Determinants of mental health and life satisfaction in Iranian older adults: a data-driven clustering study based on the biopsychosocial model

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Article Info

ABSTRACT

The rapid growth of the global aging population, including in Iran, has intensified the need to understand the physical, psychological, and social challenges faced by older adults. Identifying key determinants of mental well-being and life satisfaction is essential for guiding policies that support healthy aging. This study examined demographic, socioeconomic, and health-related predictors of general health, assessed with the GHQ-28, and life satisfaction measured by the LSI among Iranian adults aged 60 years and older. A cross-sectional survey was conducted among 3,000 older adults using validated instruments (GHQ-28, LSI, and a structured questionnaire). Statistical analyses included descriptive statistics, ANOVA, multiple linear regression, and survival analysis. Reliability was confirmed with McDonald's Omega values exceeding 0.87. Chronic diseases, pension status, daily life problems, and housing conditions emerged as significant predictors of both general health and life satisfaction. Women reported poorer general health than men, while married participants showed higher life satisfaction than those single or widowed. Chronic diseases were prevalent (75.7%) and associated with lower LSI scores. Economic insecurity, particularly the lack of pensions among women, was linked to worse GHQ scores. Survival analysis indicated that individuals with chronic disease had an 85% higher risk of experiencing daily problems (HR = 1.85). Socioeconomic and health factors substantially influence well-being in later life. Improving pension coverage, healthcare access, and social support systems may enhance healthy aging among Iranian older adults.

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1. INTRODUCTION

The global population is experiencing a significant demographic shift, with an increasing proportion of older adults due to advancements in healthcare, improved living conditions, and declining fertility rates [1]. This trend is particularly evident in countries like Iran, where the aging population is growing rapidly. According to projections, the proportion of individuals aged 60 years and above is expected to double in many low- and middle-income countries over the next few decades. This demographic transition presents both opportunities and challenges, particularly in terms of ensuring the health, well-being, and social inclusion of older adults.

Older adults face unique challenges related to physical health, psychological well-being, mental health, and social engagement, which necessitate a deeper understanding of the factors influencing their quality of life, as suggested by Gao *et al.* [2]. Two critical dimensions of well-being in this population are general health and life satisfaction, often assessed using validated tools such as the General Health Questionnaire (GHQ) and the Life Satisfaction Index (LSI-Z, 13-item) [3]. These measures provide insights into the health and subjective well-being experienced by older adults, offering valuable data for policymakers and healthcare providers.

Research has consistently shown that various demographic, socioeconomic, and health-related factors significantly impact the mental health and life satisfaction of older adults [4], [5]. For instance, chronic diseases, economic instability, and social isolation are among the key contributors to general health and reduced life satisfaction. Additionally, factors such as marital status, employment history, and access to pensions play crucial roles in shaping the well-being of this population [6], [7].

Despite these findings, there remains a gap in understanding how these factors interact and influence outcomes specifically within the Iranian context, where cultural, economic, and healthcare systems differ from Western settings. In Iran, older adults often face unique challenges, including limited access to specialized healthcare services, financial insecurity due to inadequate pension coverage, and a lack of social support systems [8]. These issues are compounded by the prevalence of chronic diseases, which are a major public health concern among the older population. Chronic conditions not only affect physical health but also contribute to emotional strain, loneliness, and reduced quality of life [9]. Furthermore, daily problems such as economic difficulties, housing instability, and caregiving burdens can exacerbate general health and diminish life satisfaction [10], [11]. Addressing these challenges requires a comprehensive understanding of the determinants of mental health and life satisfaction among older adults in Iran.

This study aims to address these gaps by examining the factors associated with general health (GH) and life satisfaction (LS) scores among older adults in Iran. Specifically, we investigate the impact of demographic characteristics (e.g., age, sex, marital status), socioeconomic factors (e.g., pension status, housing type), and health-related variables (e.g., chronic disease status, smoking habits) on GH and LS. By identifying the key determinants of well-being in this population, the findings can inform targeted interventions and policies aimed at improving the health, satisfaction, and quality of life of older adults.

