

The Effect of the Family-Centered Empowerment Model (FCEM) on the Self-efficacy of Mothers and Adolescents with Anemia

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ARTICLE INFO	ABSTRACT
<p>Article type: Original Article</p> <hr/> <p>Article History: Received: 22 Sep 2024 Accepted: 10 Nov 2024</p> <hr/> <p>Key words: Adolescents, Anemia, Family-Centered Empowerment Model, Iron deficiency, Mothers, Self-efficacy</p>	<p>Introduction: Among the interventions that help in the management of chronic diseases is improving the level of self-efficacy. Anemia caused by iron deficiency is a chronic disease that is common in teenage girls and leads to reduced productivity and physical strength, impaired concentration, reduced academic progress, and increased risk of other diseases. This study was conducted to investigate the effectiveness of the family-centered empowerment model (FCEM) on the self-efficacy of mothers and adolescents with anemia.</p> <p>Materials and Methods: The present semi-experimental research was conducted by selecting 60 teenage girls with iron deficiency anemia (IDA) by random cluster sampling method in Tehran Province, Iran. Data collection was done using a demographic information profile, a 40-item adolescent self-efficacy questionnaire, and a 38-item mothers' self-efficacy questionnaire. The intervention was carried out in 3 stages during 6 sessions. After 1.5 months post-test was done. SPSS version 16 software was used for data analysis.</p> <p>Results: Before the intervention, there was no significant difference in the mean self-efficacy score of teenagers and mothers between the test and control groups ($P > 0.005$). After the intervention, the difference between the two groups was significant ($P < 0.005$). Also, there was a significant difference in the average self-efficacy scores of teenagers and mothers in the test group before and after the intervention ($P < 0.005$).</p> <p>Conclusions: A nursing intervention based on the Family-Centered Empowerment Model can be effective in improving the self-efficacy of mothers and adolescent girls with anemia. It is suggested to use this model in other age groups with different chronic diseases.</p>
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Introduction

Control and prevention of chronic diseases is one of the leading health problems in most countries (1). People with chronic diseases need more attention for help and treatment(2) because the challenges of the disease not only affect the individual but also his family members(3). Anemia as a chronic disease requires behavioral and lifestyle adjustments(4). About 2 billion people in the world (more than 30% of the world's population) suffer from anemia, most of which are of iron deficiency type(5,6).

Globally, iron deficiency anemia (IDA) is one of the main causes of death among adolescent girls aged 10 to 19 years(7).

Factors affecting anemia include poverty, lack of access to healthcare services, inappropriate living environment, poor hygiene and poor health behaviors, parasitic infections, poor nutrition, blood loss (such as heavy menstruation), etc (8-10).

Complications of IDA include general weakness, reduced ability and physical performance, heart failure, impaired mental development and perception, impaired ability to concentrate, reduced memory and learning ability, mood changes, depression, increased susceptibility to infection, increased pain threshold, reduced release of thyroid stimulating hormone (TSH) and subsequently reduced thyroid function and body temperature regulation, decreased visual and hearing performance, and fatigue add so on(11-13).

All these complications continue in the long term and lead to a significant decrease in the quality of life of patients(14). Despite sufficient knowledge of the causes, treatment, and strategies to combat iron deficiency and anemia caused by it, the prevention and control of this disease are still considered a big challenge in public health(15). Among the interventions that help in the management of chronic diseases is raising the level of self-efficacy(16).

The concept of self-efficacy is the central core of cognitive-social theory, which was expressed by Albert Bandura in 1986 (17). Socio-cognitive theory is one of the most effective theories of health behavior in the field of education and health promotion(5). Self-efficacy means a person's belief in his ability to organize and implement a set of

activities necessary to achieve a specific outcome(18). Self-efficacy is the main prerequisite for changing health behaviors in patients suffering from chronic diseases. Patients with high self-efficacy tend to modify their lifestyle and promote their life quality(19).

Research has also shown that self-efficacy beliefs increase the motivation for progress, self-care, and life quality of patients (13,20,21).

One of the ways to increase self-efficacy in patients is family-oriented empowerment because the role of the family in the processes of disease prevention and treatment is undeniable(22). The family-centered empowerment model is an Iranian model that was presented by Alhani in 2002. The chief idea of this model is to empower the family system to promote health by emphasizing the usefulness of the family's role in motivational and psychological aspects. Based on this model, increasing knowledge and empowering family members in the field of self-care needs is the best source of support for patients with chronic diseases(14).

