

## The Effectiveness of Unified Trans Diagnostic Treatment Protocols on Parent-Child Interaction and Blood Sugar Levels in Adolescents with Type 1 Diabetes

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### Abstract

**Objective:** The parent-child relationship and the daily blood sugar control by adolescents can affect family functioning. This study aimed to evaluate the effectiveness of unified trans-diagnostic treatment protocols on parent-child interaction and blood sugar levels in adolescents with type 1 diabetes.

**Materials and Methods:** The present study was quasi-experimental with a pretest and posttest design and a control group. The statistical population of the study included all adolescents aged 12-15 years with type 1 diabetes referred to the Iranian Diabetes Society and their parents in 2020. Out of this population, 44 were selected using the convenience judgmental sampling method and randomly divided into two groups (n= 22). The Child-Parent Relationship Scale (CPRS) was used to investigate the parent-child interaction, and hemoglobin pre-and post-program tests were used to assess blood sugar. Adolescents and parents in the experimental group received the program during 17 sessions. Data were analyzed using the analysis of covariance. Statistical analyses were performed by SPSS software version 22.

**Results:** The means of corrected post-test scores of the Child-Parent Relationship Scale and hemoglobin A1c tests were significantly different in the experimental and control groups ( $P= 0.001$ ).

**Conclusion:** The unified trans-diagnostic treatment protocols affect parent-child interaction and blood sugar levels in adolescents with type 1 diabetes. It is possible to use this program to educate adolescents with diabetes and their families and preventive interventions.


**Keywords:** Blood sugar, Diabetes type 1, Parent-child interaction, Unified trans-diagnostic treatment protocols

#### QR Code:



**Citation:** Shahriari Y, Ghasemzadeh S, Kashani Vahid L, Vakili S. The Effectiveness of Unified Trans Diagnostic Treatment Protocols on Parent-Child Interaction and Blood Sugar Levels in Adolescents with Type 1 Diabetes. IJDO. 2022; 14 (3) :159-166

**URL:** <http://ijdo.ssu.ac.ir/article-1-729-en.html>

 10.18502/ijdo.v14i3.10742

#### Article info:

**Received:** 12 April 2022

**Accepted:** 18 August 2022

**Published in September 2022**



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## Introduction

Adolescence is a period of transition from childhood to adulthood that accompanies puberty. (1). The diagnosis of chronic diseases such as diabetes at this stage can lead to several problems, including psychological shock, stress, degrees of anger, anxiety, and disruption of interpersonal relationships in adolescents' life and puberty (2). There are about two million patients with diabetes in Iran, a significant number of whom are adolescents (3). Type 1 diabetes is a chronic condition in which the pancreas produces little or no insulin in the beta cells in the islet of Langerhans and accompanies the person throughout life (4). Most people with type 1 diabetes need the injection of insulin to manage their disease. This type includes 5-10% of all types of diabetes. Type 1 diabetes is the most common metabolic endocrine disorder in childhood and adolescence, affecting approximately one in every 300 to 500 thousand children under the age of 18. Boys and girls suffer the same, and the disease is more prevalent during puberty (5).

Stressful life events, patterns of interpersonal interaction with parents, peers, and health-related maladaptive behaviors affect physical illnesses like diabetes that have obvious pathophysiology (6). The parent-child interaction represents the world of child communication and a critical relationship for establishing security and love. It consists of a combination of behaviors, feelings, and expectations unique to a particular parent and a particular child (7). According to studies, positive interaction with parents has inverse associations with the number of hospitalizations of patients with chronic diseases such as diabetes (8). Child misbehavior resulting from a mental disorder, chronic illness, drug side effects, parenting style, or inappropriate parenting patterns can affect parents' reactions and behaviors toward their children. Therefore, these inconvenient and stressful parent-child interactions are in a

defective cycle (9). Also, research shows a significant relationship between psychological symptoms and the glycemic index (10).

