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Research Paper: The Relationship between Optimism and Mindfulness with Cognitive Performance in Elderly Adults

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Abstract

Objective: Aging and the onset of old age are accompanied by inevitable changes in cognitive function. Therefore, considering the aging population and the importance of cognitive functions during this sensitive period, identifying factors affecting cognitive function to enhance their cognitive abilities deserves attention. The present study aimed to investigate the relationship between optimism and mindfulness with cognitive function in the elderly.

Methods: The present research employed a descriptive and correlational design. The statistical population of the study included all elderly adults residing in nursing homes in Guilan Province during the year 2020-2021. The study sample consisted of 160 elderly adults who were selected from nursing homes residents using purposive sampling. The research instruments included the Revised Life Orientation Test (LOT-R) for optimism, the Five-Factor Mindfulness Questionnaire (FFMQ) for mindfulness, and the Cognitive Performance Evaluation Questionnaire (CPEQ) for cognitive function. Data were analyzed using Pearson's correlation coefficient and multiple regression analysis (simultaneous method) at a significance level of 0.05.

Results: The results showed a significant positive relationship between optimism and mindfulness with cognitive function, meaning that the more optimistic and mindful elderly adults were, the better their cognitive function. Furthermore, 34% of the variance in cognitive function was explained by optimism and mindfulness.

Conclusion: Therefore, based on the findings of the present study, it can be concluded that optimism and mindfulness are important variables in predicting cognitive function ($p < 0.05$).

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1. Introduction

Aging is a period of life that typically begins between 60 and 65 years of age. The growth in the number of elderly adults is so significant that it has been described as a silent revolution (Niazi et al., 2019). Estimates from the United Nations and the World Health Organization indicate that by the year 2030, the global population of elderly adults will increase from 9% to 16%, and in Iran, from 6.5% to 17.5%. The number of elderly adults in Iran, which was less than 1.2 million in 1956 (1335 in the solar calendar), has increased more than sixfold to over 7.4 million in 2016 (1395 in the solar calendar) (Afsharkohan & Ghaderi Harsini, 2022) Aging is a biological and anatomical process that affects all living organisms. With the onset of aging, individuals gradually lose some of their physiological, psychological, social, and cognitive functions (Hekmati Pour & Hojjati, 2016). The human brain begins to lose tissue from the third decade of life. Approximately 15% of the cerebral cortex and 25% of the brain's white matter are lost between the ages of 30 and 90. In addition to physiological changes during aging, a lack of physical activity can also lead to a decline in many of the body's natural processes (Tahmasebi et al., 2019). Brain aging is characterized by a gradual decline in cognitive function, often seen as age-related deterioration of synaptic function in brain regions important for memory formation and consolidation, such as the prefrontal cortex and hippocampus (Crews & Masliah, 2010). The decline in cognitive functions during adulthood is observed as a chronic deficit in planning, organizing, and initiating or completing tasks over time (Upadhyaya, 2007).

Cognitive functions encompass a range of skills, namely attention and learning, memory, language abilities, visuospatial skills, logical reasoning, and problem-solving (Airaksinen, 2006). Executive functions include abilities such as setting goals, planning, initiating, and completing tasks, and self-monitoring behaviors to achieve desired outcomes (Lezak, 1995). Cognitive and executive functions play a significant role in skills and activities related to planning, errors, working memory, emotion regulation, and concentration (Alimohammad et al., 2019). Cognitive functions are influenced by a number of demographic and health-related factors such as age, gender, socioeconomic status, and mental and physical health. Cognitive impairment is generally associated with traumatic brain injuries and Neurodegeneration disorders. Less research has been conducted on the impact of psychological conditions on cognitive functions; however, psychological factors can also influence cognitive functions (Pournaghash Tehrani et al., 2018). One of these psychological factors is optimism. Optimism is the expectation of positive events in the future and a type of cognitive structure that usually leads to motivation for effort (Carver and Schemer, 2014). It can be said that optimism, or having a general expectation that good events will happen more often than bad events in the future, can influence individuals' behavior and how they cope with problems and stressful life events (Hajimahdy and Khaleghipour, 2022).