The importance of this research lies in its potential to provide actionable insights for policymakers, healthcare providers, and community organizations. For instance, understanding the role of pension status in reducing general health issues can highlight the need for expanding social security programs. Similarly, identifying the impact of chronic diseases on LS can guide the development of integrated care models that address both physical and mental health needs.

This study is grounded in the biopsychosocial model of aging, which posits that health and well-being in later life result from complex interactions among biological, psychological, and social factors. Drawing from this framework, we hypothesized that individual demographic characteristics (e.g., age, sex, marital status), socioeconomic resources (e.g., pension coverage, housing stability), and health-related conditions (e.g., presence of chronic disease, daily functional problems) would independently and jointly affect general health (GHQ) and life satisfaction (LSI). In line with Ferring *et al.* [3] and Gao *et al.* [2], we also considered the interplay between physical health limitations and subjective well-being. This framework guided our selection of variables and analytical approach, including regression and clustering, to identify distinct risk profiles and potential intervention targets. The aim was to clarify the pathways through which these predictors shape the aging experience in a rapidly transitioning context like Iran.

Ultimately, this research contributes to the broader goal of promoting healthy and active aging, ensuring that older adults remain integrated and valued members of society. The findings may also serve as a foundation for future studies exploring similar issues in other low- and middle-income countries facing similar demographic transitions. By addressing these critical issues, we hope to contribute to a deeper understanding of aging and its implications for public health and social policy. Policymakers should prioritize expanding pension coverage, improve healthcare access, and strengthen social support to foster healthy aging in Iran. These findings can guide targeted interventions to enhance quality of life in this vulnerable population.

2. METHOD
2.1. Study design and population

This cross-sectional study included 3,000 older adults aged 60 years and above residing in three southern provinces of Iran. The study was conducted across eight day-care centers for older adults (registered as FDCF), which were selected to ensure broad geographic and demographic representation within the region. Unlike studies that employ sampling techniques, this research encompassed the entire eligible population within the study area, ensuring comprehensive coverage without selection bias. This approach eliminates the

need for sampling and provides a complete picture of the target population, enhancing representativeness and minimizing potential biases associated with selective sampling.

Participants were required to meet specific inclusion criteria: being aged 60 years or older, residing permanently in the study area, and having sufficient cognitive ability to understand and respond to the questionnaires. A total of 121 members of FDCF were excluded from the study due to severe cognitive impairment, as confirmed by clinical assessments conducted by a geriatric psychiatrist. Data collection took place between January 2024 and May 2024. All eligible older adults in the study area were included, ensuring comprehensive coverage and eliminating the need for sampling.

2.2. Inclusion criteria
-   Age: Participants aged 60 years and above were included to ensure the sample represented older adults.
-   Residency: Only individuals residing within the defined geographic region of the study were included to maintain consistency in demographic and environmental factors.
-   Cognitive ability: Participants were required to have sufficient cognitive ability to understand and respond to the questionnaires, ensuring reliable data collection.
-   Willingness to participate: Written informed consent was obtained from all participants, confirming their willingness to take part in the study.

2.3. Exclusion criteria
-   Severe cognitive impairment: Individuals with severe cognitive impairments or conditions that prevented them from completing the questionnaires accurately were excluded (121 persons).
-   Incomplete data: Participants who failed to complete the questionnaires fully or provided inconsistent responses were excluded to ensure data integrity.
-   Non-resident status: Older adults who did not reside permanently in the study area were excluded to avoid potential confounding effects of different living environments.
-   Institutionalization for non-aging reasons: Individuals residing in care facilities for reasons unrelated to aging (e.g., mental health institutions) were excluded to focus specifically on aging-related factors.

2.4. Data collection
Data were collected through face-to-face interviews conducted by trained personnel from FDCF. Interviewers underwent comprehensive training to familiarize themselves with the study protocols, questionnaire administration, and ethical considerations. Additionally, a pilot study was conducted on a small subset of the population (30 older persons) to identify potential issues with the instruments and refine the data collection process. Double-entry verification was performed for a random subset of the data to ensure accuracy and consistency throughout the dataset.

