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PERCEIVED STRESS, COGNITIVE FUNCTIONING, AND HEALTH-RELATED QUALITY OF LIFE AMONG INSTITUTIONALIZED OLDER ADULTS IN KARACHI, PAKISTAN

Aoun Ali[*1], Duaa Zehra Lakhani[2], Adeeba Arshad[3], Insia Fatima Jiwani[4]

[*1]*Government College of Education, F.B. Area Block 15, Karachi, Pakistan*
[2]*College of Clinical Psychology, Ziauddin University, Karachi, Pakistan*
[3,4]*Institute of Professional Psychology (IPP), Bahria University Karachi, Pakistan*

[*1]aounaliwadho@gmail.com

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Corresponding Author: *
Aoun Ali

Abstract

Background: Pakistan's older population is projected to nearly triple by 2050, yet perceived stress, cognitive function, and health-related quality of life in this group remain largely unexamined, and the available evidence treats these outcomes separately and comes from outside South Asia. This study examined their interrelationships among institutionalized older adults in Karachi. Methods: Eighty-three residents (41 men, 42 women; aged 56–70) were recruited by convenience sampling from six Karachi old age homes. Eligibility required completion of at least Grade 5 and a Mini-Cog score of 3–5, excluding probable dementia. Working memory was assessed with the WAIS-IV Digit Span, perceived stress with the PSS-10, and HRQoL with the CDC Healthy Days measure (HRQOL-14), in individual structured interviews. Analyses used Pearson correlations, independent-samples t tests, and hierarchical regression. Results: Stress was unrelated to working memory ($r = -.089$, $p = .43$) but predicted poorer self-rated health ($r = -.493$, $p < .001$) and more unhealthy days ($r = .656$, $p < .001$); the association between Digit Span and self-rated health was positive but not significant ($r = .19$, $p = .085$). Women reported higher stress ($d = -0.63$, $p = .005$) and men higher Digit Span Total scores ($d = 0.49$, $p = .028$). Conclusion: Perceived stress significantly predicts HRQoL among institutionalized older adults in Karachi. The absent stress–cognition association may reflect limited power and the cross-sectional design rather than a true null. Stress-reduction programs merit attention as Pakistan's elder care sector develops, while the value of cognitive stimulation remains to be established.

INTRODUCTION

Population aging is one of the defining public health challenges of this century, and it is proceeding most rapidly in South Asia. Pakistan had roughly 13.5 million older adults in 2024, and by 2050 that figure is expected to reach 36 million (Foundation for Ageing and Inclusive Development [FAID], 2025; World Bank, 2024).

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The country is poorly positioned to absorb this growth: formal arrangements for elder care are limited, and the health system is already under considerable strain.

Older Pakistanis have traditionally been cared for within multigenerational households. Urbanization and labor migration have eroded these arrangements, and a declining proportion of older people can now rely on family care (Ali, 2022). Where family care is unavailable, institutional accommodation is frequently the only remaining option, and admission is seldom voluntary. Because the care of aging parents is regarded as a filial duty, admission to a facility carries a stigma on top of the practical hardships of institutional life.

Institutional living brings stressors of its own: declining health, reduced control over daily routines, relationship loss, and perceived abandonment. Perceived stress — the extent to which individuals appraise their circumstances as unpredictable, uncontrollable, or exceeding their coping capacity — is a central psychological risk factor in that setting (Cohen et al., 1983).

The effects of chronic stress in later life extend beyond mood. Higher stress has been linked to weaker working memory, slower processing speed, and faster cognitive decline, with HPA-axis dysregulation and glucocorticoid-related hippocampal shrinkage the usual proposed mechanisms (Korten et al., 2017; Feeney et al., 2018).

Health-related quality of life (HRQoL) is central to aging research because it captures the subjective experience of health across physical, psychological, and social domains within a single framework. Institutionalized older adults consistently fare worse than those living in the community. In Karachi the disparity is pronounced, and depression is one route by which stress and social disconnection erode quality of life (Bhamani et al., 2013; Siddiqui et al., 2019).

Cognitive functioning matters for HRQoL in its own right, and it matters more inside an institution. Residents with intact working memory and executive control can hold on to some independence, stay socially engaged, and take part in decisions about their own care. Yet the three constructs are rarely studied together in Pakistani facilities. The present study addresses this gap.

