Risk Management and Healthcare Policy

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Taylor & Francis Group

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ORIGINAL RESEARCH

Healthy Lifestyle Behaviors of Adults Aged 95 Years and Above and Their Relationship with Geriatric Syndromes

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Purpose: To examine the relationship of personality traits, lifestyle factors, and geriatric syndromes—including frailty, malnutrition, depression, cognitive status, fall risk, and sleep quality—in individuals aged 95 years and over.

Patients and Methods: This cross-sectional study included 148 individuals (≥95 years) registered at three YAŞAM (Healthy Aging Center) polyclinics in Türkiye between February and October 2025. Data were collected via face-to-face interviews using socio-demographic questionnaires alongside the Katz ADL, Clinical Frailty Scale (CFS), ITAKI Fall Risk Scale, MUST, GDS-SF, PSQI, Mini-Cog, and Charlson Comorbidity Index (CCI).

Results: The mean age was 97.09±2.63 years (range: 95–109); 74.3% were women and 85.8% were widowed. Earlier regular exercise (reported by 26.4%) was significantly associated with longer functional independence, higher Katz ADL and Mini-Cog scores, lower fall risk (ITAKI), and lower frequencies of diabetes and incontinence. Frailty was prevalent among those with moderate–high comorbidity burden, while optimism and a calm temperament were associated with lower frailty, better cognitive status, and superior sleep quality. Depression and high fall risk were frequent, particularly among women and those with poor perceived health.

Conclusion: Psychological resilience (optimism) and lifelong physical activity appear to protect cognitive function, independence, and sleep quality in the oldest-old, whereas depression and inactivity are linked to frailty. These findings suggest that psychosocial factors and healthy lifestyle behaviors are critical components of longevity and should be integrated into geriatric care models and healthy aging policies.

Keywords: aged, 80 and over, geriatric assessment, healthy aging, nonagenarians, optimism

Introduction

The global extension of life expectancy is leading to a rapid increase in the population aged 80 and over, and specifically, the proportion of individuals aged 95 and over, defined as the "oldest-old," is rising significantly every year.[1] Statistics regarding this age group are quite limited both globally and in Turkey. According to the report by the Turkish Statistical Institute, individuals aged 65 and over constitute 10.6% of the total population in Turkey, and 7.8% of the older population is aged 85 and over.[2]

Prolonged life expectancy increases the prevalence of geriatric syndromes such as frailty, cognitive decline, depression, malnutrition, fall risk, and functional dependence.[3] Frailty is a clinical syndrome characterized by decreased physiological reserves and increased susceptibility to stressors in older individuals, which can lead to irreversible adverse outcomes. Inflammatory processes, sarcopenia, hormonal changes, nutritional deficiencies, and psychosocial factors play a significant role in the pathophysiology of frailty.[4]

Another important factor in this age group is the history of physical activity. Regular exercise has been shown to delay the development of sarcopenia and frailty, support cognitive functions, and reduce the risk of falling.[5] The increase in chronic

https://doi.org/10.2147/RMHP.S588151
Received: 20 December 2025
Accepted: 21 February 2026
Published: 5 March 2026

disease burden with advanced age also increases functional dependence. This situation is seen as a factor contributing to the development of depression. Social and environmental life events such as diseases, loss of a spouse, or placement in a care institution increase vulnerability in older individuals; this leads to a susceptibility to depression and sleep problems.[2]

It is known that psychological characteristics are as determinant on health outcomes in older individuals as nutrition and physical activity. Positive affect, optimism, and psychological resilience contribute to the preservation of cognitive functions and the maintenance of physical endurance. Conversely, depression and low self-efficacy levels have been reported to have negative effects on both quality of life and mortality.[6] Longevity is generally associated with the onset of multiple health problems or the worsening of existing ones.[7] Although the World Health Organization (WHO) reports an increase in the prevalence of depression among older adults, it is stated that this condition is frequently misinterpreted as a "natural process of aging" in very advanced ages, is underdiagnosed, and treatment often remains inadequate.[8]

In Turkey, the definition and purpose of Healthy Aging Centers (YAŞAM) were explained in the Regulation on Home Health Services dated June 2, 2023. Accordingly, YAŞAM units were established by the Ministry of Health to ensure that individuals, especially those over the age of 80, have easier access to health services, to evaluate and support medical care needs at home or in their environment, to perform regular medical monitoring, and to provide remote health services when necessary. Furthermore, it aims to contribute to the provision of holistic and uninterrupted health services to older adults by ensuring the coordination of in-hospital medical care processes.[9]