Optimism reduces the perception of stress and increases a person's ability to work and be active (Naderi, 2018). Optimism is an important factor for achieving successful aging and is one of the individual predictors of experiencing subjective well-being (Ferguson & Goodwin, 2010). If elderly adults have an optimistic attitude, they have a spirit for life and engage in positive activities. Furthermore, such elderly adults will be able to cope with pressures that can lead to insecurity in old age (Rahmatullatifa, 2018). An optimistic individual enjoys better physical health, a better and stronger immune system, is less likely to suffer from infectious diseases, is less prone to heart complications, and will live a longer life (Validipak et al., 2015).

Another variable that is associated with cognitive function is mindfulness. Cognitive functions of the brain that are impaired in various disorders can be improved through mindfulness meditation (Brown & Ryan, 2003). Mindfulness can be conceptualized as focus, openness, a non-judgmental state, attention, and awareness (Sedlmeier et al., 2012). Although the core concept of mindfulness includes other components besides attention, such as awareness, intention, and acceptance, most definitions of mindfulness include maintaining alertness, awareness of external events, and internal experiences (Jankowski & Holas, 2014). The primary mechanism of mindfulness appears to be attentional self-regulation, because focusing attention on a neutral stimulus like breathing creates a suitable attentional environment. Research shows that when people are in a mindful state, the number of stimuli from the inner world and the external environment that they attend to increases (Nezlek, 2016). All mindfulness exercises are designed to increase attention to the body. In research that uses mindfulness, the emphasis is on the interaction between bodily, cognitive, and emotional processes (Michalak et al., 2012). The results of Zeidan et al.'s (2010) research showed that brief mindfulness training increases visuospatial processing, memory performance, and executive functions. Therefore, a significant consequence of this type of intervention is the enhancement of executive functions with four general domains (perception, emotion, cognition, and action). It can be said that this intervention seeks to increase individuals' executive functions by improving focus and accuracy, and to facilitate individuals' efficiency in problem-solving and decision-making in daily life (McCloskey et al., 2009).

Numerous studies have been conducted in this area. Haroonrashidi and Zakizadeh (2022) stated that mindfulness-based cognitive therapy leads to increased social adjustment and reduced psychological distortions in elderly adults. Abujaradeh et al. (2018) also showed that mindfulness therapy, using appropriate therapeutic metaphors, can improve the cognitive function of trained individuals, and consequently, their psychological processes and cognitive processing are enhanced. Croswell et al. (2017) have stated that mindfulness therapy, by employing cognitive and emotional awareness, can promote the cognitive, psychological, and emotional health of individuals. Lee's research (2012) also indicated that optimism affects the increase

of cognitive flexibility and helps to expand cognitive resources. Davidson et al. (2003) believed that the success of mindfulness-based cognitive therapies demonstrates biological changes in the brain.

Considering the increasing elderly population and the costs associated with the elderly suffering from cognitive impairment, identifying solutions to compensate for and reduce this impairment has become increasingly important. Given that less research has been conducted on the impact of psychological variables on cognitive functions, this study aimed to investigate the relationship between the variables of optimism and mindfulness with cognitive function in the elderly.

2.1 Methods

2.1 Research Type, Population, and Sample

The present research employed a descriptive and correlational design. The statistical population of this study consisted of elderly individuals residing in nursing homes in Guilan Province during the year 2020-2021. According to the latest statistics, over 400 elderly individuals were being cared for in Guilan nursing homes. Considering that the minimum sample size for correlational studies is 50 individuals (Delavar, 2023), a final sample of 160 individuals was selected using purposive sampling. The inclusion criteria for the study were: having at least basic literacy (reading and writing skills), being within the age range of 65 to 80 years, and not having neurological or psychological problems such as dementia, Alzheimer's disease, or similar conditions as diagnosed by a psychiatrist. Subsequently, questionnaires on optimism, mindfulness, and cognitive function were administered to them.

2.2. Instruments

Life Orientation Test-Revised (LOT-R): Scheier & Carver (1992) designed this questionnaire to assess optimism and later revised it. This questionnaire consists of 10 questions, and the response options are scored on a scale from 0 (strongly disagree) to 4 (strongly agree). Higher scores indicate greater optimism. Scheier and Carver (1992) reported a Cronbach's alpha coefficient of 0.76 and a test-retest reliability coefficient of 0.79 (over four weeks) for a student sample. Furthermore, factor analysis of optimism and related constructs has shown that dispositional optimism is an independent and distinct factor, indicating the discriminant validity of this construct. In the research by Kajbaf et al. (2006), the results obtained based on the test-retest method and Cronbach's alpha indicated high reliability of the optimism scale. Concurrent validity coefficients between the optimism scale and depression and self-mastery were -0.649 and 0.725, respectively. Factor analysis of the optimism scale revealed that it consists of two factors: hope for the future and a positive attitude towards events.

