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Determining Middle-Aged and Older Adults' Health Beliefs to Change Lifestyle and Health Behavior for Dementia Risk Reduction

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Abstract

Background: Global population is getting older and the prevalence of dementia continuously increases. Understanding the related health beliefs is bound to enable lifestyle-based interventions that maximize public engagement in dementia risk reduction behaviors. The aim of this study was to determine health beliefs on dementia prevention behaviors and lifestyle changes and to determine the factors influencing these beliefs among middle-aged and older people in Turkey. **Materials and Methods:** This descriptive and cross-sectional study was conducted with 284 individuals aged 40 years and older, using nonprobability convenience sampling. Data were collected using a demographic characteristic form and the Turkish version of the Motivation for Changing Lifestyle and Health Behavior for Reducing the Risk of Dementia scale. The study utilized the value, mean, percentage frequency distribution, correlation, independent *t* test, and the one-way analysis of variance test. **Results:** The mean age of the participants included in the study was 56.99 $\pm$ 12.05, 68.7% of individuals were males. The mean education years of the participants were 11.22 $\pm$ 4.55. The majority (72.2%) of participants expressed subjective memory complaints. Presence of family history of dementia was 28.2%. Age, gender, education years, subjective memory complaints, presence family history of dementia, prior experience as a caregiver of dementia, and willingness to know their own risk were determined as essential factors that influence several health belief factors related to dementia risk reduction. **Conclusion:** Our findings indicate that males, older adults, and lower-educated and income are priority groups that should be guided for lifestyle and behavioral changes regarding dementia risk reduction.

Keywords

dementia, health promotion, beliefs, risk reduction behavior

Introduction

With the increase in the world population, there has been a distinct rise in the prevalence of dementia. There are more than 9.9 million new cases of dementia every year and a new case is reported every 3 seconds.[1] However, delaying or slowing the progression of dementia could help tackle these rates.[2] Growing evidence outlines numerous lifestyle factors that can be protective, and hence can reduce the risk of cognitive decline and dementia. These factors include physical activity, obesity prevention and reduction, promotion of balanced and healthy dietary habits, harmful use of alcohol and tobacco cessation, social inclusion, promotion of cognitive-stimulating activities and learning as well as prevention and management of diabetes,

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hypertension, especially in midlife, and depression. Reducing the exposure of individuals and populations to these potentially modifiable risk factors can strengthen the capacity of individuals and populations to make healthier choices and follow health-promoting lifestyle patterns, beginning from childhood and extending throughout life.[3,4] Prominent risk factors that facilitate and propel dementia have been identified during the last decades. However, and despite the identification of these risks identification and the promotion of public awareness regarding dementia protective factors, individuals have yet to demonstrate the willingness needed to make changes in their lifestyle, and hence reduce the risk of developing dementia.[5] The health belief model (HBM) is a framework that can explain and quantify the factors which either motivate or deter patients' compliance as well as behaviors that protect and improve health. When individuals are under a greater threat (perceived susceptibility and perceived severity) to develop a health problem, health promotion behavior is more likely to occur. Therefore, it is believed that a particular behavior change is bound to result in a valued outcome (perceived benefits) at an acceptable cost (perceived barriers). In fact, this threat can instigate behavioral changes (action cues), the desire to achieve results (general health motivation), and confidence in being able to perform the desired behaviors (self-efficacy).[6,7] Illness perceptions and misconceptions may restrain efforts in the areas of risk reduction.[8] Low and Anstey (2007)[9] investigated the belief patterns of underlying behaviors that people thought could reduce the risk of dementia. They concluded that individual perception of actions or changes that could reduce the risk of dementia was influenced by general health beliefs rather than scientific evidence. Similarly, current literature pinpoints that parameters such as the fear of developing dementia, strong personal beliefs that the risk of dementia can indeed be reduced, the rating of dementia as an important health issue, and having personal experience with patients having dementia are the determinants of adopting a healthy lifestyle and adopting distinct behavioral changes.[10,11] An additional factor that negatively influences individuals' perception in terms of reducing dementia risk involves the fact that dementia can be perceived as a normal and unavoidable part of the aging process disease. Consequently, individuals may believe that dementia is not an alarming health issue unlike cancer or heart disease, and hence they tend to be personally vulnerable to developing dementia.[2] Understanding health beliefs and willingness will enable the development of targeted curricula that maximize public engagement in dementia risk reduction behaviors.[5] It is important to use theory-based measures of dementia beliefs because this will in turn enable far more accurate public health surveillance of dementia prevention attitudes.[12]