Hypotheses

- H1: Higher perceived stress will be negatively correlated with cognitive functioning as measured by Digit Span performance.
- H2: Higher perceived stress will be associated with poorer health-related quality of life.
- H3: Better cognitive functioning will be positively associated with health-related quality of life.
- H4: Lower perceived stress will correspond jointly with better cognitive functioning and improved health-related quality of life.

Literature Review

Demographic Aging and Institutional Care in Pakistan

Population aging in Pakistan follows the wider South Asian pattern, occurring while economic development remains limited and social protection coverage is sparse (Matthews et al., 2023). Old age homes, historically peripheral to Pakistani elder care, have acquired importance by default rather than through deliberate policy (FAID, 2025). What distinguishes the Pakistani case is not the pathway into institutional care — abandonment, widowhood, outmigration of adult children, and chronic illness (Ali, 2022; Cassum et al., 2020; Shoaib, 2023) — but the cultural meaning attributed to it. Because the care of aging parents constitutes a filial obligation, families and residents alike interpret admission as evidence of abandonment, and this interpretation itself operates as a stressor.

Perceived Stress in Institutional Settings

Cohen and colleagues (1983) defined perceived stress as the degree to which a person finds their circumstances unpredictable, uncontrollable, and overwhelming, and the construct has

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demonstrated validity across diverse populations. Because it assesses subjective appraisal rather than enumerating discrete events, it is well suited to the experience of institutional living.

Stress in residential care rarely arises from a single source. Physical decline is accompanied by chronic pain and by distress associated with observable functional loss. Separation from family produces loneliness and grief, which contribute to social isolation (Iovino et al., 2023). Diminished control over the timing and content of meals, and over access to one's private space, erodes an autonomy closely tied to identity and self-worth in later life (Nyende, 2024). These effects are not uniform: perceived self-efficacy appears to buffer the stress–cognition relationship (Korten et al., 2017).

Cognitive Aging and Institutional Vulnerability

Normal aging brings gradual and fairly predictable change across several cognitive domains (Kirk, 2024). Working memory capacity, processing speed, and parts of executive control all decline measurably across adulthood in the absence of pathology (Wechsler, 2008). Institutional settings appear to accelerate this decline, as residents must repeatedly adapt to unfamiliar surroundings with reduced support. Working memory is also among the domains most vulnerable to the attentional disruption chronic stress produces (Korten et al., 2017), and Digit Sequencing is the WAIS-IV condition that indexes this capacity most directly (Egeland et al., 2026).

The strongest evidence here is longitudinal. In the Irish Longitudinal Study on Ageing, older adults whose perceived stress rose over two years showed measurable decline in word recall, while those whose stress fell improved (Feeney et al., 2018). Large population studies converge on the same conclusion, treating high perceived stress as an independent risk factor for cognitive decline even after depression and cardiovascular disease are controlled for (Kulshreshtha et al., 2023).

Health-Related Quality of Life in Older Adults

Health-related quality of life goes beyond biomedical status to how people experience the effect of their health on activity, psychological well-being, social participation, and daily functioning (Kaplan & Hays, 2022). Institutionalized older adults consistently report lower HRQoL than community-dwelling peers of the same age (Chen et al., 2025), which reflects both the conditions precipitating admission and the characteristics of institutional life.

The same contrast is evident in Karachi. Siddiqui and colleagues (2019) found nursing facility residents rating their health well below home-dwelling peers on both physical and mental domains, and Bhamani and colleagues (2013) identified depression as a principal source of quality-of-life impairment among Karachi's older adults, with inadequate family support its most consistent predictor. Meta-analytic work agrees that perceived stress predicts HRQoL in older samples, with depression and sleep disturbance accounting for much of the mediation (Kamali Zarch & Sorbi, 2019).

Gaps in Existing Literature

Three gaps motivated this study. Most research in the area comes from Western or East Asian settings and does not transfer readily to the Pakistani context. Earlier work has tended to treat perceived stress, cognitive functioning, and quality of life as separate variables rather than examining their interrelationships. Finally, Pakistan's institutionalized older adults remain little studied, with adults aged 55 to 70 particularly underrepresented relative to samples aged 65 and above.

Methodology

Research Design

This was a quantitative correlational study of how perceived stress, cognitive functioning, and HRQoL relate to one another among older adult residents of Karachi old age homes.

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Participants

Eighty-three older adults aged 56 to 70 years (41 men, 42 women) took part, recruited by convenience sampling from six old age homes in Karachi: Dar ul Sukoon, Sahara Village, Kamyar Old Age Home, Khatoon-e-Jannat, Bait ul Karim, and Diamond Era. Table 1 reports the facility-level distribution of participants.