To better understand the complex interplay of factors in this unique population, this study is grounded in the biopsychosocial model of aging, which posits that healthy aging is not merely the absence of disease but the result of interactions between biological, psychological, and social factors.[10] Furthermore, we adopt the World Health Organization's concept of "intrinsic capacity", defined as the composite of all physical and mental capacities of an individual.[11] This framework helps explain how lifestyle history and psychological traits (eg, optimism) contribute to functional preservation even in the presence of multimorbidity in the oldest-old.[12]

While studies on nonagenarians and centenarians are increasing globally—such as the Heidelberg Centenarian Study in Germany —data from developing countries and specifically the Mediterranean region remain limited.[7] Comparing the characteristics of the Turkish oldest-old with international cohorts, such as those from Japan is essential to identify culturally specific versus universal determinants of longevity.[13]

This study was planned to examine the relationship of personality traits, dietary habits, and lifestyle factors with geriatric syndromes such as frailty, malnutrition, depression, cognitive status, fall risk, and sleep quality in individuals aged 95 and over who are followed up in YAŞAM polyclinics. In this aspect, this study is among the rare studies in which psychosocial and biological factors are evaluated together in a very advanced age group, with the participation of three centers, and aims to contribute to the literature.

Materials and Methods

Study Design and Setting

This study was designed as a descriptive and cross-sectional study. It was conducted between February 1 and October 1, 2025, at the YAŞAM Polyclinics operating within three different training and research hospitals. All participants were informed in detail about the purpose and scope of the study, and verbal and written informed consent was obtained prior to data collection. The study was carried out in accordance with the principles of the Declaration of Helsinki.

Sampling and Participants

A total of 230 individuals aged 95 years and above were registered in the YAŞAM polyclinics. The sample size for this study was calculated using the OpenEpi (version 3.0) program, assuming a 95% confidence interval, 5% margin of error, and an expected frequency of 50%. Accordingly, the minimum required sample size was determined as 148 participants. Individuals aged 95 years and older who were registered in the YAŞAM polyclinic, had sufficient cognitive ability to respond to the questionnaire, and voluntarily agreed to participate were included in the study.Individuals aged 95 years and over registered in the YAŞAM polyclinics, who had sufficient cognitive competence to answer the survey questions and agreed to participate, were included in the study.Exclusion criteria were: (1) severe cognitive impairment that prevented completion of the interview,

(2) acute medical conditions requiring immediate treatment, (3) severe hearing or speech impairment preventing reliable communication, (4) being bedridden due to terminal illness (CFS = 9), and (5) refusal to participate.

Data Collection

Data were collected through face-to-face interviews conducted by trained researchers. Participants were informed about the study procedures, and written and verbal consent was obtained prior to questionnaire administration. The data collection form consisted of an 8-item sociodemographic questionnaire (including age, gender, marital status, education, income source, living arrangement, and health perception) and a 10-item lifestyle questionnaire (physical activity, social support, etc).

Functional independence duration represented the total number of years an individual was able to perform basic activities of daily living—including eating, dressing, bathing, toileting, and mobility—without assistance. Based on information obtained from the participant or caregiver, the age at which the individual was last fully independent was noted, and the duration was calculated by subtracting this age from the participant's current age.

Measures

Katz Index of Independence in Activities of Daily Living (Katz ADL)

This scale assesses basic self-care activities such as feeding, bathing, dressing, toileting, and transferring. Scores range from 0 to 6, with 6 indicating full independence and scores below 6 indicating dependence.

Clinical Frailty Scale (CFS)

The CFS evaluates frailty status on a scale from 1 (very fit) to 9 (terminally ill), based on comorbidities, functional capacity, and overall health.

ITAKI Fall Risk Scale

This tool includes 19 items (8 major and 11 minor) assessing fall risk in older adults. Scores of 0–4 indicate low fall risk, while scores ≥5 indicate high fall risk.

Malnutrition Universal Screening Tool (MUST)

Recommended by ESPEN, MUST evaluates malnutrition risk based on BMI, unintentional weight loss within the last 3–6 months, and the presence of acute disease. Scores are categorized as 0 (low risk), 1 (medium risk), and ≥2 (high risk).[14]

Geriatric Depression Scale – Short Form (GDS-SF)

A 15-item yes/no scale used to screen for depression. Scores ≥5 indicate a risk of depression.

