

Protective Factors Influencing Cognitive Function Among Middle-Aged Adults in Pakistan



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Abstract

Background: The rapid increase in the aging population and the critical role of cognitive functioning in successful aging have shifted scholarly focus toward identifying its risk and protective factors. This study aimed to examine the protective correlates of cognitive functioning among middle-aged adults in Pakistan.

Methodology: A correlational research design was employed, and purposive sampling was used to recruit participants. The sample size of 140 middle-aged adults (males = 43, females = 97), aged 35–55 years ($M = 44.23$, $SD = 7.1$), was calculated using G-power analysis. Data collection tools included the Montreal Cognitive Assessment (MoCA), the Islamic Practices subscale, and a demographic questionnaire. Statistical analyses were conducted using SPSS version 23.

Results: Cognitive functioning was positively associated with education, number of friends, and participation in religious activities. In contrast, negative relationships were observed with age, number of children, obesity, hypertension, and comorbidities. Regression analysis indicated that education, social connections, and religious participation were significant positive predictors of cognitive functioning, while age and obesity emerged as significant negative predictors.

Conclusion: The findings suggest that various modifiable protective factors can enhance cognitive functioning. These insights emphasize the importance of addressing modifiable factors to mitigate the effects of normal and pathological aging, offering valuable guidance for middle-aged adults and healthcare professionals.

Keywords: Cognitive functioning; middle-aged adults; protective factors

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Introduction

Cognitive impairment is a broad concept that refers to several problems in cognition which are characteristic of disorders that mainly occur with aging. Impairment in cognition reflects an individual's difficulty in learning new information, recalling previous things, focusing on different choices, and involving in new activities that influence their daily life functioning (1). With increasing life expectancies throughout the world, the rate of late-life cognitive impairment and dementia is also expected to increase in the future (2). This increasing trend has highlighted the significance of successful aging, also known as active and healthy aging. Successful aging is a worldwide requirement and there is an emerging need to devise ways for its attainment. It refers to the development and sustenance of physical, mental, and social health that enables well-being and ultimately helps individuals to remain independent in their later years (3). Cognitive maintenance is one of the crucial elements of

successful aging (4). Public health research has been emphasizing more and more on the prevention and delay of cognitive impairment. The aging research in this area has revealed the significant variability in the level of cognitive abilities that cannot be entirely explained by age (5). Keeping this in mind, the present study aimed to examine the psychosocial factors that positively correlate with cognitive functioning in middle-age.

Various factors exert continuous and progressive effects on cognition across the whole life course (6). Both modifiable and non-modifiable factors influence cognitive functioning. Non-modifiable factors, including age, gender, and apolipoprotein E-epsilon 4 allele, are those that are static and not amenable to change therefore the focus is now more on the identification of modifiable risk and protective factors of cognitive functioning (7). Prior literature has revealed various modifiable factors in relation to cognition such as level of education, tobacco smoking, alcohol consumption, presence of chronic conditions, psychological health,

obesity, physical exercise, and nutritional status etc (8, 9). The demographic profile has also been suggested as helpful in predicting the development of mild cognitive impairment (10). Higher body mass index (BMI) in early and midlife has also been found to link with poor cognitive functioning in late life (11). Similarly, another study revealed that middle-aged adults with higher BMI tend to have greater cognitive deficits after controlling for all covariates (12).

Population aging is the worldwide phenomenon and similar trend has been observed in Pakistan (13). World Health Organization (14) has assured promotion of successful aging as the prime concern of both healthcare providers and policy makers worldwide. With advancing age, maintenance of cognitive health is essential for independent functioning in both social and personal domain. Changes in cognitive functioning are common with normal aging processes that become evident in middle-age and continue to progress till late life. The level of cognitive functioning of middle-aged adults fall between that of younger and older adults but there exist wide range of individual differences in the level of cognitive functioning among middle-aged adults such that the cognitive functioning of some middle-aged adults is similar to young adults whereas some show resemblance with older adults (15). This highlights the importance of different social and lifestyle patterns that tend to influence cognitive function and can be targeted to prevent cognitive impairment in old age. Individuals belonging to this life period also play a central role in the lives of younger and older generation, at home, in the workplace, and in society at large (15). Normal cognitive functioning may definitely play an important role in handling the challenges and demands of this life period as different cognitive capacities help in independent functioning, productive living, and efficient communication (16). Therefore, the present study has diverted attention to middle age by keeping in mind the significance and top priority of cognitive health maintenance in this pivotal life period in order to prevent or delay cognitive decline later in life. The identification and exploration of different risk and protective factors in middle age could be beneficial in promoting successful aging and preventing cognitive impairment. Keeping this in mind, the present study aimed to find out the protective correlates of cognitive functioning in middle-aged adults.

