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Effect of Quran on promoting the eating habits and physical activity of adolescents: using the theory of planned behavior

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Abstract

Today, the role of education on lifestyle has been proven in different studies. This study aimed to determine the effects of Quran teachings on promoting eating habits and physical activity of adolescents using theory of planned behavior (TPB). This was a quasi-experimental study with a pretest design with no control group. Eighty students aged 12-15 years old were selected by multistage random sampling. The data were collected by a researcher-made questionnaire including demographic characteristics and constructs of the theory in the field of eating habits and physical activity. The samples received a five-session course comprising Quran teachings based on. Four weeks after the intervention, the posttest was conducted and the data were analyzed by using paired and independent t-tests, multivariable regression tests. Results showed the mean scores of eating habits and physical activity constructs were different before and after intervention in boys and girls. Moreover, mean scores of intention to healthy eating and physical activity behavior were different between boys and girls. Regression models revealed that intention was the strongest predictor for healthy eating behavior in boys and girls. Physical activity behavior was predicted with perceived behavioral control among boys and subjective norms among girls. The findings suggest to use the theory of planned behavior to design, implement and assess educational interventions, especially religious teachings for improving healthy eating habits and physical activity.

Keywords: Adolescent, Eating habits, Physical activity, quran, theory of planned behavior

Introduction

The prevalence of noncommunicable diseases, such as cardiovascular diseases, strokes, diabetes type II, and some types of cancer, is a major public health concern. Evidence shows that the incidence of these diseases highly correlates with lifestyle, mainly diet and physical inactivity [1]. The weight gain in childhood and adolescence is associated with unhealthy behaviors, including low intake of fruit and vegetables and an increase in sedentary lifestyle. Therefore, promotion of healthy diets and physical activities helps people to maintain their weight in adolescence and decreases noncommunicable diseases in adulthood [2]. According to guidelines, a healthy diet requires considerable decreases in consumption of fats, sugars, salt and

increases in consumption level of fibers [1]. Adolescents are recommended to use at least 5 servings of fruit and vegetables (400 g) per day and do daily physical activities in order to decrease the risk of chronic diseases [3]. Despite the importance of a healthy diet and physical activity in adolescence, under 30% of 12-14 year old adolescents consume vegetables four times a day and fruits three times a day, and only 36% of the students in the United States do physical activities for at least 60 minutes 5 or more days a week; however, both, healthy diet and physical activity decreases with age [4]. A national survey on Iranian 6-18 year old students in rural and urban areas revealed the onset of an obesity epidemic in childhood, which was accompanied with unhealthy dietary habits, including salty, fatty, or sweet snacks; low intake of healthy foods, especially fruit, vegetables, and dairy products, and low level of physical activity [5]. Studies have reported different origins for lifestyle behaviors in adolescents [6,7]. Therefore, familiarity with causes, origins, and roots of such behaviors can help people better understand the patterns and recognize a method that best modifies lifestyle in adolescents [6]. Most interventions in lifestyle of children and adolescents focus on the promotion of healthy behaviors [2]. Religious teachings emphasize healthy behaviors. These teachings particularly point out health-related subjects and deem health a gift of God [8]. Based on Quranic teachings, humans do not have any right to damage their own body and mind with harmful acts or to endanger themselves. According to Quran, anything that damages human body and mind is filthy, and anything that develops mental and physical health is clean and pure [9]. Studies have reported that the interventions using the theories and techniques of behavioral change had a stronger and higher synergistic effect on the support for behavioral change [10]. Theories can be a basis for effectiveness of interventions. Based on the theory of planned behavior (TPB), intention as the important predictor of behaviors consists of three components: attitude, subjective norms, and perceived behavioral control. Attitude is a set of beliefs about behavioral outcomes and evaluation of outcomes. Subjective norms refer to the individual's perception of significant others and the individual's level of desire to adhere to ideas of those people. Perceived behavioral control is determined by the individual's control beliefs and the ability to understand those beliefs [11]. Although the role of TPB-based training in modification of adolescents' lifestyle has been proved in various studies [12 & 13], there is no study on the promotion of lifestyle in adolescents using Quranic teachings. Having used TPB, this study was conducted to examine the effect of Quranic teachings on promotion of dietary behaviors and physical activities in boy and girl students aged 12-15 years.

