

# Impact of Acceptance and Commitment Therapy on Perceived Stress and Special Health Self-Efficacy in Seven to Fifteen-Year-Old Children With Diabetes Mellitus

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Received: July 9, 2014; Revised: December 6, 2014; Accepted: February 22, 2015

**Background:** Diabetes Mellitus (DM) imposes restrictions on physical, emotional and social functioning of children and adolescents.  
**Objectives:** The aim of this study was to determine the impact of acceptance and commitment therapy (ACT) on perceived stress and special health self-efficacy in seven to fifteen-year-old children with DM.  
**Patients and Methods:** The present study was a clinical trial with a pretest-posttest control group design. The study population included all seven to fifteen-year-old patients who had referred to the Diabetes Mellitus Association of Tabriz, Iran, of whom 40 participants were selected using convenient sampling. They were randomly allocated to two matched groups (experimental and control). The experimental group participated in therapy sessions, while the control group did not receive any interventions. The research instruments were perceived stress and special health self-efficacy scales.  
**Results:** The multiple analysis of covariance (MANCOVA) results showed that the treatment was effective on variables of perceived stress and special health self-efficacy ( $P < 0.001$ ).  
**Conclusions:** The ACT is effective for reducing perceived stress and increasing special health self-efficacy in children with DM.

**Keywords:** Acceptance and Commitment Therapy; Diabetes Mellitus; Stress; Self Efficacy

## 1. Background

Diabetes Mellitus (DM) is a common disease in Iran and around the world. It is a chronic, progressive and costly disease, and results in a number of complications. For individuals with DM, it is difficult to accept that they must change their lifestyle. Since these patients are unaware of short-term and long-term complications of the disease, it is not unusual for them to experience mood disorders such as depression, anxiety caused by negative thoughts about the illness and low self-efficacy in dealing with their disease (1). Depression and anxiety disorders are characterized by symptoms of low mood, reduction of energy and interest, feelings of guilt, difficulty in concentrating, loss of appetite, thoughts of death and suicide, chronic daily stress, lower levels of psychological well-being and consequent low quality of life, insomnia or hypersomnia, significant loss of weight, and dysfunction (2).

Children with DM, because of the need for self-care, and in most cases, care by family members, may see themselves as a burden on their families, compared to healthy children of the same age. These intrusive thoughts can have enormous impacts (3). The way these thoughts are

interpreted is an important factor in determining the severity of the consequential discomfort, anxiety, and perceived negative stress; such as believing themselves to be a financial burden on their family, and ascribing the difficulties of their family to themselves. The interpretation of thoughts can be influenced by cognitive biases. Evidently, it should be noted that being seen as a burden by parents and friends is also influential in creating stress and decreasing self-efficacy in children. Therefore, misinterpretation of these negative thoughts leads to a set of symptoms such as negative perceived stress and low self-efficacy (4).

Perceived stress is derived from Lazarus and Folkman's concept of stress as an individual's cognitive appraisal of negative life events. Diabetic individuals may forget to care for themselves, in terms of using certain foods and consumption of medications, due to stress, and this in turn affects their blood sugar levels (5). Due to frustration and perceived stress, diabetic children have a particular mental condition which causes feelings of helplessness, powerlessness, lack of self-efficacy, and apathy toward life (6).

Self-efficacy is an important and effective concept in Bandura's social cognitive theory and is explained as confidence and belief in one's ability to control thoughts, feelings, activities, and function effectively in stressful situations. Therefore, efficacy is an individual's actual performance, emotions, and choices, as well as inhibition of negative influences, organization and execution of courses of action required to achieve goals and advancement, and ultimately the amount of effort spent on an activity (7). Research supports that DM is a risk factor for developing psychological problems during adolescence. The aims of DM treatment are the prevention of its complications and maintaining optimal psychological well-being in patients. In the past, it was thought that the doctor was able to provide favorable conditions for an individual through effective treatments and control of disease symptoms. Nevertheless, evidence suggests that psychological well-being, and in a wider context quality of life, in treating a chronic disease such as DM does not only influence the control of symptoms, but also the improvement of psychological well-being and quality of life (8). Diabetic children do not show appropriate emotional responses and experience lower psychological well-being due to difficulties such as dietary and activity limitation, invasive monitoring of blood glucose, daily insulin injections, chronic physical complications, hospitalizations and shortened life expectancy (9).

