

The Effects of Virtual Directed Painting Therapy on Anxiety, Depression, and Self-efficacy of Children with Type 1 Diabetes: A Randomized Controlled Clinical Trial

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Received: 27 November 2021 Revised: 07 March 2022 Accepted: 16 April 2022

ABSTRACT

Background: Diabetes-induced anxiety, depression, and decreased self-efficacy lead to poor adherence to treatment in diabetic children. Since painting therapy seems to be helpful to express their feelings, this study aimed to investigate the effects of virtual directed painting therapy on anxiety, depression, and self-efficacy in diabetic children.

Methods: This randomized controlled trial was conducted on 40 children with type 1 diabetes aged 8-12 years who were referred to Imam Reza Clinic of Diabetes in Shiraz, from July to October 2020. Children were randomly selected and assigned to intervention and control groups, using block randomization. The intervention group received the routine care plus virtual painting therapy directed by WhatsApp (six 2-hour group sessions once a week for six weeks). Spence Children's Anxiety Scale, Maria Kovacs Children's Depression Inventory, and Diabetes Management Self-Efficacy Scale were completed before and after the intervention. Data were analyzed through SPSS 23, using Chi-square, Mann-Whitney U, and Wilcoxon tests. P value <0.05 was considered as significant.

Results: After the intervention, the median (interquartile range) total scores for anxiety, depression, and self-efficacy in the intervention group were 48.50 (45.00-51.75), 7.00 (4.00-9.00), and 169.00 (154.00-178.00), and in the control group 55.00 (48.50-62.25), 13.00 (10.00-17.50), and 152.00, respectively (110.50-184.00). After the intervention, there was a significant difference between the groups regarding anxiety (P=0.02) and depression (P<0.001); however, the difference in self-efficacy was not significant (P=0.20).

Conclusion: Painting therapy should be considered as a part of care programs in diabetes centers and other community settings to control anxiety and depression of diabetic children.

Trial Registration Number: IRCT20200118046181N1.

Keywords: Virtual directed paintings therapy, Anxiety, Depression, Self-efficacy, Type 1 diabetes

Please cite this article as: Zamanifard M, Soltanian M, Edraki M, Moravaj H, Sharifi N. The Effects of Virtual Directed Painting Therapy on Anxiety, Depression, and Self-efficacy of Children with Type 1 Diabetes: A Randomized Controlled Clinical Trial. IJCBNM. 2022;10(3):210-222. doi: 10.30476/IJCBNM.2022.93400.1927.

INTRODUCTION

Type 1 diabetes is one of the most common endocrine and metabolic disorders in children.¹ According to a 15-year study in the Southern regions of Iran, the incidence of type 1 diabetes has been reported equivalent to 13.35 per 100.000 individuals, and this rate has increased every 5 years.²

Following type 1 diabetes, children and their family members experience different behavioral and psychological responses that can negatively affect their daily activities.³ In this regard, anxiety and depression have been reported as the most common psychological disorders in children with type 1 diabetes and their parents.⁴ Based on a case-control study, major depressive disorder and anxiety disorders (i.e., specific panic and phobia) were significantly higher in children with type 1 diabetes compared to healthy ones.⁵ Also, insulin-induced anxiety in 3- to 12-year-old children with type 1 diabetes was mild in 50%, moderate in 30%, and severe in 20% of children.⁶ This type of anxiety is reported as one of the most common challenges in children with diabetes and their parents; it can lead to poor blood sugar control and poor adherence to treatments.⁷

In addition to diabetes-induced anxiety, depression can make life difficult for children with type 1 diabetes.⁸ Depression has a bivariate relationship with diabetes, so that diabetes leads to depression; diabetes-induced depression also leads to poor treatment and lack of blood sugar control.⁹ Based on a correlational study, a statistically negative relationship was reported between depressed mood and glycemic control in individuals with type 1 diabetes.¹⁰ Additionally, diabetes-induced anxiety and depression can lead to poor self-efficacy, which is one of the most important factors involved in successful self-care of diabetic patients.¹¹ Higher diabetes self-efficacy is also associated with improved glycemic control, medication adherence, and mental health-related quality of life.¹² However, a poor level of self-efficacy was

reported in children and adolescents with type 1 diabetes.¹³

Given the high incidence of type 1 diabetes and the importance of self-efficacy in managing this disease, there is a great need to develop appropriate interventions for promoting diabetes self-efficacy.¹⁴ On the other hand, due to the negative consequences of diabetes-induced anxiety and depression, prevention and treatment of these psychological symptoms are of great importance.⁴ In most cases, anxiety and depression caused by diabetes are managed by referring to a psychologist; however, due to the high cost of medical treatments, most patients are interested in low-cost alternative methods for alleviating these symptoms.¹⁵

In recent years, painting therapy has received significant attention as a non-pharmacological and complementary intervention to relieve depression and anxiety caused by different children's diseases.¹⁶ Painting therapy is a form of art therapy mediated by painting activities.¹⁷ This term was used in 1986 in a program called "We can weekend" to help families to cope with cancer in the form of drawing and painting.¹⁸ Painting therapy provides opportunities for individuals to freely express their feelings, emotions, and needs through colors and lines. In other words, painting therapy is used as a tool for projecting, presenting thoughts, and expressing emotions.¹⁹ Through painting, the child can express what she/he has in her/his subconscious mind and the unspoken words related to the apprehension and anxiety caused by her/his diseases and talk about repressed thoughts and feelings beyond any threat from others.²⁰