What is clear is that despite the prevalence of IDA in the country, it is currently not possible to establish an anemia clinic to refer affected patients, identify early complications of the disease, design organizational plans, and follow up the treatment; due to the lack of financial infrastructure and proper equipment. Despite these limitations, nurses have faced this challenge to some extent by providing training to people at risk and suffering from IDA and through continuous interventions. However, most interventions in the field of IDA have been patient-centered, and less attention has been paid to the role of the family(23,24).

Aims

According to the above explanations and also the existence of little interventional nursing research in the field of adolescents with IDA, the role of self-efficacy, and family support, the researchers of this study decided to investigate the effectiveness of the family-centered empowerment model on the self-efficacy of mothers and teenagers with IDA.

Materials and Methods

This semi-experimental research was conducted in three stages in Tehran/Iran from 2012-2013. Secondary girls' schools located in Tehran were the research environment. The research population was teenage girls suffering from IDA and their mothers.

Using the following formula and the results of a similar article(25), the required number of samples was determined to be 26 with 95% confidence and 80% test power. However, considering the attrition rate of 10%, 30 people were considered for each group.

$$n = \frac{(z_{1-\alpha/2} + z_{1-\beta})^2(s_1^2 + s_2^2)}{(\bar{x}_1 - \bar{x}_2)^2} = \frac{(1/96 + 0/84)^2(0/65^2 + 0/6^2)}{(3/72 - 4/2)^2} = 26 + \frac{0}{10(26)} \cong 30 \Rightarrow 30 \times 2 = 60$$

The criteria for inclusion were: having the age of 15 to 18 years, starting menstruation, having hemoglobin less than 12 grams per deciliter and serum ferritin less than 15 mg per deciliter (26), not using any drugs that affect anemia, such as iron or other vitamin supplements, not receiving nutritional interventions that affect anemia, not being treated with a special diet, consent of parents and teenagers to participate in the research, and having a specific address and phone number for follow-up. The criteria for exclusion were: suffering from acute infections and other chronic diseases such as cardiovascular diseases, thalassemia, parasitic infections, etc., absence of more than one session in the empowerment sessions, getting any disease during

research, and the vagueness of the answers in the questionnaire. The tools for this research were: a demographic profile, a researcher-made 40-item self-efficacy questionnaire for teenagers, and a 38-item self-efficacy questionnaire for mothers with a four-item Likert response scale of never, sometimes, often, always (Appendix 1 and 2). To determine the validity of the content, both self-efficacy tools were presented to 10 expert faculty members of medical universities, and finally, their corrective and suggested opinions were collected and improvements were made. To measure the reliability of the tools, they were given to 10 teenagers and 10 mothers, and Cronbach's alpha coefficient $\alpha \leq 0.7$ was obtained (Table 1).

Research tools	Cronbach's alpha
Adolescent self-efficacy questionnaire	r=0.88
Mothers' self-efficacy questionnaire	r=0.72

The intervention was carried out in 3 stages in the following order:

In the first stage, the research plan was approved by the university's research council and approved by the university's ethics committee, and the introduction letter was received from the research assistant.

Then, sixty girls with iron deficiency anemia along with their mothers were selected by cluster random sampling.

For this purpose, first from the 19 education regions of Tehran province, one region in the east of Tehran and two high schools in that region were randomly selected. To prevent

the exchange of information between the test and control groups and to homogenize the two groups, one high school was randomly assigned to the test group and one high school to the control group. After visiting school and counseling with a health teacher, the second degree was selected from the three levels of education. The health files were examined and the teenagers suspected of anemia were identified.

During a phone call, the researcher introduced herself to the family and explained the importance of the problem, the objectives of the research, and how to

conduct the research. They were asked to come on a coordinated date to school for further examination of the apparent symptoms of anemia (such as pale skin, pale mucus, headache, dizziness, nausea, decreased concentration, etc.) by the researcher and a nurse colleague with clinical experience. After obtaining written consent, teenagers who had suspicious clinical symptoms related to IDA were referred to a special laboratory whose devices had already been verified for accuracy and precision. In the case of those whose menstruation had passed at least one week, a deadline was given to take blood after one week at the appropriate time.