So far, there have been numerous treatment and intervention programs to control blood sugar levels in people with diabetes, such as cognitive-behavioral therapies and positive parenting training programs. Given that the integration of these interventions is time-consuming, unified trans-diagnostic treatment protocols are required. The unified protocol is based on cognitive-behavioral theories proposed by combining and integrating common principles derived from empirically supported psychotherapy. The use of emotion regulation methods is also a behavioral element of this program (11). This type of treatment refers to the underlying factors of mental disorders and emphasizes the functional relationship of trans-diagnostic elements (such as thoughts, behaviors, emotions, and physiology) (12,13). The study aimed to evaluate the effectiveness of unified trans-diagnostic treatment protocols on parent-child interaction and blood sugar levels in adolescents with type 1 diabetes.

## Materials and Methods

The present study belonged to applied research in terms of objectives, performed as a quasi-experimental pretest and posttest with a control group. The study's statistics included all adolescents aged 12-15 years with type 1 diabetes referred to the Iranian Diabetes Society and their parents in Tehran in 2020. Out of this population, 44 were selected using the convenience judgmental available and targeted sampling method and randomly divided into two groups (n= 22). The primary research sample was determined using the inclusion and exclusion criteria and divided into experimental and control groups (n= 22). Participants in the experimental group received parent training in separate sessions. During the research, one participant was removed from the sample. Each parent and the

adolescent with type 1 diabetes were allocated to the experimental group. Inclusion criteria to match the study population and fit the characteristics of the treatment program were as follows: adolescents in the age range of 12-15 years with type 1 diabetes (according to the medical record of the Iranian Diabetes Society), suffering from diabetes during the past year (based on the medical documents in the Iranian Diabetes Society), and report or complain of psychological problems by adolescents or parents. Exclusion criteria were: the presence of uncontrollable aggression, failure to attend more than two sessions per week, failure to do homework and worksheets for 2 sessions, and receiving other interventions during the research except for medication. Part of the research data was obtained from the medical and family history in the Iranian Diabetes Society and the other part through observations and online interviews with parents. Child-Parent Relationship Scale (CPRS), and the last hemoglobin test were completed and evaluated initially as the baseline (pretest) and finally as the posttest.

### Training protocol

The experimental group received intervention through 17 consecutive sessions twice a week. Each session was 120 minutes for adolescents, immediately followed by the session for parents. Both parents and adolescents attended skill-based sessions. Before each session, the therapist prepared the worksheets for both adolescents and parents and made them available during the session. Given the spread of the coronavirus and the underlying disease, the sessions were online to ensure the health of the participants. The parents and adolescents of the control group did not receive any interventions and were placed on the waiting list to receive the intervention after the end of the study. The members of the control group could use the psychological services provided by the therapist after the research project completion and data collection if they wished.

CPRS was the research instrument for data collection. The scale was first developed by Pianta in 1994 and contains 33 items that measure parents' perceptions of their relationship with their children in the first 16 years of life. The questionnaire was translated by Tahmasian and Khorramabadi (2007), and experts evaluated its content validity (14). This scale includes the domains of conflict (17 items), closeness (10 items), dependence (6 items), and general positive aspects of the relationship (sum of all domains). The parent-child relationship scale is a self-report questionnaire, scored on a five-point Likert scale (5= definitely applies and 0= definitely does not apply). The scores obtained in the conflict and dependence domains are reversed to obtain the general positive aspects of the relationship. A high score in each subscale indicates more presence of the mentioned components. The scoring is according to the comparison of the pretest and posttest scores and the significance of this difference. Many studies have used this scale to measure the parent-child relationship at all ages. In a study, Driscoll and Pianta (2011) reported Cronbach's alpha values of 0.75, 0.74, 0.69, and 0.80 for the dimensions of conflict, closeness, dependence, and general positive aspects of the relationship, respectively. Each of the domains of conflict, closeness, dependence, and general positive aspects of the relationship had Cronbach's alpha values of 0.84, 0.70, 0.46, and 0.80 for the localized Iranian version of the scale (15). The highest and lowest scores of the conflict subscale are 40 and 8, respectively. Scores below 40 represent better parent-child relationships, while a score of 8-16 reflects a good parent-child relationship. Parents completed the above-mentioned questionnaire to investigate the parent-child relationship. It is noteworthy that families received the online version of the research questionnaires due to the spread of coronavirus and the importance of maintaining the health of the participants.

