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ORIGINAL ARTICLE

Effects of an empowerment program for promoting physical activity in middle-aged women: an application of the health action process approach

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Abstract

Background Sedentary lifestyle is known to be a potential risk factor for chronic diseases. Given the vital role that physical activity plays in the prevention of chronic diseases in middle-aged women, this study was conducted to develop the intention for performing physical activity among middle-aged women based on the motivational phase constructs of the health action process approach model.

Methods This quasi-experimental study was conducted on 160 middle-aged women of Jovein, Iran, in 2016. Subjects were randomly selected using a multi-stage sampling method, and assigned to the control ($n=80$) and intervention ($n=80$) groups. The motivational phase constructs of the health action process approach and physical activity intention were measured at three stages; before the intervention, immediately following the intervention, and 1 month after the intervention. Data were analyzed using SPSS 17.0 software with the Chi-square test, Pearson's correlation, ANOVA, and Friedman tests.

Results One month after the intervention, the number of women with an intention to engage in physical activity was significantly higher in the intervention group ($n=56$, 73.6%) compared to the control group ($n=23$, 29.8%) ($P<0.001$). Immediately following the intervention and 1 month after the intervention, all motivational phase constructs were significantly increased in the intervention group compared to before the intervention ($P<0.001$). However, no significant change was observed in the control group. Moreover, immediately following the intervention and 1 month after the intervention, all motivational phase constructs were significantly increased in the intervention group compared to the control group ($P<0.001$).

Conclusion The results demonstrate the effectiveness of empowerment program based on the motivational phase constructs of the health action process approach on developing the intention for performing physical activity among middle-aged women.

Keywords Physical activity · Middle-aged women · Empowerment · Health action process approach

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Introduction

Extensive technological advances of the modern age have changed lifestyle in human societies, and the main features of these changes are mechanical life and lack of physical activity [1]. Physical activity, as defined by the World Health Organization (WHO), refers to any bodily movement that is created by the skeletal muscles' motion that requires energy consumption [2]. The advantages of physical activity are beyond any question so that a lifestyle without physical activity is considered as a potential risk factor of chronic diseases and premature mortality [3, 4]. Physical inactivity is among the top ten causes of death and disability, responsible for 9.1 million annual deaths worldwide [5]. Excess body weight and physical inactivity predispose people to cardiovascular diseases and high blood pressure [6, 7].

On the other hand, regular physical activity plays a protective role against non-infectious diseases such as heart disease, stroke, diabetes, and colon cancer. It also improves physical and mental functions, delays the onset of dementia, prevents risk factors of chronic diseases (including hypertension, overweight, and obesity), and finally improves the quality of life [8, 9]. Moreover, physical activity is beneficial for both primary and secondary prevention of breast cancer. Recent studies have suggested that physical activity has a positive and protective effect on sleep behavior and markers of insulin resistance in breast cancer patients [10, 11].

WHO recommends that adults 18–64-years-old should perform at least 150 min of moderate-intensity or 75 min of vigorous-intensity or an equivalent combination of moderate-vigorous aerobic physical activity per week [2]. Based on this guideline, one-fourth of adults and three-fourths of adolescents do not engage in sufficient physical activity [9]. Regions with the highest prevalence rates of physical inactivity include the Eastern Mediterranean, North America, Europe, and Western Pacific [12]. A report on the health status of American people revealed that in 1998, 41% of the American people above 18 years old did not engage in adequate physical activity. This figure reached 49% in 2015, which shows a growing trend of physical inactivity among the US population. The report also revealed that the rate of physical activity is slightly higher in men (53%) than women (48%) and the prevalence of obesity in Americans aged 20 years and older has increased steadily from 30.5% in 2001 to 36.5% in 2014 [5]. Results from a large-scale study in 2015 in Iran indicated that more than 70% of Iranians do not engage in adequate physical activity, and the average duration of weekly exercise among the 15–64-years-old population is 189 min for men and 78 min for women [13].