Methodology

Research Design and Sample Characteristics

The correlational research design was employed, and a purposive sampling technique was used to recruit participants who aged between 35 to 55 years and able to communicate in Urdu language (National language of study

country). However, the participants having any chronic psychiatric illness, screened through Mental Health screening questionnaire (17), and self-reported severe medical condition were excluded from the present study. The G-power analysis was run to calculate the sample size for regression analysis. The present study sample comprised of 140 middle-aged adults. Among them 43 were men and 97 were women. All the participants were Muslims. The age of the participants ranges between 35-55 years ($M = 44.23$, $SD = 7.1$).

Assessment Measures

Montreal Cognitive Assessment (MoCA)

This tool was used to assess cognitive functioning in the present study. It is a simple, valid, and reliable screening test which consists of 13 items. The total score ranges from 0 to 30. The present study has used the cutoff score of 23 on this tool as this cutoff lowers the false-positive rate and shows an overall better diagnostic accuracy (18). The present study used the Urdu translated version of this tool and the reliability of this translated version is 0.76 (19).

Islamic Practices Subscale of Multidimensional Measure of Islamic Spirituality

This 4-item subscale was used to assess the participants' involvement in religious activities. It includes questions such as performing namaz, fasting, doing Zikr and reciting the Holy Quran. The subscale of Islamic practices was scored on a five-point Likert scale comprising option statements such that the higher scores represented the higher level of involvement. The internal consistency of this subscale is good i-e 0.77 (20).

Demographic Sheet and Condition related Sheet

This sheet was devised by the researcher to obtain general information from the participants. It included questions regarding age, gender, education, religion, number of children, income, number of friends, marital status, self-rated health, presence of physical conditions, family history of dementia, physical exercise and engagement in risky behaviors.

Procedure

After obtaining the Institutional approval for the present study and permission to use the original tools from the respective authors, a pilot study was conducted to determine the participants' understanding. Then, the main study was conducted for which the participants were recruited through a purposive sampling strategy. The participants were given the necessary information related to the study. Confidentiality was ensured and consent was

obtained using the consent form prior to data collection. The participants who met the inclusion criterion were included in the study and then a set of assessment measures were administered.

Results

Statistical Package for Social Sciences-version 23 (SPSS-23) was used to analyze the data. At first, the descriptive statistics was run to compute the frequencies, percentages, mean and standard deviation of demographic variables. Then, the Pearson Product Moment Correlation and Stepwise Regression analysis were run to examine the relationship between study variables.

Table 1 presents the demographic characteristics of study participants. The mean age of sample is 44.23 years. Majority of the respondents were female. The majority of the participants were married and having children in the range of 3-4. More than half of the participants lived in nuclear families. The majority of the participants i-e 93% reported that there is no history of dementia in their family. Most of the participants are non-smokers. Comorbidities were not prevalent among majority of the participants. Only 49% of the total participants reported to take physical exercise. The majority of the participants reported to have good health whereas minor number of participants (7%) also reported to have poor health.

Table 1: Sociodemographic Characteristics of Participants (N=140)

Sample Characteristics	M	SD
Age	44.23	7.1
Years of Education	14.3	3.79
Sample Characteristics	f	%
Gender		
Male	43	30.71
Female	97	69.32
Family System		
Joint	56	40
Nuclear	84	60
Marital Status		
Married	128	91.4
Unmarried	4	2.9
Widowed	8	5.7
Number of children		
No child	11	7.9
1-2	52	37.1
3-4	69	49.3
5-6	8	5.7
Number of Friends		
No friend	24	17.1
1-3	48	34.28
4-6	25	17.86
7-10	43	30.71
Family History of dementia		
Yes	10	7.1
No	130	92.9

Sample Characteristics	f	%
Cigarette Smoking		
Yes	15	10.7
No	125	89.3
Hypertension		
Yes	45	32.1
No	95	67.9
Diabetes		
Yes	18	87.1
No	122	12.9
Heart Problem		
Yes	2	1.4
No	138	98.6
Obesity		
Yes	38	27.1
No	102	72.9
Comorbidities		
Yes	23	16.4
No	117	83.6
Physical Exercise		
Yes	68	48.6
No	72	51.4
Self rated health		
Poor	10	7.1
Normal	48	34.3
Good	59	42.1
Very good	23	16.4

Note. f = frequency; % = percentage, M = mean, SD = standard deviation.