This current study is the first to our knowledge that uses the Turkish version of the Motivation for Changing Lifestyle and Health Behavior for Reducing the Risk of Dementia (MCLHB-DRR) scale. This scale is based on the HBM that in turn investigates health beliefs to facilitate behavioral and lifestyle changes that reduce dementia risk. Therefore, our findings can allow researchers to better identify and understand the individuals that should be guided for lifestyle and behavioral changes that reduce dementia risk. The aim of this study was to determine health beliefs on dementia-preventing behaviors and lifestyle changes and to determine the factors affecting this process among middle-aged and older people.

Materials and Methods

Design and Sample

This descriptive and cross-sectional study was conducted from January to February 2019. Nonprobability convenience sampling was used. A total of 284 individuals aged 40 years and older were recruited from a primary care clinic located in the west of Turkey. Primary care in Turkey includes a spectrum of services from prevention to management of chronic health conditions and referring to other specialist care that the individual may need. Inclusive criteria were the following: Individuals had to speak and understand Turkish, be literate, and provide their consent to participate in this study voluntarily. On the other hand, individuals were excluded from this study if they already had dementia or psychiatric disorders and had visual and/or hearing impairments.

Data Collection

Data were collected using demographic characteristic forms and the MCLHB-DRR scale as explained in the following sections.[13]

The Demographic Form

The demographic form included individual characteristics such as age, gender, educational years, marital and employment status, household income, and living status. The form was also used to assess subjective memory complaints, family history of dementia, prior experience as a caregiver of dementia, and individuals' willingness to become aware of their own risk for developing dementia.

Motivation to Change Lifestyle and Health Behavior for Dementia Risk Reduction

The HBM was used as a conceptual model to develop the MCLHB-DRR scale that was first incepted by Kim et al (2014)[13] in Australia. This form includes 27 items that are rated on a 5-point Likert scale from 1 to 5 (strongly disagree-strongly agree) and it measures beliefs that can facilitate and promote lifestyle and health behavioral changes needed to reduce dementia risk. In fact, this occurs in 7 subscales as follows: "*perceived susceptibility*" expresses individuals' perceived risk of developing dementia, "*perceived severity*" reflects concern and stress regarding the risks of developing dementia, "perceived benefits" identifies individuals' perceptions of potential benefits related to changing lifestyle and health behaviors to reduce dementia risk, "perceived barriers" reflects

individuals' perceptions of possible barriers to changing lifestyle and health behaviors to reduce the risk of dementia, "cues to action" explains individuals' perceptions regarding the social impact of changing lifestyle and health behaviors to reduce the risk of dementia, "general health motivation" explains the process of appraising the general health and welfare of individuals, and "self-efficacy" reveals the individuals' confidence regarding their changing their lifestyles and health behaviors to reduce the risk of dementia. Higher subscale scores indicate higher beliefs for changing lifestyle and health behavioral changes needed to reduce dementia risk exclude perceived barriers scores. The Cronbach α values ranged from 0.608 to 0.864.[13] Cronbach α coefficient of the Turkish version was 0.609 to 0.781.[14] The Cronbach α value of the subscales ranged from 0.682 to 0.847 in this study. All participants had face-to-face contact with the researchers and the process of answering the questionnaire was approximately 20 minutes.

Statistical Analysis

SPSS 22.0 was used to perform the respective statistical analysis. Observed values, average, and percentage frequency distribution were examined. To determine the factors related to health beliefs to changing lifestyle and health behavior, correlations according to the characteristics of the independent variables, correlation, independent *t* test, and one-way analysis of variance test were used. A value of $P < .05$ was considered to be significant.

Ethical Considerations

Ethical approval was obtained from the Ethical Committee of Dokuz Eylul University (2019/13-19). Written permission from the directorate of the primary care clinic was received. Participants were informed about the purpose and design of the study. Oral and written consent of the participants was obtained.

Results

The mean age of the participants was 56.99 ± 12.05 ranging from 40 to 89 years old, whereas the average years of obtained education were 11.22 ± 4.55. A significant proportion of the group were male (68.7%), married (76.8%), and living with family member (84.5%). Individuals with prior experience as a caregiver of dementia were 15.8%, and individuals with a family history of dementia were 28.2%. There were 152 (53.5%) people who stated that they did not have any chronic disease. The most common diseases were hypertension (n = 65, 22.9%) and diabetes (n = 46, 16.2%). Demographic characteristics are shown in Table 1.