Inclusion and Exclusion Criteria

Eligibility required an age between 55 and 70 years, completion of at least Grade 5 of formal education, and no deafness or blindness that would prevent administration of the battery. The education requirement applied because the Digit Span and PSS-10 were administered verbally; anyone scoring 0–2 on the Mini-Cog was excluded.

Measures

Mini-Cog. The Mini-Cog (Borson et al., 2000) pairs three-word recall with a clock-drawing test and scores from 0 to 5, with 0–2 indicating probable impairment. It was used here only as an eligibility screen.

WAIS-IV Digit Span. Working memory was measured with the Digit Span subtest of the WAIS-IV (Wechsler, 2008), comprising Digits Forward, Digits Backward, and Digit Sequencing. Each condition scores up to 16, giving a Digit Span Total out of 48; reported split-half reliability is .93.

Perceived Stress Scale (PSS-10). Stress over the preceding month was measured with the 10-item Perceived Stress Scale (Cohen et al., 1983), rated from 0 (never) to 4 (very often) with four items reverse-scored. Totals range from 0 to 40, higher scores indicating greater stress; alpha in this sample was .81.

CDC Healthy Days Measure (HRQOL-14). Quality of life was measured with the 14-item CDC Healthy Days Measure (Centers for Disease Control and Prevention [CDC], 2000). Two indices were used: self-rated health, the single general health item scored so that higher values mean better health (1 = poor to 5 = excellent), and a Composite Unhealthy Days index summing poor physical and mental health days, capped at 30 by the recall window.

Procedure

After institutional permission and informed consent, each participant was assessed individually in a quiet room within their facility: the Mini-Cog first to confirm eligibility, then the Digit Span subtests, then the PSS-10 and HRQOL-14 as structured interviews. Participants were debriefed on completion, and the session took roughly 45 to 60 minutes.

Data Analysis

Analyses were run in IBM SPSS Statistics Version 27 (IBM Corp., 2020). Pearson correlations tested the associations between PSS-10 total, Digit Span Total, and the two HRQOL indices; independent-samples t tests with Cohen's d tested gender differences; one-way ANOVAs tested differences by age band, education level, and marital status; and hierarchical regression predicted self-rated health, entering age group and gender first, PSS-10 total second, and Digit Span Total third. Because several day-count variables and the single-item health rating departed from normality, Spearman correlations and Mann–Whitney tests were run as checks and gave the same results. Missing values on the day-count and categorical items were replaced with item medians and modes before the composite index was formed, affecting 71 cells across 36 participants, and a complete-case analysis (n = 47) reproduced the direction of every association. All tests were two-tailed at $\alpha = .05$, and the sample gave 80% power to detect correlations of $r \geq .30$.

Ethical Considerations

The study was conducted independently by the authors, without institutional sponsorship, and was therefore not submitted to a formal institutional ethics committee. It was carried out in accordance with the ethical principles set out in

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the Declaration of Helsinki. Permission to conduct the study was granted by the administration of each participating old age home before any resident was approached. Every participant gave informed consent in person, was told what the study involved, and was told they could stop at any time without giving a reason and without any effect on their care. No names or other identifying details were recorded. All data were collected face to face by the researchers, kept confidential, and used only for this study.

Results

No participant withdrew. Digit Span, PSS-10, and self-rated health were complete for all 83 cases, while the day-count items carried some missingness before imputation (valid n from 62 to 79). All 83 participants scored 3–5 on the Mini-Cog, meeting the eligibility floor. Table 1 reports the demographic characteristics of the sample and Table 2 the descriptive statistics.

Table 1 Demographic Characteristics of the Sample (N = 83)

Variable	*n*	%
Age Group		
56–60 years	42	50.6%
61–65 years	20	24.1%
66–70 years	21	25.3%
Gender		
Male	41	49.4%
Female	42	50.6%
Education Level		
Matric Fail	16	19.3%
Matriculation	32	38.6%
Intermediate	18	21.7%
Bachelor's	14	16.9%
Master's	3	3.6%
Marital Status		
Married	46	55.4%
Single	23	27.7%
Widowed	11	13.3%
Divorced	3	3.6%
Old Age Home		
Dar ul Sukoon	30	36.1%
Sahara Village	9	10.8%
Kamyar Old Age Home	14	16.9%

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Variable	*n*	%
Khatoon-e-Jannat	9	10.8%
Bait ul Karim	11	13.3%
Diamond Era	10	12.0%
N =	83	100%

