

Socio-cognitive Determinants of Healthy Sleep Behaviors Among Iranian Elderly: Application of the Theory of Planned Behavior

Mahshad Taherpour¹, Mehdi Mirzaei-Alavijeh², Habibolah Khazaie³, Seyyed Nasrollah Hosseini⁴, Mohammad Fattahi², Negar Karimi^{3,5}, Farzad Jalilian^{2*}

¹Department of Health Education and Promotion, School of Health, Kermanshah University of Medical Sciences, Kermanshah, Iran

²Social Development and Health Promotion Research Center, Health Institute, Kermanshah University of Medical Sciences, Kermanshah, Iran

³Sleep Disorders Research Center, Health Institute, Kermanshah University of Medical Sciences, Kermanshah, Iran

⁴Education Development Center, Kermanshah University of Medical Sciences, Kermanshah, Iran

⁵Research Instructor, Cognitive Science Research Group, Academic Center for Education, Culture and Research, Alborz Branch, Alborz, Iran

Article history:

Received: 20 June 2021

Accepted: 1 August 2021

Published: 30 June 2022

*Corresponding author:

Farzad Jalilian, Social Development and Health Promotion Research Center, Health Institute, Kermanshah University of Medical Sciences, Kermanshah, Iran, Postal Code: 6517838736. Phone: +98 (83) 38220290, Fax: +98 (83) 38220290, Email: f_jalilian@yahoo.com



Abstract

Background: Sleep quality and quantity disorders are among the most important problems in old age. Healthy sleep behaviors are among the best ways to deal with sleep disorders among the elderly. This study aimed to determine the socio-cognitive determinants predicting healthy sleep behaviors among the elderly who had been referred to the retirement centers in Hamadan, Iran.

Methods: This cross-sectional study was performed among 288 elderly people who had been referred to the retirement centers in Hamadan, Iran in 2020, and were selected through stratified random sampling. Data were collected online using a self-administered questionnaire with items on demographic characteristics and the theory of planned behavior (TPB) constructs. Data were analyzed by SPSS software (version 16) using Pearson correlation, independent *t* test, one-way ANOVA, and linear regression tests at the significance level of 0.05.

Results: The mean (\pm standard deviation) age of respondents in this study was 67.2 (\pm 6.3) years. Perceived behavior control ($\beta=0.409$), attitude ($\beta=0.251$), and subjective norms ($\beta=0.205$) were stronger predictors of healthy sleep behavior intention among the elderly, respectively; collectively, they accounted for 28.5% of the variation in sleep health behavior intention. Behavioral intention ($\beta=0.429$) and perceived behavioral control ($\beta=0.167$) were also predictors of healthy sleep behaviors among the elderly. There was a statistically significant relationship between the educational level and healthy sleep behaviors ($P<0.05$).

Conclusion: It seems that the development and implementation of educational programs based on the TPB for the improvement of attitudes, subjective norms, and perceived behavior control can play an effective role in promoting healthy sleep behaviors and sleep quality among the elderly.

Keywords: Aged, Health beliefs, Sleep, Theory of planned behavior

Please cite this article as follows: Taherpour M, Mirzaei-Alavijeh M, Khazaie H, Hosseini SN, Fattahi M, Karimi N, et al. Socio-cognitive determinants of healthy sleep behaviors among Iranian elderly: application of the theory of planned behavior. J Educ Community Health. 2022; 9(2):80-85. doi:10.34172/jech.2022.12

Introduction

Although reaching an old age can be considered a success in the field of health for communities, the lack of proper planning for the prevention of the problems related to old age can create serious challenges in the community (1). Sleep quality and quantity disorders are among the most important issues in old age (2). Sleep is one of the most important health-restoring behaviors and creates a good mood and a good feeling in the person (3). However, it was reported that 36%-69% of the elderly have some kind of

sleep disorder (4). Based on the evidence, insufficient sleep is the third most common cause of aging after headaches and gastrointestinal disorders (5). In this regard, a study conducted in Kermanshah of Iran showed that 39.8% and 24.5% of the elderly had moderate and severe sleep problems, respectively (6). In another study performed in Hamadan, Iran, the sleep quality of the elderly living in nursing homes was reported to be unfavorable (1).