Although a single-group pretest-posttest trial has indicated the positive effects of art therapy techniques with painting therapy and other forms of therapy (i.e., music, clip-art, and clay) on depression and anxiety symptoms of adolescents with type 1 diabetes,²¹ it is unclear whether painting therapy results in the similar effects independently. Considering the positive effects of independent use of painting

therapy in relieving anxiety and depression caused by other childhood disorders,²² it seems this intervention can be effective in decreasing anxiety and depression in children with type 1 diabetes. Also, since art therapy is reported as a means of support for diabetic children and adolescents to bring back self-confidence and self-reliance along with self-energy, it seems that painting therapy could be effective on their self-efficacy.²³ Accordingly, given the importance of managing diabetes in children using low-cost interventions, this study aimed to investigate the effects of painting therapy directed by virtual method on anxiety, depression, and self-efficacy among children with type 1 diabetes.

MATERIALS AND METHODS

This is a randomized controlled clinical trial with a pretest-posttest design. The study was conducted on 40 children with type 1 diabetes who were referred to the Clinic of Diabetes Imam Reza (AS) affiliated to Shiraz University of Medical Sciences (SUMS), Shiraz, Iran, from July to October 2020. This clinic is a care setting for screening, consultation, and care of diabetes. The reason for the selection of this clinic was that the children with type 1 diabetes are referred to this center frequently. The study was conducted in a non-blinded condition, since the used instruments were self-report, and also, children could not be blinded due to the nature of the painting therapy.

The inclusion criteria were age 8-12 years (they can manipulate symbols representationally), diagnosis of diabetes in at least the past three months, glycosylated hemoglobin of 8-10% at the time of enrollment (based on test sheet), no history of other chronic diseases, a score of ≥ 45 based on the Spence Children's Anxiety Scale (SCAS), the child and his/her parent's willingness to participate in the study, and access to a smartphone (any brands and models with capabilities to use WhatsApp to attend the painting therapy sessions). The exclusion criteria were absence in painting therapy sessions more than once,

the child's hospitalization during the study, and the child or his/her parents' unwillingness to continue participating in the study.

Based on data obtained for the anxiety from a recent study,²⁴ the optimal sample size was estimated 15 patients in each group, considering the following formula suggested for comparing two means and type I error of 5% ($\alpha=0.05$) and type II error of 20% ($\beta=0.20$). However, considering 30% sample attrition, 20 children were selected per group. All recruited children completed the study and were included in the statistical analysis (Figure 1).

$$n = \frac{\left(z_{1-\frac{\alpha}{2}} + z_{1-\beta}\right)^2 (S_1^2 + S_2^2)}{(M_1 - M_2)^2} = \frac{(1.96 + 0.84)^2 [(4.0)^2 + (4.9)^2]}{(29.9 - 25.2)^2} = 15$$

The data collection tools included a demographic questionnaire, the SCAS, Children's Depression Inventory (CDI), and Diabetes Management Self-Efficacy Scale (DMSES). The demographic questionnaire included items about the child's demographic characteristics, the child's illness, and the child's parents' demographic characteristics. This questionnaire was developed by the research team members; then, its qualitative face validity was confirmed by faculty members of the pediatric nursing department of SUMS.

To measure the children's anxiety, the SCAS was used. This is one of the most common scales for evaluating anxiety in children, developed by Spence et al. (1998). This scale consisted of six dimensions, namely separation anxiety, social anxiety, obsessive-compulsive disorder, agoraphobia, generalized anxiety, and fear of bodily harm. It consists of 45 items on a 4-point Likert scale ranging from 0 (never) to 3 (always). The total score ranges from 0-135, and the higher score represents a higher level of anxiety.²⁵ In Spences' study (2003), the results of confirmatory and exploratory factor