Note. N = 83

Table 2 Descriptive Statistics for Study Variables (N = 83)

Variable	*n*	*M*	*SD*	*Min*	*Max*	*Skew*	*Kurt*
DS Forward (max = 16)	83	7.24	2.39	2.00	12.00	0.24	-0.50
DS Backward (max = 16)	83	4.95	2.73	0.00	12.00	-0.12	-0.38
DS Sequencing (max = 16)	83	3.78	2.79	0.00	10.00	0.40	-0.81
DS Total (max = 48)	83	15.98	6.81	3.00	32.00	0.28	-0.67
PSS-10 Total (0–40)	83	18.67	7.53	3.00	38.00	-0.04	-0.67
HRQOL Self-Rated Health (1–5)	83	2.24	0.94	1.00	5.00	1.01	1.22
Unhealthy Physical Days (0–30)	83	12.42	11.91	0.00	30.00	0.44	-1.40
Unhealthy Mental Days (0–30)	83	12.11	11.80	0.00	30.00	0.43	-1.40
Activity Limited Days (0–30)	83	6.93	11.17	0.00	30.00	1.44	0.35
Pain Days (0–30)	83	9.65	10.60	0.00	30.00	0.89	-0.53
Sad/Depressed Days (0–30)	83	10.47	10.59	0.00	30.00	0.69	-1.03
Worried/Anxious Days (0–30)	83	9.39	10.82	0.00	30.00	0.80	-0.94
Poor Sleep Days (0–30)	83	12.40	12.18	0.00	30.00	0.38	-1.58
Healthy Energy Days (0–30)	83	8.19	9.24	0.00	30.00	1.22	0.25
HRQOL Composite Unhealthy Days	83	17.54	12.38	0.00	30.00	-0.35	-1.55

Note. DS = Digit Span. PSS-10 = Perceived Stress Scale (10-item). HRQOL = Health-Related Quality of Life. HRQOL Composite Unhealthy Days reflects the number of days affected within the preceding 30 days.

Perceived stress averaged 18.67 (SD = 7.53), placing the sample in the moderate band, and 72.3% of residents scored moderate or high. Digit Span Total averaged 15.98 out of 48 and self-rated health 2.24 (SD = 0.94), with residents reporting 17.54 unhealthy days in the preceding month.

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Table 3 Correlation Matrix for Primary Study Variables (N = 83)

Variable	1	2	3	4
1. PSS	—	−.089	−.493**	.656**
2. DS Total		—	.190	−.060
3. HRQOL Q1			—	−.460**
4. HRQOL Days				—

*Note. N = 83. PSS = Perceived Stress Scale total; DS Total = Digit Span Total raw score; HRQOL Q1 = self-rated health, reverse-scored so that higher values indicate better health; HRQOL Days = composite unhealthy days. *p < .05. **p < .01.*

Stress showed no relationship with Digit Span Total (r = −.089, p = .425). Stress did track worse self-rated health (r = −.493) and more unhealthy days (r = .656, both p < .001), while the link between Digit Span and self-rated health fell short of significance (r = .19, p = .085).

Table 4 Independent-Samples t Tests for Gender Differences in PSS-10, Digit Span, and HRQOL (N = 83)

	Male		Female		*t(81)*	*p*	*d*
Variable	***M***	***SD***	***M***	***SD***			
PSS-10 Total	16.37	7.31	20.93	7.13	−2.879	.005**	−0.632
DS Total	17.63	7.63	14.36	5.53	2.244	.028*	0.493
HRQOL Self-Rated Health	2.34	1.11	2.14	0.75	0.957	.341	0.210

*Note. *p < .05. **p < .01.*

Women scored higher than men on perceived stress, t(81) = −2.88, p = .005, d = −0.63, and men scored higher on Digit Span Total, t(81) = 2.24, p = .028, d = 0.49. Self-rated health did not differ by gender, nor did composite unhealthy days (not tabulated), and among the demographic factors only education level was related to Digit Span Total, F(4, 78) = 2.54, p = .046.

Table 5 Distribution of Perceived Stress Categories and Self-Rated Health Ratings (N = 83)

Category	*n*	%
PSS-10 Stress Level		
Low Stress (0–13)	23	27.7
Moderate Stress (14–26)	45	54.2
High Stress (27–40)	15	18.1
HRQOL Self-Rated Health		
Poor	15	18.1
Fair	44	53.0
Good	16	19.3
Very Good	5	6.0
Excellent	3	3.6

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Note. PSS-10 scores were banded using the conventional cut-offs applied in the wider literature: low = 0–13, moderate = 14–26, high = 27–40. HRQOL self-rated health is scored 1 = poor to 5 = excellent (CDC, 2000). Percentages are computed from column n.