Patterns of physical activity behavior vary across gender and age groups so that older adults and women tend to be less likely to perform physical activities compared with younger adults and men [14]. These patterns indicate that middle-aged women are the primary target group for physical activity and need special attention. Further, the risk of health problems grows in women with age, and this can be minimized by performing physical activities [15, 16]. Naturally, the body loses its functional capabilities as it approaches the middle-age period [17]. This has to do with changes in lifestyle, such as lower physical activities, unhealthy diet, smoking, and drinking. It is possible to decelerate this process and avoid early disabilities in middle-aged individuals by taking timely interventions [17]. Promotion of physical activity in middle-aged women may ensure that they follow an active lifestyle until old age [8].

Scientific observations demonstrate that Iranian women are in an undesirable condition in terms of physical readiness and their tendency toward performing physical activities is very low [18]. Lack of sufficient physical activity among people from different age groups and communities is one of the major concerns of WHO [19]. Accordingly, the WHO's global action plan on physical activity 2018–2030 recommends a set of specific political actions for improving the level of physical activity among different populations [9]. Lower access to secure and affordable facilities makes women less likely to undertake physical activity than men. The elimination of these differences is a policy priority and a fundamental principle in the WHO's global action plan on physical activity [9].

Taking into account that one of the objectives of the global action plan on physical activity 2018–2030, proposed by WHO, is to decrease the rate of physical inactivity in the middle-age individuals by at least 50% [9], and with regard to the undesirable rate of physical activity in middle-aged women and its multiple consequences, it is essential to design multidimensional interventions such as educational interventions to determine and alter women's perceptions and beliefs and promote physical activity in this population. Studies on physical activity promotion have mostly failed to pay attention to women as they should, and there is no educational intervention study based on behavior change theories and patterns to promote physical activity behaviors in women. In light of this, the present study is an attempt to develop the intention of performing physical activity in middle-aged women.

Theoretical framework

Health-compromising behaviors such as physical inactivity are difficult to change. Most social-cognitive theories assume that intention to change behavior can well predict the actual change. However, people often do not behave according to their intentions [20]. In addition, some barriers to physical activity such as laziness, work commitments, lack

of leisure time, and poor health may hinder older adults from performing physical activity [21, 22]. Health action process approach (HAPA) is an inclined motivational theory that indicates the replacement of health-compromising behaviors by health-enhancing behaviors occurs in two phases, the motivation, and volition. The motivational phase leads to forming an intention, and the volitional phase to actual behavior change [23]. The motivational phase of the HAPA was used as a theoretical framework for this study. This phase is featured with three constructs including risk perception, outcome expectancy, and task self-efficacy that are the predisposing factors in the goal-setting. Risk perception refers to the perceived estimates of probable harms or risks associated with unhealthy behavior. Outcome expectancy refers to an individual's beliefs about the probable outcomes and consequences of performing a behavior. Outcome expectancy is a central construct widely used as a framework for physical activity research [24]. Task self-efficacy is the degree to which an individual believes he or she is capable of performing a difficult or new behavior.

Before thinking about the probable advantages of behavior or competency in performing that behavior, an individual needs to see a minimum level of risk or concern that triggers the thought. At the motivational phase, one' beliefs about feasible alternatives for healthy behaviors and the consequences affect the objective. The volitional phase in HAPA is featured with four constructs including action planning, coping planning, coping self-efficacy, and recovery self-efficacy. When a person forms an intention to change a behavior, he or she first needs to make a detailed plan concerning when, where, and how the behavior change will take place, and then, he or she should be prepared enough to maintain healthy behaviors, prevent relapse, and reach health goals [25–27].

