

## Investigating the Determinants of Physical Activity in Students in Order to Prevent Diabetes based on Planned Behavior Theory

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### Abstract

#### Background

Diabetes is the most common endocrine glands disease. Among the factors contributing to increased incidence of diabetes in adolescents is lack of physical activity. Various studies indicate prevalence of sedentary lifestyle in children and adolescents. Therefore, in this research the factors affecting performing physical activity have been examined with the aim of preventing diabetes using the planned behavior theory in girl students.

#### Materials and Methods

In this cross-sectional study, 185 female students were chosen through random multistage sampling method. The data collection instrument was a questionnaire consisting of four sections including demographics, awareness about diabetes, the constructs of planned behavior theory about physical activity, and international physical activity questionnaire (IPAQ). Data analysis was performed with the help of SPSS 16, through Pearson correlation coefficient and generalized linear model (GLM).

**Results:** The mean age of the students was  $11.51 \pm 0.76$  years. The mean scores of different components were as follows: awareness ( $4.85 \pm 1.49$ ), attitude ( $35.84 \pm 3.56$ ), mental norms ( $21.96 \pm 4.53$ ), controlling perceived behavior ( $15.02 \pm 2.65$ ), and behavioral intention ( $15.21 \pm 2.50$ ). There was a significant relationship between the intention of performing physical activity and attitude ( $P < 0.001$ ), mental norms ( $P < 0.001$ ), and controlling perceived behavior ( $P < 0.001$ ). The results of fitted GLM showed that only the perceived behavior control construct was significant in terms of predictive power for performing physical activity ( $P < 0.001$ ).

#### Conclusion

According to the results, the intention of performing physical activity had a significant relationship with the constructs of attitude, mental norms, and perceived behavior control.

**Key Words:** Diabetes, Students, Physical Activity, Planned Behavior Theory.

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## 1- INTRODUCTION

In recent decades, in parallel with economic advances, the epidemiology of diseases has also undergone major transformations, including reduction in infectious diseases while growth in lifestyle-associated diseases (1). Diabetes mellitus is the most common endocrine disease, and currently there are about 422 million people suffering from this disease worldwide (2). It causes chronic complications to develop in eyes, kidneys, blood vessels, and nerves by creating metabolic abnormalities (3). Various studies indicate prevalence of inactivity in children and adolescents (4-7). Furthermore, the prevalence of inactivity among girls has been reported to be especially higher than that of boys in developing countries (8). During adolescence, teenagers develop their areas of qualification, whereby the responsibility of maintaining health is relegated from parents to the teenagers. Further, this large group of the society is the generating force and capital of any country (9).

Investigations suggest that one of the factors determining performing physical activity is the barriers that the person feels for performing these behaviors (10). In contrast, the abilities to overcome the obstacles against physical activity have a positive and significant relationship with enhanced physical activity (11). Planned behavior theory was propounded in 1885 and further developed by Ajzen and Fishbin in 1991. This theory consists of constructs including personal attitude, mental norms, perceived behavior control, and behavioral intention. According to the theory, behavioral intention is an outcome of 1) the person's attitude to the behavior, 2) the person's perception about social norms of others and the surroundings, and 3) the person's perception about the extent of control they have for performing or not performing the behavior (12). Considering the importance of physical activity for

preserving and improving the health of girls, in this research, we dealt with determining the factors affecting performing physical activity with the aim of preventing diabetes using planned behavior theory in female students in Mashhad city, Iran. By identifying these factors, we would be able to design an effective educational program to enhance physical activity and eventually the public health of students.

## 2- MATERIALS AND METHODS

### 2-1. Method

This descriptive study is of cross-sectional type conducted on primary girl students in 2018. The sample size was considered 185, assuming  $\alpha=0.05$ , and  $\beta=0.2$  using the following formula, and correlation coefficient ( $r=0.205$ ) between the construct of intention with mental norms based on a preliminary study (20 individuals). They were chosen through random multistage sampling selected from the seven areas of District 1 in Mashhad (Area 5) randomly, whereby three primary schools were chosen indiscriminately. Again, two classes were chosen randomly from the fifth and sixth grades from each school. Overall, six classes including three classes from the fifth grade and three classes from the sixth grade were selected and examined in this study.

### 2-2. Inclusion criteria

Fifth and sixth grade primary girl students with no physical disability and with willingness to participate in the research.

### 2-2. Measuring tools

Data collection instrument in this research included four parts: demographic questions, diabetes awareness questionnaire, physical activity questionnaire based on the constructs of planned behavior theory, and standard physical activity questionnaire IPAQ in

order to measure the extent of consumed energy by physical activity.

### **2-2-1. Baseline characteristics**

This part consisted of seven questions about the age of student, occupation of mother and father, level of education of mother and father, family income, and existence of any member with diabetes in the family.