The participants featured a mean perceived susceptibility score of 10.76 ± 3.69 with a range of 4 to 19, perceived severity 14.26 ± 4.62 with a range of 5 to 25, perceived benefits 15.32 ± 3.22 with a range of 5 to 20, perceived barriers 10.18 ± 4.36 with a range of 4 to 20, cues to action 10.57 ± 4.39 with a range of 4 to 20, health motivation 16.23 ± 3.11 with a range of 5 to 20, and self-efficacy 7.11 ± 1.80 with a range of 2 to 10 for the MCLHB-DRR scale (Table 2).

Independent variables were analyzed in terms of the influencing factors, and results demonstrated that age, gender, education, household income, family history of dementia, prior experience as a caregiver of dementia, subjective memory complaints, and their willingness to know their own risk promoted statistically differences in MCLHB-DRR subscale

Table 1. Demographic Characteristics of Participants.[a]

Characteristics	Mean	SD
Age, years	56.99	12.05
Education, years	11.22	4.55
Gender	n	%
Female	89	31.3
Male	195	68.7
Marital status		
Married	218	76.8
Single	66	23.2
Employed status		
Employed	108	38.0
Unemployed	176	62.0
Household income		
Income higher than expenses	58	20.4
Income equal to expenses	185	65.1
Income lower than expenses	41	14.5
Living with		
Alone	44	15.5
Family member	240	84.5
Subjective memory complaints		
Yes	205	72.2
No	79	27.8
Presence family history of dementia		
Yes	80	28.2
No	204	71.8
Prior experience as a caregiver of dementia		
Yes	45	15.8
No	239	84.2
Willingness to know their own risk		
Yes	184	64.8
No	100	35.2

Abbreviation: SD, standard deviation.
[a]n = 284.

Table 2. Results of the MCLHB-DRR Subscales Scores.[a]

	$X \pm$ SD	Range
Perceived susceptibility	10.76 ± 3.69	4-19
Perceived severity	14.26 ± 4.62	5-25
Perceived benefits	15.32 ± 3.22	5-20
Perceived barriers	10.18 ± 4.36	4-20
Cues to action	10.57 ± 4.39	4-20
Health motivation	16.23 ± 3.11	5-20
Self-efficacy	7.11 ± 1.80	2-10

Abbreviation: MCLHB-DRR, Motivation for Changing Lifestyle and Health Behavior for Reducing the Risk of Dementia; SD, standard deviation.
[a]n = 284.

Table 3. Demographic Characteristics and MCLHB-DRR Mean Subscales of Participants.[a]