Sleep is a complex combination of physiological and behavioral processes, and its quality affects people's



mental, physical, and social interactions (7). Aging causes major changes in sleep quality and structure, as well as the circadian rhythm, namely the body's biological clock (8). Overall, while the time of stay in bed and light sleep increases, rapid and non-rapid eye movement sleep time represents a decrease (9). These changes lead to frequent sleep disorders and complaints in the elderly (8). Poor sleep quality impairs the immune system and the function of the endocrine system (2). Sleeping more than 8 hours or less than 7 hours a day is associated with increased risk of death among the elderly (5). Moreover, poor sleep can lead to disturbances in emotions, thoughts, motivation, risk of fall (10), depression, dementia (11), and exacerbation of ischemia and myocardial infarction (12).

Sleep changes seem to reflect natural growth processes that are either caused by primary factors such as aging, as the most important factor in the development of sleep disorders in the elderly, (1) or secondary factors, including medical diseases and psychiatry or a combination of these factors (13). In some studies, such factors as general health, social support, and anxiety have been effective in the development of sleep disorders (1,4,5, 14,15). Among factors affecting sleep, healthy sleep behaviors indicate a relationship between mental status and sleep in the elderly (16). Based on the evidence, healthy sleep behaviors are one of the best approaches for dealing with sleep disorders in the elderly (8). Some of the known unhealthy behaviors affecting sleep in the elderly include daily naps, reading or watching TV at bedtime, relaxation, drinking coffee, and doing exercises near bedtime (17). The results of a study performed by Leblanc et al showed that napping is a common activity among most aged people, and watching TV and reading at bedtime are also frequent habits among the elderly (17).

Sleep health refers to the lifestyle and environmental conditions that improve sleep quality (18). The cognition of healthy sleep behaviors plays an important role in improving sleep quality (16). Indeed, raising the cognition of the elderly about healthy sleep health behaviors can be regarded as an important part of interventions and rapid behavioral changes that improve health outcomes (19). Given the above-mentioned explanation and the possibility of changes in the cognition of the elderly about healthy sleep behaviors, it is necessary for health-sector officials and planners to pay more attention to the issue of healthy sleep since the adoption of effective educational interventions in this field will guarantee people's physical and mental health (6,8).

So far, several educational interventions have been designed to improve the quality of sleep in the elderly; however, only a limited number of them have proved to be successful (8). Some experts believe that the reason for the failure of these programs is the lack of attention to etiological studies and their design without consideration for psychosocial patterns, as a specific intellectual framework in educational planning (20,21). Various psychosocial models have been used to study health

behaviors in the elderly, among which one can refer to the theory of planned behavior (TPB) proposed by Fishbein and Ajzen (22).

This theory predicts the occurrence of a particular behavior that a person intends to do. According to this theory, the intention to perform a behavior is predicted by three factors, including attitude, subjective norms, and perceived behavioral control. Attitude is a person's positive or negative evaluation of performing a behavior. Subjective norms refer to the social pressure perceived by an individual for performing or not performing a specific behavior. Finally, perceived behavioral control is a degree of a person's sense of voluntary control over the performance or non-performance of a certain behavior (23). In this regard, the results of similar studies confirm the effectiveness of the TPB in predicting healthy sleep behaviors (19,24,25).

Considering that cognitive factors related to health behaviors affect the elderly's intent to start a specific behavior, the present study was conducted among the elderly who had been referred to the retirement centers in Hamadan, Iran to determine the socio-cognitive factors predicting healthy sleep behaviors in the elderly using the TPB.

Materials and Methods

This cross-sectional study was conducted among 288 elderly people who had been referred to the retirement centers in Hamadan of Iran in 2020. These individuals were randomly selected from all active retirement centers (8 out of 28 centers were active) considering the sample size. The inclusion criteria included age over 60 years, membership in the retirement centers, access to the internet (at least one hour during the day), possession of a smartphone, and willingness to participate in the study. However, elderly people were excluded from the study if they refused to complete the questionnaire or returned incomplete questionnaires. In the next stage, the list of members in the retirement centers meeting the inclusion criteria was obtained by referring to eight active retirement centers in Hamadan, Iran.