Method

This quasi-experimental study was performed with a pretest-posttest design without a control group. The target population included the 12-15 year old students of the 2013-2014 in Gonabad, Iran. Using a similar study [14], the sample size was calculated as 47-65 people for different constructs. Regarding the probable loss of samples by 20%, 80 students were selected through multistage sampling method. In this regard, three schools were randomly selected from the only education district in Gonabad, and then, one class was randomly selected from each grade. The students who were not willing to participate in the study or had a history of a physically and mentally debilitating disease were excluded from the study. The participants firstly completed an inventory on adolescents' dietary habits and physical activities (TPB-based) as a pretest. Then, the 5-week training intervention began upon the confirmation of the training content by an expert in Quran and health education. The above-mentioned inventory was completed by the participants four weeks after the training intervention. The measurement instrument was a reliable and valid researcher-made, 5-option inventory that was administered as a self-report anonymously. The inventory was designed using the available articles relevant

to the objectives of the study [7, 12, 15]. To determine validity of the inventory, ten experts in the fields of health education, nutrition, psychology, and epidemiology were requested to comment about the inventory. The reliability of the inventory was determined using the Cronbach's alpha coefficient of 0.92 for all constructs after performing a pilot study on 30 adolescents who were not included in the main study. The inventory comprised 42 items in 6 parts, demographic variables, and TPB's constructs (attitude, subjective norms, perceived behavioral control, intention, and behavior). The demographic variables (including age, sex, father's occupation, mother's occupation, the parents' level of education, place of birth, and place of residence) were examined within 8 items. The theory's construct, attitude, was measured in 7 items within two parts; behavioral beliefs and evaluation of outcomes related to the significance of healthy behaviors and expected outcomes resulting from the practice or failure to practice healthy behaviors (e.g., the intake of fruit and vegetables is good for health; the use of snacks causes obesity; or regular practice of physical activities prevents the diseases) ($\alpha = 0.98$). The subjective norms were measured in 7 items within two parts; normative beliefs and motivation to follow, which show the significant others' perception of behavior and the addressee's motivation to follow that behavior (e.g., physicians believe that exercising adjusts the level of fat and blood pressure; I am willing to consume enough fruits and vegetables every day; or I agree with the specialists who claim that exercising results in weight loss) ($\alpha=0.90$). The perceived behavioral control, which shows the perceived ability to do a behavior, was measured using the control beliefs and perceived ability in 7 items (e.g., I can't help eating snacks; I am sure I can use fruits and vegetables three times a day, or exercising is easier for me if the necessary space and facilities are available) ($\alpha=0.87$). The intention is a construct showing individual's readiness for performing a behavior and was measured with 4 items (e.g., I intend to consume fruits and vegetables three times a day during the next month, or I will try to exercise at least three times a week from the beginning of the next month) ($\alpha=0.88$). The behavior construct, which includes the evaluation of food products (e.g., I consume vegetables 3-5 times a day on average, or I consume dairy products (milk, cheese, curd, etc.) 3-5 times a day on average) and daily walks and regular weekly exercises (e.g., I often participate in a regular exercise programs, such as volleyball, swimming, etc.), with 9 items ($\alpha=0.82$). The items were pointed based on the 5-point Likert scale; from 5 points for "absolutely agree" to 1 point for "absolutely disagree" in areas of attitude, subjective norms, perceived behavioral control, and intention and from 5 for "always" to 1 for "never" in the area of behavior. The data were analyzed in SPSS-20 software using the descriptive and analytical statistical tests. Measures of central tendency and dispersion were used as descriptive tests. Regarding the analytical tests, the normal distribution of the data was determined using Smirnov–Kolmogorov test, and then, given that the distribution of the data was normal, the parametric tests, such as paired t test, Student's t test, and univariate and multivariate regression analysis were used.

Prior to the present study, needs assessment was performed for the training program for promotion of lifestyle with TPB in 175 adolescents in order to implement the program and develop appropriate criteria for intervention. The training program was designed on the basis of priorities in needs assessment and Quranic teachings on healthy diet and physical activity within TPB's constructs. Before beginning the intervention, a manual titled healthy lifestyle in Quran was given to adolescents, their parents and teachers. The intervention had to be supervised by the principal and teachers of the school. Five training sessions were held within 5 weeks for each group. Every session lasted 90 minutes (presentation for 30 minutes, discussion for 30 minutes, questions and answers for 15 minutes, and feedback for 15 minutes). The first session

was related to the attitude construct, and the positive outcomes of healthy diets and physical activities were discussed from the perspective of Quranic teachings. The second session was dedicated to discussing the subjective norms, which refer to the perceived social pressure by the significant others on performing or not performing a behavior. Accordingly, if a student uses Quranic teachings to modify his lifestyle, the significant others, such as parents, agree with his behaviors to a greater extent because his behaviors are more accepted by the religion. The third and fourth sessions were both dedicated to discuss the perceived behavioral control in the fundamental needs assessment due to the importance of this construct. The internal factors, such as skills and abilities of behavioral control, and external factors, such as the facilities and sources that may facilitate or inhibit performing a healthy behavior were discussed in the above two sessions. The fifth session was dedicated to providing motivating spiritual messages (e.g., God is powerful, or God is vivacious) for the adolescents in order to encourage them to intend healthy behaviors besides concluding the materials and evaluating the total content. Both groups were given the post-test in the ninth week.