Pittsburgh Sleep Quality Index (PSQI)

A 19-item self-report scale assessing sleep quality over the previous month. Total scores range from 0 to 21, with ≥5 signifying poor sleep quality.

Mini-Cognitive Assessment Instrument (Mini-Cog)

Consists of three-word recall and a clock drawing task. Scores range from 0 to 5, with ≤2 indicating possible cognitive impairment.

Charlson Comorbidity Index (CCI)

The CCI assesses comorbidity burden based on 19 chronic conditions, each scored from 1 to 6 points. Total scores of 0–2 indicate low risk, whereas ≥3 indicate moderate-to-high risk.

Statistical Analysis Methods Section

Statistical analyses were performed using SPSS (Statistical Package for the Social Sciences) version 22.0. Descriptive statistics for continuous variables were reported as mean ± standard deviation for those meeting the normal distribution assumption, and as median (minimum–maximum) or median (IQR) for those not meeting it; categorical variables were reported as number (percentage, %). The distribution of continuous variables was evaluated with the Kolmogorov–Smirnov test and skewness–kurtosis z-scores ($|z| < 1.96$ accepted), and homogeneity of variance between groups was evaluated with the Levene test.

Independent samples *t*-test was used for comparisons of two groups fitting normal distribution and homogeneity of variance, and the Mann–Whitney *U*-test was used when assumptions were not met. The Pearson chi-square test was applied in the comparison of categorical variables; Fisher's exact chi-square test was preferred in cases where the expected cell count was <5. In cross-tabulation analyses, cell percentages and effect sizes (phi [φ] or Cramér's V) were also reported for significant relationships. Relationships between continuous variables were examined with Pearson correlation when assumptions were met, and with Spearman rank correlation when they were not or for ordinal variables. All tests were conducted as two-tailed, and the statistical significance level was determined as $p < 0.05$.

Effect sizes were reported as Cohen's d (for t-tests), r (for Mann–Whitney U), and phi (φ) / Cramér's V (for chi-square tests) where appropriate. Approximate threshold values for small, medium, and large effects were accepted as d = 0.20 / 0.50 / 0.80; r = 0.10 / 0.30 / 0.50; φ or V = 0.10 / 0.30 / 0.50, respectively. Bonferroni correction was made when necessary in multiple comparisons. Missing data were excluded listwise from analyses. Significant p-values were presented as exact values up to three decimal places (eg, p =0.032); inequality notation was used for $p < 0.001$.

Results

A total of 148 individuals were included in the study. The ages of the participants ranged from 95 to 109 years, with a mean of 97.09±2.63 years. The number of individuals over the age of 100 is 25. Of the participants, 74.3% (n=110) are women, the vast majority are widowed (85.8%), and the rate of those who have not changed their place of residence in the last 10 years is 85.1%. Regarding income source, 35.1% reported their own retirement pension, while 49.3% reported a spouse/child/parent pension. It was determined that care support was mostly provided by children (69.6%). The sociodemographic, health perception, and personality characteristics of the participants are shown in Table 1.

The mean height was 154.39±8.55 cm, weight 57.93±11.29 kg, BMI 24.18±3.78 kg/m^2, and calf circumference was 29.2±3.77 cm.

It was determined that 26.4% of the participants had exercised regularly in earlier periods of their lives. The presence of chronic disease was 91.9%, with hypertension being the most frequent at a rate of 70.3%, followed by cardiovascular

Table 1 Sociodemographic Data and Health Perception Characteristics of Participants (n=148)

Variables	N	%
Gender		
Female	110	74.3
Male	38	25.7
Marital status		
Married	18	12.2
Widowed	127	85.8
Never married	3	2.0
Change in place of residence in the last 10 years		
Yes	22	14.9
No	126	85.1
Source of income		
Retirement pension (own)	52	35.1
Retirement pension (spouse/child/parent)	73	49.3
Old-age pension	21	14.2
Home care allowance	2	1.4

(*Continued*)

Table 1 (Continued).

Variables	N	%
Care support provider		
Child	103	69.6
Spouse	14	9.5
Other relative	15	10.1
Living alone	7	4.7
Paid caregiver	8	5.4
Neighbor	1	0.7
Health perception		
Very good	15	10.1
Good	31	20.9
Moderate	72	48.6
Poor	24	16.2
Very poor	6	4.1

diseases at 37.2%, diabetes mellitus at 20.3%, and dementia at 18.9%. Osteoporosis was detected at 7.4%, COPD/asthma at 4.1%, psychiatric disease at 3.4%, Parkinson's at 2.0%, malignancy at 1.4%, and incontinence complaints at 66.9%.