The following validated instruments were used: (a) General health questionnaire-28 (GHQ-28): A widely recognized screening tool used to assess psychological well-being across four domains: somatic symptoms, anxiety/insomnia, social dysfunction, and severe depression. Each of the 28 items is rated on a 4-point Likert scale (0–3), with higher total scores indicating greater psychological distress and poorer general mental health (range: 0–84); (b) Life satisfaction index (LSI-Z): A 13-item self-report instrument developed to assess overall life satisfaction, particularly among older adults. Each item is scored on a 3-point Likert scale (agree = 2, not sure = 1, disagree = 0), yielding a total score ranging from 0 to 26. Higher scores indicate greater life satisfaction; (c) Socio-demographic and health-related questionnaire: A structured questionnaire was developed to collect information on key variables, including age, sex, marital status, number of children, employment status, pension status, housing type, chronic disease status, smoking habits, and the presence of daily problems.

Reliability testing using McDonald's Omega coefficient demonstrated excellent internal consistency for both instruments, with values exceeding 0.87. Although no exploratory factor analysis was conducted within this sample, the dimensionality of both instruments has been well established in prior Iranian validation studies. Thus, Omega was deemed appropriate for evaluating scale reliability in this context.

2.5. Statistical analysis and effect size reporting
Data were analyzed using JAMOVI v. 2.5.5 (2025). Descriptive statistics, including frequencies, percentages, means, standard deviations (SD), medians, and interquartile ranges (IQR), were calculated to summarize the characteristics of the study population. Inferential statistics were employed to test hypotheses.
-   Group comparisons: Independent samples t-tests and one-way ANOVA were used to assess differences in GHQ and LSI scores across demographic variables such as sex, marital status, and pension status. Post-hoc tests, including Tukey's HSD, were used when ANOVA results were significant.

- Multiple linear regression: Performed to identify predictors of GHQ and LSI scores, with standardized beta coefficients and R^2 contributions reported to evaluate the relative importance of each predictor.
- Cluster analysis: Conducted using the K-means algorithm to classify participants into homogenous subgroups based on their GHQ and LSI profiles. The optimal number of clusters was determined using multiple validation indices, including the Elbow method, Silhouette Coefficient, and Dunn Index. This approach allowed for the identification of distinct well-being profiles, providing a basis for tailored intervention planning.
- Survival analysis: Applied using the log-rank test to examine differences in time to the onset of self-reported daily problems, based on chronic disease and pension status. Although survival analysis is typically used in longitudinal data, here it was implemented as a retrospective event-time analysis, drawing on participants' recall of when difficulties in daily life began. This exploratory use aimed to highlight differential vulnerability and inform future prospective research.

Effect sizes were calculated to complement p-values and provide a measure of practical significance. For t-tests and ANOVA, Cohen's d, Hedges' g, partial eta-squared (η^2), and omega-squared (ω^2) were reported. In regression analyses, standardized beta coefficients and R^2 contributions were used. For cluster analysis, Silhouette Coefficient and Dunn Index were reported to evaluate cluster quality, and for survival analysis, hazard ratios (HR) and restricted mean survival times (RMST) were reported.

To ensure robustness, assumptions for all statistical methods were rigorously checked. For regression, residual normality, homoscedasticity, and multicollinearity were assessed. For t-tests and ANOVA, assumptions of normality and homogeneity of variances were verified. The significance level for all statistical tests was set at $\alpha < 0.05$.

2.6. Quality assurance

To ensure the reliability and validity of the collected data, several quality assurance measures were implemented. Interviewers underwent comprehensive training to familiarize themselves with the study protocols, questionnaire administration, and ethical considerations. Additionally, a pilot study was conducted on a small subset of the population (30 older persons) to identify potential issues with the instruments and refine the data collection process. Finally, double-entry verification was performed for a random subset of the data to ensure accuracy and consistency throughout the dataset.

3. RESULTS

3.1. Demographic characteristics of participants

A total of 3,000 older adults participated in this study, with a nearly equal gender distribution (48.7% males and 51.3% females). The mean age of participants was 69.35 years (SD = 5.63), ranging from 60 to 104 years. No significant difference in mean age was observed between males (M = 70.12, SD = 5.24) and females (M = 69.35, SD = 6.01). Most participants were married (75.6%), with a slightly higher proportion of married females (38.1%) compared to males (37.5%). Among unmarried or widowed participants, females constituted a larger group (13.3%) than males (11.1%).

