



The Effectiveness of an Education Intervention Based on Self-Care Model on Social Support among Adolescents with Type 1 Diabetes Mellitus

Sherry Oluchina

- Department of Nursing Education Leadership Management and Research, School of Nursing, Jomo Kenyatta University of Agriculture and Technology, (JKUAT), PO BOX 62000 Nairobi, Kenya

***Corresponding author:** Sherry Oluchina. Email address: soluchina@jkuat.ac.ke
<https://orcid.org/0009-0003-1183-6495>

DOI: <https://dx.doi.org/10.4314/ajhs.v37i3.7>

This work is distributed Open Access under the Creative Commons Attribution 4.0 (CC BY 4.0).
Copyright resides with the authors

Abstract

INTRODUCTION

The increasing prevalence rate has made diabetes mellitus a world epidemic. Type 1 diabetes mellitus (T1DM) demands are extensive. Self-care among adolescents with T1DM improves when social support is provided by parents, caregivers and peers. This intervention study among adolescents with T1DM evaluated the effectiveness of a self-care model education intervention on social support.

METHODOLOGY

We conducted a quasi-experimental non-equivalent study design utilizing pre-test and post-test at Thika Level 5 Hospital (TL5H) and Kiambu Level 5 Hospital (KL5H) diabetes clinics in Kenya from January to August 2021. Adolescents aged 10 to 19 years at the two clinics selected by stratified random sampling were the study population. Experimental and control arms had 48 adolescents with T1DM. The experimental arm received education intervention but the control arm did not. The Medical Outcomes Study (MOS) Social Support Survey (SSS) scale was used to assess social support in the first and seventh months. Data were analysed by the paired sample T-test and Independent T-test.

RESULTS

Paired sample T-test showed a significant increase in social support ($p < 0.05$) before and after the intervention. Independent T-test showed a significant increase in social support ($p < 0.05$) post-intervention.

CONCLUSION

Education intervention based on the self-care model is an effective program that could improve social support. In addition, the education intervention based on self-care model needs to be implemented continuously to prevent diabetes-related complications and improve social support for diabetic patients.

Keywords: Adolescents; Education; Social Support; Self-Care Model; Type 1 Diabetes Mellitus

[*Afr. J. Health Sci.* 2024 37 (3)306-315]

Introduction

Social support is the care or assistance offered by other people (1), and it can be in the form of emotional/informational, tangible, affectionate and positive social interaction (1). Diabetes self-management can be improved when parents, caregivers and

peers provide social support to adolescents with T1DM thus helping these adolescents control blood sugar within normal limits. In the United States of America (USA), a study showed that social support from parents and peers to adolescents with T1DM positively influenced self-care (2, 3), the social supports offered included

emotional, informational, esteem, social networks and tangible supports.

Adherence to a healthy diet and foot care were the diabetes self-care behaviours that had the greatest impact when social support was offered to adolescents with T1DM (3). Thus, to enhance self-management it is important to support diabetic patients. Studies done in Italy and Australia recommended that significant others needed to support diabetic patients in the course of diabetes treatment to promote their health (4, 5). Additionally, Self-efficacy in diabetes management was enhanced when adolescents with T1DM received social support (6), similarly a study in Paraíba, Brazil, reported that adolescents with T1DM self-care vision were enhanced when they received social support (7).

Education improves knowledge of diabetes management and enhances social support provided to adolescents with T1DM by family members and peers. A study done in the USA showed that at post-test, social support increased significantly in the intervention arm after education intervention (1). This was consistent with a study done in China, where diabetes self-management education significantly enhanced social support (8). Education influences knowledge, skills and networks for building and maintaining strong social connections, hence enhancing diabetic patients' overall well-being. Education is also associated with greater access to supportive social circles, which is beneficial to diabetic patients during challenging life situations. This intervention study among adolescents with T1DM therefore aimed to evaluate the effectiveness of a self-care model education intervention on social support.

