



## The Effects of Self-care Training on Self-perception in Diabetic Adolescents

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### Authors' contributions

This work was carried out in collaboration between all authors. Author FB designed the study, performed the statistical analysis, wrote the protocol and managed the literature searches and wrote the first draft of the manuscript. Author PA provided advice for the study design and managed the analyses of the study and supervised writing the manuscript. Author AF provided advice for the study design and supervised writing the manuscript. Author MS provided advice for the study design and supervised writing the manuscript. All authors read and approved the final manuscript.

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### ABSTRACT

**Introduction:** Some of the problems that diabetic adolescents face are disturbances in mental image, difficulty in communicating with peers, and fear of dependence and lack of self-sufficiency, which cause changes in self-perception.

**Methods:** This study was a clinical trial with a sample size of 80 patients in two groups, including a

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control group (n=40) and an experimental group (n=40) of adolescents between 11–19 years of age referred to the Iran Diabetes Association (Aboozar). The training content was similar in both groups. In the control group, the educational contents were presented in three sessions of four hours; in the experimental group, they were trained by a CD. Their self-perception scores were then measured by using an 80-item Piers-Harris questionnaire, before and after intervention. SPSS software version 16 was used for the data analysis.

**Results:** There were no significant differences in the self-perception of the two groups before the intervention, but there was a significant difference between the self-perception scores obtained from the Piers-Harris test in the control and experimental groups after the intervention ( $P=0.000$ ).

**Conclusion:** The self-perception of diabetic adolescents can be increased by the use of e-learning, and subsequently their blood glucose levels can be reduced, thus reducing various complications from diabetes.

*Keywords: Adolescence; diabetes; e-learning; self-perception; self-care.*

## 1. INTRODUCTION

Although type 1 diabetes (also known as diabetes mellitus type 1) can happen at any age, it usually develops by early adulthood, and most often reaches its peak during maturity [1]. An appropriate self-care plan is necessary to maintain the quality of life and glycemic control in diabetic adolescents [2]. Managing type 1 diabetes is a very complex task; in addition to managing and maintaining blood glucose levels, diabetics need to control their diet and to partake in regular exercise [3].

During adolescence, families should consider factors such as individual differences in caloric intake, adolescent activity level, age of menarche in girls, and adolescent mood swings, and they should encourage adolescent self-care [4]. Orem in 1995 defined self-care as a regular humanistic performance which individuals can do for themselves, and that they can transfer to others. Orem believes that self-care may be divided into two: public sectors for healthcare and self-care at the time of deviation from health [5]. The self-care behaviors of health deviation often are used in diseases such as diabetes. Diabetes necessitates self-care behaviors for one's whole life, such as self-controlling blood glucose levels with insulin injections, and controlling for hypoglycemia and hyperglycemia by following a diet, exercising regularly, and taking care of the feet [6]. Providing self-care activities in patients, and training and encouraging them in this field, can increase health outcomes such as the ability to manage symptoms and the improvement of daily living activities, and subsequently of individuals' self-perception [7].

'Self-perception' refers to what individuals think of themselves. Self-perception is inherent, and it

is created based on the concept of 'I'. Many believe that self-perception is adopting the individual's behaviors and activities [8]. Self-perception is considered to be a multidimensional, hierarchical, and two-part concept: a scientific and an unscientific part. In the scientific part, the aspects related to different academic areas are created, while the emotional aspects are formed in the unscientific part [9]. Self-perception is formed as a result of self-experimentation, genetics, and other factors; it is formed by individual identity and is the self-acceptance of oneself. Self-perception is considered to be a key principle in mental health [10]. Negative self-perception, especially during adolescence, can lead to problems such as anxiety, aggression, depression, criminal behavior, drug abuse, failure in school, and poor quality of life [11]. Individual self-perception is formed throughout one's life, but a large part of it is formed during adolescence, and it provides an area for mental health. Acceptance of one's physical appearance, gaining approval from important people in one's life (especially one's peers), social acceptance, academic and athletic abilities, and physical and mental health are important factors that influence the formation of self-perception [12].

The presence of chronic disease can cause a decrease in self-perception, because it can lead to individual limitations and it can impair a person's mental image [13]. Thus, compatibility in the presence of chronic disease and accurate management (which can largely be obtained from self-care) can be helpful in the formation of positive self-perception. In addition, there is a direct relation between self-perception and self-care. Positive self-perception can lead to better self-care in a person, and it can increase the person's quality of life [14]. Proper training of

self-care principles in a person can also lead to an increase of a person's quality of life [15].