Five Facet Mindfulness Questionnaire (FFMQ): This questionnaire is a 39-item self-report scale developed by Baer et al. (2006) that measures five facets of mindfulness: Observing, Describing, Acting with awareness, Non-judging of inner experience, and Non-reacting to inner experience. Respondents are asked to

indicate their level of agreement or disagreement with each statement on a five-point Likert scale ranging from one (never or very rarely) to five (often or always). The total score range for this scale is 39-159. A total score is obtained by summing the scores of each subscale, with higher scores indicating greater mindfulness. The internal consistency of the questionnaire's factors using Cronbach's alpha coefficient was found to be 0.75 for Non-reactivity, 0.91 for Describing, 0.83 for Observing, 0.87 for Acting with awareness, and 0.87 for Non-judging. The validity of the questionnaire, assessed using the correlation method with the Freiburg Mindfulness Inventory, was found to be greater than 0.90 (Baer et al., 2006). In the research by Ahmadvand et al. (2013), Cronbach's alpha coefficients for the subscales were 0.71 for Observing, 0.83 for Describing, 0.81 for Acting with awareness, 0.73 for Non-judging, and 0.55 for Non-reactivity. To examine the validity of the questionnaire, the results showed that it had a positive and significant correlation with the Big Five personality questionnaire, with the exception of the neuroticism factor.

Cognitive Performance Evaluation Questionnaire (CPEQ): This test was developed by Folstein et al. (1975) and is the most common screening tool for cognitive impairments worldwide, having been translated into various languages and standardized for different cultures. The cognitive domains assessed in this questionnaire include orientation, registration, attention and calculation, immediate recall, various language functions, and visuospatial thinking. This questionnaire consists of 20 questions, and the total score is 30, with a score below 23 indicating the likelihood of cognitive impairment. This test includes 5 questions to assess temporal orientation, 5 questions to measure spatial orientation, 3 questions to evaluate registration and recall, 5 questions to assess attention and calculation, 3 questions to weigh recall ability, 3 questions to assess comprehension and language ability, and 6 questions to evaluate complex commands such as visuospatial ability. Each correct answer receives one point, and the score range for each participant varies between zero and thirty (Folstein et al., 1975). In the research by Rezaei et al. (2013), the internal consistency of the items of the Mini-Mental State Examination (likely the CPEQ being referred to here) was found to be 0.85 using Cronbach's alpha coefficient.

2.3. Procedure

After obtaining the necessary permission and visiting the nursing homes, the researcher selected 160 elderly individuals using purposive sampling and administered questionnaires on optimism, mindfulness, and cognitive function to them. Participants were assured that the questionnaire results would remain confidential, and their informed consent was obtained for participation in the research. After the questionnaires were completed, the data were analyzed using descriptive statistics and Pearson's correlation coefficient, and inferential statistics at a significance level of 0.05.

3. Results

Table 1
Descriptive Statistics of the Studied Variables

Variables	Mean	Standard Deviation
Cognitive Function	16.38	1.99
Optimism	24.99	3.35
Mindfulness	112.21	20.41

Table 2. *Correlation Matrix of the Research Variables.*

Variable	Optimism	Mindfulness	Cognitive Function
Optimism	-		
Mindfulness	0.51**	-	
Cognitive Function	0.68**	0.57**	-

As Table 2 showed, there was a direct relationship between optimism and cognitive function ($r = 0.68$, $p < 0.01$) and a direct relationship between mindfulness and cognitive function ($r = 0.57$, $p < 0.01$).