The treatment of chronic diseases such as DM, on the one hand, disrupts the psychological well-being and social function of the individual, and on the other hand, has a negative impact on family function. The prevalence of negative psychological outcomes among people with DM, especially children and adolescents, and their frustration from the medical treatment process demonstrates the necessity of developing psychological interventions in the fields of clinical psychology, health psychology and pediatric psychology. Most studies performed on people with DM have often been based on self-care training, which has been performed publicly. Acceptance and commitment therapy (ACT) differs from traditional cognitive behavioral therapy (CBT). This form of therapy has two major goals: a) fostering acceptance of problematic unhelpful thoughts and feelings that cannot and perhaps need not be controlled, and b) commitment and action toward living a life according to one's chosen values (10). This treatment method endeavors to increase individual psychological acceptance in the case of subjective experiences (thoughts and emotions), reduces ineffective control measures, and increases psychological awareness (11). There are numerous psychological therapeutic interventions for stress, and depression and psychological consequences associated with it, such as inability and infirmity, for diabetic patients. Some researchers believe that ACT has high efficacy, due to its underlying mechanisms such as increasing acceptance and awareness, desensitization,

living in the present moment, observing without judgment, confrontation and release (12). Results of previous studies showed that the use of the mindfulness method will cause a decrease in depressive and anxiety attacks (13, 14). The study by Boey showed that acceptance of DM and its related cognitions is significantly associated with lower HbA1c values and decreased stress in patients, simultaneously (15).

The results of a research indicated that stress can lead to mental and physical diseases, impairment of function and adaptation, and ultimately lower self-efficacy in coping with the disease (7). Another study revealed that stress can result in the patient not following the required diet, and therefore, indirectly affect blood sugar (16).

There is a wide range of research on psychosocial and behavioral interventions for adolescents with DM, and current psychosocial interventions have demonstrated modest effects on glycemic control. It may prove useful to identify underlying psychological processes that contribute to poor disease management. However, very little research has been done on the mentioned psychological complications of DM (perceived stress and special health self-efficacy) with this treatment method. Moreover, a few studies have been conducted on children and adolescents. This paper aimed to illustrate how the psychological processes of cognitive fusion and experiential avoidance may contribute to DM management difficulties. Therapeutic strategies outlined in ACT might be a way to intervene in DM care and simultaneously target issues relating to regimen adherence, DM-related acceptance, and family management issues.

## 2. Objectives

According to the above discussion, this study aimed to answer the question of whether ACT is effective in reducing perceived stress and increasing special health self-efficacy in seven to fifteen-year-old children with DM.

## 3. Materials and Methods

The present study was a clinical trial with a pretest-posttest control group design, and random assignment. The study population included all seven to fifteen-year-old individuals who had referred to the DM Association of Tabriz, Iran, of whom 40 participants were selected using convenient sampling. They were randomly allocated to two matched groups (experimental and control). The experimental group participated in therapy sessions and the control group did not receive any interventions.

Inclusion criteria for this study included age of < 15 years, having DM (type 1 and 2) for at least one year, and lack of any major psychiatric disorder. Furthermore, all participants continued their medical treatment process normally. Exclusion criteria, determined by the diagnosis of a physician in most cases, included needing significant change in the dose of insulin administered during the research, suffering from an acute or chronic medical

illness that causes problems in venesection or intolerance of long sessions, having severe medical complications of DM, receiving psychiatric treatments or using psychotropic drugs, and drug abuse during the study period.

In order to obey research ethics, in addition to obtaining written consent from the children and their parents to participate in the research, pretests were also conducted. Evidently, two members of the experimental group and two patients of the control group were excluded for various reasons, including absenteeism from more than three sessions, lack of participation in pretest, disease, and relocation to another city. Finally, 18 patients in the experimental group and 18 patients in the control group remained in the study. For data collection, the special health self-efficacy scale was used. This questionnaire included 14 items and three subscales of nutrition self-efficacy scale, physical exercise self-efficacy scale, and resist alcohol self-efficacy scale. It was a Likert-type scale with items answered on a four-point scale from one for very uncertain to four for very certain. Cronbach's alpha internal reliability was 0.87 for nutrition self-efficacy, 0.88 for physical exercise self-efficacy, and 0.79 for resist alcohol self-efficacy (17). Validity evidence for this scale has been reported by Narimani and Ahadi (17). The reliability of this test was calculated at 0.76 using Cronbach's alpha in this research.