The participants' average number of hospitalizations in the last 10 years was 1.81±1.89; the average number of doctor visits in the last 1 year was 8.59±5.33. The average number of prescribed drugs was 4.0±2.3 (min 2–max 6). The duration of functional independence was 86.89±8.43 years, and the life spans of mothers and fathers were 77.99±12.96 and 75.09 ±14.08 years, respectively.

When participants' personality traits were queried, they were identified as "calm" 33.1% (n=49), "talkative" 29.7% (n=44), "optimistic" 29.1% (n=43), "extroverted" 23.6% (n=35), "irritable" 20.9% (n=31), "introverted" 14.9% (n=22), and "pessimistic" 12.2% (n=18).

When geriatric scales were evaluated, it was found that Clinical Frailty Scale (CFS) scores ranged from 3–8, with a mean value of 6.11±0.98. Katz ADL varied between 0–6, calculated as an average of 2.95±1.70. Mini-Cog was applied to only 43 participants; scores were found to be in the 0–5 range (mean 2.44±1.47). ITAKI-minor mean score was 5.29 ±1.77 (1–9), ITAKI-major mean score was 7.64±5.23 (0–20), and ITAKI-total was 12.93±6.01 (1–28). MUST score ranged from 0–4 with a mean of 0.87±1.13. GDS-SF scores ranged from 0–14 with a mean score of 4.87±2.57. Finally, the PSQI total score varied between 2–19, and the mean value was determined as 8.03±3.85.

In comparisons by gender, the Mini-Cog score was higher in men (2.14±1.35 vs 3.75±1.28; p=0.004). In women, doctor visits in the last 1 year (12.51±7.63 vs 6.88±7.99; p=0.010), GDS-SF score (5.51±3.40 vs 3.13±2.47; p=0.002), and hospitalizations in the last 10 years (median 2 [1–3] vs 1 [0–1]; p=0.032) were higher. These data were statistically significant. There was no significant difference in terms of BMI, calf circumference, CFS, ITAKI scores, PSQI, MUST, and number of prescribed drugs (p>0.05).

In those with a history of exercise, functional independence duration (U=1272.5; Z=–3.97; p<0.001), Katz (U=1591.0; Z=–2.36; p=0.018), and Mini-Cog (U=32.0; Z=–2.44; p=0.015) scores were higher. Conversely, ITAKI-major (U=1601.5; p=0.016) and ITAKI-total (U=1608.5; p=0.024) scores were higher in those without an exercise history (Table 2). Additionally, DM (25.6% vs 12.1%; p=0.046) and incontinence (73.3% vs 56.9%; p=0.038) were more frequent in those without an exercise history. In continuous variable analyses, hospitalizations in the last 10 years (p=0.015) and GDS-SF (p=0.032) were higher in those without an exercise history; CFS tended to be higher (p=0.018) and Katz lower (p=0.050).

When the relationship between personality traits and geriatric syndromes was evaluated; in Chi-square analyses, a significant relationship was observed only between optimism and CFS ($\chi^2(1,n=148)=11.04$; p=0.001; φ=–0.27); the frailty rate was lower in those who were optimistic. There was no significant relationship between other personality traits and CFS (all p>0.05). No significant relationship was detected between the presence of depression and personality traits

Table 2 Evaluation of the Relationship of Exercise History with Other Variables

Parameter	No Exercise History (n = 109) Mean Rank	Exercise History Present (n = 39) Mean Rank	U	Z	p
Number of prescribed drugs	74.36	74.88	2110.5	−0.07	0.947
BMI	73.77	76.55	2045.5	−0.35	0.728
Calf circumference	74.68	74.00	2106.0	−0.09	0.932
Functional independence duration (years)	66.67	96.37	1272.5	−3.97	**<0.001**
Number of hospitalizations in the last 10 years	77.06	67.35	1846.5	−1.26	0.209
Number of doctor visits (in one year)	75.80	70.86	1983.5	−0.62	0.533
Katz ADL	69.60	88.21	1591.0	−2.36	**0.018**
Mini-Cog	20.34	34.60	32.0	−2.44	**0.015**
ITAKI-minor	76.54	68.79	1903.0	−0.98	0.326
ITAKI-major	79.31	61.06	1601.5	−2.42	**0.016**
ITAKI-total	79.24	61.24	1608.5	−2.26	**0.024**
MUST	70.74	85.00	1716.0	−1.93	0.053
GDS-SF	78.32	63.83	1709.5	−1.83	0.068
CFS	74.60	71.12	2109.5	−0.509	0.611

Note. p values <0.05 are considered statistically significant. Bold rows indicate significant results.