Regarding employment status, more than half of the sample (54.7%) were unemployed, with a significantly higher unemployment rate among females (46.6%) compared to males (18.1%). Retirees accounted for 33.2% of the sample, with males (21.0%) being more likely to be retirees than females (12.2%). A small proportion (12.1%) were engaged in occupations such as shop-keeping or public affairs, predominantly males (9.5%) compared to females (2.6%).

Housing status revealed that most older persons were landlords (77.3%), with a slightly higher proportion of male landlords (39.6%) compared to females (37.7%). Only 1.4% of participants were previously residents of nursing homes, with females (1.2%) being more likely to have lived in such facilities than males (0.4%). Approximately 8.2% of participants lived in their children's homes, with no significant gender differences observed. Pension coverage was relatively low, with only 27.2% of participants receiving pensions. Females were less likely to receive pensions (7.3%) compared to males (15.9%).

3.2. Health-related variables

Regarding health-related variables, 75.7% of older adults reported having at least one chronic disease, with no significant gender disparity (males: 36.3%, females: 39.4%). Smoking was uncommon, reported by only 4.3% of participants, with males (2.9%) being more likely to smoke than females (1.4%). Interestingly, 88.8% of participants indicated not experiencing significant problems in their daily lives, with no notable gender differences (males: 43.1%, females: 45.7%).

Well-being, assessed using the GHQ and LSI scales, revealed mean scores of 25.51 (SD = 8.14) and 15.16 (SD = 8.28), respectively. Females scored slightly higher on both scales (GHQ: M = 25.86, SD = 7.99; LSI: M = 15.14, SD = 8.26) compared to males (GHQ: M = 25.13, SD = 8.29; LSI: M = 15.19, SD = 8.30).

Older participants with chronic diseases reported higher GHQ scores (M = 25.62, SD = 8.50) compared to those without chronic diseases (M = 25.15, SD = 6.93), indicating greater general health issues among those with health conditions. Similarly, LSI scores were lower among participants with chronic diseases (M = 14.59, SD = 8.06) compared to those without (M = 16.94, SD = 8.68), suggesting a more negative perception of life among individuals with chronic conditions.

3.3. Psychological and emotional states

The analysis of life perception revealed that a substantial portion of older persons (50.5%) reported having "no idea" about their current life situation, followed by 17.9% who described their life as "good." Worry and extreme concern were reported by 11.1% and 0.3% of participants, respectively. Economic problems were cited by 8.4% of the sample, while feelings of loneliness and dissatisfaction were reported by 1.1% and 1.6%, respectively. These findings highlight the diverse emotional and psychological states among older adults in southern Iran, emphasizing the need for targeted interventions to address specific challenges faced by this population.

3.4. Gender differences

Independent samples t-tests revealed no significant differences in GHQ or LSI scores between males and females. For GHQ scores, males reported slightly lower mean scores (M = 25.13, SD = 8.29) compared to females (M = 25.86, SD = 7.99), but the difference was not statistically significant (t = -1.45, p = 0.147). Similarly, for LSI scores, males reported slightly higher mean scores (M = 15.19, SD = 8.30) compared to females (M = 15.14, SD = 8.26), but again, the difference was not significant (t = -0.56, p = 0.575). Small effect sizes (Cohen's d = 0.17 for GHQ and d = 0.06 for LSI) further indicate minimal influence of gender on these outcomes.

According to Table 1, independent samples t-tests were conducted to compare mean GHQ and LSI scores between older males and females. The results revealed no significant differences in either GH or LS scores between the two groups. For GHQ scores, males reported slightly lower mean scores (M = 25.13, SD = 8.29) compared to females (M = 25.86, SD = 7.99), but the difference was not statistically significant SD = 8.30) compared to females (M = 15.14, SD = 8.26), but again, the difference was not significant (t = -0.56, p = 0.575).

As shown in Table 2, the small effect sizes (Cohen's d = 0.17 for GHQ and d = 0.06 for LSI) further indicate that sex has minimal influence on these outcomes. Hedges' g values (g = 0.16 for GHQ and g = 0.05 for LSI) confirm the non-significance too. These results suggest that gender alone does not play a substantial role in shaping general health or life satisfaction among older adults. This finding underscores the importance of considering other factors, such as socioeconomic status, health conditions, and social support, when designing interventions aimed at improving well-being in this population.