### **2-2-2. Questions related to awareness about diabetes**

The questionnaire applied in the study had already been employed by Peyman and Alipour (13) whose reliability and validity had been measured with Cronbach alpha coefficient of 0.76. It included 10 questions about the knowledge of people about the symptoms for diagnosing type I diabetes, methods for preventing type II diabetes, and the symptoms of hypo-and hyperglycemia. The student scores are calculated from 10 scores, whereby one score is dedicated to every correct answer, while zero is assigned to wrong answers.

### **2-2-3. Questions related to the constructs of planned behavior theory**

In order to design and develop the questionnaire related to the variables of planned behavior theory, the study by Solhi et al. (14) whose reliability and validity had been measured was used. Its Cronbach alpha coefficients were as follows: questions of attitude = 0.70, mental norms = 0.73, perceived behavior control = 0.75, and behavioral intention = 0.72. The questionnaire related to the planned behavior theory constructs included: attitude nine questions (out of 45 scores), mental norms six questions (out of 30 scores), perceived behavior control four questions (out of 20 scores), and behavioral intention four questions (out of 20 scores), all of which were presented as five-option Likert scale ranging from absolutely agree to absolutely disagree. In all of the constructs, absolutely

disagree=1, disagree=2, no idea=3, agree=4, and absolutely agree=5. Nevertheless, in the first two questions of the construct of perceived behavior control, the scoring was inverse compared to other constructs.

### **2-2-4. Standard physical activity questionnaire (IPAQ)**

In this questionnaire, some questions are asked from the subjects about vigorous and moderate physical activity as well as walking in the past week (15) (the total physical activity of the person in the past week; Metabolic Equivalent of Task (MET)-minutes per week). MET is a unit which is used to estimate the energy consumed by physical activity (16). It is almost equivalent to the extent of the resting state energy of the person. All physical activities can be categorized as factors of the extent of energy consumption in the resting state. In this questionnaire, walking, moderate physical activity, and vigorous physical activity were considered as 3.3, 4, and 8 METs, respectively. This questionnaire has been used in measuring the physical activity across different studies in the country, and its reliability and validity are also acceptable (17). These questionnaires were provided to the subjects of the research.

### **2-3. Data Analyses**

After completion of the questionnaires, the data analyzed using SPSS software version 16.0, whereby descriptive statistics were used to determine the mean and standard deviation (SD) of awareness as well as the constructs of planned behavior theory. Also, Pearson correlation coefficient test was employed to determine the relationship between the intention for performing physical activity and the constructs of planned behavior theory for data analysis. In addition, the generalized linear model (GLM) was utilized to determine the most powerful predictive construct in enhancing physical activity of

students to design an educational interventional program.

#### 2-4. Ethical consideration

Note that informed consent for participation in the research was taken from all participants before conducting this study, and all ethical principles were followed across all stages of the research. Also, it was not necessary to write a name and the information was extracted in general.

### 3- RESULTS

The age range of subjects was 10-13 years with the mean of  $11.51 \pm 0.76$ . Also, 34.1%, and 39.5% of the educational levels of father and mother belonged to diploma group, respectively. Also, 85.4% of students' mothers were housewives, and 45.9% had fathers who were self-employed. Further, 40% of the monthly family income ranged between 5 and 10 million rails. Ultimately, 27.6% of students had a family member with diabetes. In terms of status of physical activity, the students were categorized into three groups in terms of extent of physical activity based on IPAQ questionnaire. Based on that, none of the students were assigned into the vigorous physical activity

group. On the other hand, 24.3% (45 individuals) had moderate physical activity, and 75.7% (140 individuals) stated walking as their physical activity (**Table.1**). The findings suggest moderate level for the score of knowledge and constructs of planned behavior about physical activity. The findings showed a significant relationship between intention for performing physical activity among girl students and attitude ( $P=0.000$ ,  $r=0.297$ ), mental norms ( $P=0.000$ ,  $r=0.260$ ), and perceived behavior control ( $P=0.000$ ,  $r=0.270$ ) (**Table.2**). Considering the power of relationship between variables, it was observed that the relationship between attitude and behavioral intention is the most powerful. Among the GLMs, Tweedie mixed models with the identity link function was better fitted based on the Akaike Information Criterion (AIC). The results of fitted GLM were reported in **Table.3**. From among the mentioned constructs, only the construct of perceived behavior control was significant ( $P<0.001$ ). Accordingly, education in the meetings of the intervention group should be performed on all constructs of planned behavior theory and with a greater emphasis on the perceived behavior control construct.

