27. Zhang B, Li J. Gender and marital status differences in depressive symptoms among
439 elderly adults: the roles of family support and friend support. *Aging Ment Health*.
440 2011;15(7):844–54.

441 Tables

442 **Table 1** Characteristics of the study sample (n = 325)

Characteristic	Category	n	%
Gender	Female	187	57.5
	Male	138	42.5
Age group (years)	60–64	98	30.2
	65–69	79	24.3
	70–74	72	22.2
	≥75	76	23.4
Marital status	Married	193	59.4
	Widowed	66	20.3
	Single/divorced/separated	53	16.3
Living arrangement	With family	233	71.7
	Residential care	36	11.1
	With spouse only	31	9.5
Principal source of income	Family and relatives	194	59.7
	Pension	98	30.2
	Fixed deposit	33	10.2
Education	No formal education	82	25.2
	Primary/secondary	68	20.9
	College or above	107	33.0

443 Percentages are of the total sample. Categories with small counts are combined; percentages may not sum to 100
 444 because of missing responses or categories not shown.

445 **Table 2.** Exploratory factor analysis by domain

Domain (items)	KMO	Factors	Variance explained (%)	Factors identified
Functional ability and work history (13)	0.847	3	60.54	Daily self-care challenges; social engagement; post-retirement activity
Social support and caregiving (12)	0.785	3	61.65	Family relationships and emotional wellbeing; health-related family dynamics; leisure engagement and dependency
Health status (21)	0.724	5	60.54	Sensory and cognitive limitation; mobility challenges; healthcare and social involvement; persistent conditions; health of vital organs
Emotional and psychological impact (10)	0.832	3	61.43	Emotional challenges; social pressure on health; social exclusion

446 Extraction: principal component analysis with Varimax rotation. Bartlett's test of sphericity was significant ($p <$
 447 0.001) in all domains. KMO, Kaiser–Meyer–Olkin measure of sampling adequacy.

448 **Table 3** Structural equation model: unstandardised path estimates

Path	B	SE	C.R.	p
Health status → Social support and caregiving	0.220	0.126	1.744	0.081
Health status → Emotional and psychological impact	0.947	0.156	6.065	<0.001
Health status → Functional ability	1.095	0.165	6.651	<0.001
Functional ability → FA2	0.375	0.123	3.052	0.002
Functional ability → FA3	-0.101	0.098	-1.030	0.303
Emotional and psychological impact → E_S2	0.814	0.169	4.825	<0.001
Health status → HS2	0.990	0.180	5.495	<0.001
Social support and caregiving → SC2	5.460	3.137	1.740	0.082
Health status → HS4	0.140	0.121	1.152	0.249
Health status → HS5	0.160	0.122	1.314	0.189

449 B, unstandardised estimate; SE, standard error; C.R., critical ratio (B/SE). Loadings of FA1, E_S1, HS1 and
450 SC3 were fixed at 1.00 for identification. Model fit: $\chi^2 = 97.282$, $df = 39$, $CMIN/df = 2.494$, $CFI = 0.833$, $TLI =$
451 0.765 .

452 **Table 4** Binary logistic regression: significant correlates of reporting lack of social support
453 and loneliness as the principal concern of later life

Predictor	B	SE	Wald	p	OR [Exp(B)]
Education level	0.555	0.179	9.608	0.002	1.742
Marital status	0.370	0.131	8.029	0.005	1.448
Living arrangement	-0.523	0.292	3.221	0.073	0.593
Able to cook	0.293	0.138	4.513	0.034	1.341
Difficulty cleaning	-0.444	0.175	6.438	0.011	0.642
Uses wheelchair or stick	-0.413	0.239	2.994	0.084	0.662
Part-time or voluntary work	0.410	0.140	8.600	0.003	1.507
Manages finances independently	-0.233	0.139	2.805	0.094	0.792
Watches television	0.257	0.143	3.234	0.072	1.293
Communicates with family	-0.422	0.234	3.248	0.071	0.655
Family participates in health decisions	0.427	0.226	3.559	0.059	1.533
Diabetes medication	-0.220	0.127	2.982	0.084	0.803
Difficulty with vision	-0.550	0.159	11.925	0.001	0.577
Urinary incontinence	-0.393	0.191	4.207	0.040	0.675
Feels isolated from others	0.675	0.181	13.856	0.001	1.965
Feels people do not wish to talk	0.438	0.175	6.278	0.012	1.550

454 B, regression coefficient; SE, standard error; OR, odds ratio. Significance assessed at $\alpha = 0.10$. $OR > 1$ indicates
455 higher odds of reporting lack of social support and loneliness as the principal concern. Model: $\chi^2 = 139.859$, $df =$
456 64 , $p < 0.001$; Nagelkerke $R^2 = 0.522$; Hosmer–Lemeshow $p = 0.291$