It should be noted that after the blood sampling, teenagers and their mothers were treated and then the questionnaires prepared for the pre-test were given to each person of the two groups. After analyzing the primary data, which led to the identification of resources, limitations, needs, and weaknesses of teenagers and mothers in different fields, the content of the designed empowerment program was revised.

In the second stage, because the empowering agent in this model is a teenager, so to improve self-efficacy, the empowering method with small groups of peers is more appropriate. In this way, group problem-solving or problem-solving sessions were held in groups of 5-6 people in a class that was previously coordinated with the school authorities.

During the group sessions, the teenagers talked with each other under the supervision of the researcher about the symptoms they have, ways of diagnosis, medicinal and non-medicinal treatments that they know, how to prevent parasitic infections in the family, how to make vegetables healthy in the family, how to cook and prepare food by the mother, daily diet and measures to improve their illness. Also, how to properly wash hands and clean vegetables to prevent parasitic contamination was demonstrated by the researcher.

Also, how to calculate a suitable diet considering the daily needs of teenage girls for iron and vitamin C was operationally taught to the students by the researcher. Then the students were asked to practice and repeat the learned behavior and skills and

calculate a diet meal enriched with iron and vitamin C in the presence of the researcher. The intervention for the test group lasted for 8 weeks and the goal was to make the teenagers pay attention to the fact that "I can play a role in improving my situation".

To empower mothers, teenagers were asked to take the role of teaching their mothers as a health interface.

The implementation of this method will increase the self-efficacy of the family system. Due to the possibility that the mothers were not empowered by the education of the teenager, they were also invited to the school to discuss the contents that the teenager taught them during 1-2 sessions. In these meetings, most of the contents were expressed by the mothers regarding anemia and the solutions and measures taken by them, the calculation of dietary iron, and the researcher only had a guiding role.

If the information and functional behavior of the mothers were insufficient, more information was added and the necessary measures were shown practically. In the third stage, after 1.5 months of the intervention, the post-test was done by completing the questionnaires again by the teenagers and their mothers (test and control groups). It should be noted that in the data collection at each stage, all the samples answered the questionnaires completely and there were no scratches or distortions. SPSS software version 16 was used for data analysis. In the descriptive part, mean and standard deviation, frequency, and percentage were used, and in the inferential part, chi-square, independent t-test, and paired t-test were used. A value of $P < 0.05$ was considered statistically significant.

Results

The age of teenagers was in the range of 15-18 years with an average of 16 years in both groups. In both groups, the highest percentage of mothers were in the age range of 40.1-50 years.

Most of them had a diploma and were housewives. The findings of the demographic information are shown in Table 2.

Table 2. Distribution and frequency percentage of research samples based on individual characteristics

Variable		Test Group	Control Group	*P-Value
Teenage age	15-16	17(56.7%)	16(53.3%)	**p= 0.22
	16.1-17	12(40.0%)	10(33.3%)	
	17.1-18	1(3.3%)	4(13.3%)	
****M ± SD		16.0±0.77	16.25±0.79	
Field of Study	Math	7(23.3%)	9(30.0%)	***p= 0.66
	Experimental	10(33.3%)	11(36.7%)	
	Humanities	13(43.3%)	10(33.3%)	
mother's age	40>	5(16.7%)	2(6.7%)	**p= 0.49
	40.1-50	17(56.7%)	20(66.66%)	
	50<	8(26.7%)	7(23.3%)	
****M ± SD		47.43±5.72	46.47±5.12	
Mother's education	Under diploma	1(3.3%)	2(6.66%)	*** p= 0.60
	Diploma	19(63.33%)	20(66.6%)	
	Bachelor's degree	10(33.3%)	7(23.3%)	
	Master's degree	0(0.0%)	1(3.3%)	
Mother's job	Housewife	24(80.0%)	21(70.0%)	**p= 0.37
	Employed	6(20.0%)	9(30.0%)	
* Significance level ** Derived from Independent t-test ***Derived from χ^2 :Chi-squared **** Mean ± Standard deviation				

The comparison of the mean self-efficacy scores of the adolescents before the intervention in the test and control groups did not show a significant difference (p=0.97) and the two groups were similar in this respect, while after the intervention this difference was significant (p=0.000).