To explain the roles of optimism and mindfulness in explaining the variance of cognitive function, the predictor variables were entered into a regression equation. Before running the test, the assumptions were checked. The results of the Kolmogorov-Smirnov test revealed that the distribution of residuals was normal ($KS = 0.43$, $p > 0.05$). The assumption of homogeneity of variances was examined by plotting the standardized regression residuals against the standardized regression predicted values. To check the independence of errors, the Durbin-Watson statistic was used, and the results showed that independence was established ($DW = 1.31$). The assumption of multicollinearity was examined through the tolerance statistic (0.77) and the variance inflation factor ($VIF = 1.02$). The results indicated that there was no multicollinearity between the independent variables. After verifying the assumptions, multiple regression using the simultaneous method was used to determine the contribution of the predictor variables in explaining the variance of the criterion variable.

Table 3
Simultaneous Regression Analysis between Optimism and Mindfulness on Cognitive Function

Variables	Sources	Sum of Squares	Degrees of Freedom	Mean Square	F	P	R	R^2
Cognitive Function	Regression	407.78	2	89.47	15.91	0.001	0.4258	0.342
	Residual	184.23	157	0.67				
	Total	591.01	159					

The results presented in Table 3 illustrated that the F-statistic from this analysis was significant at the 0.01 level (F = 15.91), and the variables of optimism and mindfulness explained 34% of the variance in cognitive function of elderly adults ($R^2 = 0.34$).

4. Discussion

The present study aimed to investigate the relationship between optimism and mindfulness with cognitive styles in elderly adults. The results of the study showed a significant positive relationship between optimism and mindfulness with cognitive styles. The results of this study are consistent with the research of Haroonrashidi & Zakizadeh (2022), Rahmatullatifa (2018), Abujaradeh et al. (2018), Croswell et al. (2017), Michalak et al. (2012), Zeidan et al. (2010), and Davidson et al. (2003).

In explaining the obtained results, it can be said that Clark & Isen (1982) believed that in different mood states, information was processed differently. In a happy mood, information is processed heuristically and superficially, while in a depressed mood, it is processed deeply and systematically. For optimistic individuals, pleasant stimuli (such as pictures of people, music, words, descriptions, and memories) are more attractive and attention-grabbing, while pessimistic individuals tend to focus on unpleasant stimuli.

Fox (2010) believed that from an information processing perspective, optimism, as one of the factors creating resilience, exerts its influence through attentional control. If individuals can effectively and flexibly use attentional control strategies and pay less attention to negative stimuli, they will have fewer negative evaluations of the environment, and this change in environmental evaluation will lead to fewer emotional reactions in the long term. In this regard, Gross & Thompson (2007) believe that optimists and pessimists experience their environment cognitively in the same way (for example, seeing and hearing), and the differences between them only appear in how they interpret what they have seen and heard, such that the underlying attentional mechanisms in what they see and hear are quite selective. Attention to negative stimuli disrupts individuals' ability to regulate their mood, while attention to positive stimuli can create adaptive and creative thought patterns. Therefore, optimism not only influences how individuals interpret what they have seen but also influences what they should pay attention to in the environment (Parkhurst et al., 2002; Isaacowitz, 2005).

Furthermore, researchers such as Garland et al. (2015) believed that optimism, by directing attention and memory recall towards positive information and increasing positive interpretation of ambiguous situations, as well as positive valuation of subjects and thoughts during cognitive appraisal, increases the frequency and intensity of positive cognitions and leads to the promotion of cognitive function. Optimism also improves cognition by increasing dopamine activity in the prefrontal cortex and anterior cingulate cortex. Therefore, by increasing optimism and consequently stimulating the prefrontal cortex, cognitive abilities can be

strengthened. Increased dopamine and the positive affect associated with it facilitate working memory, which in turn helps to expand existing cognitive resources or even build new cognitive resources.

Similarly, according to the research results, it was observed that mindfulness in elderly adults can predict their cognitive performance and ability. The reason for this relationship is the common structural and functional basis of the shared constructs of mindfulness and executive function, which is considered part of cognitive abilities (Nejati, 2010).

Research shows that mindfulness meditation leads to the activation of an area of the brain that plays an important role in creating positive emotions and beneficial effects on cognitive function. In other words, since we consider the brain to be the origin of behavior, any type of behavioral change requires structural and functional changes in the brain. The connection between psychotherapy methods and the cognitive functions of the brain, and the discovery of their neuropsychological effects, in addition to substantiating the therapeutic effects, can provide strategies for improving these therapeutic methods (Nejati, 2010).