**Table-1:** Mean of knowledge and attitude scores and constructs of planned behavior theory in participants

Variables	Mean	SD
Knowledge (0-10)	4.85	1.49
Attitude (0-45)	35.84	3.56
Subjective Norms (0-30)	21.96	4.53
Controlling perceived behavior (0-20)	15.02	2.65
Behavioral intention (0-20)	15.21	2.50

SD: Standard deviation.

**Table-2:** The correlation coefficient of intention with the structures of planned theory of physical activity in the participants

Variables	Pearson correlation coefficient	P-value
Attitude	0.297	< 0.001
Subjective Norms	0.270	< 0.001
Controlling perceived behavior	0.260	< 0.001

**Table-3:** The results of generalized linear model analysis (GLM) to predict physical activity by planned behavior theory and knowledge of diabetes

Variables	Regression coefficient	Standard Error	P-value
Intercept	151.89	411.75	0.712p
Attitude	-4.58	10.93	0.675
Subjective norms	9.56	8.62	0.267
Controlling perceived behavior	55.74	14.18	< 0.001
Behavioral intention	-24.52	15.40	0.111
Knowledge	17.78	23.87	0.456

#### 4- DISCUSSION

This research dealt with determining the factors affecting performing physical activity with the aim of preventing diabetes using the planned behavior theory among girl students in Mashhad, Iran. Given the maximum score of awareness in this study could be 10, the mean awareness score of students, which was 4.85, suggests their moderate level of awareness about diabetes. The results of awareness in this study are in accordance with the findings obtained by Peyman and Alipour (13), in which awareness about diabetes before the educational intervention was average. For this reason, by presenting adequate information through holding educational sessions and providing the necessary references about diabetes as well as the benefits of physical activity, we can take effective steps to enhance awareness among students and prevent diabetes. Considering the maximum score of 45 for attitude in this study, the average score of 35.84 suggested positive attitude to physical activity, which is congruent with similar studies in this regard (14, 18, 19). The maximum score of mental norms is 30, while in this study the average score was 21.96, suggesting moderate level of mental norms, which is in line with the findings of Tabataei et al., and Parut et al. (18, 20). In this regard, the school officials can encourage students to have an active lifestyle by creating a supportive and encouraging environment for performing

physical activity in schools. Since enjoying the support of friends is one of the facilitating factors in adopting exercise-minded behavior, using peer group and students willing to cooperate in presenting education to their classmates' one can take effective steps to enhance the mental norms associated with physical activity. Furthermore, it is possible to attach banners with health-related mottos in the noticeboards about physical activity, such that as soon as students enter the school, they are exposed to different encouraging slogans. The mean score of behavior intention in students was  $15.21 \pm 2.50$ , which in relation to the maximum score of 20 for this construct in this study, the students had an almost moderate level of intention for performing physical activity. Similarly, in the study by Tabataei et al., the studied individuals had moderate levels of intention for performing physical activity, which is consistent with our study (18). For this reason, adopting effective educational approaches for behavioral intention can be effective in achieving desired level of physical activity among students. Considering the perceived behavior control construct, the mean score was  $15.02 \pm 2.65$ , which in relation to the maximum score of 20, suggests average control on physical activity by students, which is congruent with the findings of Tabataei et al., and Paarot et al. (18, 20). Since controlling perceived behavior depends on the absence or presence of

facilitators or obstacles for performing a behavior or perceived power, this result suggests that the studied population feels that they do not have complete control for performing physical activity due to the existence of some barriers. In response, by providing the necessary facilities to perform physical activity in schools, parks, and public places, some of the barriers against performing physical activity can be eliminated. Further, educational programs should reinforce this idea in students: in spite of obstacles, they can have regular and adequate physical activity, and in this regard use of inspiring interviews and holding meetings for enhancing self-efficacy in them can be effective. Considering the predictive power of the constructs of planned behavior theory for performing physical activity, only the perceived behavior control construct was significant, which was in accordance with studies on walking by children until school (21), and physical activity in teenagers (22).

#### 4-1. Limitations of the study

In this research, cross-sectional study was used for describing the relationships between variables. The major characteristic of cross-sectional studies is that the data are collected within a certain period of time which limits the ability of determining causal relationships between variables. Secondly, because of the selection of participants from female students, there is a possibility of bias by the candidate. Eventually, in this study the data were collected as self-reported, and thus may not reflect the real performance of individuals.

#### 5- CONCLUSION

In this study, the intention of performing physical activity had a significant relationship with the constructs of attitude, mental norms, and perceived behavior control. It is suggested that by

holding brainstorming sessions and group discussions for students, one can identify the factors affecting physical activity among students. In this way, by changing our attitude one can drive them towards performing physical activity. Further, holding educational sessions for influential people who can influence students through encouragement can also be effective. Finally, by providing the necessary facilities required for doing exercise in schools one can contribute to enhancing physical activity and preventing diabetes among girl students.

**6- CONFLICT OF INTEREST:** None.

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