Also, the comparison of the mean self-efficacy scores of the adolescents before and after the intervention in the test group showed a significant difference (p=0.000), however, no significant difference was observed in the control group (p=0.18) (Table 3).

Table 3. Average score of adolescents' self-efficacy before and after the study

Variable	Time	Test (M ± SD)	Control (M ± SD)	P-value
Adolescents' self-efficacy	Before	41.13±11.30	41.00±13.72	*P= 0.970
	After	79.60±9.52	41.81±15.27	*P= 0.000
P-value		**P= 0.000	**P= 0.18	
* Independent t-test **Paired t-test				

In the comparison of the mean self-efficacy scores of active family members (mothers) before and after the intervention, a significant difference was seen in the test group (p=0.000), but in the control group, no significant difference was observed (p=0.312). Also, before the intervention, there was no significant difference between

the mean self-efficacy scores of the active family members (mothers) in the test and control groups (p=0.986) and the two groups were similar in this regard. However, after the intervention, there was a significant difference between the test and control groups (p=0.010) (Table 4).

Table 4. Average score of mothers' self-efficacy before and after the study

Variable	Time	Test (M ± SD)	Control (M ± SD)	P-value
Mothers' self-efficacy	Before	40.93±7.57	40.90±7.40	*P= 0.986
	After	46.00±6.80	41.10±7.33	*P= 0.000
P-value		**P= 0.000	**P= 0.312	
* Independent t-test **Paired t-test				

Discussion

Considering the growing prevalence of chronic diseases in Iran, it is recommended to take measures to increase the ability of patients to take care of themselves(27). Self-care behaviors include actions such as controlling disease symptoms, adopting a therapeutic and nutritional diet, maintaining a healthy lifestyle, and controlling disease progression(28,29). Increasing patients' trust and confidence in their ability to perform self-care behaviors is an essential factor in the self-management of the disease, which is called self-efficacy(29). In this research, the effectiveness of the family-centered empowerment model on the self-efficacy of mothers and adolescents with anemia was investigated. As it was obtained from the results of this study, the mean scores of self-efficacy of teenagers with anemia in the test group increased significantly 1.5 months after the completion of the intervention. In this regard, several quantitative studies have been conducted in Iran and other countries on the effect of FCEM (6,30,31).

In a study on 70 patients with diabetes, Nasrabadi et al. (2021) showed that after three months of using the family-centered empowerment model with an emphasis on a healthy diet, the average level of hemoglobin A1C in the test group decreased significantly ($P < 0.005$)(32). Therefore, FCEM can guide a person with a chronic disease on how to modify their nutritional habits through empowerment training. FCEM helps patients' families identify lifestyle problems, improve their patient advocacy skills, and the ability to change the condition and lifestyle of the family. Since FCEM is related to patient participation, it can also improve patient self-efficacy. Some studies have shown a significant positive relationship between FCEM and self-efficacy in patients(32, 33). Timuri et al. (2017) in a study on 60 children with asthma showed after the use of FCEM during seven 30-minute sessions, the self-efficacy scores of all children in the test group before and after the intervention had a significant difference ($P = 0.0001$), while no significant difference was observed between the self-efficacy scores of the control group ($P = 0.845$)(34). Brimnejad et al. (2017) in a two-group semi-

experimental study on 70 teenagers with an average age of 15 years who were suffering from major thalassemia showed that there was a significant increase in the average self-efficacy score in the test group compared to the control after using 6 sessions of FCEM(35).

Sargazi et al. (2017) on 50 teenagers with type 1 diabetes showed that after using the family-centered empowerment model, the average scores of self-efficacy and life quality increased in the experimental group compared to the control group (36). These findings confirm the results of the present study. In line with the present study, there are other studies on other chronic diseases such as blood pressure, myocardial infarction, obesity, ostomy surgery, urinary infection, hemodialysis, breast cancer, and kidney failure regarding other variables such as lifestyle, life quality, level of knowledge, self-esteem, perceived stress, treatment adherence have been done, all of which used the FCEM model during 4-8 training sessions(31). In all these studies, the samples under investigation have been focused on the person with chronic disease, while in this study, not only the self-efficacy of the sick person but also the active family member (mother) was examined.