(all p>0.05); borderline significance was observed for "talkativeness" (χ^2=3.23; p=0.072; φ=–0.15). While there was generally no significant relationship according to Mini-Cog results, optimism was associated with normal cognitive function (χ^2(1,n=43)=7.44; p=0.006; φ=0.42).

Evaluation of the Relationships of Independent Variables with Geriatric Syndromes

Factors Associated with Frailty (CFS)

Significant relationships were observed between CFS categories and perceived health status, CCI, and optimistic/calm personality (all p<0.05). Frailty was more common in CCI moderate–high risk (p=0.023). Frailty was lower in the optimistic/calm group (p=0.018). It was determined that the frail rate was high in the "very good/good" perceived health status group (p<0.001) (Table 3).

Table 3 Comparison of Demographic and Clinical Variables with CFS (Frailty)

Variable	Subgroups	Nonfrail n (%)	Frail n (%)	p value
Perceived health status	Very good/good Moderate Poor/very poor	1 (4.3) 9 (39.1) 13 (56.5)	45 (36.0) 63 (50.4) 17 (13.6)	**<0.001**
Age group	95–99 ≥100	17 (73.9) 6 (26.1)	106 (84.8) 19 (15.2)	0.200
Charlson Comorbidity Index (CCI)	Low risk Moderate–high risk	21 (91.3) 2 (8.7)	85 (68.0) 40 (32.0)	**0.023**
Exercise history	Yes No	8 (34.8) 15 (65.2)	31 (24.8) 94 (75.2)	0.318

(*Continued*)

Table 3 (Continued).

Variable	Subgroups	Nonfrail n (%)	Frail n (%)	p value
Personality traits				
Pessimistic/irritable	Yes No	7 (30.4) 16 (69.6)	40 (32.0) 85 (68.0)	0.882
Optimistic/calm	Yes No	17 (73.9) 6 (26.1)	59 (47.2) 66 (52.8)	**0.018**
Talkative/extroverted	Yes No	6 (26.1) 17 (73.9)	58 (46.4) 67 (53.6)	0.071
Introverted	Yes No	2 (8.7) 21 (91.3)	20 (16.0) 105 (84.0)	0.365

Note. Data are presented as n (%). Pearson Chi-square test was applied. Significant p values ($p < 0.05$) are shown in bold. Clinical Frailty Scale (CFS) score 1–3 was considered nonfrail, and ≥4 was considered frail.

Factors Associated with Functional Independence (Katz)

Functional dependence was associated with perceived health status ($p<0.001$), CCI ($p=0.023$), gender ($p=0.044$), and optimistic/calm personality ($p=0.004$). The independence rate was higher in poor/very poor health perception; all individuals in the CCI moderate–high risk group were dependent. The independence rate was higher in men compared to women. No significant relationship was observed with other variables.

Factors Associated with Cognitive Status (Mini-Cog)

A relationship was detected between gender ($p=0.029$) and Mini-Cog categories: the probability of cognitive impairment was higher in women. The relationship with optimistic/calm personality was borderline significant ($p=0.050$). There was no significance in other variables.

Factors Associated with Fall Risk (ITAKI)

Perceived health status ($p=0.002$) and exercise history (Fisher $p=0.003$) were associated with fall risk. It was determined that the rate of low risk for falling was high in those who exercised. No relationship was detected with other variables (Table 4).

Table 4 Comparison of Demographic and Clinical Variables with ITAKI (Fall Risk)

Variable	Subgroups	Low Risk n (%)	High Risk n (%)	p value
Perceived health status	Very good/good Moderate Poor/very poor	0 (0.0) 9 (12.5) 8 (26.7)	46 (100.0) 63 (87.5) 22 (73.3)	**0.002**
Age group	95–99 ≥100	17 (13.8) 0 (0.0)	106 (86.2) 25 (100.0)	0.078
Gender	Female Male	11 (10.0) 6 (15.8)	99 (90.0) 32 (84.2)	0.335
CCI	Low risk Moderate-high risk	14 (13.2) 3 (7.1)	92 (86.8) 39 (92.9)	0.297
Exercise history	Yes No	10 (25.6) 7 (6.4)	29 (74.4) 102 (93.6)	**0.003**

Notes: Data are presented as n (%). Pearson Chi-square test was applied; Fisher's exact test was used when cell frequencies were <5. ITAKI score ≥ 5 was considered as high fall risk. Significant p values ($p < 0.05$) are shown in bold.

