

The Relationship of Regimen Adherence with Family Resilience and Parenting Style among Adolescents with Type 2 Diabetes

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Abstract

Background: The prevalence of diabetes mellitus is rising rapidly. Adolescence is also related to weaker medication adherence and increased risk of psychiatric disorders. This study aims to investigate the relationship between parenting style, family resilience, and regimen adherence.

Method: This research is a descriptive cross-sectional study. 180 adolescents with type 2 diabetes and their parents were selected through convenience sampling at Mofid and Taleghani Hospitals, Tehran, Iran. The instruments were "Summary of Diabetes Self-Care Activities," "the Family Resilience Assessment Scale," and "Parenting Style and Dimensions Questionnaire". The sampling duration was from February to April 2021; descriptive statistics and Pearson correlation coefficient were performed using SPSS version 2021.

Results: The results showed that family resilience was moderate in most participants (80%). The mean score of family resilience was 2.94 ± 0.29 and among the subcomponents of this scale, "family Belief systems" was found to have the highest mean score (3.05 ± 0.347). Regimen adherence was moderate in most participants (60%). Parents of Adolescents had higher uses of authoritative parenting styles (3.70 ± 0.54). Adherence to non-smoking (6.31 ± 1.23) and specific medications (5.55 ± 1.28) were higher than adherence to diet, physical exercise, blood glucose monitoring, and foot care. Authoritative parenting styles ($r=0.524$, $P=0.000$) and total family resilience ($r=0.599$, $P=0.000$) were positively related to total regimen adherence. Family resilience was positively correlated with authoritative parenting styles ($r=0.385$, $p=0.000$). Authoritarian and permissive styles were not correlated with regimen adherence ($p>0.05$).

Conclusions: Adherence to the regimen positively correlated with family resilience and authoritative parenting styles for adolescents with type 2 diabetes.

Key Words: *****Achievement goals, cheating behavior.

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1- INTRODUCTION

Regimen adherence covers all kinds of health-related behaviors and is not only about taking prescribed medication. The WHO describes adherence as "the degree to which the patient follows up medical assistance" (1).

Follow-up effectively controls adolescents with Diabetes Mellitus Type 2 (DMT2) by achieving better metabolic regulation in diabetes and retaining a mixture of lifestyle improvements and pharmacological care. Creating near-normal glycated hemoglobin substantially reduces complications of the danger (2). DMT2 is still the most prevalent type of diabetes. The worldwide prevalence of DMT2 is so high that it is expected to reach 417 million people by 2035 (3, 4). There was an estimated 3.78 million DMT2 cases in Iran (5). It is estimated that in 2030, about 9.2 million Iranians will be affected by this disease (6). In this way, it can impose a lot of costs on the health care delivery systems of Iran and other countries. (3). The World Health Organization and the International Diabetes Federation consider DMT2 as a severe challenge to primary health care in the 21st century. This threat is becoming more potent in the Middle East (6, 7).

Adolescence is a period of development during which youth gain independence from parents while undergoing rapid biological and hormonal changes. Adolescence is also related to weaker medication adherence, declining metabolic regulation, and increased risk of psychiatric disorders (8). Every day living with and managing diabetes can be a battle. Feeling like they are a burden on the family, getting handled unfairly or delicately, as if they're ill, facing endless parental questions about their consumption of food, how they feel and whether or not they've taken their insulin, receiving extra attention from parents or others that can trigger envy among other siblings. It's

common for teenagers to feel depressed, angry, and even get fed up with their diabetes. Diabetes is a progressive condition that requires continuous self-management, as well as patient and service provider cooperation to avoid complications. Effective management of DMT2 requires regimen adherence, monitoring of blood glucose, oral pills and/or insulin injections, increased physical activity, adherence to specific diets, and smoking cessation (9). Adherence is defined as the extent to which a person follows the guidelines and medication as recommended by the health care practitioner (10). Regimen adherence is the essential fundamental principle in chronic diseases like DMT2. Non-adherence to treatment is associated with adverse outcomes, and in addition to the physical consequences, the prevalence of mental illness is high in adolescents with diabetes due to complex regimens (11). Although studies show that achieving treatment goals and controlling blood sugar are completed in less than 50% of patients, which indicates low adherence to the treatment (11), the role of the family is undeniable.