Education of family members in the field of control and prevention of diseases is of great importance because sick people rely on their family members and their attitude directly affects the sick person, especially in chronic diseases. Therefore, empowering the family improves the family's support for the patient, increases the patient's self-efficacy, and as a result improves the lifestyle and disease management(37). Therefore, in this research, the effectiveness of the family-centered empowerment model on the self-efficacy of mothers with children with anemia was also investigated. As it was obtained from the results of this study, the average scores of mothers' self-efficacy in the test group increased significantly after 1.5 months from the end of the intervention. In other words, after the intervention, mothers of the test group had more self-efficacy than the control group, although this value was minor. The reason for the lower changes in the mothers' self-efficacy scores could be an instrumental

measurement error, the interval between the pre-test and the post-test, and events that may have occurred during this period, such as the occurrence of illness in the mothers, which was beyond the researcher's control.

The increase in the self-efficacy scores of the mothers in the test group showed that teenage girls were successful in transferring concepts to their mothers and improving their self-efficacy. In the present study, adolescents and mothers of the control group had no restrictions in receiving health information at their discretion from various information sources. But what is clear is the significant difference in the level of self-efficacy of the two groups, which can be caused by the quality of training provided in empowering the family and considering the complementary role of teenagers in transferring information and education to mothers.

Based on the framework of the FCEM, not only did the knowledge and understanding of adolescents as the empowering agent improve, but it also had a positive effect on their ability to perform self-care behaviors. On the other hand, it enabled teenagers to transmit information to their mothers as active members of the family. This allowed mothers to be empowered in examining and making decisions in choosing the right care options for their chronically ill teenagers. Therefore, the use of the above method with emphasis on self-care and self-efficacy can be considered as a new perspective on the subject of educating sick teenagers and their families.

The findings of other family empowerment programs focused on parents are also consistent with the findings of current research. The study by Shoghi et al. (2019) showed that the empowerment of parents of children with cancer during four sessions of 20 to 30 minutes affects the reduction of parental burden of care(38). Also, the results of a study by Yeh et al. (2016) in Taiwan showed that the use of the FCEM has a positive effect on the family's performance in controlling the disease and reducing the symptoms of the disease in children(39). In the study of Rajabi et al. (2016) on 172 mothers of children with asthma, the knowledge, attitude, and self-efficacy of mothers increased significantly in the test

group compared to the control group after the empowerment intervention(40).

Due to the prevalence of IDA around the world, various interventions have been made to improve it. Jeihooni et al. (2021) in a semi-experimental study on 160 students with anemia in the city of Fasa, Fars province, conducted a six-session educational intervention for 45 or 50 minutes based on the PRECEDE model. After 4 months, the results indicated that there was a significant increase in nutritional behaviors that prevent IDA in the intervention group. Also, the average scores of hemoglobin, hematocrit, and blood ferritin showed a significant increase in the experimental group 4 months after the intervention (24). Ghoreishi et al. (2018) in an educational intervention based on the health belief model during two 90-minute sessions on 140 female high school students in Mashhad, showed that after 3 months the average score of self-efficacy, awareness, and the behavior of iron supplement consumption increased significantly in the test group(23).

In the above two studies, no role was assigned to families, especially mothers, and the education process was patient-centered, while in the third step of the present study (educational participation), children were encouraged to convey what they learned to their mothers. Two separate training sessions were also held for mothers, which is the distinguishing feature of the present study.

In addition, in these two studies, the post-test was taken after 3-4 months, while in the present study, re-evaluation was done 1.5 months later, which shows the faster effectiveness of the intervention with family involvement in enhancing the condition of adolescents with chronic diseases. Lucas Gosdin et al. (2021) administered iron and folic acid supplements to 1387 adolescent girls aged 10-19 in two schools located in Ghana in a weekly school-based program for one year. The results indicated that the school pill administration program effectively reduces anemia in girls(7). Although the above study was a valuable work, as it can be seen, only the prescription of medicine was emphasized and no role was assigned to the self-efficacy of teenagers and mothers in improving their lifestyle. This is while empowering teenage girls about iron

deficiency and anemia resulting from it and improving their self-efficacy to improve incorrect dietary patterns and apply measures to control and prevent it is very important.