Methods

Participants and setting

This study is a quasi-intervention study conducted on 160 middle-aged women of Jovein, Iran, in 2017. Sampling was performed through the multi-stage sampling method. First, two out of five district health centers in the city were selected randomly. Then, two urban health centers and two health posts covered by the district health centers were randomly selected. Next, subjects were randomly selected from the health center registration records. The inclusion criteria were a middle-aged woman (age range, 30–59 years.), a resident of Jovein, physically inactive, and willing to participate. The eligible subjects were identified by a preliminary, descriptive study in which we determined the prevalence of physical inactivity and its contributing factors in the middle-aged women of Jovein. For this purpose, the Persian version of the Baecke Habitual Physical Activity Questionnaire was used to measure the levels of physical activity in 208 women of Jovein. The questionnaire provides details of physical activity (amount, duration, type, and frequency) in respondents [28]. Women with lower physical activity than WHO recommended guideline (30 min a day, for 5 days a week) [2] were considered physically inactive. The exclusion criteria included absence in more than two training sessions or having exercise limitations. The required number of subjects was estimated to be 74 women in each group according to the previous study by Geravandi et al. [29] in Iran and concerning the 95% confidence interval and power of 80%. Given the probable loss of participants, 160 women (intervention group: $n=80$; control group: $n=80$) were finally recruited. For each group, participants were randomly selected from one urban health center and one health post. Based on the exclusion criteria, four participants were excluded from the study.

Study variables

Independent variables Demographic variables (age, occupational status, educational level, marital status, family income, weight, height) and constructs of the motivational phase of the HAPA model.

Dependent variable Physical activity intention.

Measures

The data collection tool was a researcher-made questionnaire consisting of three sections. To design a questionnaire, HAPA codification guideline [23], the results of a preliminary study, and a literature review were taken into account. The first section of the questionnaire contained seven questions about the demographic characteristics of the participants. The second section contained 29 questions related to the constructs of the motivational phase of HAPA; eight questions related to risk perception, 13 questions related to outcome expectancy, and eight questions related to task self-efficacy. The responses were measured using a 4-point Likert scale (0 3 points). The third section contained two questions which assessed physical activity intention. The responses were measured using a 5-point Likert scale in a range from 0 (certainly) to 4 (not at all). Face validity was ensured with 20 middle-aged women before conducting the survey. Women were asked to verify whether the items were relevant, unambiguous, clear, and understandable. For content validity, a panel of ten experts in health education and promotion were invited, and their comments were applied in the final form of the questionnaire. The content validity index equal to or greater than 0.83, and the content validity ratio equal to or greater

than 0.79 were considered acceptable. The reliability of the questionnaire was calculated via Cronbach's alpha coefficient, and results showed that all constructs had a good internal consistency (risk perception = 0.75, outcome expectancy = 0.74, task self-efficacy = 0.82, physical activity intention = 0.91).

Training program

The pretest results were analyzed and based on which an educational package was developed. Educations were implemented in the health centers and were provided by a health education expert using methods such as group discussion, brainstorming, modeling, and use of education-aid tools like film (comparing the life of an elderly who had or had not adequate physical activity during the past 10 years), slide presentation, and education materials (booklets, pamphlets, etc.). The program lasted for 3 weeks and included three training sessions. The intervention was based on active learning, and the women were motivated to participate in the discussions and share their experiences actively. The session one was an introduction to physical activity and topics such as definition, importance, time, and intensity of physical activity needed for middle-aged women were discussed. The primary objective of the session two was to improve awareness and perception of the risks and outcomes of lack of physical activity in participants.

Additionally, the advantages of physical activity and its effect on one's health were discussed in this session. The objective of session three was to improve self-efficacy in women so that they could learn how to carry out and maintain physical activity in different situations. It is to be noted that the control group did not receive any education; however, the educational materials such as booklets and pamphlets were given to the control group after the study was completed. Both intervention and control groups filled out the questionnaires at three stages; before the intervention, immediately following intervention, and 1 month after the intervention.

Statistical analysis

Data were analyzed using SPSS 17.0 statistical software. Descriptive statistics such as mean, standard deviation, and frequencies were used to describe study participants. A Pearson's correlation coefficient was used to determine the association between independent variables and a dependent variable. The one-way ANOVA test was used to compare the differences between groups. The Friedman test was used to analyze changes in the motivational phase constructs over time. The level of statistical significance was set at 0.05.