The adherence to the regimen in adolescents with DMT2 was 27% higher when adolescents had psychological help from positive family dimensions (e.g., coordination and family guidance) and better glycemic control among people with diabetes (12).

Parenting has been one of the exogenous factors implicated in the etiology of psychopathology and the healthy growth of an infant and a teenager. Four major so-far-investigated parenting styles, which have most frequently evoked the interest of researchers, are authoritative, authoritarian, permissive (liberal) loving, and permissive unengaged style. The relationship between particular parenting models and their effects on depression, eating disorders, addiction or violence has

also been demonstrated in previous studies (13). It has been shown that the liberal-unloving parenting style is positively associated with aggressive behavior, based on little control and lack of emotional support. Parenting models based on extreme discipline and emotional coldness increase the risk of depression as well as child and adolescent substance abuse; and decrease follow-up for children and teenage diseases. In contrast, the strict parenting style adopted by both parents minimizes the risk of depression and suicidal thoughts and is also negatively associated with the misuse of drugs, bulimia, and anorexia nervosa and leads to more commitment to the care of children and adolescent diseases (13).

Family resilience plays a significant role in adolescent care and follow-up (14). It is defined as characteristics that help the family endure hardships and not experience negative consequences. It is considered a complex mechanism unique to each family that can support families in significant adversities. There are three requirements for resilience: severe hardship, the availability of multiple resources, and the avoidance of adverse outcomes or a positive adaptation to the new situation (14). The experience of resilience and its intensity changes throughout life. The presence of a potentially traumatic event can change a person's capacity for resilience and enable the family to withstand adversity and adapt positively.

One of the common problems of nurses and health care providers is the lack of adherence of patients to treatment for chronic diseases such as type 2 diabetes, especially in adolescents. Poor adherence is a warning to adolescents, nurses, and healthcare systems. Poor adherence will increase the symptoms of the disease and the duration of hospitalization and will have negative consequences for adolescents and families (15), so

recognizing the relevant factors can be used to improve the quality of nursing care and provide the conditions for preventive measures.

Due to the importance of adherence to treatment in chronic diseases, especially in adolescents with DMT2, this study was conducted to determine the relation between regimen adherence, parental style, and family resilience in adolescents with DMT2.

2- MATERIALS AND METHODS

This study applied a descriptive cross-sectional design. The participants included 180 adolescents with DMT2, aged between 12 and 18 years, and their parents, in Taleghani and Mofid Children's hospitals, affiliated to Shahid Beheshti University of Medical Sciences, Tehran, Iran, in 2021. The patients were selected through convenient sampling, based on which all adolescents with DMT2, who met the characteristics of the study in the two hospitals, were asked to participate in the study. The inclusion criteria encompassed the adolescents, aged between 12 and 18 years without any mental or physical disability based on medical records, who were living with their biological parents, and didn't have any complications of diabetes. Using the following formula, the sample size of 164 adolescents was obtained. Considering 10% of the sample loss, 180 adolescents were selected.

$$n \geq \left[\frac{(z_{1-\alpha/2} + z_{1-\beta})}{0.5 \times \ln\left[\frac{(1+r)}{(1-r)}\right]} \right]^2 + 3$$

$$r = 0.25$$

$$\alpha = 0.05 \Rightarrow z_{1-\alpha/2} = 1.96$$

$$\beta = 0.10 \Rightarrow z_{1-\beta} = 1.28$$

"r" is the correlation between the variables, which is considered to be 0.25 according to the article by Goethals et al. (2017) (16).

A demographic questionnaire was used to obtain information about the participants. Its items included age, sex, school level, the number of family members, Adolescent's birth rate, father and mother's occupation, family economic status, level of education for mother and father, age of mother and father, Duration of DMT2, complications of DMT2, family history of diabetes, duration of treatment and whether or not to receive insulin.