Conclusion

In the present study, the assumption that the average self-efficacy score of adolescents and mothers is different in two groups after the intervention was confirmed. The items of the self-efficacy questionnaire in girls and mothers are designed in such a way (Appendix 1 and 2) that it examines behavior change in the field of preventing iron deficiency anemia, especially practical points in daily nutrition. According to the empowerment sessions and after 1.5 months from the end of the intervention, a significant and positive change in the average scores was obtained. Therefore, it can be said that we have achieved the goal of changing the behavior of girls and mothers.

Although the effectiveness of the family-centered empowerment model in this study has not been investigated in the long term, nevertheless, a significant difference in the self-efficacy status of adolescents and mothers in the two groups was seen after 1.5 months, which indicates the effectiveness of the implemented model. The use of any intervention and educational method can create positive effects with different scopes on different aspects of a person suffering from a chronic disease(41). But the important thing is to empower the whole family to control the disease and its complications as much as possible, and ultimately increase the life quality of the person suffering from chronic diseases in the family(38). Considering the growing prevalence of chronic diseases in Iran (42), it is suggested that this model be systematically implemented to improve the self-efficacy of adolescents with other chronic diseases. In the present study, before the intervention, the role of confounding variables was controlled by a random distribution of the samples in test and control groups. The limitations of this study include receiving educational information from other sources and the possibility of non-cooperation of some mothers in educational participation

sessions by teenagers, which could affect the results of the research and were beyond the researcher's control. Environmental factors, differences in individual characteristics, and the influence of the psychological and motivational states of adolescents and mothers when completing the questionnaire were also the other limitations of this research. The researcher's verbal and emotional communication with mothers and teenagers during the empowerment sessions and the friendly atmosphere in these sessions may also have influenced the results of the intervention group.

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References

1. Sohrabzadeh F, Hakim Javadi M. Relationship between Emotional and Social Maturity Problems in Adolescents with Depression and Social Anxiety Disorder. *Scientific Journal of Nursing, Midwifery and Paramedical Faculty*. 2021; 6(3): 58-67.
2. Tabrizi JS, Khoshmaram N, Doshmangir L, Shakibazadeh E. Related Factors to Health Promoting Self-Care Behaviors among Adolescents. *Depiction of Health* 2019; 9(4): 282-291.
3. Boris P, Kovács KE, Nagy BE. The comparative study of chronically ill and healthy children and adolescents in the light of their general mental health. *Scientific Reports*. 2024 Mar 21; 14(1): 6754.
4. Asar Sh, Jalalpour Sh, Ayoubi F, Rahmani MR, Rezaeian M. PRISMA; Preferred Reporting Items for Systematic Reviews and Meta-Analyses. *J Rafsanjan Univ Med Sci* 2016; 15(1): 63-80.
5. Bahari NI, Baharom M, Zahid SN, Daud F. Behavioral impact on clinical specialist payment method: A systematic review. *Iranian Journal of Public Health*. 2022 Jul;51(7):1469.
6. Mulianingsih M, Khalid S, Ilham I, Aryani NP, Risma R, Musfira MA. Development of family empowerment models for adolescent anemia: systematic review. *International Journal of Chemical and Biochemical Sciences (IJCBS)*, 2024; 25(15): 202-207.
7. Gosdin L, Sharma AJ, Tripp K, Amoafu EF, Mahama AB, Selenje L, Jefferds ME, Martorell R, Ramakrishnan U, Addo OY. A school-based weekly iron and folic acid supplementation program effectively reduces anemia in a prospective cohort of Ghanaian adolescent girls. *The Journal of nutrition*. 2021 Jun 1;151(6):1646-55.
8. De Nardi L, Trombetta A, Ghirardo S, Genovese MR, Barbi E, Taucar V. Adolescents with chronic disease and social media: a cross-sectional