Factors Associated with Depression (GDS-SF)

Depression was associated with perceived health status (p=0.002) and gender (p=0.010); depression was higher in women. No significant relationship was found with age group, exercise, personality traits, and CCI.

Malnutrition Risk (MUST), Caregiver, and Sleep Quality (PSQI)

No significant relationship was observed between MUST categories and demographic/clinical variables (all p>0.05); there was a tendency for moderate–high risk in those with poor/very poor health perception (p=0.168). No significant relationship was detected between the type of caregiver and MUST, Mini-Cog, PSQI, ITAKI, GDS, Katz, and CFS (all p>0.05). PSQI was associated only with optimistic/calm personality. Sleep quality was better in those with an optimistic/calm personality (χ^2=6.52; p=0.011); there was no significant relationship with other variables.

Discussion

This study aimed to shed light on the psychosocial determinants of being healthy in advanced age by evaluating the relationships between lifestyle habits, personality traits, and geriatric syndromes in individuals aged 95 and over. Findings show that behavioral and psychological factors such as optimism and physical activity are associated with the preservation of cognitive function and the maintenance of functional independence. These results indicate that psychosocial resilience continues to be effective on clinical outcomes even in individuals aged 95 and over.

Women constituted the vast majority of participants, and the rate of being widowed was found to be quite high. Similarly, female predominance and high rates of widowhood in long-lived individuals have been reported in the literature.[15] A significant portion of the participants are dependent on their children for care, and this situation demonstrates the importance of social support networks in advanced age. It was determined that the participants' long lives did not parallel their parents' life spans. This finding is consistent with studies in the literature suggesting that longevity is not strongly hereditary or sex-linked.[16]

In our research, it was observed that among personality traits, only optimism was significantly associated with frailty and cognitive status. Studies have shown that optimism is a protective factor against frailty in older adults despite negative life events.[7,17] These results support that psychological resilience is an important protective factor in advanced age. It suggests that the effect of personality traits on health outcomes in old age should be evaluated within a biopsychosocial framework. Notably, the consistency of this association across multiple outcomes—including lower frailty, better cognitive performance, and superior sleep quality—identifies optimism as a robust and primary determinant of healthy aging in our sample. This strong correlation suggests that psychological assets may be as influential as physical health markers at the extreme end of the human lifespan.

Depression, detected in more than one-third of the participants, was found to be associated with gender and subjective health status. The high rates observed in women parallel study findings emphasizing that this group is at risk for depression in the older population.[18]

Moreover, the unexpectedly observed levels of depression among individuals who perceive their health as "good" support the "well-being paradox," indicating that psychological processes independent of physical health are influential.[19]

Regarding falls, the vast majority of the sample was in the high-risk group, and as the most striking finding, it was observed that all participants over the age of 100 carried a high risk of falling without exception; despite this, no statistical difference was detected between the 95–99 and ≥100 age groups. Finding a relationship between regular exercise history and low fall risk in our study is consistent with the literature emphasizing that physical activity is the most effective strategy in preventing falls.[20] This protective effect is explained by exercise creating resistance against loss of balance by increasing neuromuscular control and physiological reserve (intrinsic capacity).[21] Indeed, current meta-analyses confirm that exercise significantly reduces fall rates in older adults.[22]

In our study, widespread sleep disorder was detected as an expected finding in the older population. However, the significantly lower levels of sleep disorder in optimistic and calm-tempered individuals are consistent with current literature emphasizing that personality traits can create a protective (buffering) effect on sleep physiology.[23] Optimistic individuals perceiving daily stressors as less threatening and staying away from pre-sleep rumination preserves sleep

quality by balancing autonomic nervous system activation.[24] Therefore, our findings support that psychological well-being functions as a protective barrier against sleep disorders frequently seen in old age.