Self-care diabetes training has been identified as an essential component of diabetes care. The purpose of this training is to help patients to gain awareness, knowledge, attitudes, and required skills to perform effective self-care [16]. Some researchers believe that the selection of an accurate self-care training method for adolescents can increase the quality of self-care and adolescents' self-perception. In diabetes training, in considering the education and health needs of patients, we should also pay attention to individual differences and the educational contents of such trainings, and methods should be acceptable from a person's cultural perspective [17]. Prior to training, it is important to choose an educational approach [18]. The educational approach depends on several factors, such as the purpose of education; educational opportunities and experiments; interests and characteristics of the target audience; learning principles governing the subject; educational facilities and equipment; and educational resources [19].

Because adolescents are often interested in technology, the use of information technology (IT) for training and changing their learning approaches is a natural choice [20]. E-learning (short for 'electronic learning') is a type of individual learning in which learners are able to achieve their educational goals according to their talents; they actually learn how to learn [21]. Today young adolescents are so interested in using computers and mobile devices that e-learning is one of the most appropriate methods for training them [22]. Adolescence is a sensitive and critical stage of life in which physical and psychological changes occur. The formation of self-perception during this period can have a significant effect on adolescent growth and development; as such, diabetes can be a serious hazard to adolescent self-perception. As a result, it is necessary to nourish a positive self-perception in adolescents. Training is one measure that should be undertaken to help.

This research was conducted to determine the effects of self-care training on the self-perception of diabetic adolescents.

## 2. MATERIALS AND METHODS

### 2.1 Study Population

This study is a quasi-experimental study. The study population is composed of adolescents

aged 11–19 with type 1 diabetes who were referred to the Iran Diabetes Association (Aboozar) who were not suffering from other chronic diseases such as asthma, epilepsy, mental retardation, severe mental disorders, learning disorders, memory disability, or any other disorder that would prevent a patient from cooperating. Other inclusion criteria were that they were not participating in a similar study; that at least six months had passed since they had received a definitive diagnosis of diabetes by a physician; that they had access to and familiarity with technology such as a CD or DVD player; that they were not in the denial stage of their disease; and that they were willing to participate in the study.

### 2.2 Data Collection Tools

Before intervention, information was collected by a two-part questionnaire. The first section of the questionnaire included general information on adolescents (personal, family, and social lives); the second part included questions related to self-perception, as determined by the Piers-Harris questionnaire. The Piers-Harris questionnaire consists of 80 questions; it is used to measure the self-perception of adolescents and children between the ages of 8 and 21. The questionnaire consisted of seven sections on different issues, including behaviour (16 questions); school situation and mental/cognitive situation (17 questions); physical attributes and appearance (11 questions); anxiety (14 questions); friendliness and popularity (12 questions); and happiness and satisfaction (10 questions). Questions were in the form of 'Yes' or 'No'; about half of the questions were positive and half were negative. In negative questions, a 'No' answer had a rating of 1, and in positive questions, a 'Yes' answer had a rating of 1. This means that for positive questions, 'Yes' answers had 1 point and 'No' answers had -1 point. For negative questions, these scores were reversed: 'Yes' answers scored -1 and 'No' questions scored 1. Thus, the scores obtained from the questionnaires fell between -80 to +80. Average and standard deviation were then calculated, and scores were divided into four groups in terms of the mean and standard deviation. Thus, the scores between 60 and 80 represented a very positive self-perception; scores between 40 and 60 represented positive self-perception; and scores between 20 and 40 represented negative self-perception. Scores lower than +20 showed very negative self-perception. A Wilcoxon signed rank test was used to compare the adolescents'

levels from the self-perception perspective; the results were used in two consecutive tests. The statistical rate  $Z=-0.037$  with  $P=0.971$  indicates a higher reliability for classifying individuals.

### 2.3 Ethical Considerations

Authors obtained ethical approval from Tehran University of Medical Sciences. In addition, before the intervention, informed consent was received from the subjects after fully explaining the details in the form. They signed the form if they were willing to participate in the study. If the subjects were younger than 18 years of age, the contents of the form were read aloud and explained to them, and their parents were also briefed about the contents of the study; accordingly, the form was signed by the parents and the adolescents.