- study. *Archives of Disease in Childhood*. 2020 Aug 1; 105(8):744-8.
9. Lang AC, Greenley RN, Davies WH. Impact of perceived health competence on the quality of life of emerging adults with chronic health conditions. *Emerging Adulthood*. 2022 Jun;10(3):702-11.
 10. Bai G, Herten MH, Landgraf JM, Korfage IJ, Raat H. Childhood chronic conditions and health-related quality of life: Findings from a large population-based study. *PLoS One*, 2017; 12(6): e0178539.
 11. Pinquart M. Health-related quality of life of young people with and without chronic conditions. *Journal of Pediatric Psychology*. 2020 Aug 1;45(7):780-92.
 12. Toledano-Toledano F, Moral de la Rubia J, Nabors LA, Domínguez-Guedea MT, Salinas Escudero G, Rocha Perez E, Luna D, Leyva Lopez A. Predictors of quality of life among parents of children with chronic diseases: a cross-sectional study. *InHealthcare* 2020 Nov 3,8(4): 456.
 13. Seyed Nematollah Roshan FS, Navipour H, Alhani F. Practical intervention on quality of life of anemic girls and their mothers. *International Journal of Adolescent Medicine and Health*. 2021 Jun 29; 33(3):107-13.
 14. McDougall J, Baldwin P, Evans J, Nichols M, Etherington N, Wright V. Quality of life and self-determination: Youth with chronic health conditions make the connection. *Applied Research in Quality of Life*. 2016 Jun;11:571-99.
 15. Seyed Nematollah Roshan FS, Akhavan Amjadi M, Mahjoub Vaghaee Dashti S. The Effect of Online Family-Centered Care on the Lifestyle of Adolescent Girls with Obesity. *Journal of Patient Safety and Quality Improvement*. 2023; 11(2): 127-133. Doi: 10.22038/PSJ.2023.69322.1383.
 16. Toledano-Toledano F, Contreras-Valdez JA. Validity and reliability of the Beck Depression Inventory II (BDI-II) in family caregivers of children with chronic diseases. *PLoS ONE* 2018; 13: e0206917.
 17. Toledano-Toledano F, De La Rubia JM, McCubbin LD, Cauley B, Luna D. Brief version of the coping health inventory for parents (CHIP) among family caregivers of children with chronic diseases. *Health Qual. Life Outcomes*. 2020;18: 1-14.
 18. Ghasemzadeh S, Hosseinian S, Gholami Fesharaki M. Evaluation of the Effectiveness of Family-Centered Treatments on the Behavioral Consequences of Iranian Children and Adolescents: A Systematic Review and Meta-Analysis. *Psychology of Exceptional Individuals*. 2022 Jun 22;12(46):233-56.
 19. Sarkis-Onofre R, Catalá-López F, Aromataris E, Lockwood C. How to properly use the PRISMA Statement. *Systematic Reviews*. 2021 Dec;10:1-3.
 20. Tehranineshat B, Mohammadi F, Mehdizade Tazangi R, Sohrabpour M, Parviniannasab AM, Bijani M. A study of the relationship among burned patients' resilience and self-efficacy and their quality of life. *Patient preference and adherence*. 2020 Aug 4:1361-9.
 21. Turi ER, Reigada LC, Liu J, Leonard SI, Bruzzese JM. Associations among anxiety, self-efficacy, and self-care in rural adolescents with poorly controlled asthma. *Annals of Allergy, Asthma & Immunology*. 2021 Dec 1;127(6):661-6.
 22. Molazem Z, Taheri E, Kalyani MN. Effectiveness of Family-oriented Education on Self-care behaviors of Patients with Acute Myocardial Infarction: A Randomized Clinical Trial. *International Journal of Community Based Nursing and Midwifery*. 2024 Jan;12(1):13.
 23. Ghoreishi MS, Abusalehi A, Peyman N, Tehrani H. The effect of preventive educational intervention for promoting iron supplement use in high school female's students: an application of Health Belief Model. *RJMS*. 2018;25(171):31-42.
 24. Khani Jeihooni A, Hoshyar S, Afzali Harsini P, Rakhshani T. The effect of nutrition education based on PRECEDE model on iron deficiency anemia among female students. *BMC women's health*. 2021 Jun 24;21(1):256.
 25. Teymouri F, Alhani F, Kazemnejad A. The effect of family-centered empowerment model on the Quality of life of school-age asthma children. *Iranian Journal of Nursing Research (IJNR)*, 2011; 6 (20): 63-52.
 26. Filippatos G, Ponikowski P, Farmakis D, Anker SD, Butler J, Fabien V, Kirwan BA, Macdougall IC, Metra M, Rosano G, Ruschitzka F. Association between hemoglobin levels and efficacy of intravenous ferric carboxymaltose in patients with acute heart failure and iron deficiency: an AFFIRM-AHF subgroup analysis. *Circulation*. 2023 May 30;147(22):1640-53.
 27. Tabrizi JS, Doshmangir L, Khoshmaram N, Shakibazadeh E, Abdolahi HM, Khabiri R. Key factors affecting health promoting behaviors among adolescents: a scoping review. *BMC Health Services Research*. 2024 Jan 11;24(1):58.
 28. Riegel B, Westland H, Iovino P, Barelds I, Slot JB, Stawnychy MA, Osokpo O, Tarbi E, Trappenburg JC, Vellone E, Strömberg A. Characteristics of self-care interventions for patients with a chronic condition: A scoping review. *International journal of nursing studies*. 2021 Apr 1;116:103713.
 29. Farley H. Promoting self-efficacy in patients with chronic disease beyond traditional education: A literature review. *Nursing open*. 2020 Jan;7(1):30-41.
 30. Mulyana AM, Rakhmawati W, Adistie F, and Maulana S. Recent evidence regarding family-centered empowerment in improving the quality of life and Treatment outcomes among Asian and African children with chronic illnesses: a scoping review. *Journal of Health and Translational Medicine (JUMMEC)*. 2024 Jan 2;27(1):7-20.
 31. Bashar FR, Salesi M, Alhani F. A review of 15 years application the family centered empowerment model on the consequences of acute and chronic Diseases. *Journal of Military Medicine*. 2019;21(4):325-41.
 32. Nasrabadi H, Nikraftar F, Gholami M, Mahmoudirad G. Effect of family-centered empowerment model on eating habits, weight, hemoglobin A1C, and blood glucose in Iranian patients with type 2 diabetes. *Evidence Based Care*. 2021 Apr 1;11(1):25-34.