Characteristics	Perceived Suspectibility, Mean (SD)	Perceived Severity, Mean (SD)	Perceived Benefits, Mean (SD)	Perceived Barriers, Mean (SD)	Cues to Action, Mean (SD)	Health Motivations, Mean (SD)	Self-Efficacy, Mean (SD)
Gender							
Female	10.88 (3.76)	15.09 (4.66)	15.50 (3.26)	9.17 (4.08)	11.12 (4.51)	16.18 (3.21)	7.25 (1.87)
Male	10.48 (3.55)	12.42 (3.99)	14.93 (3.10)	10.64 (4.42)	9.35 (3.87)	16.34 (2.90)	8.82 (1.62)
	$t = -0.854$	$t = -4.948$	$t = -1.398$	$t = -2.642$	$t = -3.381$	$t = 0.410$	$t = -1.876$
	$P = .384$	$P < .001$[b]	$P = .163$	$P = .009$[b]	$P = .001$[b]	$P = .682$	$P = .062$
Marital Status							
Married	10.76 (3.72)	14.34 (4.52)	15.43 (2.94)	10.37 (4.16)	10.82 (4.29)	16.04 (2.97)	7.12 (1.62)
Single	10.75 (3.64)	13.98 (4.97)	14.96 (3.99)	9.56 (4.96)	9.75 (4.65)	16.87 (3.47)	7.07 (2.30)
	$t = 0.007$	$t = 0.552$	$t = 0.877$	$t = 1.204$	$t = 1.727$	$t = -1.769$	$t = 0.173$
	$P = .994$	$P = .582$	$P = .383$	$P = .232$	$P = .085$	$P = .080$	$P = .863$
Household income							
Income higher than expenses	10.00 (3.91)	14.72 (5.06)	15.13 (3.27)	9.65 (4.23)	10.20 (4.68)	17.36 (2.35)	6.82 (2.08)
Income equal to expenses	10.98 (3.66)	14.15 (4.56)	15.42 (3.29)	9.92 (4.50)	10.36 (4.28)	15.97 (3.32)	7.22 (1.72)
Income lower than expenses	10.80 (3.45)	14.09 (4.35)	15.14 (2.85)	12.07 (3.41)	12.02 (4.30)	15.82 (2.73)	7.02 (1.73)
	$F = 1.590$	$F = 0.366$	$F = 0.252$	$F = 4.690$	$F = 2.666$	$F = 4.934$	$F = 1.145$
	$P = .206$	$P = .694$	$P = .777$	$P = .010$[b]	$P = .071$	$P = .008$[b]	$P = .320$
Subjective memory complaints							
Yes	11.19 (3.85)	14.88 (4.66)	15.28 (3.38)	10.61 (4.50)	11.05 (4.46)	16.12 (3.21)	7.15 (1.87)
No	9.63 (3.00)	12.64 (4.13)	15.44 (2.76)	9.06 (3.81)	9.32 (3.97)	16.51 (2.82)	7.02 (1.61)
	$t = 3.613$	$t = 3.733$	$t = -0.375$	$t = 2.918$	$t = 3.002$	$t = -0.951$	$t = 0.526$
	$P < .001$[b]	$P < .001$[b]	$P = .708$	$P = .004$[b]	$P = .003$[b]	$P = .343$	$P = .599$
Presence of family history of dementia							
Yes	12.18 (3.84)	15.60 (4.76)	15.28 (3.58)	10.61 (4.60)	12.20 (4.81)	16.05 (3.76)	7.20 (1.87)
No	10.20 (3.49)	13.73 (4.47)	15.34 (3.07)	10.01 (4.27)	9.93 (4.06)	16.30 (2.82)	7.08 (1.77)
	$t = 4.190$	$t = 3.100$	$t = -0.131$	$t = 1.037$	$t = 3.720$	$t = -0.629$	$t = 0.708$
	$P < .001$[b]	$P = .002$[b]	$P = .896$	$P = .317$	$P < .001$[b]	$P = .530$	$P = .625$
Prior experience as a caregiver of dementia							
Yes	12.00 (3.52)	15.68 (5.07)	14.97 (3.69)	11.15 (4.91)	10.93 (4.83)	15.95 (3.60)	7.15 (1.91)
No	10.52 (3.69)	13.99 (4.50)	15.39 (3.12)	10.00 (4.24)	10.50 (4.31)	16.28 (3.01)	7.01 (1.78)
	$t = 2.473$	$t = 2.273$	$t = -0.793$	$t = 1.476$	$t = 0.149$	$t = -0.658$	$t = 0.159$
	$P = .014$[b]	$P = .024$[c]	$P = .428$	$P = .145$	$P = .583$	$P = .511$	$P = .874$
Willingness to know their own risk							
Yes	11.21 (4.04)	15.89 (4.62)	15.35 (3.09)	11.02 (4.40)	11.75 (4.78)	15.86 (3.72)	7.32 (2.01)
No	10.69 (3.64)	14.01 (4.58)	15.32 (3.24)	10.50 (4.40)	9.94 (4.26)	16.29 (3.01)	7.08 (1.77)
	$t = 0.803$	$t = 2.317$	$t = 0.048$	$t = 0.671$	$t = 2.368$	$t = -0.777$	$t = 0.752$
	$P = .423$	$P = .021$[c]	$P = .962$	$P = .503$	$P = .019$[b]	$P = .438$	$P = .453$
Age (years)	$r = -0.092$	$r = 0.008$	$r = -0.232$	$r = -0.334$	$r = -0.279$	$r = 0.078$	$r = -0.257$
	$P = .121$	$P = .893$	$P < .001$[b]	$P < .001$[b]	$P < .001$[b]	$P = .193$	$P < .001$[b]
Education (years)	$r = 0.061$	$r = -0.025$	$r = 0.131$	$r = -0.152$	$r = .083$	$r = .123$	$r = 0.164$
	$P = .309$	$P = .675$	$P = .027$[c]	$P = .011$[b]	$P = .165$	$P = .039$[c]	$P = .006$[b]

Abbreviations: SD, standard deviation, *t* value, independent samples *t* test; *F* value, one-way ANOVA test; *r* value, pearson correlation coefficient.
[a] $n = 284$.
[b] $P \leq .01$.
[c] $P < .05$.

scores (Table 3). This study revealed no marital status differences in health beliefs.