Parenting Style and Dimensions Questionnaire (PSDQ), which was filled by parents (fathers or mothers) with 32 items, was used for measuring parenting style. Its scores range from 32 to 160. The Family Resilience Assessment Scale (FRAS), filled by adolescents, was used for measuring family resilience. This tool consists of 66 items, and the minimum and maximum scores are 66 and 246, respectively. "The Summary of Diabetes Self-Care Activities "(SDSCA) was the last instrument used for the purpose of this study. It consists of 12 items, and the minimum and maximum scores are 0 and 84. The qualitative content validity of all three tools was assessed, and the results showed acceptable content validities.

Alpha Cronbach's reliability of the scales was also calculated with the following results: FRAS = .90, SDSCA = .76, and PSDQ = .79.

2-1. Data Analysis

First, the mean and standard deviation of resilience, parenting, and adherence scores were calculated. Then, the Chi-square test, Paired-sample t-test, Independent-Sample t-test, Analysis of variance (ANOVA), and Pearson correlation coefficient were performed to determine the correlation between variables, using the statistical package for social sciences (SPSS) version 2021, and the significance level was set at $p < 0.05$.

3- RESULTS

The results showed that a high percentage (60%) of adolescents was within the age group of 16 to 18 years and 53.9% of them were females. Most mothers were housewives (53.3%). In most adolescents, the duration of treatment was less than one year (50.6), and most of them did not receive insulin (68.9%) and had a family history of diabetes (71.1%). The rest of the demographic characteristics are shown in **Table 1**.

Table-1: Distribution of the participants (Adolescents and parents) according to the demographic characteristics

Demographic characteristics	Subgroup	N	%
Adolescent's educational level	primary school	32	17.8
	middle school	72	40.0
	secondary school	76	42.2
	Total	180	100.0
Mother's education	under diploma	73	40.6
	diploma	49	27.2
	above diploma	41	22.8
	bachelor	15	8.3
	higher bachelors	2	1.1
	Total	180	100.0
Mother's age	30-40	111	61.7
	41-50	68	37.8
	51-above	1	.6
	Total	180	100.0

Father's education	under diploma	33	18.3
	diploma	91	50.6
	above diploma	35	19.4
	bachelor	20	11.1
	higher bachelors	1	.6
	Total	180	100.0
Father's job	jobless	25	13.9
	employer	149	82.8
	retired	6	3.3
	Total	180	100.0
Age of father	30-40	56	31.1
	41-50	111	61.7
	51-above	13	7.2
	Total	180	100.0

The results revealed that family resilience was moderate in most participants (80%). The mean score of family resilience was 2.94 ± 0.29 and was higher in the dimension of "family Belief systems" (3.05 ± 0.347), as shown in **Table 2**. Regimen adherence was at a moderate level in most participants (60%); and 33.3 % were found

to have good adherence, and 6.7% had poor adherence. Adherence to non-smoking (6.31 ± 1.23) and specific medications (5.55 ± 1.28) were higher than adherence to diet, physical exercise, blood glucose monitoring, and foot care. Authoritative parenting style was most used by the parents (3.70 ± 0.54).

Table-2: Mean \pm SD of the Family Resilience, Regimen Adherence, Parenting Style and their subcomponents in adolescents with DMT2

Variable		M	SD
Family Resilience	A / Family Belief Systems	3.05	0.347
	B / Family Organizational Patterns	2.82	0.278
	C / Communication /Problem-Solving	2.79	0.361
	Total	2.94	0.295
Regimen Adherence	Healthy diet	4.63	1.063
	Physical activity	4.49	1.171
	Self-monitoring of glucose	4.42	1.216
	Foot care	4.61	1.275
	Medications adherence	5.55	1.282
	Smoking	6.31	1.238
Total	4.78	0.773	
Parenting Style	Permissive	3.28	0.583
	Authoritarian	2.35	0.409
	Authoritative	3.70	0.541
	FRAS total	2.94	0.295

M = Means, SD = Standard deviation

The results showed that authoritarian and permissive styles had no correlation with the total regimen adherence ($p > 0.05$). There is a significant positive correlation

between authoritative parenting style and total adherence to regimen, as presented in **Table 3**.