### 2.4 Intervention

The study began after obtaining the necessary permits from Tehran University of Medical Sciences and coordinating with the officials at the diabetes centre. Adolescents who met the inclusion criteria were selected and divided into two groups (control group=40, experimental group=40) using a random numbers table. In order to implement a routine control training, a few approaches were taken, such as diabetes path physiology; insulin treatment; insulin injection method; daily monitoring of blood glucose (blood glucose in urine and acetone in urine > 240 mg/dl); early complications (ketoacidosis and hypoglycemia) as well as late complications; diabetes' effects on other diseases (e.g., infectious disease, diarrhea and vomiting, etc.); and the nutrition, exercise, and psychology of diabetes patients. The subjects received this information in the form of a fifteen-hour training course as a group class in three continuous sessions of four hours each at the Iran Diabetes Association.

The experimental group received the same training via a CD or DVD in PowerPoint or video format. In order to investigate the effectiveness of training in adolescent self-perception, the final blood-glucose rate of the subjects was measured on the day of their visit to the centre in both the control and experimental groups. After one month (4 weeks), a second questionnaire related to the Piers-Harris questions was given to the

subjects for follow-up treatment. Data gathering and training courses were conducted by the researchers, who are trained nurses.

### 2.5 Data Analysis

SPSS software version 16 was used for the data analysis. For comparison between the two groups, the chi-square test was used, and the T-test was used for comparing means. In addition, a paired t-test was used before and after the intervention for comparing self-perception means.

## 3. RESULTS

The results showed that the mean age of the adolescents in the experimental group was  $15.87\pm 2.62$ , and  $15.85\pm 2.51$  in the control group. Twenty-five percent of the experimental group had a person in their family with diabetes. The number of insulin injections in the experimental group (with 97.5%) was four times a day, and in the control group (with 47.5%) was three times a day. In the experimental group, 52.5% were diagnosed with diabetes between the ages of 11 and 15, and in the control group, 54% were diagnosed with diabetes below 10 years of age. Just over three-fifths (62.5%) of the experimental group and nearly three-quarters (74.4%) of the control group had had diabetes for more than 37 months. The demographic characteristics of the experimental and control groups were not significantly different; 82.5% of the experimental group and 77.5% of the control group were injected with insulin (Table 1).

The paired t-test indicated that there was no significant difference between the mean and standard deviation of the Piers-Harris test; after intervention, these differences became significant ( $P<0.001$ ) (Table 2). The results also indicate that there was a significant statistical difference between the control and experimental groups during the study of self-perception scores before the intervention. The self-perception scores after intervention was higher in the experimental group proportional to the control group, however, and there was no significant difference between the two groups ( $P<0.001$ ) (Tables 3 and 4). The self-perception scores before and after intervention were not significantly different between the two groups for males and females.

**Table 1. Comparison of mean±SD blood sugar, haemoglobin A1C, and self-perception scores among the referred adolescents with diabetes before and after the intervention, in the experimental and control groups**

Groups' mean±SD	Experimental		Control	
	Before	After	Before	After
Last blood sugar	166.3±69.38 T=-2.56; df=38; p=0.015	142.65±76.61	175.35±110.8 T=1.39; df=398; p=0.171	191.07±103.20
Hb A1C	8.48±1.99 T=0.409; df=22; p=0.687	8.11±2.23	7.90±1.59 T=-1.36; df=28; p=0.185	8.25±1.90
Difference in self-perception scores	35.38±20.44 T=-7.80; df=39; p=0.000	53.40±16.19	37.38±22.64 T= -0.066; df=39; p=0.50	38.80±22.17

**Table 2. The blood glucose, haemoglobin a1c, and piers-harris self-perception scores in the referred adolescents before and after the intervention, in the control and experimental groups**

Group variable	Intervention	Control	Results
Difference in blood sugar	73.62±30.18	71.26±15.72	T=2.816; Df=77; P=0.006
Difference in haemoglobin	1.73±0.148	0.560±0.141	T=0.769; Df=25; P=0.449
Difference in self-perception score	18.02±14.60	13.46±1.43	T=5.28; Df=78; P=0.001

**Table 3. The self-perception scores in the adolescents referred to the diabetes association before the intervention, in the control and experimental groups**

Group frequency of self-perception	Intervention N (%)	Control N (%)	Results
<20 (Very negative)	10(25)	9(22.5)	X <sup>2</sup> test Df=3 P=0.44
20-40 (Negative)	14(35)	11(27.5)	
40-60 (Positive)	13(32.5)	12(30)	
60-80 (Very positive)	3(7.5)	8(20)	
Total	40(100)	40(100)	Z=759.5; P=0.696 Mann-Whitney U
Mean± SD	35.38±20.44	37.38±22.64	

**Table 4. The self-perception scores in the adolescents referred to the diabetes association after the intervention, in the control and experimental groups**