Ethical considerations

The study was registered in the Iranian Registry of Clinical Trials (identification number IRCT20180626040243N1). Ethical approval was obtained by the ethics committee of the Sabzevar University of Medical Sciences (IR.MEDSAB: REC.1396.120). All participants were informed about the process and period of the study and were ensured about the confidentiality of their information, and they could leave the study freely at whatever stage of the study. After giving consent for participation by the participants, the questionnaires were administered.

Results

The mean (SD) age of the participants was 35.36 (5.24) in the intervention group and 38.29 (4.7) in the control group, with no significant difference between the two groups ($P = 0.064$). The mean (SD) body mass index (BMI) of the participants was 25.96 (3.9) in the intervention group and 27.14 (4.9) in the control group, with no significant difference between the two groups ($P = 0.098$). After matching for demographic variables, the Chi-square test showed no significant difference between the intervention and control groups in any of the studied variables. Details on demographic characteristics of the participants are indicated in Table 1.

The results of the one-way ANOVA test showed that women with higher age and educational level had significantly higher outcome expectancy compared to those with lower age and educational level. Moreover, women in the age range of 51–60 years had significantly higher task self-efficacy compared to other age groups ($P = 0.03$) (Table 2).

Data were assessed for normality of distribution, and the result indicated non-normality of data. The Man–Whitney test indicated no significant differences in the mean score of the motivational phase constructs (except for outcome expectancy construct) between the two groups before the intervention. However, immediately following the intervention and 1 month after the intervention, all motivational phase constructs were significantly higher in the intervention group compared to the control group ($P < 0.001$). The Friedman test indicated that immediately following the intervention and 1 month after the intervention, all motivational phase constructs were significantly increased in the intervention group compared to before the intervention ($P < 0.001$). However, the control group did not show any significant change in any of the motivational phase constructs immediately following the intervention and 1 month after the intervention compared to before the intervention. Further, the Chi square test revealed that 1 month after the intervention, the number of women with an intention to engage in

Table 1 Demographic characteristics of the participants ($N=156$)

Characteristics	Categories	Intervention group *n* (%)	Control group *n* (%)	*P* value
Age	30–40 years	58 (74.4)	48 (61.5)	0.08
	41–50 years	19 (24.4)	24 (30.8)	
	51–60 years	1 (1.3)	6 (7.7)	
Occupational status	Public servant	1 (1.3)	3 (3.8)	0.13
	Retired	2 (2.6)	0	
	Housewife	75 (96.1)	71 (91.0)	
	Self-employed	0	2 (2.6)	
	Worker	0	2 (2.6)	
Educational level	Illiterate	7 (9.0)	13 (16.7)	0.10
	Less than a diploma	38 (48.7)	45 (57.7)	
	Diploma	26 (33.3)	14 (17.9)	
	University	7 (9.0)	6 (7.7)	
Marital status	Single	1 (1.3)	2 (2.6)	0.70
	Married	76 (97.4)	74 (94.9)	
	Other	1 (1.3)	2 (2.6)	
Family income (million IRR/month)	1–14	64 (82.1)	68 (87.2)	0.37
	15–30	14 (17.9)	10 (12.8)	
Body mass index	Underweight	1 (1.3)	6 (7.7)	0.28
	Healthy	35 (44.9)	30 (38.5)	
	Overweight	31 (39.7)	26 (33.3)	
	Obese	11 (14.1)	20 (25.6)	

physical activity was significantly higher in the intervention group ($n=56$, 73.6%) compared to the control group ($n=23$, 29.8%) ($P<0.001$) (Table 3).

Discussion

Regular physical activity, as an essential health behavior, has a significant impact on women's health. Women constitute one half of the society and play a determining role in ensuring the health and well-being of the family, and play a primary role in the success of community-based programs. To fulfill their role, women need to be in good mental and physical health condition and this, in turn, needs adequate physical activity. In this study, the effectiveness of a HAPA-based intervention in the development of an intention for performing physical activity in middle-aged women was studied. Following the educational intervention, the mean scores of all constructs of the motivational phase and physical activity intention were increased in the intervention group. This points out the effectiveness of an educational intervention on improvement of awareness and the perception of the risks and outcomes of the lack of adequate physical activity. Bandura maintained that the awareness of the risks and advantages of different lifestyle behaviors is a prerequisite of changes in behavior and if people lack the required knowledge in this regard, they may not find enough reason to undertake the hardships for changing behaviors [30]. Peyman et al. [31] and Mehrabian et al. [32] found that theory-based educational interventions were practical ways to improve people's knowledge and motivate them to engage in physical activities. We also found that educational intervention could enhance individuals' motivation to engage in physical activities.