Subsequently, the number of quotas for each center was determined by the proportional assignment of the samples. The samples were randomly selected, and the link of the online questionnaire was sent to each person through SMS. It is worth mentioning that in case of revering no response from the selected individuals, an alternative number was randomly selected from among other members of each center, and a questionnaire was sent to them. A total of 720 questionnaires were sent to the elderly, and 288 questionnaires were returned to the researchers (a response rate of 40%).

The data collection tool was a researcher-made and self-report questionnaire. The data were collected on demographic characteristics (i.e., age, gender, level of education, marital status, economic status, and the number of children), the TPB constructs, and a healthy

sleep behaviors questionnaire. A sample questionnaire from similar studies (18,24) was used to design the items of the TPB constructs, and the validity and reliability of the items were examined and confirmed subsequently. The attitudes toward healthy sleep behaviors were measured by 7 items (e.g., “limiting drinks at night helps my sleep”), and the subjective norms encouraging healthy sleep behaviors were measured by eight items (e.g., “my spouse suggests that I should avoid tea, coffee, or other drinks before going to bed”), which were rated on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Moreover, perceived behavioral control toward healthy sleep behaviors was measured by six items (e.g., “It’s hard for me to control bedroom temperature, sound, and light at bedtime”) and rated on a 5-point scale ranging from 1 (very likely) to 5 (very unlikely). Intention to perform healthy sleep behaviors was measured by six items (e.g., “I intend not to take a nap during the day”) and rated on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Healthy sleep behaviors were also evaluated by 12 items (e.g., “Limiting drink consumption from evening onwards”) and scored based on a 3-point Likert-type scale (Always=2, Sometimes=1, and Not at all=0).

The questionnaire was distributed among 10 health education and promotion specialists to assess its content validity, which was finally approved by the specialists after the estimation of the content validity ratio and index for the items of the questionnaire and the application of necessary changes. The reliability of the questionnaire was evaluated in a group of 30 elderly people in Hamadan, Iran using the internal consistency method. The internal correlation coefficient (Cronbach’s alpha) of the items for attitude, subjective norms, perceived behavior control, behavioral intention, and healthy sleep behaviors was obtained at 0.85, 0.91, 0.84, 0.79, and 0.72, respectively.

The collected data were analyzed by SPSS software (version 16) using independent *t* tests, one-way ANOVA, Pearson correlation coefficient, and linear regression at a significance level of less than 0.05.

Results

The mean age of participants was 67.2 ± 6.3 years, and they were in the age range of 60-75 years. The majority (70.5%) of participants were males and in the age group of 60-70 years (69.8%). Most (49.7%) of the elderly participants in this study had a university degree and were married (93.8%). In terms of economic status, half of them (55.2%) reported an average economic level. Moreover, 56.5% of the elderly had three or more children. According to the findings, among the healthy sleep behaviors, “avoiding heavy food before bedtime” (94.1%) and “controlling the proper temperature of the bedroom” (92.4%) had the highest frequency, while “limiting the consumption of different drinks from evening onwards” (61.8%) and “investigating the effect of drugs on sleep” (62.2%) represented the lowest frequency among the elderly.

The association between demographic variables and healthy sleep behaviors is presented in Table 1. There was a statistically significant association between education level and healthy sleep behaviors so that the mean score of healthy sleep behaviors among participants with high school diplomas and university education was significantly higher than that in those with undergraduate education ($P=0.026$).

Table 2 provides the mean and standard deviation of the TPB constructs and Pearson correlation coefficients. According to the findings, the attitude and behavioral intention obtained 75.9% and 73.6% of the achievable scores and were estimated as having a relatively desirable status. In addition, healthy sleep behaviors obtained 58.6% of the achievable scores and were estimated as having a moderate status, respectively. Furthermore, a positive and significant correlation was observed between healthy sleep behaviors and all TPB constructs ($P<0.001$).

The results of the linear regression analysis of the constructs of the TPB in predicting behavioral intention and healthy sleep behaviors are summarized in Tables 3 and 4. Based on the findings, perceived behavioral control ($\beta=0.409$) was the best predictor of behavioral intention, and the total score of the constructs of TPB explained 28.5% of the variance of the behavioral intention score. Eventually, behavioral intention ($\beta=0.429$) was a better predictor of healthy sleep behaviors among the elderly compared to perceived behavioral control ($\beta=0.167$).