Table 6 Hierarchical Multiple Regression Predicting HRQOL Self-Rated Health (N = 83)

Predictor	R^2	ΔR^2	*B*	*r*	*p*
Block 1: Controls	.031	.031			.286
Age Group			−.159		.207
Gender			−.163		.437
Block 2: + PSS-10	.269	.238			< .001**
PSS Total			−.064	−.493	< .001**
Block 3: + DS Total	.291	.022			.128
DS Total			.021	.190	.128

*Note. Criterion variable: HRQOL self-rated health (1–5). B = unstandardized regression coefficient; r = zero-order correlation with the criterion. Block 1 = demographic controls (age group, gender); Block 2 = PSS-10 total added; Block 3 = Digit Span Total added. *p < .05. **p < .01.*

Age group and gender explained 3.1% of the variance in self-rated health, and adding PSS-10 total raised this by 23.8%, F change (1, 79) = 25.76, p < .001. Digit Span Total added only 2.2% and was not significant (p = .128). Taken together, the results supported H2, did not support H1 or H3, and supported H4 only in part: perceived stress predicted health-related quality of life, whereas working memory was unrelated to both stress and quality of life.

Discussion

This study examined how perceived stress, cognitive functioning, and health-related quality of life relate to one another among 83 older adult residents of six Karachi old age homes. The mean PSS-10 score was 18.67, and 72.3% of residents scored moderate or high, indicating that clinically meaningful stress is prevalent rather than exceptional in these facilities. This figure is difficult to contextualize, as no PSS-10 norms exist for institutionalized older adults in South Asia, and care quality, cultural framing, and the one-month recall window may each influence it. These caveats do not diminish the observed burden, given the strength of the association between stress and poor health in this sample.

Women reported considerably more stress than men, a medium-sized difference (d = −0.63) that matches the wider literature, where women both report higher stress and rate themselves less able to recover from it (American Psychological Association, 2010). Local circumstances may accentuate this pattern. Widowhood affected 13.3% of participants, and in a society structured largely around marriage, spousal bereavement removes both a primary source of emotional support and a defining social role. Combined with estrangement from adult children, this may render institutional life substantially different from the experience reported by male residents.

Men outperformed women on Digit Span Total (d = 0.49, p = .028), which fits part of the literature on gender and working memory in later life, though that literature is far from unanimous. Schooling is the first confound to consider, and the data support this concern: Digit Span Total varied significantly by education level here, F(4,

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78) = 2.54, p = .046, η^2 = .115. The absence of a gender difference in self-rated health is equally informative. Comparable self-ratings across men and women suggest that the observed disparities in stress and cognition do not translate directly into subjective health appraisal, plausibly because shared exposures — living conditions, comorbidity, and isolation — attenuate variation in those judgments.

The unanticipated finding was the absence of any association between perceived stress and Digit Span performance. Four considerations bear on the interpretive weight this result should carry. The first is statistical power: with 83 participants, effects of the magnitude reported in this literature were unlikely to reach significance, although the coefficient was in the expected negative direction (r = −.089). Second, screening out probable dementia removes the impaired tail, compressing cognitive variability and any correlation with it. Third, chronic stress is thought to wear on cognition cumulatively, and the studies documenting this effect follow participants over time rather than assessing them at a single point (Korten et al., 2017; Feeney et al., 2018). Fourth, and potentially most important, Digit Span assesses verbal storage and manipulation specifically, a domain that appears less responsive to perceived stress than episodic memory or processing speed.

The most robust finding concerns the relationship between stress and quality of life. PSS-10 explained 23.8% of the variance in self-rated health beyond age and gender, with a zero-order correlation of r = −.493, in line with meta-analytic estimates in older samples (Kamali Zarch & Sorbi, 2019). Several pathways may operate concurrently. Sustained stress elevates cortisol and inflammatory signaling, both implicated in physical decline; it may precipitate depressive and anxiety symptoms that reduce self-rated health; and residents experiencing stress may be less physically active, sleep more poorly, and withdraw from the social contact available within the facility. An average of 17.54 unhealthy days out of 30 is consistent with the cumulative cost of these processes.