Discussion

The worldwide prevalence rates of dementia have been rapidly increasing and this disease is considered as one of the most challenging global public health issues. There are a number of factors that lead to the development of dementia and certain modifiable lifestyle risk factors for dementia have been identified in previous studies.[4,15] Health-care professionals can promote better awareness and education about dementia through public health promotion and eventually can help reduce the overall prevalence of dementia.[10] Determining people's perceptions and beliefs to adopt a healthier lifestyle and induce behavioral changes for reducing dementia risk is one of the main steps to achieve this goal.[16] The HBM has been widely used to explain and predict health behaviors and sick-role behaviors.[6,7] Therefore, this study intend to assess the association between the HBM constructs, identify health beliefs regarding individuals' lifestyle and health behavioral changes for dementia risk reduction among middle-aged and older Turkish people.

When investigating factors influencing health beliefs on dementia preventing behaviors and lifestyle changes, age was positively correlated with several health belief factors. More specifically, the younger the individual was the greater was the association with higher perceived benefits, cues to action, and self-efficacy. However, current literature presents inconsistent findings on this subject. Certain studies suggest that younger people perceive more profound and greater to anticipate barriers[5] and hence they are less likely to implement changes.[11] On the contrary, Werner[17] found that perceived benefits were associated with younger age and also with lower income and education, as well as worse health. Literature also reveals that it is mostly younger people, especially those younger than 50 years, who begin to worry about their memory, and hence they start to believe that it is possible to improve their brain health.[8,11,18] Older people may be more likely to agree that "there is nothing anyone can do to reduce their risks of developing dementia" and "dementia is a normal phenomenon in old age" compared to younger people.[19] Furthermore, it is reported that younger people have the capacity to better adapt to healthy lifestyle changes such as physical activity.[20,21] With advancing age, the deterioration of health, diminished physical capacities, and balance and vision problems can affect the adaptation to a different lifestyle which can subsequently facilitate a negative effect on individuals' motivation to reduce dementia risk. At the same time, it is also known that health literacy declines with age.[22] It was stated that public engagement in dementia risk reduction remains low, especially for individuals with low-health literacy.[12] Inadequate health literacy may lead to a profound lack of or insufficient knowledge regarding the risk factors for dementia that can be modified. Decreased intention to indulge into any action and lower perceived benefits to reduce dementia risk may also be associated with this issue.

The results of this study exhibit that people's beliefs to adopt healthier lifestyles and behavior varied between genders. More specifically, gender differences were found in subscales where females tend to have significantly higher perceived severity and cues to action and lower perceived barriers scores than males. The prevalence of dementia is higher among women than men,[23] and women have greater attention to personal wellness.[11] Perceived benefits are one's perceptions of the gains associated with performing screening behavior.[7] Kim et al (2014)[13] stated that higher perceived benefits can reveal increased will and objectives of screening for dementia, and hence lower perceived barriers. Moreover, Low and Antsey (2009)[24] suggest that women's caregiving role in society may raise their awareness of the risk for this illness. Although no direct data regarding behavioral decisions were obtained, 66.2% of women reported their willingness to become aware and knowledgeable of their own risk, as opposed to 61.8% in men. Consequently, it can be inferred that male individuals may place less emphasis and importance on this issue.[9,25] Cues to action include a diverse range of triggers, such as perception of symptoms, social influence, and health education campaigns.[7] Smith et al (2015)[11] identified that women were more intended to take action to improve their brain health. It has been shown that the majority of informal caregivers for people with dementia are women[26] and this is the reason why they have high level of stress and burden regarding their role. Furthermore, women were found to be more inclined to recommend and seek professional help compared to men.[23] Women have provided care for more family members with dementia, and hence their caregiving role may be the reason for their increased awareness regarding dementia risks. These findings may also be the incentives that allow them to change desired behaviors. An additional reason may be the higher prevalence of dementia among women.