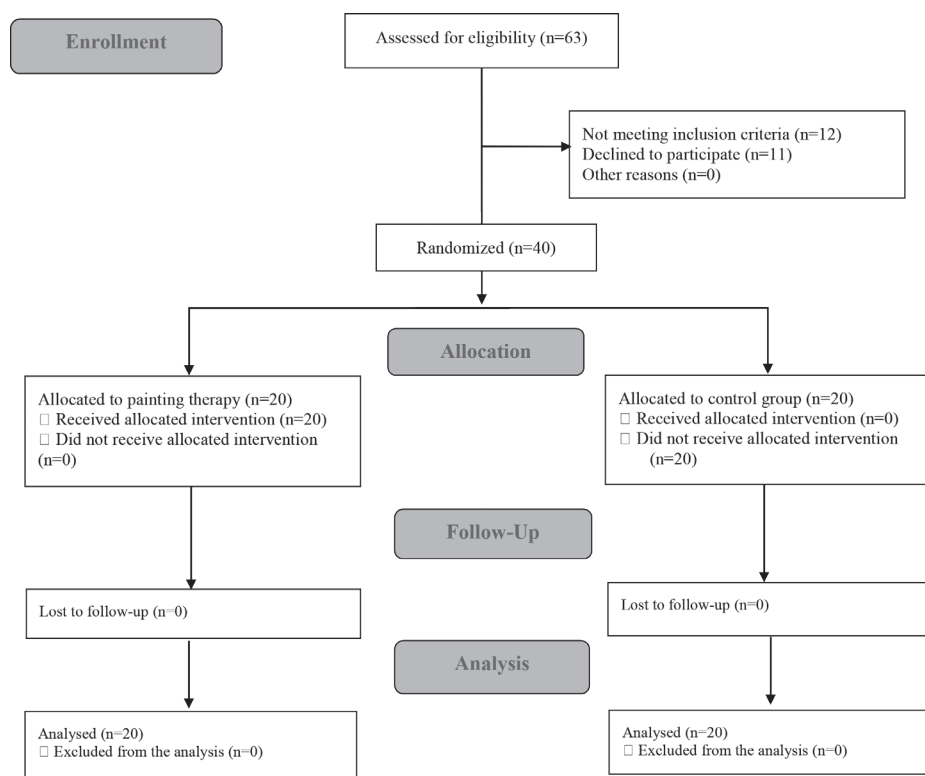


Figure 1: CONSORT flow diagram of the participants of the study.

analyses supported six factors consistent with the hypothesized subtypes of anxiety. There was support also for a model in which the first-order factors loaded significantly on a single second-order factor of anxiety in general. Likewise, the convergent validity was supported by a strong correlation between the SCAS total score and total score on the Revised Children's Manifest Anxiety Scale (RCMAS) ($r=0.75$). Moreover, the divergent validity of the scale was confirmed by the lower correlation of the SCAS total score and the CDI ($r=0.60$) than the correlation between the SCAS total score and the RCMAS anxiety score. The internal consistency of the total score was 0.92, and the 12-week test-retest reliability was 0.63.²⁶ The psychometric of the Persian version of SCAS was demonstrated by Mousavi et al. (2007). The confirmatory factor analysis of six uncorrelated factors supported the six hypothesized factors, with the strong internal consistency of dimensions and the total score and indicated a good fit index for six factors. The Chi-square value also explained the covariance of the data, and exploratory factor analysis was consistent

with the proposed factor structure. They also reported the entire Cronbach's alpha as 0.89.²⁷ In the present study, the Cronbach's alpha coefficient for the entire scale was 0.60, and that for the six dimensions of separation anxiety, social anxiety, obsessive-compulsive disorder, agoraphobia, generalized anxiety, and fear of bodily harm was 0.53, 0.66, 0.69, 0.65, 0.79, and 0.61, respectively.

To measure the children's depression, the CDI was used. This inventory was devised by Kovacs and Beck (1977), and includes 27 items and five dimensions of negative mood, ineffectiveness, interpersonal problems, lack of pleasure, and low self-esteem. Each item has three responses, and participants are asked to select one response based on their feelings and thoughts during the last two weeks. Each item is scored from 0-2 and the total score, ranging from 0-54, is computed by summing up the scores of all items. A higher score indicates a higher level of depression.²⁸ Smucker et al. (1986) confirmed the reliability of CDI for the first time through Cronbach's alpha=0.83-0.89, item-total score product-moment correlation=0.42-0.47, and 3-week

test-retest=0.74-0.77.²⁹ Rajabi et al. (2007) evaluated the psychometric properties of the Persian version of CDI. The results of factor analysis extracted six factors. In addition, the total inventory had the test-retest of 0.81, split-half of 0.84, and internal consistency of 0.87.³⁰ In the present study, the Cronbach's alpha coefficient for the entire inventory was 0.81, and also that for the five dimensions of negative mood, ineffectiveness, interpersonal problems, lack of pleasure, and low self-esteem was 0.69, 0.66, 0.62, 0.72, and 0.80, respectively.

To measure the children's self-efficacy, we used the DMSES. This scale was developed by Bijl et al. (1999) to reflect the tasks a person with type 2 diabetes has to carry out in the context of managing this condition. The scale consists of 20 items which are scored according to a Likert scale ranging from 0 (I can't at all) to 10 (certainly I can) within four dimensions including diet control (nutritional specific and weight), physical exercise, blood sugar control, and medical care (nutritional general and medical treatment). Additionally, the total score can be obtained between 0 and 200, so that a higher score indicates more self-efficacy. In the study of Bijl et al. (1999), factor analysis identified four factors, all of which were related to clusters of self-care activities used to manage diabetes which comprised this scale. The internal consistency of the total scale was 0.81, and the test-retest reliability with a 5-week time interval was 0.79.³¹ The Persian version of DMSES was first validated by Haghayegh et al. (2010). They reported acceptable reliability by Cronbach's alpha=0.68-0.83 and 2-week test-retest=0.78-0.86, and also the high concurrent validity with Sherer's General Self-efficacy Scale and Self-care Behaviors Questionnaire ($r=0.48$, $r=0.81$).³² Additionally, the Persian version of DMSES has been used for type I diabetes to measure the extent to which the respondents are confident that they can manage their diet, level of physical activity, blood sugar level, and medication.³³ Kermansaravi et al. (2017) showed acceptable

validity and adequate internal consistency score ($\alpha=0.89$) of DMSES in adolescents with type I diabetes.³⁴ In the present study, the Cronbach's alpha coefficient for the entire scale was 0.93, and also that for the four dimensions of diet control, physical exercise, blood sugar control, and medical care was 0.95, 0.80, 0.70, and 0.64 respectively.