Table 1. Independent samples t-test

Variable	Group	Mean (SD)	t-value	p-value	Result	Effect size: Cohen's d	Effect size: Hedges' g
GHQ score	Male	25.13 (8.29)	-1.45	0.147	Not significant	0.17	0.16
	Female	25.86 (7.99)					
LSI score	Male	15.19 (8.30)	-0.56	0.575	Not significant	0.06	0.05
	Female	15.14 (8.26)					

Table 2. One-way ANOVA

Variable	Group	Mean (SD)	F-value	p-value	Result	Effect size: Partial Eta-sqr	Effect size: Omega-sqr
LSI score	Married	16.80 (7.20)	7.67	<0.001	Significant	0.06	0.05
	Single	12.40 (6.90)					
	Widowed	11.70 (6.50)					

As outlined in Table 2, a one-way ANOVA was conducted to compare mean LSI scores across marital status groups. The results revealed a significant difference in life satisfaction scores among the groups, $F(2, 2997) = 7.67$, $p < 0.001$. Post-hoc comparisons using Tukey's HSD test indicated that married older persons reported significantly higher life satisfaction (M = 16.80, SD = 7.20) compared to both single (M = 12.40, SD = 6.90) and widowed individuals (M = 11.70, SD = 6.50). The effect sizes (Partial $\eta^2 = 0.06$ and $\omega^2 = 0.05$) suggest a small-to-moderate practical significance of marital status on life satisfaction. These findings indicate that being married is associated with better life satisfaction, while single and widowed individuals experience lower levels of satisfaction. This highlights the potential protective role of marital relationships in enhancing LS among older adults.

3.5. Predictors of general health

According to Table 3, multiple linear regression analyses identified key predictors of GHQ scores. Age was positively associated with poorer general health (standardized beta = 0.15, R^2 contribution = 0.04), indicating that older age is linked to higher psychological distress or worse health status. Marital status also emerged as a significant predictor, with being married associated with better health (lower GHQ scores) (standardized beta = -0.12, R^2 contribution = 0.03). Furthermore, the presence of chronic diseases significantly contributed to poorer general health (standardized beta = 0.08, R^2 contribution = 0.02). These findings suggest that demographic factors (e.g., age and marital status) and health-related factors (e.g., chronic disease status) play important roles in influencing mental health and well-being among older adults.

Table 3. Multiple linear regression analysis

Predictors	GHQ score (Beta ± SE)	p-value	Result	Effect size: standardized beta	Effect size: partial R-sqr
Age	0.15 ± 0.03	<0.001	Significant	0.15	0.04
Marital status	-2.3 ± 0.85	0.007	Significant	-0.12	0.03
Chronic disease	0.47 ± 0.18	0.009	Significant	0.08	0.02

The overall model explained 18% of the variance in GHQ scores (R^2 = 0.18), highlighting the combined influence of these predictors. Among the variables, age had the strongest effect (standardized beta = 0.15), followed by marital status (standardized beta = -0.12) and chronic disease status (standardized beta = 0.08). These results underscore the importance of addressing both demographic and health-related factors in designing targeted interventions to reduce psychological distress and improve mental health outcomes for older adults.

3.6. Cluster analysis

Survival analysis using the log-rank test was tabulated in Table 4 and assessed differences in time to experiencing daily problems based on chronic disease and pension status. Individuals with chronic diseases experienced daily problems significantly earlier (median time = 12 months) compared to those without chronic diseases (median time = 24 months), $\chi^2(1) = 15.23$, p<0.001. The hazard ratio (HR = 1.85) indicates an 85% higher risk of experiencing problems for individuals with chronic diseases. Similarly, having a pension delayed the onset of problems (HR = 1.45), highlighting the protective role of pension coverage.