The hemoglobin test or glycated hemoglobin (A1C) was the second research instrument. It

is a simple blood test that measures the individual's average blood sugar level in the past 3 months. This test shows whether the blood sugar of a patient with diabetes is close to or higher than normal levels over a certain period. For people with diabetes, the hemoglobin level should be less than seven. Closer values of the hemoglobin test result to seven indicate less likelihood of experiencing diabetic complications, such as visual, renal, or neurological problems. This test helps investigate the blood sugar levels of adolescents during the intervention. The results of the experimental and control groups were compared using covariance analysis. Statistical analyses were performed by SPSS software version 22.

## Ethical considerations

Researchers tried to observe the standards and ethical considerations in all stages of this research, including providing the necessary information and completing the informed consent form by the participants. This study received the IR.IAU.SRB.REC1399.168 code from the Ethics Committee in Biomedical Research of the Islamic Azad University, Science and Research Branch in Tehran. Table 1 provides a summary of the educational content.

## Results

Table 2 shows the descriptive findings (mean and standard deviation) of the parent-

**Table 1. Summary of training sessions for unified transdiagnostic treatment protocols**

Session	Form of implementation	Title	Content
1	1 <sup>st</sup> Group of adolescents Group of parents	Creating and maintaining motivation	Familiarity with the therapist and introduction of the program – agreement on the rules Introducing participants
2	2 <sup>nd</sup> Group of adolescents Group of parents	Creating and maintaining motivation	Goal Setting – identifying items that change motivation
3	3 <sup>rd</sup> Group of adolescents Group of parents	Familiarity with emotions and behaviors	Familiarity with emotions – the reason for the presence of emotions
4	4 <sup>th</sup> Group of adolescents Group of parents	Familiarity with emotions and behaviors	Training to understand three dimensions of emotions – why to show unhelpful behaviors
5	5 <sup>th</sup> Group of adolescents Group of parents	Introducing emotion-based behavioral experiments	Familiarity with conflicting actions – familiarity with emotion-focused behavioral experiments
6	6 <sup>th</sup> Group of adolescents Group of parents	Introducing emotion-based behavioral experiments	Finding out the level of mood and activity – familiarity with making and evaluating small behavioral changes
7	7 <sup>th</sup> Group of adolescents Group of parents	Awareness of physical sensations	Training on physical sensations – training to track intense emotions
8	8 <sup>th</sup> Group of adolescents Group of parents	Awareness of physical sensations	Awareness of the individual's own physical sensations – providing exercises for different physical sensations
9	9 <sup>th</sup> Group of adolescents Group of parents	Flexible thinking	Training and providing flexible thinking exercises
10	10 <sup>th</sup> Group of adolescents Group of parents	Flexible thinking	Training common thinking traps
11	11 <sup>th</sup> Group of adolescents Group of parents	Flexible thinking	Relating thoughts to actions using critical thinking and problem solving
12	12 <sup>th</sup> Group of adolescents Group of parents	Awareness of emotional experiences	Awareness of the present moment and providing related exercises Training non-judgmental awareness and providing related exercises
13	13 <sup>th</sup> Group of adolescents Group of parents	Awareness of emotional experiences	Conduct behavioral experiments using emotion arousal awareness strategies
14	14 <sup>th</sup> Group of adolescents Group of parents	situational emotion exposure	Behavioral experiments using exposure techniques
15	15 <sup>th</sup> Group of adolescents Group of parents	situational emotion exposure	Dealing with problematic emotional behaviors
16	16 <sup>th</sup> Group of adolescents Group of parents	situational emotion exposure	Dealing with problematic emotional behaviors (Continuation of the fifteenth session)
17	17 <sup>th</sup> Group of adolescents Group of parents	Continuing the path and maintaining the achievements	Reviewing new skills and progress of goals – providing a plan to prevent relapses
18	18 <sup>th</sup> Group of parents	Parenting of emotional adolescents	Parents' awareness of their responses to disorder – introducing four common distinct parenting behaviors and contradictory actions (inconsistent parenting behaviors)

child interaction variable. As the results show, the experimental group shows a significant change between pretest and posttest stages in almost all subscales. However, the control group did not show a significant change between pretest and posttest stages in almost all subscales. Also, descriptive findings (mean and standard deviation) of blood sugar levels indicated that there was a significant change between pretest and posttest in the experimental group, but the control group did not show a significant change between pretest and posttest.