Barg et al. [33] used the HAPA model to determine the predictors of physical activity in middle-aged women and found that women with higher outcome expectancies and attitude of risks had higher self-efficacy and were more likely to engage in physical activities, which is consistent with our findings. Williams et al. [34] used the HAPA model to encourage individuals to quit smoking and reported that people at pre-intention phase had lower levels of risk perception compared with those at intention phase. They found that informing people and reminding them about the health problems caused by smoking was effective in the intention to quit and change behavior.

Our findings showed that there was a significant positive association between the outcome expectancy construct with age and educational level in such a way that while the age and educational level increased the outcome expectancy increased and vice versa. Williams et al. [24] stated that positive outcome expectancy seems to be more predictive of physical activity in older adults than in young to middle-aged adults, and personal barriers seem to be

Table 2 The mean and standard deviation of scores of motivational phase constructs at baseline according to the demographic characteristics ($N = 156$)

Constructs		Risk perception	Outcome expectancy	Task self-efficacy	Physical activity intention
Characteristics	Categories	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Age	30–40 years	18.2 (4.7)	22.2 (5.4)[b, c]	15.6 (5.2)[d]	5.1 (2.2)
	41–50 years	18.1 (3.9)	29.2 (5.2)[b]	13.7 (4.2)[d, e]	5 (2.1)
	51–60 years	16.5 (2.2)	26.1 (5.4)[c]	15.8 (3.3)[e]	5.4 (2.3)
	P value[a]	0.90	0.001*	0.03*	0.74
Occupational status	Public servant	16.7 (2.5)	26.2 (8.9)	14.2 (2.6)	6.5 (1.0)
	Retired	18.5 (0.7)	32 (2.8)	19 (5.6)	7 (1.4)
	Housewife	18.1 (4.5)	28.2 (5.4)	15 (5.0)	5 (2.2)
	Self-employed	21.5 (2.5)	30.5 (2.1)	18.5 (7.7)	6.5 (2.1)
	Worker	17 (0)	26 (5.6)	14 (2.8)	4 (2.8)
	P value[a]	0.80	0.70	0.67	0.36
Educational level	Illiterate	17 (6.0)	25.4 (7.3)[f, j, h]	15.9 (5.8)	4.3 (2.4)
	Less than a diploma	18 (4.3)	28.2 (5.1)[f, i]	17.1 (4.5)	5 (2.1)
	High school diploma	19 (4.2)	29.2 (4.1)[j]	15.1 (5.3)	5.5 (2.1)
	University	17.9 (2.9)	30.2 (6.3)[h, i]	4.3 (4.1)	5.6 (2.0)
	P value[a]	0.40	0.04*	0.06	0.17
Marital status	Single	33.1 (1.1)	30.6 (4.5)	15 (4.3)	5.6 (2.5)
	Married	18.1 (4.5)	28.2 (5.5)	15.2 (4.9)	5.1 (2.1)
	Other	20.3 (3.2)	29.6 (4.1)	10.6 (3.7)	3 (1.0)
	P value[a]	0.38	0.67	0.29	0.21
Family income (million IRR/month)	1–14	18.1 (4.6)	28.3 (5.5)	15.2 (5.1)	5.1 (2.2)
	15–30	17.9 (3.3)	27.6 (5.0)	14.7 (3.7)	4.9 (1.8)
	P value[a]	0.81	0.52	0.67	0.57
Body mass index	Underweight	19.6 (2.8)	33.6 (8.3)	19 (3.6)	6 (1.0)
	Healthy	17.9 (4.1)	28 (5.7)	15.2 (4.6)	5.2 (2.2)
	Overweight	18.4 (4.8)	28.6 (4.7)	15.1 (4.9)	5.1 (2.3)
	Obese	18 (6.6)	27.4 (5.7)	14.4 (5.7)	5.1 (1.80
	P value[a]	0.87	0.26	0.48	0.63