Results

In this study, 80 boy and girl adolescents were equally divided into two groups. Mean age (standard deviation) of the adolescents was 13.5 (0.9) years in the range of 12-5 years. In terms of demographic specifications, girls significantly differed from boys only in terms of the father's educational level (P=0.004) in that girls' fathers' educational level was higher than that of boys' fathers'. However, other variables were not significantly different between the two groups.

Table 1 shows that the healthy dietary behavior and physical activity in boys and girls significantly increased after the intervention.

According to the paired t test, mean value for TPB's constructs (attitude, subjective norms, perceived behavioral control, intention, and behavior) relevant to the healthy dietary

Table 1 *The adolescents' lifestyle before and after the training intervention*

	Before the intervention		**After the intervention**	
The intake of fruit and vegetables 3 times a day	Percentage	Frequency	Percentage	Frequency
Consumption of harmful snacks	36	29	82	56
Consumption of proteins twice a day	22	17	10	8
Consumption of dairy products twice a day	8	6	71	57
Consumption of cereals 6 times a day	37	29	80	64
Physical activity	7	6	27	21

Table 2 *Comparison of mean and standard deviation of the constructs of the theory of planned behavior in terms of the adolescents' healthy dietary habits before and after the intervention (paired t test)*

		Before	**After**	
Constructs	sex	Mean(±SD)	Mean(±SD)	Significance level
Attitude	Boy	13.95(5.36)	19.32(1.49)	<0.001
	Girl	14.25(3.90)	18.80(1.84)	<0.001
Subjective norms	Boy	15.40(4.38)	19.25(1.86)	<0.001
	Girl	14.40(4.05)	18.77(2.55)	<0.001
Perceived behavioral control	Boy	13.15(4.98)	17(3.12)	<0.001
	Girl	13.47(4.36)	16.65(3.43)	<0.001
Intention	Boy	4.85(2.35)	9.30(1.45)	<0.001
	Girl	5.27(2.20)	8.35(1.98)	<0.001
Behavior	Boy	16.30(7.78)	31.02(5.04)	<0.001
	Girl	18.27(7.76)	29.57(6)	<0.001

behaviors before the intervention differed from that after the intervention in boy and girl adolescents at 5% error (P<0.001). It can be argued that the Quranic teachings (within TPB) are effective in healthy dietary habits of boy and girl adolescents (Table 2).

Based on the results of paired t test, mean value for TPB's constructs (attitude, subjective norms, perceived behavioral control, intention, and behavior) relevant to the physical activity before the intervention differed from that after the intervention in boy and girl adolescents at 5% error (P<0.001). Therefore, it can be concluded that Quranic teachings (within TPB) are effective in physical activity of male and female adolescents (Table 3).

Regarding the Student's t test, mean level of intention for the healthy dietary behaviors (P=0.017) and mean level of physical activities (P=0.013) after the intervention in boys differed from that in girls at 5% error. In this respect, it can be argued that Quranic teachings (within TPB) affect the healthy dietary habits and physical activity of boy and girl adolescents in different ways (Table 4).

Table 3 *Comparison of mean and standard deviation of the constructs of TPB in terms of the adolescents' physical activity before and after the intervention*

		Before	After	
Constructs	sex	Mean(±SD)	Mean(±SD)	Significance level
Attitude	Boy	13.17(2.73)	14.70(0.75)	<0.001
	Girl	11.62(2.63)	14.55(1.06)	<0.001
Subjective norms	Boy	12.05(3.40)	14.52(1.19)	<0.001
	Girl	11.05(2.90)	14.47(1.56)	<0.001
Perceived behavioral control	Boy	10.30(3.22)	14.15(1.95)	<0.001
	Girl	11.20(3.18)	13.90(1.94)	<0.001
Intention	Boy	6.57(2.64)	9.52(1.06)	<0.001
	Girl	6(2.51)	9(1.41)	<0.001
Behavior	Boy	6.67(2.22)	9.52(0.96)	<0.001
	Girl	6(2.52)	8.72(1.73)	<0.001

The multivariate regression analysis showed that the demographic specifications and

Table 4 *Comparison of mean and standard deviation of the constructs of the TPB before and after the intervention (independent t test)*