Methodology

Study area and design

A quasi-experimental non-equivalent study design, utilizing pre-test

and post-test that ran from January to December 2021 was conducted at Thika Level 5 Hospital (TL5H) and Kiambu Level 5 Hospital (KL5H) diabetes clinics. The two hospitals are located in Kiambu County, Kenya and the diabetic clinics are in the outpatient department and run on a Tuesday every week. Additionally, the two hospitals provide comprehensive medical and surgical services.

Study population and sample size

The study population was adolescents with T1DM whose ages ranged from 10 to 19 years attending diabetic clinics at TL5H and KL5H. According to 2018/2019 diabetics statistics, an average of 60 and 55 adolescents with T1DM visited monthly diabetic clinics at TL5H and KL5H respectively. The formula for a quasi-experimental study design was used (9) to determine the sample size.

$$n = \frac{[(Z_{\alpha/2} + Z_{\beta})^2 \times (p_1(1-p_1) + p_2(1-p_2))]}{(p_1 - p_2)^2}$$

$Z_{\alpha/2}$ = the critical value of the Normal distribution at $\alpha/2$ (for a confidence level of 95%, α is 0.05) = 1.96

Z_{β} = the critical value of the Normal distribution at β (for a power of 80%, β is 0.2) = 0.84

p_1 = the expected sample proportion in the control group with uncontrolled blood glucose = 20%

p_2 = the expected sample proportion in the intervention group with uncontrolled blood glucose = 40%

$$n = \frac{(1.96 + 0.84)^2 \times (0.2(1-0.2) + 0.4(1-0.4))}{(0.2 - 0.4)^2}$$

$$n = 37$$

To cater for attrition, 30% was added to the minimum sample size. The number of participants in the intervention and control arm was 48.

Recruitment of participants and sampling

Lists of all eligible participants diagnosed with T1DM attending TL5H and KL5H diabetic clinics were obtained from

the computerized patients' record system after permission was granted. Adolescents with T1DM were issued with invitation letters containing information about the study. Researchers/research assistants approached eligible adolescents with T1DM in diabetes clinic waiting rooms. Participants were pair-matched by age and education level to eliminate confounding factors. Stratified random sampling was used to select participants to ensure equal representation. In stratified random sampling, first, the study populations from each study site were stratified by sex (male and female), then by age (10 to 14 and 15 to 19 years) and lastly by education level (primary and secondary). Then proportionate probability sampling was done within each stratum and finally, simple random sampling using a table of random numbers to select the participants.

Inclusion and exclusion criteria

Inclusion criteria. Adolescents with T1DM whose ages ranged from 10 to 19 years living in Kiambu County and attending diabetic clinics of TL5H and KL5H; adolescents with T1DM diagnosed at least three (3) months before recruitment to the study; and adolescents with T1DM who agreed to participate in a follow-up survey after six months.

Exclusion criteria. Adolescents with T1DM who were physically and mentally very sick as this would make them incapable of participating in the study.

Intervention

A training guideline based on a self-care model was developed. This was validated by content experts. The intervention arm was divided into four groups (12 participants per group) and each group attended an 8-hour educational programme. Each group received four sessions of a 2-hours educational programme for a duration of four months. The contents covered were as follows: session one: introduction to T1DM, epidemiology, signs and symptoms,

aetiology, diagnosis and complications; session two: healthy diet, physical activity and self-monitoring of blood glucose; session three: treatment adherence and foot care; and session four: healthy coping, reduction of risks and problem-solving skills. The education for all the groups lasted from July to October 2021 and was facilitated by the principal investigator. They were trained using the self-care model AADE7 self-care behaviours: healthy eating, being physically active, monitoring blood glucose, compliance with medications, foot care, stress management and problem-solving skills. Self-care model AADE7 self-care behaviours offer the younger population the opportunity to fully engage in their healthcare journey (7). In instructional sessions, collaborative and interactive teaching methods (group discussion, brainstorming, and question and response techniques) were used. To promote participants' self-efficacy, the researcher also utilized specific training approaches such as verbal encouragement and persuasion, interactive discussion of experience sharing, role plays, educational video playbacks, peer support and performance accomplishments. The principal investigator concluded the diabetes self-management education sessions by providing take-home activities. Motivational counselling was provided to participants who had HbA1c > 9. This was followed by monthly follow-ups for the next two months. Adolescents with T1DM in the control arm continued their usual care, including having their blood pressure and weights checked, consulting with physicians, and collecting medicines.