Presence of family history of dementia and prior experience with dementia were found to be significantly associated with perceptions of susceptibility and severity and also with cues to action about adopting healthier lifestyle and behavior for reducing dementia risk. This finding is consistent with the results of other studies in the literature. Personal susceptibility is associated with having a relative with dementia.[11,23] When people have experiences with the risk of developing dementia, such in the case of having a family history, they are more prone to take action for risk reduction.[23] Qualitative study with individuals having a family history of Alzheimer's disease (AD) have revealed that genetics and protective factors are viewed as important factors in causing AD.[27] Development and occurrence of AD are perceived as potentially avoidable even for individuals at increased risk.[8] Therefore, the majority of respondents with a family history of dementia (70.0%) are interested in learning their personal risk of developing this disease. Beliefs about personal susceptibility and concern regarding a given disorder are capable of predicting individual willingness to seek preventive and screening options.[7] This finding is consistent with the results of Roberts et al (2014).[8] If an individual is at a greater risk (perceived susceptibility and perceived severity), health-promoting behaviors are more likely to occur.[5,28] Individuals are more likely to act because of previous exposure has increased their knowledge and concerns regarding this condition.[11] These beliefs may also increase awareness toward adopting a healthier lifestyle and behavior for risk reduction.

Our findings indicate that individuals with a higher educational level demonstrate increased perceived benefits, motivation, self-efficacy, and lower perceived barriers. A higher level of education is known as a distinct protective factor for dementia risk reduction.[29] Higher educational level can allow individuals to endorse the benefits of health behaviors in terms of dementia risk reduction, including keeping physically active, eating a healthy diet, and taking vitamins.[8] This is because these individuals are more likely to have increased health literacy, and hence the ability to devote greater attention to personal wellness.[11] Higher education not only leads to a healthier life style and improved health outcomes but also propels individuals to become more efficient learners of new skills and competencies, and hence invest more resources on their education.[30] These findings are also consistent with the literature. University-educated people were more intended to take action to improve their brain health.[11] It is considered that individuals

with higher education have better social environment, financial opportunities, and have more confidence to adopt healthier lifestyles and implement behavioral changes.

An interesting finding from the current study was that people whose income was lower than their respective expenses tended to have significantly higher perceived barriers and lower general health motivation. Results in the literature are inconsistent regarding this finding. For instance, and contrary to our study, Smith et al (2015)[11] identified that individuals with a lower income are more likely to express intentions to take action to improve brain health; yet, the reasons for this are still unclear. Although Werner (2003)[17] found that greater benefits are associated with higher income, individuals with lower income are less prone to implement behavioral and lifestyle changes. This may reflect a view among high-income individuals that they can rely on clinical services to address the health problems encountered at different stages of their life.[31] Further studies need to be conducted to clarify this inconsistency with household income.

On the other hand, our findings indicate that individuals with subjective memory complaints and willingness to know their own risk have higher perceived severity, cues to action. In agreement with current literature, perceptions about help-seeking for memory problems revealed greater willingness for individuals who described themselves as being at greater risk.[17,32] Also, having subjective memory complaints was associated with higher perceived barriers. The reasons for this are unclear. However, this may be explained by their opinion that they will not receive any positive answers and that it is too late to reduce the respective risk of developing dementia.

This study has some limitations. First, participants were referred to a family health center and this may not be representative of the overall Turkish population. We used a correlational design that limits our capacity to demonstrate causal relationships. This study did not seek to find whether participants were aware of any personal risk factors for developing dementia. Therefore, we recommend that it is essential to determine individual's risk factors and to consequently examine individuals' health beliefs underpinning the lifestyle and health behavioral changes needed for dementia risk reduction.

Despite these limitations, this is the first study to our knowledge that used a validated scale based on the HBM to examine Turkish people' health beliefs to adopt healthier lifestyle and behavior for reducing dementia risk. Therefore, our results provide important information to facilitate a greater insight and understanding of the factors affecting this issue. Our findings indicate that men, older adults, and those with lower education and income are priority groups for public health education regarding dementia risk reduction. Educational programs should be organized to increase public awareness that dementia is not an inevitable part of aging and that there are factors which can reduce the risk of developing this disease. Family history of dementia and subjective memory complaints may trigger perceptions of susceptibility and severity, and hence encourage individuals to adopt healthier lifestyles and behaviors. Finally, we suggest that campaigns need to be organized to improve the knowledge and awareness of general public on these issues.

Future research is needed to explore how dementia knowledge and health literacy influence beliefs and willingness. It is recommended to reduce these modifiable risk factors for developing dementia even from the beginning of childhood while extending them throughout the entire individuals' life. For this reason, risk reduction for dementia must begin earlier. We also suggest that future research should focus on understanding health beliefs that can induce lifestyle health behavior changes for dementia risk reduction in younger groups. Finally, it is required to focus on interventions are designed to improve health behaviors and lifestyle changes for dementia risk reduction.

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