The experimental and control groups had significantly different mean corrected scores of closeness in posttest after removing the effect of pretest scores ( $P= 0.001$ ), indicating the positive effect of the unified transdiagnostic treatment protocols. In addition, the effect size was 0.74, according to which 74% of the observed difference between the posttest scores of re-evaluations of the experimental and control groups is the result of the intervention (unified transdiagnostic treatment protocols). Also, the experimental and control groups had significantly different mean corrected scores of the dependence in posttest after removing the effect of pretest scores ( $P= 0.004$ ), indicating the positive effect of the unified transdiagnostic treatment protocols. However, the effect size of 0.11 shows the weak effect of the intervention on this variable. Finally, according to the results, the experimental and control groups had significantly different mean corrected scores of the conflict in posttest after removing the effect of pretest scores ( $P= 0.001$ ), indicating

the positive effect of the unified transdiagnostic treatment protocols. In addition, the effect size was 0.28, according to which 28% of the observed difference between the posttest scores of re-evaluations of the experimental and control groups is the result of the intervention (unified transdiagnostic treatment protocols).

The experimental and control groups had significantly different mean corrected scores of the parent-child interaction (overall score) in posttest after removing the effect of pretest scores ( $P= 0.001$ ), indicating the positive effect of the unified transdiagnostic treatment protocols. In addition, the effect size was 0.60, according to which 60% of the observed difference between the posttest scores of re-evaluations of the experimental and control groups is the result of the intervention (unified transdiagnostic treatment protocols); thus, the research hypothesis on the effectiveness of the transdiagnostic treatment program on the parent-child interaction of parents with adolescents suffering type 1 diabetes is supported. Also, the experimental and control groups had significantly different mean corrected scores of the blood sugar levels in posttest after removing the effect of pretest scores ( $P=0.004$ ), indicating the positive effect of the unified transdiagnostic treatment protocols on blood sugar levels of adolescents in the experimental group. Besides, the effect size was 0.45, according to which 45% of the observed difference between the posttest scores of re-evaluations of the experimental and control groups is the result of the intervention (unified transdiagnostic treatment

**Table 2. Descriptive findings: parent-child interaction and blood sugar levels variables**

Variable	Step	Experimental group Mean ( $\pm$ SD)	Control group Mean( $\pm$ SD)	<i>P</i>	
<b>Parent-child Interaction</b>	Closeness	Pretest	34.90 ( $\pm$ 6.32)	34 ( $\pm$ 5.39)	0.001
		Posttest	28 ( $\pm$ 3.96)	34.57 ( $\pm$ 5.51)	0.001
	Dependence	Pretest	20 ( $\pm$ 5.06)	19.52 ( $\pm$ 4.86)	0.001
		Posttest	22.33 ( $\pm$ 5.83)	20.05 ( $\pm$ 5.05)	0.04
	Conflict	Pretest	53.62 ( $\pm$ 13.86)	52.29 ( $\pm$ 12.64)	0.001
		Posttest	57.52 ( $\pm$ 10.23)	53.38 ( $\pm$ 12.78)	0.001
Overall score	Pretest	105.33 ( $\pm$ 15.46)	104.62 ( $\pm$ 14.21)	0.001	
	Posttest	93.90 ( $\pm$ 12.39)	104.81 ( $\pm$ 14.52)	0.001	
<b>Blood sugar Levels</b>	Pretest	9.623 ( $\pm$ 1.31)	9.857 ( $\pm$ 1.14)	0.001	
	Posttest	9.333 ( $\pm$ 1.29)	9.969 ( $\pm$ 1.21)	0.001	

\* Child-Parent Relationship Scale (CPRS) and hemoglobin test

protocols); hence, the research hypothesis on the effectiveness of the transdiagnostic treatment program on the blood sugar levels of adolescents with type 1 diabetes is supported.