Mindfulness-based interventions, with an emphasis on mindful attention to the present moment, lead to greater awareness of individuals' external, internal, and motor cues (Thompson et al., 2011). Mindfulness meditation increases the gray matter thickness in the brain, which promotes learning, memory, and emotional regulation (Moran et al., 2010). Therefore, according to the findings of Hasker (2010), individuals with high mindfulness can easily acquire physical skills, and it is possible that individuals with higher mindfulness have a greater ability to acquire cognitive skills, which also improves their performance. Thus, mindfulness can be related to the memory component, which is one of the components of cognitive function.

Stein's (2008) neuroscientific research on the neurological foundations of meditation and mindfulness-based practices indicates the regulation of emotional states accompanied by increased activity in the prefrontal cortex and decreased activity in the amygdala and insula regions. On the other hand, Weaver et al. (2009) neuroscientific investigations into attentional functions have shown the involvement of prefrontal areas in directing sustained attention and attention-based cognitive executive functions.

The indicators that Carson & Langer (2006) identified for a mindful state include: the ability to track two objects from different perspectives and the ability to change the aspect of the object being examined depending on the context. From a neuroscientific perspective, the first function can be interpreted as divided attention, and the second function can be interpreted as attentional shifting. Furthermore, Hayes & Wilson (2003) consider mindfulness as the maximum mastery of internal and external bodily experiences. Therefore, from this perspective, mindfulness can be considered equivalent to an individual's attentional scope, i.e., the capacity for sustained attention. Many exercises used to improve

mindfulness include sustained attention exercises.

Moore and Malinowski (2009) believed that contact with the present moment emphasizes the importance of observing and attending to the full range of internal and external stimuli and encompasses non-judgmental acceptance or a non-evaluative stance towards the present moment. Committed action, in essence, is acting based on awareness, without distraction, in a non-habitual way, and based on personal values. In a study, they examined the role of these three components (acceptance, contact with the present moment, and committed action) in inhibiting irrelevant and distracting information and the de-automatization of habitual responses, which showed a positive correlation between these three components and non-automatic cognitive processing and cognitive flexibility.

Therefore, it seems that reducing automatic cognitive processes and improving cognitive flexibility are among the most important abilities that individuals need to avoid bias in the perception of psychological balance and well-being. A study has shown the role of mindfulness training in increasing information processing speed, and it was found that after mindfulness training, in addition to an increased ability to de-automatize automatic responses, there was also faster responding to stimuli (Moore & Malinowski, 2009). As Savari (2013) stated, in mindfulness training, individuals learn to observe the layers they normally add to the understanding of their experience and identify the specific lenses through which they view the world.

In explaining the present findings, it should be noted that according to Miller & Brooker (2017), mindfulness therapy can increase cognitive and metacognitive awareness, enabling individuals to gain greater control, management, and monitoring of their thoughts and behaviors, and experience higher cognitive self-regulation. This process allows them to exhibit more organized cognitive processing. It is worth mentioning that cognitive processes mainly occur in the frontal part of the brain, the same area where executive functions and neuropsychological skills are also primarily processed.

The results of this study are limited to elderly adults over 60 years of age, and caution should be exercised when generalizing the results to other age groups. In the present study, given the breadth of the topic of mental and physical health of elderly adults, a questionnaire was used. Consequently, the specific conditions of the elderly studied when answering the questions may have influenced the study results, and their precise control was beyond the researcher's ability. It is suggested that similar research be conducted in other age groups to allow for a comparison of developmental changes between middle and old age. Based on the findings of the present study, it is suggested that therapeutic interventions based on promoting mindfulness and optimism be considered to enhance the cognitive function of elderly adults.

Given the specific conditions of elderly adults and the cognitive difficulties they face, serious attention to mindfulness exercises can

improve their condition. Therefore, to promote psychological variables in elderly adults, encouraging and motivating them to engage in activities effective in their cognitive function seems important.

5. Conclusion

According to the results obtained from this research, it can be concluded that there is a relationship between optimism and mindfulness with the cognitive function of elderly adults, and increasing optimism and mindfulness will improve the cognitive function of the elderly.

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Conflicts of Interest

The Authors declare that there is no conflict of interest with any organization. Also, this research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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