Discussion

The current study sought to determine the predictors of healthy sleep behaviors among the elderly who were referred to retirement centers in Hamadan, Iran. According to the

Table 1. Association Between Demographic Variables and Healthy Sleep Behaviors (N=288)

Variables	Mean	Standard Deviation	P Value
Age (y)			0.669
60-70	14.09	4.26	
71-80	14.12	3.63	
>80	15.07	3.23	
Gender			0.224
Male	13.99	3.87	
Female	14.54	4.51	
Marital status			0.985
Single	14.17	4.01	
Marriage	14.15	4.07	
Degree			0.026
Under diploma	11.65	3.73	
Diploma	14.36	4.05	
Academic degrees	14.26	4.29	
Economic status			0.346
Good	14.01	4.64	
Moderate	14.25	4.09	
Weakly	12.42	3.21	

Table 2. Descriptive Statistics and Inter Correlations Between the TPB Constructs (N=288)

Variables	1	2	3	4	5	Mean (\pm SD)	Range	Percent
1. Attitude	1	0.536**	0.080	0.379**	0.420**	28.27 (\pm 3.55)	7-35	75.9
2. Subjective norms		1	-0.014	0.382**	0.419**	29.55 (\pm 4.03)	8-40	67.3
3. Perceived behavior control			1	0.379**	0.433**	21.81 (\pm 4.47)	6-30	65.8
4. Behavioral intention				1	0.552**	23.67 (\pm 3.05)	6-30	73.6
5. Behavior					1	14.08 (\pm 4.21)	0-24	58.6

Note. ** $P < 0.01$; TPB: Theory of planned behavior; SD: Standard deviation.

Table 3. Linear Regression of the Constructs of TPB in Predicting Intention to Perform Healthy Sleep Behaviors

Variables (N=288)	B	SE	β	P-value	95% CI
Attitude	0.234	0.054	0.251	<0.001	(0.127-0.341)
Subjective norms	0.165	0.048	0.205	<0.001	(0.071-0.259)
Perceived behavior control	0.283	0.035	0.409	<0.001	(0.214-0.352)
Constant	5.938	1.716	---	<0.001	(2.561-9.315)

Note. B: Unstandardized regression coefficient; SE: standard error.

Table 4. Linear Regression of the Constructs of TPB in Predicting Healthy Sleep Behaviors

Variables (N=288)	B	SE	β	P-value	95% CI
Behavioral intention	0.523	0.067	0.429	<0.001	(0.392-0.655)
Perceived behavior control	0.141	0.046	0.167	0.002	(0.050-0.232)
Constant	-1.140	1.524	---	0.455	(-4.139-1.858)

Note. B: Unstandardized regression coefficient; SE: Standard error; Adjusted R-squared: 0.260.

results, among the healthy sleep behaviors, “avoiding eating heavy food before going to bed at night” and “controlling the proper bedroom temperature” were the most prevalent behaviors. However, “limiting consumption of drinks from evening onwards” was the least frequent behavior among the elderly. Consistently, in the study by Nakajima et al, “consuming heavy foods late at night” was considered an unhealthy habit and a risk factor that can cause obesity and type 2 diabetes in people (26). The results of another study also indicated a relationship between sleep disorders with heavy food consumption and indigestion (27). In many studies, the observation of healthy eating habits and modification of nutritional behaviors have been considered important factors in improving sleep health and physical and mental health (28). Therefore, it is necessary to design promotional studies to encourage a healthy lifestyle, modify unhealthy habits, and prevent metabolic diseases in communities.

In addition, the increased frequency of proper bedroom temperature control in the elderly is among the other findings of the present study that can improve sleep hygiene and induce deep sleep in individuals. This result is consistent with those of Imagawa and Rijal (29). Therefore, promotional studies should be designed to promote a healthy lifestyle and sleep health in the elderly.