The results of correlation analysis, as presented in Table 2, revealed that age, number of children, hypertension, obesity and comorbidities have significant negative correlation with cognitive functioning reflecting the deterioration in cognitive functioning with increasing age and increased number of children. Hypertension, obesity and presence of greater number of chronic conditions among middle-aged adults also found to negatively influence the cognitive functioning.

It also revealed significant positive relationship of number of friends with cognitive functioning indicating that cognitive functioning tends to increase with increase in number of friends. Similarly, years of education and participation in religious activities found to have significant positive relationship with cognitive functioning. This shows that with an increase in the level of education and greater involvement in religious activities the cognitive functioning also tends to increase.

As presented in Table 3, the results of stepwise regression analysis shows that the model was statistically significant $F(5, 134) = 21.85, p < .001, \text{Adjusted } R^2 = .43$ such that age, education, obesity, number of friends and religious activities together explained 43% of the variance in cognitive functioning. However, age and obesity were found to negatively relate to cognitive functioning, whereas education, number of friends, and participation in religious activities were found to positively relate to cognitive functioning.

Table 2: Intercorrelation of Study Variables with Cognitive Functioning (Total Sample, N = 140)

Measures	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Age	1	-.24	-.08	.36**	-.09	-.01	.41**	.22*	.06	.06	.42**	-.22**	.00	-.18*	.19*	-.21*
2. Gender		1	-.06	.19*	.31*	.06	.14	.07	.05	.01	.14	.44**	-.03	.09	-.25**	-.04
3. Years of Education			1	-.30**	.11	.00	-.17*	-.22*	.09	-.22*	-.22**	-.11	.14	.17*	.28**	.60**
4. Number of Children				1	.06	.11	.30**	.15	.06	.09	.28*	-.08	.09	-.19*	.08	-.17*
5. Number of Friends					1	.03	-.02	-.01	.07	-.02	-.00	-.11	-.20*	.23**	.02	.23**
6. Family History of Dementia						1	-.07	-.03	-.03	.14	-.07	.00	.10	-.03	-.15	-.12
7. Hypertension							1	.28**	-.08	.13	.85**	-.15	-.06	-.32**	.15	-.19*
8. Diabetes								1	-.05	.19*	.71**	.05	.03	-.19*	.08	-.12
9. Heart Problem									1	-.07	.09	-.14	-.12	.05	-.09	.04
10. Obesity										1	.18*	.04	.11	-.13	-.08	-.28**
11. Comorbidities											1	-.11	-.05	-.32**	.13	-.19*
12. Smoking												1	.01	.09	-.29**	-.01
13. Physical Exercise													1	.14	.15	.07
14. Self-Rated Health														1	.04	.16
15. Religious Activities															1	.26**
16. Cognitive Functioning																1

Note. For gender 0 = woman, 1 = man, for family history of dementia 0 = no, 1 = yes, for physical conditions 0 = no, 1 = yes, for smoking 0 = no, 1 = yes, for physical exercise 0 = no, 1 = yes *p<.05, **p<.01.

Table 3: Stepwise Regression Analysis Showing Predictors of Cognitive Functioning in Middle-age

Variables	Model			
	B		β	95% CI
Constant	19.93			[17.23, 22.64]
Education	.30**		.49**	[.21, .38]
Age	-.05**		-.17**	[-.09, -.01]
Obesity	-.74*		-.15*	[-1.40, -.08]
Number of Friends	.10*		.15*	[.01, .20]
Religious Activities	.14*		.14*	[.00, .27]
Adjusted R ²		.43		
F		21.85***		
ΔR ²		.02		
ΔF		4.16		

Note. B = unstandardized coefficient, β = standardized coefficient, CI = confidence interval,

R² = R Square, ΔR² = R Square Change, ΔF = F change *p<.05, ***p<.001.

Discussion

The present study aimed to find the protective factors of cognitive functioning in middle age. Although research work has been done to explore various psychosocial factors that tend to influence the cognitive functioning especially in old age, the present study has planned to assess the protective

factors of cognitive functioning in middle age which is a period pivotal for the promotion of cognitive health in order to prevent or delay the cognitive decline later in life. In this section results obtained are discussed with reference to previous literature.