Furthermore, the perceived stress scale (PSS) was also used for data collections. The PSS is a 14-item Likert-type scale that offers a nonspecific measure of appraised stress. The internal consistency reliabilities of the PSS ranged from 0.84 to 0.86 across two groups of university students and one group of participants in a community smoking-cessation program. The alpha coefficient for the Mexican sample was 0.835 while for the individuals residing in the USA this was 0.885 (18). This instrument has been found to be significantly correlated with life events, depressive and physical symptoms, utilization of health services, social anxiety, maintenance of smoking reduction and lower life satisfaction (18). It is said to be an appropriate measure of global stress for all age groups (19). In a study performed by Ghorbani et al. (20), Cronbach's alpha was calculated as 0.86 for America and 0.81 for Iran. In the present study, the reliability of this test was calculated as 0.84 using Cronbach's alpha.

Therapy sessions were held for 90 minutes, every week, for ten weeks. The topics for each session included: 1- building a therapeutic contract and functional analysis; 2- creative hopelessness: "the man in the cave" and "the farmer and the donkey" metaphors; 3- value clarification and building a commitment, "the funeral" exercise metaphor: "eat the whole apple"; 4- control as a problem: "the rule of 95 - 5%" and control as a problem: "pink elephants" and "what's the name of your mother?" exercises; 5- the alternative to control, be willing as a possibility, and acceptance exercises: "eyes on" exercise; 6- cognitive diffusion: "the ride with posters", "milk, milk, milk"

exercises and establishing language conventions: "I'm having the thought that I'm a failure" instead of saying "I'm a failure"; 7- self as context: metaphor: "chessboard", and screening for barriers and strengthening values: metaphors: "the journey" and "welcome to all and the rude"; 8- acceptance and commitment, and fear of commitment: metaphor: "now you know how to drive"; 9- remember session, internal dialogue: "this is not working, it is always the same, and I thought it was OK, but it is not..." metaphor: "the rider"; 10- remember session and relapse prevention (21).

After ten sessions of intervention for the experimental group, the posttest was performed on both groups. Data were collected orally from illiterate subjects. In order to obey research ethics, a meeting was held for the control group and their questions were answered. We performed a descriptive study of the dependent variables of interest (means and standard deviations). Multiple analysis of covariance (MANCOVA) was carried out to determine group differences. Data analysis was performed with the SPSS statistical package (version 19.0; SPSS Inc., Chicago, IL, USA) and a 5% priori type I error.

#### 4. Results

The participants in this research were in the age range of seven to fifteen years, and 69.44% were boys and 30.56% girls. The Mean ( $\pm$  SD) age of the experimental group was 11.44 ( $\pm$  2.59) and the control group was 9.72 ( $\pm$  2.37) ( $P < 0.05$ ). In addition, twelve boys and four girls participated in the experimental group, and nine boys and seven girls participated in the control group. Table 1 shows mean and standard deviation of perceived stress and special health self-efficacy variables in the experimental and control groups. To measure the equality of variances, data were evaluated with Levene's test of homogeneity of variance. The results showed that variances of the experimental and control groups for total perceived stress ( $F = 1.03$ ,  $P = 0.317$ ), negative perceived stress ( $F = 1.50$ ,  $P = 0.22$ ), positive perceived stress ( $F = 0.46$ ,  $P = 0.50$ ), and special health self-efficacy ( $F = 1.45$ ,  $P = 0.23$ ) were equal. The results showed significant homogeneity using MANCOVA tests including Pillai's trace, Wilks' lambda, Lawley-Hotelling trace, and Roy's largest root. Experimental and control groups differed from each other, in at least two dependent variables; therefore, these variables could be used to analyze the data. The MANCOVA results on the variables of perceived stress and special health self-efficacy in both control and experimental groups after controlling the pretest are shown in Table 2. This analysis showed that the two groups were different in three investigated variables according to the means presented in Table 1. Furthermore, an increase in positive perceived stress and special health self-efficacy variables and a decrease in total perceived stress and negative perceived stress scores were observed in the experimental group as compared with the control group.

**Table 1.** Mean and Standard Deviation of Perceived Stress (Along With its Subscales) and Special Health Self-Efficacy Variables in the Experimental and Control Groups <sup>a</sup>

Variables	Experimental Group		Control Group	
	Pretest	Posttest	Pretest	Posttest
<b>Total perceived stress</b>	32.56 ± 2.99	30.22 ± 2.13	31.89 ± 3.19	32.06 ± 2.79
<b>Negative perceived stress</b>	21.33 ± 2.37	10.67 ± 1.97	21.22 ± 2.66	21.11 ± 1.90
<b>Positive perceived stress</b>	11 ± 2.44	19.56 ± 1.82	10.67 ± 2.22	10.89 ± 2.16
<b>Special health self-efficacy</b>	22.44 ± 4.75	31 ± 4	21.33 ± 4.33	21.06 ± 3.31

<sup>a</sup> Data are presented as Mean ± SD.