The findings revealed an association between education level and healthy sleep behaviors, which is in line with the results of Thichumpa et al, demonstrating the association between education level and sleep quality (30). Luo et al also found that older people with a lower level of Chinese education living in Shanghai, China had lower sleep quality compared to more educated people (31), which confirms

the findings of the present study. In general, the results of studies indicate that the level of education is an important predictor of the promotion of a healthy lifestyle, especially in the elderly (32). Further, the results of a similar study represented an association between education and health level (33). Overall, stakeholders, planners, and politicians must pay great attention to the socio-economic status of all individuals and all classes in society in order to improve health and prevent the spread of injustice and inequality in the health sector.

Moreover, based on the results, a positive and significant correlation was found between healthy sleep behaviors and all constructs of the TPB. Similarly, the results of the study conducted by Strong et al (19) on the healthy sleep behaviors of adolescents based on the TPB confirmed the results of this study. It should be noted that based on evidence, the TPB can be used to understand and recognize many health behaviors, including healthy sleep behaviors (25,34).

Our findings showed that perceived behavior control was the best predictor of behavioral intention. Likewise, Zhang et al concluded that the perceived behavior control construct had a predictive power of 29% for the healthy sleep behavior intention in students (35). Based on the results of many studies, the perceived behavior control construct, as an important predictor of the TPB, has a direct impact on sleep health (24,36). Therefore, promotional studies should be designed to increase perceived behavior control. The findings of the present study can be useful for the providers of healthcare to the elderly. In this regard, it seems that if interventions to create behavioral goals in the elderly are focused on enhancing the perception of control

over healthy sleep behaviors, they may lead to useful data on the promotion of healthy sleep behaviors and sleep quality among the elderly. Self-monitoring of behavior, cue alerting, and goal setting are among the methods that can be applied to improve the status of perceived behavior control (23).

Furthermore, the findings demonstrated that the behavioral intention construct was a better predictor of healthy sleep behaviors among the elderly in comparison to the perceived behavior control construct. In the same vein, according to Zhang et al, sleep is a routine behavior, and a person's intent plays an important role in maintaining sleep health, which is generally regarded as an intentional behavior. It was also noted that in the face of challenging situations, individuals' intent to maintain sleep hygiene plays the most significant role in the absence of any planned coping strategy. Thus, the self-efficacy construct has no significant effect on maintaining and promoting sleep hygiene behaviors, and people's intent is the only determinant of this behavior (35). It is recommended that other studies should be conducted to determine the mediating role of the intent variable in evaluating healthy sleep behaviors.

Regarding the limitation of the present study, one can refer to the self-reporting method of data collection. Moreover, considering that data were collected only from retirement centers in Hamedan, Iran, the generalization of findings to all elderly populations in Iran should be conducted with caution. Finally, it is recommended that future studies examine the determinant role of the intent variable in healthy sleep behavior, which can yield useful the information in this area of research.

Conclusion

Overall, the results represented the moderate status of healthy sleep behaviors among the elderly. It also seems that the design and implementation of educational programs for the improvement of attitudes, subjective norms, and perceived behavior control can play a key role in promoting healthy sleep behaviors and sleep quality among the elderly. According to the findings, it seems that the improvement of the perceived behavior control should be the point of focus in educational interventions in the area of healthy sleep behaviors.

Acknowledgments

This study is part of a master's degree in health education and promotion approved by Kermanshah University of Medical Sciences (no. 990685), which was performed with the financial support of the Vice-chancellor for the Research and Technology of Kermanshah University of Medical Sciences. In addition, the authors thank all participants in this study, as well as employees of retirement centers in Hamadan.

Authors' Contribution

MMA and FJ participated in the study design, data analysis, and manuscript writing. MT contributed to data collection and wrote the manuscript. HK played a role in the study design and edited the manuscript. NH, MF, and NK participated in editing the manuscript.

The manuscript was read and approved by all the authors.

Conflict of Interests

There is no conflict of interests.

Ethical Permissions

Participants entered the study by ensuring the confidentiality of information and giving informed consent. The present study was approved by the Ethics Committee of Kermanshah University of Medical Sciences (ID: IR.KUMS.REC.1399.420).

Funding/Support

This study was funded by Kermanshah University of Medical Sciences, Kermanshah, Iran.

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