After explaining the methodology and research objectives to the invited children and their parents, children completed the SCAS under the supervision of their parents. In this stage, 63 children with an anxiety score of ≥ 45 were identified. Consequently, the demographic questionnaire was completed by interviewing one of the child's parents and reviewing the clinical record. Finally, the CDI and DMSES were completed by the included children under the supervision of their parents to record the baseline data. For anxiety, the data obtained in the eligibility stage were considered as the baseline data.

To select 40 children out of 63 eligible samples, we used simple random sampling with a random numbers table. Then, the 40 selected children were randomly allocated into equal intervention ($n=20$) and control ($n=20$) groups (Figure 1). Randomization was performed through the block randomization method to provide a balance between the groups and prevent the selection bias. The allocation ratio was 1:1. Accordingly, 10 four-patient blocks were generated for the two groups, and the blocks were numbered. Then, for allocation concealment, 40 sealed envelopes numbered from 1 to 40 were used, 20 for Group A (intervention) and 20 for Group B (control). For each child, an envelope was selected and the child was allocated to either of the groups based on the label in the envelope. Randomization was performed by an assistant researcher, and all the data were kept confidential during the trial.

The children in the control group received the routine care provided by the Clinic of Diabetes. They participated in nutritional, psychological, and exercise counseling when needed. The children in the intervention

group received the routine care plus painting therapy. Since it was not possible to implement the painting therapy sessions in the clinical settings during the Coronavirus Disease 2019 lockdown period, the sessions were run in the children's homes and directed via WhatsApp. First, children in the intervention group were divided into four groups with three children and two groups with four children. Then, children of each group were invited to a WhatsApp group. For each group of children, painting therapy was held in six 2-hour sessions once a week for a duration of six weeks. The time of each session was determined in coordination with the children of each group.

Each painting therapy session was directed via WhatsApp video call by the main researcher (a master's degree student of pediatric nursing), who was a professional painter and trained by the assistant psychologist about painting therapy principles. Initially, an online briefing session was held for each group and the group members were introduced to each other by the main researcher. Moreover, the children were instructed in this session on how to use the painting tools (like: pencil, crayon, watercolor, pastel, and marker). In each painting therapy session, a video call was made through the WhatsApp group, and the group members were encouraged to draw any topic they were interested in without any technical concerns and attention to detail, using painting tools. Based on the painting therapy principles, children were also requested to use colors to express their feelings of sadness, anger, fear, desire, and happiness. During the session, the main researcher and the assistant psychologist accompanied by one of the children's parents supervised how the children drew. At the end of the session, the children were asked to take a photo of their paintings and then send it to the WhatsApp group. Also, at the end of each session, they were asked to briefly explain what they had painted to the assistant psychologist through WhatsApp. Finally, according to the painting therapy principles, the children whose painting showed their

anxiety and depression were identified, and reports were sent to their parents for further follow-ups.

At the end of the painting therapy sessions, the children in both groups completed the three questionnaires under the supervision of their parents again. Finally, the collected data were analyzed using the Statistical Package for Social Sciences software (SPSS, version 23.00; SPSS Inc., USA). The normal distribution of the quantitative data was not confirmed by the Kolmogorov-Smirnov test., so nonparametric tests were used. To assess the homogeneity of the groups for demographic characteristics, we used Chi-square and Mann-Whitney U tests. To compare anxiety, we employed depression, and self-efficacy scores between and within groups, the Mann-Whitney U and Wilcoxon tests. P value<0.05 was considered as significant.

Ethical approval was obtained from the Local Research Ethics Committee of SUMS[†] (Approval No. IR.SUMS.REC.1398.1194). After providing the eligible children and their parents with a brief verbal description of the study' objectives and assuring them of the confidentiality of their personal information, written informed consent was obtained from children's parents after obtaining children's verbal assent. In addition, all children and their parents were informed that they had the right to withdraw from participating in the study. At the end of the study, one painting therapy session was held for the control group. This session was similar to what was performed in the intervention group; however, due to time and budgetary constraints, only one session was performed. Likewise, the children in both groups were given an incentive.

RESULTS

All children had primary education. There was no statistically significant difference between the two groups in terms of demographic variables ($P>0.05$), except for fasting blood sugar ($P=0.04$) (Table 1).

Before the intervention, there was no

Table 1: Demographic characteristics of children with type 1 diabetes among the control and intervention groups