Group frequency of self-perception	Intervention N (%)	Control N (%)	Result s
<20 (Very negative)	3(7.5)	7(17.5)	X <sup>2</sup> test Df=3 P=0.000
20-40 (Negative)	2(5)	15(37.5)	
40-60 (Positive)	23(57.5)	10(25)	
60-80 (Very positive)	12(30)	8(20)	
Total	40(100)	40(100)	Z=463.00; P=0.001 Mann-Whitney U
Mean± SD	53.40±16.19	38.80±22.17	

#### 4. DISCUSSION

The results of this study indicate that although the mean and standard deviation scores of self-perception gathered from the Piers-Harris test after the study was greater in the control group than in the experimental group, they were not

statistically significant. Van Minnen et al. [23] in a study entitled 'Precision and Control of Effective Factors on Self-perception in Type 2 Diabetic Patients', showed that self-perception about weight management is negatively affected in type 2 diabetic patients. They believe that having a chronic disease such as diabetes can have an

effect on an individual's self-perception in all self-care dimensions, which thus requires the double support of patients [23].

Kafaie et al. [24] concluded in their study (2011) that self-care leads to an 82% reduction of diabetic foot ulcers. Because self-care leads to a reduction of such ulcers, which allows a person to walk more easily, patients can better participate in social situations. They can also exercise, and can be accepted by others, so that the social dimension of self-perception is also strengthened. Self-care can also lead to the creation of positive self-perception of the individual. Jahanbin et al. [25] investigated the effects of self-perception on the clinical performance of students; they concluded that self-perception training increases the scientific and non-scientific levels of self-perception, and it also increases the scientific effects of students. Samadi et al. [7] showed in their study that there was a significant relation between a person's self-perception before and after intervention, and metabolic control relates to one's self-perception. They also showed that there was a relation between the glucose levels in men and women, obesity, and low self-perception. Hypoglycemia, diabetic foot ulcers, and hospitalisation led to a decrease in one's self-perception. Negative self-perception leads to hopeless feelings in a person, which then impairs their treatment. The findings also indicated that before the intervention in the two control and experimental groups, the self-perception scores as determined by the Piers-Harris test were negative, and their haemoglobin A1C and blood-glucose levels were high, which was consistent with the studies of Miettola et al. [26] in 2008, Miettola and colleagues concluded that an increase of plasma glucose in men and central (i.e. abdominal) obesity in women with type 2 diabetes was associated with decreased self-perception. Bodenheimer et al., in a 2002 study entitled 'The Self-perception Effect on Effectiveness of Self-care in Patients with Chronic Disease', stated that self-confidence and quality of life decrease in patients with severe chronic disease. Treatment teams must plan to improve the quality of life of patients with chronic disease, and to increase their self-confidence and subsequently their self-perception [27]. In girls who had a low self-perception level, HbA1C was high, and HbA1C changes with 30% variance during mood changes, while effective experimental and emotional issues tend to improve the self-perception of adolescent girls;

consequently, metabolic control is more comfortable [28].

According to the high (and increasing) prevalence of diabetes in our country (Iran), patients' awareness of signs and symptoms and how to control them have a particular importance in diabetes management. Thus, by taking better care, patients can have better metabolic control and can prevent or delay the symptoms and complications of diabetes, which cause psychological problems and subsequently lead to depression or low self-perception in adolescents. Training adolescents for self-care provides a possibility for them to have a sense of independence, and helps them to be present in the community and accepted by their peers. Self-care leads to high self-perception in adolescents, and consequently leads to their development. It is necessary to educate diabetic adolescents about self-care, and these training methods should ideally use methods that adolescents enjoy. As the results of our study showed, using e-learning through the use of CDs and DVDs can be helpful in self-care training for adolescents, because these methods provide a possibility for adolescents to observe training tests more often, and whenever they want to do so.

A limitation of this research is the adolescents' access to other training resources, which was not possible for the researchers to obtain. Finally, we suggest that the effects of Orem's self-care plan on the self-confidence and self-esteem of diabetic adolescents should be measured.

## 5. CONCLUSION

The results of this study showed that e-learning can promote self-care and subsequently affect adolescent self-perception. As a result, nurses, as members of the health care team, play an essential role in the prevention, care, and treatment of people with chronic diseases such as diabetes. It is necessary to ensure the proper use of the method in accordance with adolescents and to assist them in their care. Nurses must also be familiar with good teaching methods. Nurse Managers may need to help their employees to get to know the proper nurses' training methods.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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