		Before			After		
		Male	Female		Male	Female	
		Mean (±SD)	Mean (±SD)	P-value	Mean (±SD)	Mean (±SD)	P-value
Attitude	Diet	13.95(5.36)	14.25(3.90)	0.776	19.32(1.49)	18.80(1.84)	0.165
	Physical activity	13.17(2.73)	11.62(2.63)	0.012	14.70(0.75)	14.55(1.06)	0.469
Subjective norms	Diet	15.40(4.38)	14.40(4.05)	0.239	19.25(1.86)	18.77(2.55)	0.346
	Physical activity	12.05(3.40)	11.05(2.90)	0.162	14.52(1.19)	14.47(1.56)	0.783
Perceived behavioral control	Diet	13.15(4.98)	13.47(4.36)	0.757	17(3.12)	16.65(3.43)	0.635
	Physical activity	10.30(3.22)	11.20(3.18)	0.213	14.15(1.95)	13.90(1.94)	0.568
Intention	Diet	4.85(2.35)	5.27(2.20)	0.408	9.30(1.45)	8.35(1.98)	0.017
	Physical activity	6.57(2.64)	6(2.51)	0.322	9.52(1.06)	9(1.41)	0.064
Behavior	Diet	16.30(7.78)	18.27(7.76)	0.260	31.02(5.04)	29.57(6)	0.246
	Physical activity	6.67(2.22)	6(2.52)	0.208	9.52(0.96)	8.72(1.73)	0.013

TPB's constructs predicted healthy dietary behavior in boys by 80% and in girls by 68%, as the intention construct was the strongest predictor of healthy dietary behavior in boys (B=0.831) and girls (B=0.529). The factors altogether predicted physical activity in boys by 72% and in girls by 67%, as the perceived behavioral control and subjective norms predicted the physical activity respectively in boys (B=0.628) and girls (B=0.882) (Table 5).

Table 5 *Prediction of the behavior using the multivariate regression analysis and regarding the difference between males and females in terms of constructs before and after the intervention*

		Dietary habits			Physical activity		
Constructs	sex	B standard	t-value	Significance level	B standard	t-value	Significance level
Attitude	Boy	-0.283	-1.48	0.150	0.038	0.25	0.804
	Girl	0.352	1.51	0.140	-0.511	-0.87	0.071
Subjective norms	Boy	0.076	0.43	0.667	-0.139	-0.64	0.522
	Girl	0.432	3.28	0.002	0.882	3.70	0.001
Perceived behavioral control	Boy	0.073	0.54	0.590	0.628	3.50	0.001
	Girl	-0.049	-0.45	0.653	-0.266	-1.14	0.265
Intention	Boy	0.831	9	<0.001	-0.094	-0.54	0.593
	Girl	0.529	6.32	<0.001	0.336	1.44	0.159
Age	Boy	0.552	3.50	0.00	0.021	0.11	0.908
	Girl	-0.295	-1.70	0.099	0.066	0.23	0.816
Father's educational level	Boy	0.036	0.40	0.689	0.338	3.12	0.044
	Girl	0.171	0.64	0.640	-0.157	-0.44	0.664
Mother's educational level	Boy	-0.412	-3.30	0.002	0.264	1.40	0.18
	Girl	-0.088	-0.38	0.382	0.454	1.30	0.209
		Boy adjusted R^2=0.80 Girl adjusted R^2 = 0.68			Boy adjusted R^2=0.72 Girl adjusted R^2 = 0.67		

Discussions

The inappropriate habits in adolescents' lifestyle not only threaten the health of this age group but also expose Iran to the risk of epidemic noncommunicable diseases [5]. This study was conducted to examine the effect of Quranic teachings on promotion of adolescents' dietary habits and physical activity using TPB. The results showed that the "Quranic teachings based on TPB were effective in healthy dietary behaviors of the boy and girl adolescents." This result conforms to that of two similar studies that showed the effectiveness of religious teachings in higher use of fruit and vegetables in the participants [16 & 17]. Similar to the present study, Kim et al. showed that the scriptural teachings had positives effects on adopting healthy diets, weight loss, and improvement of physical activity in African men and women based on the cognitive theory [18]. They also showed that the religious teachings played an important role in promotion of healthy behaviors, especially in indigenous and small communities [18]. It seemed that the useful recommendations in Quranic teachings developed motivations appropriate for increasing healthy dietary habits in adolescents, as they were encouraged to use healthy foods after the intervention.