Table-3: Correlation between regimen adherence and Parenting style

Parenting style Regimen adherence	Permissive		Authoritarian		Authoritative	
	r	P. value	r	P. value	r	P. value
Healthy diet	0.407	0.412	-0.025	0.735	0.511	0.000
Physical activity	-0.3151	0.000	0.029	0.697	-0.322	0.000
Self-monitoring of blood glucose	0.221	0.073	-0.120	0.109	0.473	0.000
Foot care	0.355	0.502	-0.076	0.309	0.451	0.000
Adherence to recommended medications	0.381	0.120	-0.043	0.571	0.515	0.000
Smoking	0.327	0.302	0.003	0.973	0.390	0.000
Total Regimen adherence	0.358	0.101	-0.062	0.407	0.524	0.000

P. value = probability value, NS: Non Significant at $P > 0.05$, S: Significant at $P < 0.05$, r = Pearson correlation

There is a positive significant correlation between the total Regimen adherence and

the total family resilience, as well as all its subcomponents, as shown in **Table 4**.

Table-4: Correlation between regimen adherence and family resilience

Family resilience Regimen adherence	Family Belief Systems		Family Organizational Patterns		Communication /Problem-Solving		Total Family Resilience	
	r	P. value	r	P. value	r	P value	r	P. value
Healthy diet	0.522	0.000	0.288	0.101	0.587	0.000	0.535	0.000
Physical activity	-0.126-	0.092	0.030	0.694	-0.237-	0.001	0.137	0.067
Self-monitoring of blood glucose	0.393	0.000	0.183	0.014	0.528	0.000	0.427	0.000
Foot care	0.493	0.000	0.258	0.000	0.536	0.000	0.493	0.000
Adherence to recommended medications	0.544	0.000	0.316	0.000	0.576	0.000	0.548	0.000
Smoking	0.439	0.000	0.294	0.000	0.565	0.000	0.496	0.000
Total regimen adherence	0.579	0.000	0.341	0.000	0.650	0.000	0.599	0.000

P. value =probability value, r = Pearson correlation

As presented in **Table 5**, the results revealed a positive significant correlation

between the total family resilience and authoritative parenting style.

Table-5: Correlation between family resilience and parenting style in adolescence with DMT2

Family resilience Parenting style	Family Belief Systems		Family Organizational Patterns		Communication /Problem-Solving		Total Family resilience	
	r	P. value	r	P. value	r	P. value	r	P. value
Permissive	0.152	0.041	0.038	0.611	0.247	0.001	0.172	0.201
Authoritarian	-0.278	0.000	0.005	0.948	-0.221	0.003	-0.198	0.108
Authoritative	0.412	0.000	0.102	0.173	0.469	0.000	0.385	0.000

P. value =probability value, r = Pearson correlation.

4- DISCUSSION

This study aimed to determine the relationship between regimen adherence, parental style, and family resilience in adolescents with DMT2.

The results showed that 60 % of adolescents had regimen adherence at moderate level and only 33.3 were at a good level of adherence. Ashur et al. (2015) in the National Center for Diabetes and Endocrinology in Tripoli, Libya, studied 523 type 2 diabetes patients, showing that 63.9% had moderate to high treatment adherence and 36.1% had low adherence to treatment. In the present study, poor adherence was 6.7%, which is much lower than in the above study. Differences in the participants' demographic characteristics and study methodology could explain this mismatch. The above study has reported that females were 1.5 times less likely than males to be low adherers (17). Previous research demonstrates that family functioning, parental supervision, peer support, adolescent mood disorders, eating disorders, and parenting culture and styles have been implicated in adolescents' non-adherence (18). A study reported that the prevalence of poor drug adherence in patients with DMT2 varies from 38% to

93% due to different methodological approaches (3). Yet another study proposed that 31.5% of the participants were not adherent (19).

One of the capabilities that adolescents with type 2 diabetes must have for adapting to stressors is resilience (20). In this study the total family resilience of the participants was at moderate level. In line with this finding, Fayazi & Bagherian, 2018, investigating the relationship between family resiliency with self-efficacy and stress in Iranian female high school students in Tehran, revealed that family resilience was moderate (21). However, in another study, the mean resilience score in diabetic adolescents was 67.95, with 53.5% having low resilience (22). The above study also found that family support could predict adolescent resilience. The family has a significant influence on the self-care of adolescents with diabetes. The supportive behaviors of parents and family members of adolescents with DMT2 appear to be related to family resilience. Family support by facilitating the disease management process can help reduce the possible complications of the disease.