Table 4. Cluster analysis

Cluster description	Proportion (%)	Mean of GHQ	Mean of LSI	F-value	p-value	Result	Effect size: silhouette coefficient	Effect size: Dunn index
Cluster 1 (low GHQ, high LSI)	40.5%	20.4	21.3	8.45	<0.001	Significant	0.65	0.45
Cluster 2 (high GHQ, low LSI)	35.2%	32.1	10.8	10.23	<0.001	Significant	0.58	0.40
Cluster 3 (moderate GHQ, LSI)	24.3%	25.6	14.9	5.67	0.003	Significant	0.52	0.35

Cluster analysis in Table 4 identified three distinct subgroups based on GHQ and LSI profiles. Cluster 1 represented individuals with low general health and high life satisfaction, while Cluster 2 included those with high GH and low satisfaction. Cluster 3 consisted of individuals with moderate levels of both GH and satisfaction. The silhouette coefficients (ranging from 0.52 to 0.65) and Dunn index values (ranging from 0.35 to 0.45) indicate good cluster quality and separation. Additionally, ANOVA results revealed significant differences in demographic characteristics across clusters, with age (F = 8.45, p<0.001, η^2 = 0.09), marital status (F = 5.67, p = 0.003, η^2 = 0.06), and pension status (F = 10.23, p<0.001, η^2 = 0.11) playing key roles in differentiating these groups.

As shown in Table 5, survival analysis using the log-rank test in Table 5 was conducted to assess differences in time to experiencing daily problems based on chronic disease and pension status. Individuals with chronic diseases experienced daily problems significantly earlier (median time = 12 months) compared to those without chronic diseases (median time = 24 months), $\chi^2(1) = 15.23$, p<0.001. The hazard ratio (HR = 1.85) indicates an 85% higher risk of experiencing problems for individuals with chronic diseases. Similarly, having a pension delayed the onset of problems (HR = 1.45), highlighting the protective role of pension coverage. Accordingly, the survival analysis revealed significant differences in both median survival times and restricted mean survival times (RMST) based on chronic disease status and pension status. For individuals with chronic diseases, the RMST was 14 months (up to 24 months), compared to 21 months for those without chronic diseases. Similarly, older adults without pensions had a shorter RMST (11 months)

compared to those with pensions (19 months). These findings highlight the substantial impact of chronic diseases and financial insecurity on daily functioning and underscore the importance of targeted interventions to improve well-being among at-risk groups.

These insights underscore the importance of considering individual differences when designing policies and programs aimed at improving the health situation of older adults. For individuals with chronic diseases, the restricted mean survival time (RMST) was 14 months (up to 24 months), compared to 21 months for those without chronic diseases. Similarly, older adults without pensions had a shorter RMST (11 months) compared to those with pensions (19 months). These findings underscore the substantial impact of chronic diseases and financial insecurity on daily functioning.

Table 5. Survival analysis (log-rank test)

Variables	Median time (Months)	RMST	Log-rank X-srq	p-value	Result	Effect size: hazard ratio	Effect size: log-rank test
Chronic disease	12	14	15.23	<0.001	Significant	1.85	0.25
No chronic Disease	24	21					
Pensioning	18	11	8.45	0.004	Significant	1.45	0.18
No pensioning	10	19					

Note: RMST = Restricted Mean Survival Time (Months, up to 24 months)

4. DISCUSSION

4.1. Summary of key findings

This study highlights the multifactorial nature of general health (GH) and life satisfaction (LS) in older adults, aligning with the biopsychosocial model of aging [2], [3]. Consistent with prior literature, chronic disease emerged as a key determinant of both poorer psychological health and reduced life satisfaction [6], [9], [12]. Older adults with chronic conditions reported significantly higher GHQ scores, indicating greater psychological distress, and lower LS scores, underscoring the emotional burden of managing long-term health issues. These findings support the need for integrated care strategies that address both physical and mental health challenges in later life [10].

Economic factors, particularly pension coverage, also played a substantial role in shaping well-being. Older adults with pensions reported better psychological health and delayed onset of daily life difficulties, as captured in retrospective time-to-event analysis. While the survival analysis employed was exploratory due to the cross-sectional nature of the data, the findings point to meaningful differences in functional resilience based on financial security. This supports previous evidence linking pension access to improved mental well-being among aging populations [11].

Contrary to expectations, gender did not significantly influence GH or LS in this sample. Although females had marginally higher GHQ scores, the difference was not statistically or practically significant. This suggests that socioeconomic and health-related variables may exert a stronger influence on psychological well-being than biological sex alone, a finding echoed in recent population-based research [12]-[15].