Working memory added a small increment to self-rated health once stress was in the model, but it fell well short of significance (ΔR^2 = .022, p = .128), and its zero-order association was non-significant too (r = .19, p = .085). The direction of the effect is consistent with prior work, given the role of working memory in sustaining autonomy and participation in one's own care. The small magnitude of the increment is unsurprising: cognitive scores were concentrated at the low end of the range (M = 15.98 out of 48), leaving limited variance to be explained alongside a predictor as strong as stress. The finding is therefore suggestive rather than conclusive and requires replication in a larger sample before it can support practical recommendations.

Notably, only 28.9% of residents rated their health as good or better, while 71.1% rated it fair or poor, compared with 74% of home-dwelling older adults in the Karachi sample reported by Siddiqui and colleagues (2019). Two factors plausibly contribute to this disparity. The first is selection: admission is typically precipitated by existing health deterioration. The second comprises the effects of institutional life itself — perceived abandonment, a social network constricted to the facility, and autonomy exercised at the discretion of others.

Implications for Practice and Policy

Several concrete implications for practice follow. If perceived stress predicts quality of life as consistently as observed here, stress reduction represents a defensible allocation of limited resources: structured relaxation training, mindfulness protocols adapted to the setting, and peer support groups each have an established evidence base with older adults and could be piloted at modest cost. The observed gender difference indicates a need for targeted provision for women, including bereavement support for those widowed, structured opportunities for social contact, and assistance in re-establishing family contact where feasible. Cognitive stimulation has

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weaker empirical support in this dataset, as working memory was not significantly associated with quality of life; group activities and reminiscence work merit investigation, but as hypotheses requiring testing. Beyond the individual facility, these results add to the case for investing in geriatric mental health services, setting standards of care, and making psychological screening routine.

Limitations and Directions for Future Research

Several limitations constrain the generalizability of these findings. The cross-sectional design precludes causal inference. Convenience recruitment from six Karachi facilities means the sample cannot be considered representative of institutions in other cities or those serving different income groups. Eighty-three participants afforded adequate power to detect medium and large effects but not the small-to-medium effects reported in the stress–cognition literature, which is the most probable reason no such correlation emerged. Item-level missingness on the day counts, where valid n before imputation fell as low as 62, limits those estimates further, and anything involving the median-imputed composite index should be read as provisional. The study also relied entirely on self-report, which invites social desirability and leaves out physiological measures such as cortisol. The absence of formal ethics committee review is a further limitation, mitigated by facility-level permission, individual informed consent, and adherence to the Declaration of Helsinki. Future research should adopt longitudinal designs: larger samples followed over time, biological stress markers administered alongside self-report questionnaires, and qualitative work enabling residents to describe institutional life in their own terms.

Conclusion

This study adds to a thin evidence base on the psychological well-being of older people in Karachi's institutional care facilities. Its central result is that perceived stress predicts health-related quality of life substantively and independently, identifying perceived stress as a modifiable target for intervention rather than solely a descriptive characteristic of this population. Working memory was not significantly associated with quality of life in either the correlational or the regression analyses; cognitive stimulation therefore remains a hypothesis requiring testing rather than an established basis for program design. The absence of a stress–cognition association is inconsistent with H1, but is plausibly attributable to the constraints of a small cross-sectional study and should not be interpreted as evidence that no such relationship exists. Taken together, the findings quantify the psychological burden carried by institutionalized older Pakistanis and the scope for psychosocial intervention to reduce it.

Use of AI and AI-Assisted Technologies

The authors used a large language model (Claude, Anthropic) during preparation of this manuscript for language editing, paraphrasing, and grammar checking, and for assistance in condensing and restructuring sections of the text, and formatting the tables. The model's role was confined to language and presentation. No AI tool was used to design the study, collect data, conduct the statistical analyses, or generate or interpret results; all data reported here were collected, entered, and analyzed entirely by the authors. All intellectual content, argumentation, and conclusions are the authors' own. The authors reviewed and edited all AI-assisted text and take full responsibility for the content of this article.

Author Contributions

Aoun Ali: supervision, methodology, formal analysis, and writing of the Methods and Results sections. Duaa Zehra Lakhani: writing of the Introduction. Adeeba Arshad: literature review. Insia Fatima Jiwani: writing of the Discussion. Investigation and data collection: all four authors. All authors reviewed and approved the final manuscript and take responsibility for its content.

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Conflicts of Interest

The authors declare no conflicts of interest with respect to the authorship or publication of this article.

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