Parenting style of the majority of the participants was the authoritative style.

This result is supported by Greene et al. 2010 in Brigham, Utah, who had explored the relationships among metabolic control, self-care behaviors, and parenting in adolescents with type 1 diabetes; and had demonstrated that the parents tended to be more authoritative in their approaches to parenting than either authoritarian or permissive, which is consistent with the findings of the present study (23). When it comes to exposure to different parenting styles during childhood, lack of authoritative parenting was identified as the most critical factor in lower life satisfaction among young people (24).

The results showed that there was a high statistically significant correlation between authoritative parenting style and total score of regimen adherence. It means that the adolescents' regimen adherence increases, along with the increase in the mothers' authoritative parenting style, which usually occurs within highly cohesive family systems (25). This result is supported by Radcliff et al., 2018, who showed that authoritative parenting is indirectly linked to better HbA1c ($\beta = -.15$, $p = .021$) through both better adherence and higher QOL. Authoritative parenting was also found to be, directly, associated with better adherence ($\beta = .26$, $p = .001$), which was in turn linked to better HbA1c ($\beta = -.35$, $p = .021$). In addition, adherence was, directly, associated with QOL ($\beta = -.56$, $p = .001$). In the above study, the participants were 257 parent-child dyads with T1D and their primary caregivers. And most of the participating adolescents used insulin pumps, which were different from the present study and could have influenced the results. Moreover, the mean age of adolescents was lower than that in the present study (26). Four types of parenting styles are defined based on two dimensions of parenting behavior, namely demandingness and responsiveness. In authoritative parenting, there is a high demand and high response. Evidence

shows that this type of parenting style has positive consequences such as higher self-efficacy for the child and family (27).

There is a significant correlation between family resilience and the total score of regimen adherence. This result is supported by Everhart et al. (2014) in Virginia, assessing the associations between family functioning and treatment adherence in children and adolescents with CF. They revealed that the better family functioning, the better adherence to antibiotic treatment and the worse adherence to enzymes (28).

Our results manifested that there is a highly significant correlation between the total scores of family resilience and authoritative parenting style. Consistent with this finding, Qiu et al., in 2021 evaluating the level of parent-reported family resilience, parenting styles, and psychosocial adjustment of children with chronic illness, revealed that the parents who scored higher on authoritative parenting reported more resilience and fewer psychosocial problems for their children. Moreover, authoritative parenting appeared to account for much of the relationship between family resilience and improved child functioning, suggesting that education on parenting styles would be helpful for families of children with chronic illnesses (29). Likewise, another study showed that depressed students who receive an authoritative parenting style, have higher resilience (30).

4-1. Limitations of the study

This study was carried out on adolescents with type 2 diabetes; thus, the results may not be generalized to other adolescents with type 1 diabetes. The data were collected by self-reporting questionnaires, which may be a limitation of this study. The large number of questionnaires could have also affected the accuracy of the participants' responses.

5- CONCLUSION

Overall, family resilience had a positive correlation with adherence to treatment for adolescents with type 2 diabetes; so, the higher the percentage of family resilience, the better the rate of treatment adherence. The study also demonstrated that authoritative parenting styles positively correlate with adherence to treatment.

6- ETHICAL CONSIDERATIONS

This study was approved by Shahid Beheshti University of Medical Sciences, with the ethical code of IR.sbm.pharmacy.RFC.1399-322. Moreover, permissions were granted from the director of the Outpatient Clinic for adolescents with DMT2 and the director of nursing in the pediatric ward at the Hospitals of Taleghani and Mofid, Tehran, 2021. The patients were also informed that their participation was voluntary and that they could withdraw from the study at any time without providing a reason. The questionnaires were filled anonymously and after getting the consent form.

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8- CONFLICTS OF INTERESTS

None.

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