33. Madmoli M. A systematic review study on the results of empowerment-based interventions in diabetic patients. *Int Res Med Health Sci.* 2019; 2(1):1-7.
34. Teymouri F, Alhani F, Kazemnejad A. The effect of family-centered empowerment model on self-efficacy and self-esteem of the children with asthma. *Preventive Care in Nursing and Midwifery Journal.* 2017; 7(1): 18-26.
35. Borimnejad L, Parvizy S, Haghaani H, Sheibani B. The effect of family-centered empowerment program on self-efficacy of adolescents with thalassemia major: A randomized controlled clinical trial. *International Journal of Community Based Nursing and Midwifery.* 2018;6(1):29-38.
36. Sargazi Shad T, Kermansaravi F, Navidian A. Effect of the family-centered empowerment model on quality of life and self-efficacy in adolescents with type 1 diabetes referring to the Ali Asghar's clinic in Zahedan, 2016. *Iranian Journal of Endocrinology and Metabolism.* 2018; 19(5):330-9.
37. Novita Haryanto A, Hafizurrachman M, Hardisman, Afrizal. The impact of a family-empowerment program on smoking prevention among elementary student in Indonesia: a cluster randomized controlled trial. *International Journal of Health Promotion and Education.* 2024 Jan 2; 62(1):15-28.
38. Shoghi M, Shahbazi B, Seyedfatemi N. The effect of the Family-Centered Empowerment Model (FCEM) on the care burden of the parents of children diagnosed with cancer. *Asian Pacific journal of cancer prevention: APJCP.* 2019; 20(6): 1757-63.
39. Yeh HY, Ma WF, Huang JL, et al. Evaluating the effectiveness of a family empowerment program on family function and pulmonary function of children with asthma: A randomized control trial. *International Journal of Nursing Studies.* 2016;60: 133-44.
40. Rajabi R, Forozy M, Fuladvandi M, et al. The effect of family-centered empowerment model on the knowledge, attitudes and self-efficacy of mothers of children with asthma. *Journal of Nursing Education.* 2016;5:41-50.
41. Reynolds R, Dennis S, Hasan I, Slewa J, Chen W, Tian D, Bobba S, Zwar N. A systematic review of chronic disease management interventions in primary care. *BMC family practice.* 2018 Dec;19: 1-3.
42. Seyed Nematollah Roshan FS, Navipour H, Alhani H. Effect of Family-Centered Empowerment Model (FCEM) on quality of life of mothers having teenagers with iron deficiency anemia. *Nursing Education Research Journal,* 2014; 3 (2): 27-40.