## Discussion

This study investigated the effectiveness of the unified transdiagnostic treatment protocols on parent-child interaction and blood sugar levels in adolescents with type 1 diabetes. According to the results, the unified transdiagnostic treatment protocols were effective in the improvement of the parent-child interaction of parents with adolescents suffering from type 1 diabetes. The use of incorrect parenting styles is one of the malfunctions of parent-child interaction. In this intervention, parents were familiarized with mindful parenting through contracting behaviors against adolescent distress and improving the quality of relationships with their children, which is consistent with the results of other studies (16). Based on the findings of this study, teaching the skills of the unified transdiagnostic treatment protocols to parents makes it possible to familiarize them with the context, background, and needs of themselves and their children. Hence, the parents can inform their children through positive interaction, which is consistent with the results of Holman and Koenig Kellas (2018) (17).

Participants of this study were encouraged to act independently using the techniques of this program, which in turn led to greater coherence, less conflict, and improved parent-child interaction, which is consistent with the findings of other studies (18). On the other hand, the results of this study showed that the unified transdiagnostic treatment protocols were effective in reducing the blood sugar levels of adolescents with diabetes. The present study helped in the individuals' emotional and behavioral stability by teaching emotional self-regulation skills.

Also, the techniques of situational exposure, examining conflicting behaviors, and using flexible and critical thinking improve the

cognitive reconstruction and help individuals overcome the fear of hypoglycemia, individual and independent insulin injection, and changing the injection site to prevent capillary rupture. Teaching to manage the correct timing of injections and reduce discomfort with being different from peers helps control adolescent metabolism and lower blood sugar, increasing response to treatment. The results of this study are consistent with the research of vanDuinkerken et al. (2020) (19). Most studies in the field of type 1 diabetes and clinical guidelines of the American and Canadian Diabetes Association emphasize psychological and family-centered interventions to improve quality of life and adaptation to disease while resulting in more effective metabolic control, which agrees with the results of the present study (20,21). Parents of adolescents with uncontrolled diabetes believed that the disease negatively affected their personality, physical well-being, education, and participation in outdoor activities (22). Therefore, based on the findings of this study, the skills of the unified transdiagnostic treatment protocols can help the mental and physical health of adolescents with diabetes.

One of the limitations of the study was its implementation on adolescents aged 12-15 years. Another limitation of the study was its coincidence with the COVID-19 pandemic, which made in-person sessions and assessments impossible. Future studies can concentrate on different age groups and genders. Besides, future research can investigate other psychological components. Another limitation of the study was the lack of a follow-up step. Therefore, future studies can focus on long-term follow-ups after this intervention to find out whether this improvement continues in the long run or not.

## Conclusions

Interpersonal relationships are very important in the context of family, and the quality and quantity of these relationships have mutual impacts on parents and children. The parents' parenting style and their emotion

management can affect relationships, which become persistent factors in the case of undesirable and behavioral symptoms of adolescents, subsequently threatening the physical health of diabetic patients to control their blood sugar levels and the mental health of parents. Teaching self-management and problem-solving skills make it possible to help individuals adapt properly to the conditions of the disease and manage their blood sugar levels. Conflicts with parents (caused by disease management) and parental stress and anxiety decrease with increased individual compatibility, while psychological problems follow a decreasing trend.

The results of this study and other studies confirmed the effectiveness of the unified transdiagnostic treatment protocols in increasing and improving parent-child interaction and controlling blood sugar levels in adolescents with type 1 diabetes. This program is applicable as one of the psychological therapies for emotion management in parents and adolescents with type 1 diabetes. Emotion management of parents and children can affect the family functioning and interpersonal relationships, helping both parents and adolescents manage the disease. Simultaneous training of parents can reduce emotional disorders in the family.

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## Acknowledgments

This article is part of a doctoral dissertation in the field of psychology and exceptional children education approved by the Tertiary Education Council of the Islamic Azad University Science and Research Branch. The authors would like to appreciate the management of the Iranian Diabetes Society, Mr. Rajab, and all the participants in the research for their sincere cooperation.

## Funding

The present study is the result of research project conducted without the financial support of any specific organizations.

## Conflict of Interest

The authors claim no conflict of interests.

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