Quantitative variables		Control	Intervention	P value
		Mean±SD	Mean±SD	
Age (year)		10.20±1.50	9.65±1.26	0.22*
Duration of diabetes (year)		4.30±2.27	4.12±2.27	0.80*
Fasting blood sugar (mg/dl)		194.35±87.04	146.40±50.43	0.04
2-hour postprandial blood sugar (mg/dl)		197.70±54.98	178.20±78.74	0.37*
Glycosylated hemoglobin (%)		8.71±2.06	8.17±2.53	0.46*
Mothers' age		32.12±5.11	33.01±5.16	0.58*
Fathers' age		35.02±6.01	34.17±5.19	0.63*
Qualitative variables		N(%)	N(%)	
Gender	Female	14(70)	17(85)	0.25**
	Male	6(30)	3(15)	
Education of children	Primary	20(100)	20(100)	1.000**
History of relative with diabetes	Yes	7(35)	3(15)	0.14**
	No	13(65)	17(85)	
The child's relationship with the relative with diabetes	Father	1(14.30)	0(0.00)	0.93**
	Mother	1(14.30)	1(33.30)	
	Sister	0(0.00)	1(33.30)	
	Brother	0(0.00)	0(0.00)	
	Other (uncle, grandmother)	5(71.40)	1(33.30)	
Mother's education	High school	5(25)	4(20)	0.37**
	Diploma	9(45)	5(25)	
	Above diploma	6(30)	11(55)	
Father's education	High school	6(30)	3(15)	0.78**
	Diploma	8(40)	11(55)	
	Above diploma	6(30)	6(30)	
Mother's job	Housewife	12(60)	10(50)	0.79**
	Employee	6(30)	8(40)	
	Self-employment	2(10)	2(10)	
Father's job	Unemployed	3(15)	4(20)	0.20**
	Employee	9(45)	13(65)	
	Self-employment	8(40)	3(15)	
Place of residency	Shiraz	13(65)	15(75)	0.49**
	Cities of Fars province	7(35)	5(25)	

* Mann-Whitney test; ** Chi-Square test

statistically significant difference between the groups in terms of total median score of anxiety ($P=0.09$); however, after the intervention, the score in the intervention group was significantly lower than the control group ($P=0.02$). Based on the within-group findings, there was no significant difference in the total median score of anxiety in any of the groups before and after the intervention ($P=0.12$ and $P=0.15$) (Table 2).

After the intervention, the total median score of depression in the intervention group was significantly lower than the control group ($P<0.001$), but before the intervention, there was no statistically significant difference

between the total median score of the two groups ($P=0.20$). In the intervention group, the total median score of depression was significantly reduced after the intervention as compared to before the intervention ($P<0.001$), but in the control group, this difference was not significant ($P=0.34$) (Table 3).

In terms of total median self-efficacy score, no statistically significant difference was observed between the two groups before and after the intervention ($P=0.28$, $P=0.20$). Also, there was no statistically significant difference between the total mean self-efficacy scores in any of the groups before and after the intervention ($P=0.99$, $P=0.69$) (Table 4).

Table 2: Comparison of the within-group and between-group anxiety median scores of children with type 1 diabetes between the control and intervention groups

Variables		Control	Intervention	Between-group P value*
		Median (IQR)	Median (IQR)	
Separation anxiety	Before	8.00 (5.25-11.00)	7.00 (6.00-9.00)	0.37
	After	8.00 (5.25-11.00)	7.00 (6.00-9.00)	
Within-group P value**		1.00	0.70	
Social anxiety	Before	11.50 (9.25-13.00)	12.00 (8.00-12.00)	0.52
	After	11.50 (9.00-14.00)	11.00 (8.25-12.00)	
Within-group P value**		0.94	0.30	
Obsessive compulsive disorder	Before	9.00 (7.00-10.00)	7.00 (6.00-8.00)	0.03
	After	9.00 (7.25-11.00)	7.00 (6.00-8.00)	
Within-group P value**		0.06	0.41	
Agoraphobia	Before	7.00 (4.25-9.00)	6.00 (4.00-8.00)	0.39
	After	8.00 (5.25-9.00)	6.50 (4.00-8.00)	
Within-group P value**		0.06	0.91	
Generalized anxiety	Before	11.00 (9.00-12.75)	11.00 (8.25-12.00)	0.65
	After	11.00 (10.00-13.00)	10.00 (8.00-11.75)	
Within-group P value**		0.41	0.04	
Fear of bodily harm	Before	7.50 (6.00-10.00)	9.00 (7.00-10.00)	0.32
	After	7.50 (6.00-10.00)	9.00 (7.00-10.70)	
Within-group P value**		0.41	0.65	
Total	Before	52.50 (49.00-56.75)	49.50 (47.00-53.00)	0.09
	After	55.00 (48.50-62.25)	48.50 (45.00-51.75)	
Within-group P value**		0.12	0.15	

* Mann-Whitney test; ** Wilcoxon test

Table 3: Comparison of the within-group and between-group depression median scores of children with type 1 diabetes between the control and intervention groups

Variables		Control	Intervention	Between-group P value*
		Median (IQR)	Median (IQR)	
Negative mood	Before	2.00 (1.00-3.00)	3.00 (1.25-4.00)	0.23
	After	2.00 (1.00-3.75)	1.00 (0.25-2.00)	
Within-group P value**		0.35	0.008	
Ineffectiveness	Before	1.50 (1.00-2.00)	1.00 (1.00-2.00)	0.89
	After	1.50 (0.25-2.75)	0.50 (0.00-1.00)	
Within-group P value**		0.25	0.008	
Interpersonal problems	Before	2.50 (1.00-4.00)	1.00 (0.00-3.00)	0.04
	After	2.50 (1.00-4.00)	1.00 (0.00-2.00)	
Within-group P value**		0.76	0.27	
Lack of pleasure	Before	5.00 (4.25-6.75)	4.50 (3.00-6.00)	0.43
	After	5.00 (5.00-6.00)	2.50 (2.00-5.00)	
Within-group P value**		0.61	0.005	
Low self-esteem	Before	1.00 (1.00-2.00)	0.50 (0.00-2.00)	0.08
	After	2.00 (1.00-2.00)	0.00 (0.00-1.00)	
Within-group P value**		0.08	0.08	
Total	Before	13.00 (11.00-16.00)	10.00 (5.50-19.00)	0.20
	After	13.00 (10.00-17.50)	7.00 (4.00-9.00)	
Within-group P value**		0.34	<0.001	