**Table 2.** Multiple Analysis of Covariance Results on the Variables of Perceived Stress (Along With its Subscales) and Special Health Self-Efficacy in Control and Experimental Groups After Controlling the Pre-Test

Dependent Variable	Type III Sum of Squares	Degree of Freedom	Mean Square	F	P Value
<b>Posttest of total perceived stress</b>				007.64	< 0.010
Group	043.36	01	043.36		
Error	170.25	30	005.67		
<b>Posttest of negative perceived stress</b>					< 0.001
Group	997.21	01	997.21	357.66	
Error	083.64	30	002.78		
<b>Posttest of positive perceived stress</b>					< 0.001
Group	632.10	01	632.10	174.63	
Error	108.58	30	003.62		
<b>Special health self-efficacy</b>					< 0.001
Group	721.80	01	721.80	175.10	
Error	123.66	30	004.12		

## 5. Discussion

The results showed that ACT is effective on reducing perceived stress and increasing special health self-efficacy of children with DM. These results are consistent with the results of the studies by Law et al. (22), Hadlandsmlyth et al. (23), Hor et al. (24), Hayes et al. (25), and Gregg et al. (26). They believed that the application can increase effectiveness of this method in addition to reducing the disease symptoms, due to its underlying mechanisms such as increasing acceptance and awareness, desensitization, living in the present moment, observing without judgment, confrontation, and release (24). It should be noted that this treatment modality is a short-term and structured intervention. In addition, and like traditional cognitive therapy, the purpose of mental care education is not to change the content of thoughts, but rather to create a different attitude toward or relationship with thoughts, feelings, and emotions, which includes maintaining full and constant attention with an attitude of acceptance and without judgment (25). Conceptually, children and adolescents with DM, who drown in their private issues and subsequently engage in experiential avoidance, may attempt to control their private affairs via behavioral strategies

that may not be useful in the long-term. For example, an adolescent with DM may have thoughts such as “people think I’m different when they see me check my blood sugar”, “my insulin makes me fat and unpopular” “I can’t do normal things like go out for ice-cream”, or “I won’t have a normal life.” They may then engage in unhealthy eating (e.g. unplanned snacking), or avoid insulin injections or blood-glucose checks, as an attempt to alleviate these painful thoughts. These experiential avoidance behaviors may lead to greater long-term emotional distress and health problems. By not engaging in DM management behaviors, adolescents are at increased risk of later medical complications (23). The focus of this ACT process is to develop and enhance clients’ willingness to accept their private experiences. Treatment involves exploring the futility of emotional control and avoidance, which can often paradoxically increase individuals’ levels of distress and deter them from engaging in purposeful and vital value-driven behavior. Instead, individuals are encouraged to accept their private experiences; doing so will help them engage in valued behavior (3). Based on ACT, the concept of emotional interlinking or diffusion is defined as the

rate of the impact of a thought on behavior; such as the effects of subjective interpretation on children's perceived stress and special health self-efficacy (21).

Context-dependent behavior and thought-dependent behaviors are placed on the continuum between emotional interlinking and diffusion. When an individual merges and becomes one with his thoughts, he does not distinguish subjective judgment from reality (23, 26). Thus, increasing psychological flexibility of pediatric patients in ACT and creating a thinking strategy based on mindfulness can increase the patient's ability to cope with symptoms of disease and family adversity, and follow the prescribed diet. Naturally, reduction of negative perception caused by stress and individual commitment caused by some behaviors will increase self-efficacy of the child in dealing with the illness in the long-term. These findings are consistent with that of studies by Gonzalez-Menendez et al. (21) and Clarke et al. (27). These findings indicate that increased cognitive fusion and experiential avoidance are related to decreased adherence and DM-related quality of life, and increased social anxiety and DM-related worry. In conclusion, these findings provide preliminary support for the adverse impact of cognitive fusion and experiential avoidance for children and adolescents with DM.

Limitations of this study were the small study population, inability to generalize the results and limited number of similar studies in Iran and the world. Moreover, some of the obtained differences are related to possible differences in confounding variables due to lack of matching confounding variables (such as age and gender).

## Acknowledgements

We sincerely appreciate the cooperation of all subjects who helped us in performing this research.

## Authors' Contributions

Vahid Ataie Moghanloo conceived and designed the study. Mousa Moazzezi collected the clinical data. Roghayeh Ataie Moghanloo interpreted the clinical data. Vahid Ataie Moghanloo performed the statistical analysis. Malihe Pishvaei drafted the manuscript. All the authors read and approved the final manuscript.

## Clinical Trial Registration Code

IRCT2014072616602N2.

## Declaration of Interest

None declared.

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