The results also showed that the "Quranic teachings based on TPB were effective in the physical activity behavior in the boy and girl adolescents." This result agrees with that of similar studies conducted on the effect of religious teachings on increasing the physical activities [19,20], but disagrees with that of some other studies [21,22]. It should be noted that the complicated and habitual behaviors, such as physical activities, depend on personal abilities and environmental opportunities; that is, the positive intention is not actualized if the skills and facilities required for modification

of the physical activity behavior do not exist although enough knowledge is available [23]. In the present study, the physical activity behavior significantly increased in boys and girls. This increase can be attributed to Quranic teachings that increased the control and self-efficacy in adolescents, and their ability to overcome the barriers to physical activities.

Moreover, the results revealed that the "Quranic teachings based on TPB affected the healthy dietary behavior and the physical activity behavior in boy and girl adolescents at different degrees." Some similar studies have shown that boy and girl adolescents acted differently in adopting lifestyle behaviors, and thus, the training strategy is better to be different for boys and girls [5, 6]. Recognizing lifestyle behaviors in both sexes can facilitate the perception of behavioral patterns and detection of the most appropriate method for modifying behavior [6]. The difference between sexes was also examined in terms of the prediction of behaviors through TPB's constructs.

Regression analysis showed that intention was the strongest predictor of healthy dietary behavior in both sexes. Similar to the present study, evidence showed that intention was the strongest predictor of behavior in relation to consumption of fruits and vegetables 5 times a day in adolescents [24]. This result confirms the hypotheses of TPB and validity of the model in prediction of behavior and deems the intention an integral determinant of a specific behavior [12].

There was no correlation between intention and physical activity behavior in this study. This result disagrees with that of studies indicating intention as the most important predictor of behavior [24, 25]. It seems that the intentions of adolescents, rather than those of adults, are less compatible with their behaviors. Furthermore, if people do not have enough capacity, facilities, and control for performing a specific behavior, the poor facilitating conditions can prevent the performance of the intended behavior [25]. The perceived behavioral control predicted physical activity behavior in boys, as compared with girls in this study, which conforms to evidence about the physical activity [26]. Some evidence shows that adolescents with high self-efficacy and control used enough fruits and vegetables and participated in exercising activities more favorably than those with poor control [27]. The subjective norms predicted physical activity behavior in girls in this study. However, some studies have shown subjective norms as the most important factor in promoting participation in physical activities in young women [6, 28]. The analyses by several studies revealed that subjective norms were often less important than attitude and perceived behavioral control constructs [29]. In the present study, probably a strong sense of parental support may suggest why physical activity behavior has been affected directly by subjective norms. The Quranic teachings might have developed a strong sense of social acceptance and also perceived control of healthy behavior in adolescents. Moreover, the higher educational level of girls' fathers as compared to boys' fathers might be effective in prediction of physical activity by subjective norms in girls, which needs further studies.

According to studies, attitude has a major effect on behavior, and behaviors are often the influence of attitude [30, 31]. The low contribution of attitude in the present study might be due to the fact that the adolescents were well aware of the advantages of healthy diet and physical activity. However, the TPB-based interventions alone were effective in adolescents' lifestyle in terms of consuming fruits and vegetables [13] and physical activity [14]. Regression analysis in this study showed that demographic variables and TPB constructs predicted behavior by 67%-80%, which was higher than that in most studies using TPB without religious teachings. Therefore, Quranic teachings may have higher effects on adolescents' adoption of a healthy lifestyle.

The intervention was performed based on educational needs assessment for promoting lifestyle, and the theoretical framework and Quranic teachings used in this intervention

were advantages of this study. The limitations of this study included the lack of literature on Quranic teachings, the lack of a control group for accurate comparison, the unexpected irregularities during the intervention, and the limited time of data collection. Moreover, the results cannot be generalized to adults or people without religious beliefs.

Conclusion

This study shows a positive correlation between Quranic teachings and healthy lifestyle; Quranic teachings can be considered an important strategy for promoting health in adolescents, and TPB can be a basis for effectiveness of interventions using religious teachings. The comparison of boy and girl adolescents showed higher effectiveness of Quranic teachings in boys who believed that they could really control their behavioral changes, while, girls received more social support than boys did and preferred to enjoy and spend their time with others. The difference between sexes may need separate interventions for both sexes. It is recommended to embed the Quranic teachings in the programs for promoting adolescents' lifestyle. Further studies in this regard are recommended to be performed on parents and also on the effect of such a program using a control group. Moreover, qualitative studies are recommended in order to define the barriers to adopting a healthy lifestyle from the perspective of adolescents. Future studies are also recommended to examine all personal and social levels of lifestyle using interpersonal theories.

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Contributions

Study design: FT, MM
Data collection and analysis: FT, AA
Manuscript preparation: FT, JT

Conflict of Interest

"The authors declare that they have no competing interests.

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