* Mann-Whitney test; ** Wilcoxon test

Table 4: Comparison of the within-group and between-group total mean self-efficacy scores of children with type 1 diabetes between the control and intervention groups

Variables		Control	Intervention	Between-group
		Median (IQR)	Median (IQR)	P value*
Diet control	Before	48.50 (31.75-74.75)	69.50 (64.50-74.25)	0.17
	After	58.50 (39.00-76.25)	69.00 (58.75-72.75)	
Within-group P value**		0.19	0.48	
Physical exercise	Before	33.50 (18.25-40.00)	36.50 (35.00-39.75)	0.18
	After	32.50 (25.50-38.50)	37.50 (35.00-40.00)	
Within-group P value**		0.35	0.13	
Blood sugar control	Before	34.00 (21.25-40.00)	32.50 (30.25-37.50)	0.69
	After	31.50 (21.50-39.75)	34.50 (31.25-38.00)	
Within-group P value**		0.44	0.13	
Medical care	Before	30.00 (28.00-30.00)	30.00 (28.25-30.00)	0.88
	After	29.50 (27.25-30.00)	30.00 (27.00-30.00)	
Within-group P value**		0.29	0.72	
Total	Before	134.50 (108.25-179.75)	168.50 (161.00-176.50)	0.28
	After	152.00 (110.50-184.00)	169.00 (154.00-178.00)	
Within-group P value**		0.69	0.99	

* Mann-Whitney test; ** Wilcoxon test

DISCUSSION

The study showed that painting therapy directed by WhatsApp decreased anxiety and depression in children with type 1 diabetes. In this study, the children who received the routine care plus painting therapy reported lower anxiety and depression scores compared to those who received only routine care. The presented results are consistent with those of some studies in this field. In a trial among children with burns, anxiety and depression were significantly lower among children who participated in the painting therapy compared to those who received the routine care.²⁴ Similarly, a trial reported the significant effect of painting on the reduction of anxiety compared to the routine care in children with cancer.²³ Besides, painting therapy was effective in decreasing preoperative anxiety levels in children undergoing elective surgeries.³⁵ The consistency of our findings with those reported by previous studies may be due to the fact that the study population was children in all studies. Painting therapy probably decreases anxiety and depression by helping the child to express his/her emotions, feelings, desires, and internal conflicts. Also, it assists the child to understand himself/herself better; hence, it changes his/her perceptions of the environment which are the main reason for

childhood anxiety and depression.²⁰

In contrast to the present study, a trial showed no significant difference between the children's preoperative anxiety levels who participated in the painting therapy compared to those who received anxiolytic premedication.³⁶ Similarly, no statistically significant difference was reported between the depression of children with asthma in the two groups of control and painting therapy.³⁷ Perhaps the lack of consistency is related to the type of condition or number of painting therapy sessions. In the present study, the painting therapy was held in six 2-hour sessions for children with type 1 diabetes; however, in the above mentioned studies, painting therapy was performed either in one 30-minute session for hospitalized children before tonsillectomy³⁶ or in seven 1-hour sessions for hospitalized children with asthma.³⁷ Additionally, in the present study, painting therapy was conducted at the children's home and directed through the WhatsApp groups by the main researcher and the assistant psychologist, whereas in the reviewed studies the painting therapy was run individually in the hospitalized wards in a face-to-face manner by the researchers. Accordingly, longer duration of the intervention and also children's interaction

in the WhatsApp groups in the present study, as well as using the children home as the intervention environment might lead to better effects in the present study.

Despite anxiety and depression, there was no statistically significant difference in the total score of self-efficacy between the two groups. This finding could be attributed to a short follow-up period or a short-term intervention. However, the physical exercise dimension was significantly increased after the intervention in favor of the painting therapy group, which can be due to the interaction of the intervention and the high frequency of physical activity in childhood.³⁸ Although we could not find a study that examined the effect of painting therapy on children's self-efficacy, a trial reported that painting therapy increased the self-efficacy scores significantly among adults admitted to the psychiatric ward.³⁹ Probably, the difference in the age range of the study population can be important reasons for the difference in the results of our study and the previous one. Also, in the mentioned study, painting therapy was held in more sessions (eight 45-minute sessions) and all the sessions were run individually in the presence of the researcher in the psychiatric ward. Perhaps a longer duration of intervention, as well as hospitalization, leads to improvement of self-efficacy in the previous study as hospitalization improves self-efficacy through promoting the quality of care and self-care behaviors.⁴⁰

One of the most important strengths of this study was that the painting therapy sessions were conducted at the children's home and directed by the WhatsApp groups. However, the present study had some limitations. First, this study was performed on a small sample of Iranian children with type 1 diabetes. Second, we could not perform a long-term follow-up and only evaluated the outcomes at the end of the intervention.