4.2. Interpretation of cluster analysis

The use of cluster analysis further revealed heterogeneity within the older population [16], [17]. Three distinct well-being profiles were identified, each characterized by unique combinations of GH and LS. For example, one group with high psychological distress but moderate satisfaction may reflect resilience in the face of adversity, whereas another group experiencing both poor GH and low LS could represent a particularly vulnerable subgroup requiring multidimensional interventions [17]-[19].

4.3. Comparison with prior studies

Our findings align with several international studies. For instance, Gao *et al*. [2] highlighted the role of social activities in enhancing mental health among older adults, which complements our emphasis on socioeconomic factors like pension coverage. Similarly, Wang and Zheng [11] demonstrated the protective role of public pensions in improving mental well-being, consistent with our survival analysis results [2], [20]-[23]. However, unlike some Western studies that emphasize gender disparities in mental health [13], [24], [25], our study found no significant gender differences, suggesting that cultural and systemic factors in Iran may play a more dominant role.

4.4. Limitations

It is important to interpret these findings within the limitations of a cross-sectional design. While multiple statistical approaches were used, including regression and clustering, causality cannot be inferred.

Additionally, the GHQ-28, while widely used, measures psychological distress rather than general health per se; higher scores reflect worse mental health status. This distinction is critical and has been addressed accordingly in the current interpretation. Furthermore, reliance on self-reported data may introduce recall bias, particularly in the survival analysis. Future longitudinal studies are needed to validate these temporal patterns and assess causality.

4.5. Policy implications

Findings also emphasize the heterogeneity of aging experiences. Cluster profiles derived from GH and LS data highlight the need for tailored policy approaches rather than one-size-fits-all solutions. Policymakers should consider expanding pension access, promoting community-based support for chronic disease management [26], and enhancing mental health services for older adults. Importantly, these strategies must account for the psychological dimensions of aging [27], not solely physical decline.

5. CONCLUSION

This study contributes to a better understanding of the interrelated demographic, socioeconomic, and health factors influencing psychological health and life satisfaction in older adults in southern Iran. Chronic disease burden and lack of pension coverage emerged as central risk factors for poor mental well-being and reduced satisfaction with life. The absence of significant gender differences suggests that interventions should prioritize health status and financial security over demographic targeting alone. By addressing modifiable risk factors, Iran can advance toward its goal of healthy, active, and inclusive aging. Future research should focus on longitudinal designs to explore causal relationships and evaluate the effectiveness of targeted interventions. Additionally, comparative studies across different regions and cultural contexts can provide broader insights into aging and well-being.

ETHICAL APPROVAL

Ethical approval was obtained from the Ethics Committee of Shiraz University of Medical Sciences (IR.SUMS.SCHEANUT.REC.1402.161 on January 20, 2024). Written informed consent was secured from all participants, ensuring their data remained confidential and used solely for research purposes. Participants were informed of the study's objectives and could withdraw at any stage without consequences. The study adhered to ethical standards, including the Helsinki Declaration, STROBE, and Belmont Report principles, while minimizing risks and maintaining participant privacy.

AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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C	: **C**onceptualization	I	: **I**nvestigation	Vi	: **Vi**sualization
M	: **M**ethodology	R	: **R**esources	Su	: **Su**pervision
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CONFLICT OF INTEREST STATEMENT
The author declares no conflict of interest, financial or otherwise.

DATA AVAILABILITY
The datasets generated and/or analysed during the current study are available from the authors upon reasonable request and with the permission of SUMS.

ETHICAL APPROVAL
No animals were used for studies that are the basis of this research. This research was conducted on humans in accordance with the Helsinki Declaration of 1975, as revised in 2013 (http://ethics.iit.edu/ecodes/node/3931).

THE STANDARD FOR REPORTING
The STROBE guidelines and methodology, as well as the 2013 Helsinki Declaration (including its 2020 amendments), and ICMJE (2019), and the principles outlined in the Belmont Report, were followed during this study. All procedures conducted in this study involving human participants were in compliance with the ethical standards of the institutional and national research committees and their subsequent amendments, which emphasize informed consent and the confidentiality of personal information.

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