In comparisons made according to gender, it was observed that men had higher cognitive performance, while women had higher rates of depression, hospital admissions, and healthcare visits. This situation is consistent with the "morbidity–mortality paradox," which indicates that although women have a longer life expectancy, they carry a higher morbidity and psychological burden.[4] The high frequency of depression in women may be related to the rate of living alone as well as hormonal and psychosocial factors.

In this study, functional independence and cognitive performance are higher, and frailty and malnutrition rates are lower in individuals with a history of exercise. The role of physical activity in reducing frailty can be explained by biological mechanisms such as suppression of oxidative stress, preservation of mitochondrial function, and maintenance of muscle mass.[25] Studies have stated that physical activity balances age-related changes in the prevention of sarcopenia and frailty.[1,4] Furthermore, it has been reported that aerobic and resistance exercises support cognitive functions and neuroplasticity.[26,27]

Finding functional independence levels associated with perceived health status, gender, comorbidity burden, and optimism is an expected result. However, a higher rate of frailty in individuals evaluating themselves as "very good/good" was an unexpected finding. Possible explanations for this situation include the small sample size, the subjective nature of subjective health perception, and the change in the health reference frame in advanced age. Jung et al stated that subjective health assessment is shaped not only by medical indicators but also by psychosocial factors.[28] Wuorela et al showed that subjective health perception can strongly predict long-term mortality.[29] Therefore, although subjective health assessment is not a marker of geriatric syndromes alone, it is a valuable complementary indicator in understanding the general well-being of older individuals. Gobbens and van Assen's model, emphasizing that frailty is a multidimensional concept closely related to quality of life and subjective well-being, supports these results.[10] On the other hand, certain findings should be interpreted as exploratory. For instance, the relationship between "talkativeness" and depression showed only borderline significance ($p=0.072$). Similarly, while the Mini-Cog results provided valuable insights into cognitive impairment patterns, they are based on a reduced subset of the population ($n=43$). These results, while plausible, warrant further validation in larger, more diverse cohorts of nonagenarians to determine their clinical stability.

Limitations

This study has several limitations that should be acknowledged. First, the cross-sectional design precludes any inferences regarding causality. Second, the use of convenience sampling and the focus on a specific geographic region in Turkey may limit the generalizability of the findings to the broader global population of the oldest-old. Third, although we reported significant findings regarding cognitive status, the reduced sample size for the Mini-Cog assessment restricts the power and generalizability of these specific results. Fourth, our assessment of physical activity relied on a self-reported history without detailed metrics on the type, intensity, or duration of exercise, which may be subject to recall bias. Finally, certain potential confounders, such as detailed nutritional intake or specific biomarkers of aging, were not included in the current analysis.

Conclusion

This study provides important insights into the main determinants of longevity among individuals aged 95 years and older in Türkiye. It demonstrates that even at very advanced ages, psychological and behavioral factors play a determining role in health and functionality. From a clinical perspective, these findings suggest that Healthy Aging Centers (YAŞAM) and similar geriatric care models should move beyond traditional medical monitoring to include routine screenings for psychological assets like optimism and social engagement. Furthermore, our results underscore the importance of promoting "intrinsic capacity" through tailored physical activity programs, even for the oldest-old, to delay functional dependence. Integrating psychosocial resilience support into standard geriatric assessments could provide a more holistic approach to longevity and improve the quality of life for individuals at the extreme end of the human lifespan.

Abbreviations

ADL, Activities of Daily Living; BMI, Body Mass Index; CCI, Charlson Comorbidity Index; CFS, Clinical Frailty Scale; COPD, Chronic Obstructive Pulmonary Disease; DM, Diabetes Mellitus; GDS-SF, Geriatric Depression Scale–Short Form; ITAKI, ITAKI Fall Risk Scale; MUST, Malnutrition Universal Screening Tool; PSQI, Pittsburgh Sleep Quality Index; SPSS, Statistical Package for the Social Sciences; YAŞAM, Healthy Aging Centers (Türkiye Ministry of Health).

Ethical Statement

This study was reviewed and approved by the İzmir Katip Çelebi University Health Research Institutional Review Board (Decision Date: February 13, 2025; Decision No: 0043). All procedures involving human participants were conducted in accordance with the ethical standards of the institutional research committee and with the principles of the Declaration of Helsinki.

Prior to participation, all participants were fully informed about the purpose and procedures of the study, and written informed consent was obtained from all individuals included in the research. Participation was voluntary, and participants were assured of the confidentiality and anonymity of their data.

Disclosure

No potential conflict of interest was reported by the authors.

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