CONCLUSION

The findings suggest that applying painting

therapy for children with type 1 diabetes may have a significant effect on decreasing their level of anxiety and depression. Therefore, this non-invasive method could be used along with other treatments or routine care in diabetes care centers, pediatric wards, and also community settings to manage diabetes-induced anxiety and depression among children. Given that the children's self-efficacy in the intervention group did not increase significantly compared to the control group, it is recommended that in further studies, the follow-up and intervention should be continued in a longer term, so that the effects of the intervention on self-efficacy can be examined longitudinally.

ACKNOWLEDGEMENT

This article is extracted from the master's thesis in nursing, which was presented by the first author of the article and done with the financial support of SUMS with the code of 21082-08-01-98. We would like to express our sincere gratitude to the Vice Chancellor for Research and Technology of SUMS, as well as the children and their parents, without whose cooperation this research would not be possible. We also would like to thank the Center for Development of Clinical Research of Nemazee Hospital and Dr. Nasrin Shokrpour for editorial assistance.

Conflict of Interest: None declared.

REFERENCES

- 1 Ogle GD, von Oettingen JE, Middlehurst AC, et al. Levels of type 1 diabetes care in children and adolescents for countries at varying resource levels. *Pediatric Diabetes*. 2019;20:93-8.
- 2 Aminzadeh M, Navidi N, Valavi E, Aletayeb SMH. Childhood onset type 1 diabetes at a tertiary hospital in south-western Iran during 2000-2015: Rapid increase in admissions and high prevalence of DKA at diagnosis. *Primary Care Diabetes*. 2019;13:43-8.

- 3 Deeb A, Akle M, Al Ozairi A, Cameron F. Common issues seen in pediatric diabetes clinics, psychological formulations, and related approaches to management. *Journal of Diabetes Research*. 2018;2018:1684175.
- 4 Nguyen LA, Pouwer F, Lodder P, et al. Depression and anxiety in adolescents with type 1 diabetes and their parents. *Pediatric Research*. 2022;91:188-96.
- 5 Zahed G, Shakiba M, Seifi K. The prevalence of psychological disorders among children with diabetes aged 5-12 years old referred to the Endocrinology Clinic of Mofid Hospital, Tehran, Iran in 2014-2015. *Iranian Journal of Child Neurology*. 2018;12:101-12.
- 6 Ebrahimipour F, Sadeghi N, Ghaljaei F, Naderianfar M. Insulin-induced anxiety in children with diabetes. *Journal of Diabetes Nursing*. 2015;3:63-74. [In Persian].
- 7 Shen Y, Zhu W, Lu L, et al. Contribution of structured self-monitoring of blood glucose to self-efficacy in poorly controlled diabetes patients in China. *Diabetes Metabolism Research and Reviews*. 2019;35:3067-76.
- 8 Pashaki MS, Mezel JA, Mokhtari Z, et al. The prevalence of comorbid depression in patients with diabetes: A meta-analysis of observational studies. *Diabetes and Metabolic Syndrom*. 2019;13:3113-9.
- 9 Zhang J, Xu CP, Wu HX, et al. Comparative study of the influence of diabetes distress and depression on treatment adherence in Chinese patients with type 2 diabetes: A cross-sectional survey in the People's Republic of China. *Neuropsychiatric Disease and Treatment*. 2013;9:1289-94.
- 10 Van Tilburg MA, McCaskill CC, Lane JD, Edwards CL, Bethel A, Feinglos MN, et al. Depressed mood is a factor in glycemic control in type 1 diabetes. *Psychosomatic Medicine*. 2001;63:551-5.
- 11 Schmitt A, McSharry J, Speight J, et al. Symptoms of depression and anxiety in adults with type 1 diabetes: Associations with self-care behaviour, glycaemia and incident complications over four years - Results from diabetes MILES-Australia. *Journal of Affective Disorders*. 2021;282:803-11.
- 12 Walker RJ, Smalls BL, Hernandez-Tejada MA, et al. Effect of diabetes self-efficacy on glycemic control, medication adherence, self-care behaviors, and quality of life in a predominantly low-income, minority population. *Ethnicity & Disease*. 2014;24:349-55.
- 13 Kermansaravi F, Navidian A, Sargazishad T, Ebrahimi Tabas E. Evaluation of self-efficacy and some related factors in adolescents with type I diabetes referred to diabetes clinic of Hazrat Ali Asghar Zahedi 2016. *Journal of Diabetes Nursing*. 2017;5:187-98. [In Persian]
- 14 Edraki M, Zarei A, Soltanian M, Moravej H. The Effect of Peer Education on Self-Care Behaviors and the Mean of Glycosylated Hemoglobin in Adolescents with Type 1 Diabetes: A Randomized Controlled Clinical Trial. *International Journal of Community Based Nursing and Midwifery*. 2020;8:209-19.
- 15 Henriquez-Tejo R, Cartes-Velasquez R. Psychosocial impact of type 1 diabetes mellitus in children, adolescents and their families Literature review. *Revista Chilena de Pediatría*. 2018;89:391-8.
- 16 Rubin JA. Introduction to art therapy: Sources & resources. 2nd ed. New York: Routledge Publication; 2010.
- 17 Ding Z, Ouyang Y, Zhang N. Painting therapy in cancer care: A descriptive systematic review. *Open Journal of Nursing*. 2019;9:89-102.
- 18 Johnson JL, Berendts CA. Arts and flowers: drawing out the patients best. The 'we can weekend'. *American Journal of Nursing*. 1986;86:164-6.
- 19 Mardani F, Shafi Abadi A, Jafari A. The effectiveness of painting therapy on anxiety in children with attention-deficit/hyperactivity disorder. *Applied Family Therapy*. 2020;1:68-85.[In Persian]
- 20 Lavey-Khan S, Reddick D. Painting together: A parent-child dyadic art