The present study findings revealed that age, education, obesity, hypertension, chronic comorbidities, number of children, number of friends, and participation in religious activities significantly correlate with cognitive functioning. Age had a significant negative relationship with cognitive functioning which is consistent with the findings of previous research suggesting that age has been closely linked with cognitive functioning which tends to decline with advancing age as a result of numerous structural and functional age-related neural changes such as loss of neurons, synaptic connections, etc (21, 22). Education was found to have significant positive relationship with cognitive functioning which is also evident by the findings of previous studies suggesting that individuals with higher educational levels tend to have higher cognitive performance as compared to those with low educational attainment (23, 24). The positive relationship of education with cognitive functioning could be justified by the findings of a study suggesting that involvement in educational activities helps in keeping the brain active and involved thus increasing the

level of cognitive reserve and reducing the likelihood of experiencing cognitive decline (25)

Obesity was another significant negative correlate of cognitive functioning as corroborated by the findings of previous studies suggesting a robust relationship between obesity and impaired cognitive functioning in middle-age (26). The physiological or vascular changes associated with obesity resulted in increased occurrences of comorbidities in obese individuals that in turn lead to cognitive decline (27). Another explanation given for the association of obesity and cognitive impairment suggests that obesity exerts negative effects on brain functioning by reducing the volume of various brain areas such as the hippocampus, and cerebral cortex (28).

Hypertension and comorbidities were also found to be negatively related with cognitive functioning. The results of a systematic review have provided evidence in support of these findings and suggested that high blood pressure is related to poor cognitive functioning in middle age (29). High blood pressure is the most common cardiovascular risk factor that exerts negative effects on brain structure and function resulting from underlying vascular changes, reduced blood flow, and cerebral volume thus increasing the risk of cognitive decline (30). Similarly, comorbidities tend to exert adverse effects on various brain processes resulting in negative influences on cognitive functioning as corroborated by the results of the present study (31).

The significant negative relationship between the number of children and cognitive functioning can be explained by the results of a study suggesting a negative U-shaped relationship between the number of children and cognitive functioning. Both fewer and greater number of children tends to decrease cognitive functioning (32). A greater number of children reduce economic resources as well as opportunities for mental stimulation at work especially for women which in turn results in poor cognitive functioning (33). The negative relationship between the number of children and cognitive functioning could be explained by an increase in the level of burden and stress with an increasing number of children thus increasing the risk of cognitive decline (34). Likewise, another study conducted in China revealed that a higher number of children are related to cognitive impairment and also reported that depressive symptoms and social involvement mediate the relationship between these two variables (35).

It was also revealed that the number of friends had a significant positive relationship with cognitive functioning. The findings are supported by the results of another study suggesting that larger social network sizes tend to improve cognitive functioning (36). Similarly, having a larger number of friends positively relates to cognitive functioning in middle-aged adults because it results in increased participation in mentally stimulating activities thus

enhancing the cognitive reserve (37). Concerning an Asian culture, a study also revealed a significant positive relationship between the social network of friends and cognitive functioning in older adults (38).

Participation in religious activities also found to significantly relate to cognitive functioning among middle-aged adults. This is also in line with the findings of previous research suggesting that people who frequently participate in religious activities have a higher level of cognitive functioning as compared to those who participate less in religious activities (39, 40). Participation in religious activities tends to positively influence cognitive functioning because regular participation provides an opportunity for heightened sensory and mental stimulation thus increasing the cognitive reserve and delaying the onset of cognitive decline. It is also suggested that private religious activities such as prayer, and zikr, positively influence cognitive functioning by increasing the feelings of hope and meaning in life which can in turn help people cope with stress, anxiety, and depression (41). Similarly, the recitation of Al-Quran stimulates the brain areas, improves language and learning abilities, and also has positive influences on emotional health (42). Furthermore, participation in religious activities could also protect cognitive functioning by refraining people from engaging in health risky behaviors such as cigarette smoking, and drinking (43).

Conclusion

The present study aimed to examine the positive correlates of cognitive functioning in middle age. The findings reveal that age, education, obesity, hypertension, chronic comorbidities, number of children, number of friends, and participation in religious activities significantly relate to cognitive functioning. Age and obesity are potential risk factors for cognitive functioning, whereas educational level, number of friends, and participation in religious activities emerged as notable protective factors of cognitive functioning in middle-aged adults.

Implications and Future Directions

The protective factors explored in this study were all modifiable and amenable to change through various strategies in order to promote successful aging. Therefore, the present study findings have noteworthy health implications and suggested healthcare providers and middle-aged adults the importance of various modifiable lifestyle factors that can help prevent cognitive decline in late years of life. However, further work could be done to investigate the influence of other modifiable factors, such as a multidimensional construct i-e., spirituality, on the cognitive functioning of middle-aged adults.

Ethical Approval:

This study was approved by Centre for Clinical Psychology,

University of the Punjab, Lahore.

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Authors' Contribution:

TS: Concept and design of the study, Acquisition, analysis, interpretation of the data, Drafting of the article.

TA: Concept and design of the study. Major revision of the intellectual content

The authors agree to be accountable for all aspects of work related to the reliability of article.

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