Same alphabets demonstrate a statistically significant difference between the two groups based on the Bonferroni correction method

*Indicates significant values

[a]*P* values based on one-way ANOVA

the most significant predictor of negative outcome expectancy. A study among older adults in Iran has also indicated that people with higher knowledge, perceived benefits, and self-efficacy are more likely to engage in physical activities [22]. The positive association between physical activity knowledge and health outcome expectancies has also been discussed in a study by Heinrich et al. [35]. We conclude that people with higher levels of education have a higher level of knowledge and awareness about the negative health consequences of lack of physical activity. This suggests that education programs should focus more on improving outcome expectancy for physical activity in women with a lower educational level. To this end, women should initially be well informed and have adequate information on the risk factors associated with low physical activity such as hypertension, overweight, and obesity. After acquiring an in-depth understanding of the intensity and magnitude of the harms associated with low physical activity, women should be educated about the preventive role of physical activity on some diseases such as stroke, cardiovascular diseases, colon cancer, and diabetes. At the next stage, self-efficacy in women should be improved. Therefore, by increasing the risk perception, outcome expectancy, and self-efficacy through a well-established educational intervention, the readiness to change behaviors and intention to undertake physical activity will be created.

In the present study, we observed significant improvement in the mean score of task self-efficacy in the intervention group immediately and 1 month after the intervention. Schwarzer et al. [23] argued that self-efficacy is one

Table 3 The mean score of motivational phase constructs before, immediately after, and 1 month after the intervention ($N = 156$)

Variables		Intervention group mean (SD)	Control group mean (SD)	*P* value[b]
Risk perception	Before	18.14 (4.70)	18.15 (4.29)	0.61
	Immediately after	23.19 (1.77)	18.15 (4.29)	< 0.001*
	1 month after	22.05 (3.10)	19.49 (3.84)	< 0.001*
	P value[a]	< 0.001*	0.11	
Outcome expectancy	Before	29.35 (4.98)	27.12 (5.65)	0.009*
	Immediately after	33 (3.79)	27.2 (5.48)	< 0.001*
	1 month after	33.14 (4.74)	28.12 (4.40)	< 0.001*
	P value[a]	< 0.001*	0.15	
Task self-efficacy	Before	14.98 (5.32)	15.36 (5.70)	0.59
	Immediately after	18.96 (3.72)	15.38 (4.69)	< 0.001*
	1 month after	18.60 (4.16)	15.34 (4.54)	< 0.001*
	P value[a]	< 0.001*	0.19	
Physical activity intention	Before	5.10 (2.06)	5.14 (2.35)	0.62
	Immediately after	6.17 (1.57)	5.14 (2.35)	0.02*
	1 month after	5.92 (1.93)	5.20 (2.08)	< 0.001*
	P value[a]	< 0.001*	0.23	

*Indicates significant values

[a]*P* values based on the Friedman test to analyze the changes in motivational phase constructs over three time points

[b]*P* values based on Man–Whitney test to evaluate differences between two groups in three time points

of the most effective motivational factors and the strongest predictor of behavioral intention. Perrier et al. [36] used HAPA to predict sports participation among individuals with acquired physical disabilities and mentioned that self-efficacy has potential and critical effects on sports participation. Scheerman et al. [37] applied the HAPA model to explain oral hygiene behavior during fixed orthodontic treatment and found that higher action self-efficacy, maintenance self-efficacy, and intention, as well as higher education, was significantly associated with the use of a proxy brush in adolescents.

Through different educational techniques and using the facilities available, self-efficacy provides an opportunity for the development of the intention of performing physical activities [36]. Brisk walking, group physical activity, at-home exercise using visual media, and the use of dead times during the day for performing physical activities are some recommended ways to improve self-efficacy for physical activity in middle-aged women.