- therapy group. *the Arts in Psychotherapy*. 2020;70:101687-93.
- 21 Başlı E, Özmen S, Demirci E, et al. The Effects of Art Therapy Techniques on Depression, Anxiety Levels and Quality of Life in the Adolescent with Type 1 Diabetes Mellitus: A Preliminary Study. *Erciyes Medical Journal*. 2020;42:431-5.
 - 22 Moammadi A, Raadin A. The effectiveness of art therapy on decreasing on depression, anxiety and aggression in preschoolers. *J Analytical Cognitive Psychology*. 2017;8:43-51. [In Persian].
 - 23 Khodabakhshi Koolae A, Vazifehdar R, Bahari F, Akbari ME. Impact of painting therapy on aggression and anxiety of children with cancer. *Caspian Journal of Pediatrics*. 2016;2:135-41.
 - 24 Rezazadeh H, Froutan R, Abadi AA, et al. Effects of art therapy program on anxiety and depression among 6-12-year-old burned children. *Open Access Macedonian Journal of Medical Sciences*. 2020;8:126-32.
 - 25 Spence SH. A measure of anxiety symptoms among children. *Behavior Research and Therapy*. 1998;36:545-66.
 - 26 Spence SH, Barrett PM, Turner CM. Psychometric properties of the Spence Children's Anxiety Scale with young adolescents. *Journal of Anxiety Disorders*. 2003;17:605-25.
 - 27 Mousavi R, Moradi A, Farzad V, et al. Psychometric properties of the Spence children's anxiety scale with an Iranian sample. *International Journal of Psychology*. 2007;1:17-26.
 - 28 Kovacs M, Beck A. An empirical-clinical approach towards a definition of childhood depression. In: Schulterbrandt J, Raskin A, editors. *Depression in childhood: Diagnosis, treatment, and conceptual models*. New York: Raven Press; 1977. p. 1-26.
 - 29 Smucker MR, Craighead WE, Craighead LW, Green BJ. Normative and reliability data for the Children's Depression Inventory. *Journal of Abnormal Child Psychology*. 1986;14:25-39.
 - 30 Rajabi G. Assess the validity and reliability of the depression (CDI in adolescents 13 to 15 years old). *Journal of Psychology and Education*. 2007;37:23-46. [In Persian]
 - 31 BijlJV, Poelgeest E, EelinkAV, Shortridge L, Baggett L. The psychometric properties of the diabetes management self-efficacy scale for patients with type 2 diabetes mellitus. *Journal of Advanced Nursing*. 1999;30:352-9.
 - 32 Haghayegh A, Ghasemi N, Neshatdoost H, et al. Psychometric properties of Diabetes Management Self-Efficacy Scale (DMSES). *Iranian Journal of Endocrinology and Metabolism*. 2010;12:111-5. [In Persian]
 - 33 Biglar Chopoghlo S, Hosseinkhani A, Khedmat L, et al. The self-efficacy improvement in adolescent girls with type 1 diabetes mellitus with self-care education through mobile-based social networking. *International Journal of Diabetes in Developing Countries*. 2021;41:676-82.
 - 34 Kerman Saravi F, Navidian A, Ebrahimi Tabas E, Sargazi Shad T. Prediction of the quality of life in the adolescents with diabetes based on self-efficacy. *Medical - Surgical Nursing Journal*. 2017;5:e67998.
 - 35 Forouzandeh N, Drees F, Forouzandeh M, Darakhshandeh S. The effect of interactive games compared to painting on preoperative anxiety in Iranian children: A randomized clinical trial. *Complementary Therapies in Clinical Practice*. 2020;40:101211-8.
 - 36 Babaei S, Fatahi Babani S, Fakhri M, et al. Painting therapy versus anxiolytic premedication to reduce preoperative anxiety levels in children undergoing tonsillectomy: A randomized controlled trial. *Indian Journal of Pediatrics*. 2021;88:190-1.
 - 37 Beebe A, Gelfand EW, Bender B. A randomized trial to test the effectiveness of art therapy for children with asthma. *The Journal of Allergy and Clinical*

- Immunology. 2010;126:263-6.
- 38 Zurc J, Planinšec J. Associations between Physical Activity and Academic Competence: A Cross-Sectional Study among Slovenian Primary School Students. *International Journal of Environmental Research and Public Health*. 2022;19:1-18.
- 39 Shokrnezhad S. The effectiveness of art therapy (painting) on self-efficacy and perceived social support of Hospitalized patients of Sina hospital in Ahvaz. [thesis]. Ahvaz (Iran): Shahid Chamran Unvesity of Ahwaz; 2015. [In Persian].
- 40 Eller LS, Lev EL, Yuan C, Watkins AV. Describing Self-Care Self-Efficacy: Definition, Measurement, Outcomes, and Implications. *International Journal of Nursing Knowledge*. 2018;29:38-48.