As the results indicated, the highest mean score of task self-efficacy was observed in participants in the age range of 50–60 years. One explanation for this finding can be the higher experience in this age group about the diseases rooted in sedentary lifestyle as well as the higher perception of the risks and outcomes related to physical inactivity. As age increases, women become more susceptible to chronic diseases and related deaths [38]. Therefore, improvement of self-efficacy and physical activity is essential for self-care and a protecting factor against behavioral health risk factors. It is achieved through planning and implementing the well-designed educational programs and recruiting health educators and expert physical education teachers in health centers so that a safe transfer from middle-age to old age in a healthy way and mental, spiritual, and physical health in middle-aged women are guaranteed.

The results of this study showed that 1 month after the intervention, participants in the intervention group had significantly higher intention to engage in physical activity. In agreement with our study, Shirvani et al. [39] reported that the educational intervention based on social-cognitive theory led to an increase in the average physical activity level of adolescent girls by 70 min a day, 263 min per week. In a study by Hazavehei et al. [40], educational intervention based on BASNEF model was proven to be an effective strategy to promote physical activity status in employed women. Payaprom et al. used HAPA to trigger intention for flu vaccination and found that self-efficacy and intention were significant determinants of flu vaccination, and HAPA-based intervention was a useful strategy to improve people's intention for flu vaccination [41].

Ahmadi Tabatabaei et al. [42] used the theory of planned behavior-based educational intervention to improve physical activity in health center staff and did not observe any significant change in physical activity behavior following the intervention, which is inconsistent with our findings. This inconsistency may be explained by a different theoretical

basis and limitations of the theory of planned behavior to change complex health behaviors such as physical activity and dietary behaviors. Another probable explanation can be the differences in the target population, methods of education, and implementation of study procedures. Given that Tabatabaei et al. focused more on non-interactive methods for education, it might have attenuated the effectiveness of the intervention. The methods used in the present study, i.e., group discussion and brainstorming provided an opportunity for having a broader perception of threats and outcomes related to physical inactivity. Results of this study also support the effectiveness of these methods on creating an intention of performing physical activities. The interactive learning methods are known to be highly advantageous for achieving educational goals as learners participate actively in the learning process [43].

Strengths and limitations

Among the strengths of this study is that middle-aged women with reduced physical activity were selected as a target group. It is notable that there have been no interventional studies with such a model as the present one on physical activity. Regarding limitations, we studied only middle-aged women; thus, our results cannot be generalized to the general population. As with similar surveys, self-report bias can also be a significant limitation. To compensate, participants were briefed about the study objectives and were given enough time to complete the questionnaires.

Further, the educational sessions were arranged with the women to minimize the interferences with their daily activities. This study also did not cover the role of family and friends' support in the development of the intention of performing physical activities. Taking into account the pivotal role of significant others in creating behavioral change and intention, it is recommended that future researches add the subjective norm construct to the HAPA model. Most of the studies on physical activity are prospective and do not assess the role of lifestyle behaviors on physical activity intention. Therefore, it is recommended for future research on physical activity to pay enough attention to the role of previous behaviors and habits on the formation of physical activity intention in individuals.

Conclusion

The results supported the effectiveness of the educational intervention based on the motivational phase of the HAPA model in the development of intention for performing physical activities in middle-aged women. Using this model provides a broader perception of the risks, and outcomes, belief in capabilities, and development of an intention for performing physical activities. The findings here provide applied approaches for health service personnel to design and implement educational programs in healthcare centers. Moreover, public health officials may find the finding convincing to plan chronic disease management programs based on holding educational courses based on behavior change theories to promote healthy lifestyles in the target groups. Such interventions prevent excessive costs for the patients and the health system and ensure higher performance regarding health economics.

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Compliance with ethical standards

Conflict of interest The authors declare no conflict of interest associated with this study.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the Institutional Research Committee (ethical committee of the Sabzevar University of Medical Sciences under the code IR.MEDSAB: REC.1396.120) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Written informed consent was obtained from all individual participants included in the study.

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