Data collection

Data was collected using a structured interviewer-administered questionnaire that had two sections: section A: socio-demographic and diabetic-specific characteristics; section B: social support assessed using the pretested

Medical Outcomes Study (MOS) Social Support Survey (SSS) scale (5). The MOSS-SSS assess social support and has an overall index consisting of 19 items and 4 functional support subscales: emotional/informational support (involves caring, love and empathy) (8 items); tangible support (the provision of material resources or behavioural assistance) (4 items); and affectionate support and positive social interaction (involving expressions of love and affection/the availability of other persons to do fun things) (7 items). Each of the 19 items had a 5-point Likert response (ranging from: 'none of the time' = 1 to 'all of the time' = 5). Scores cut-off point was 50%, where a score of $\geq 50\%$ was categorized as better/satisfactory and $< 50\%$ as worse/unsatisfactory perceived social support (10).

Data analysis

Quantitative data entry, cleaning and coding was done to enhance the data quality. The questionnaires were assessed by the principal investigator upon receipt for completeness and legibility. They were then cross-checked for errors, coded and entered into Statistical Package of Social Sciences (SPSS) version 26 (SPSS Armonk, NY: IBM Corp) software for data analysis. A paired T-test determined significant differences before and after the intervention, while an Independent T-test was done to find the significant difference between the groups of study. A P-value of < 0.05 at a 95% confidence interval was considered significant.

Ethical consideration

Ethical approval was obtained from Jomo Kenyatta University of Agriculture and Technology (JKUAT) Institutional Ethics Review Committee (JKU/IERC/02316/0015) and National Commission for Science Technology and Innovation (NACOSTI) (NACOSTI/ P/ 20/

7746/ 779807). Written informed consent was sought from all participants. Autonomy and privacy were maintained and any information shared with them was confidential. Additional consent was sought from parents of participants younger than 18 years. Participation was voluntary and privacy was ensured during the educational intervention and data collection. The audio recordings used during the FGD sessions were only used for transcription purposes after which they were erased or destroyed. The filled study tools were stored in a secure place.

Results

Socio-demographic characteristics of respondents

The response rate was 100% at baseline and end-line surveys. Most respondents were in the aged 10-13 years, female, attained primary level of education, and lived with two parents. Majority of respondents had the primary caregiver as mother and most of them their primary caregiver had reached tertiary level education (Table 1).

Diabetes-specific characteristics of respondents

Most respondents had T1DM between 1-5 years, a normal body mass index ($18.5 - 25.0 \text{ kg/m}^2$), and a positive history of diabetes in the family. Regarding insulin regime, 67.7% ($n=65$) of respondents had 2 daily injections (Table 2).

Social support

The score cut-off point was 50%, where a score of $\geq 50\%$ was categorized as better/satisfactory and $< 50\%$ as worse/unsatisfactory social support (10). At baseline, the majority of respondents 91.7% ($n=88$) had satisfactory social support. At post-intervention, the majority of respondents 94.8% ($n=91$) had satisfactory social support (Figure 1).

Table 1:
Socio-Demographic Characteristics of Respondents

Variable	Category	Control n (%)	Intervention n (%)	Total n (%)
Age in years	10 -13	25 (52.1%)	18 (37.5%)	43 (44.8%)
	14-17	16 (33.3%)	17 (35.4%)	33 (34.4%)
	≥ 18	7 (14.6%)	13 (27.1%)	20 (20.8%)
Gender	Male	23 (47.9%)	20 (41.7%)	43 (44.8%)
	Female	25 (52.1%)	28 (58.3%)	53 (55.2%)
Education level	None	1 (2.1%)	2 (4.1%)	3 (3.1%)
	Primary	24 (50.0%)	20 (41.7%)	44 (45.8%)
	Secondary	18 (37.5%)	20 (41.7%)	38 (39.6%)
	Tertiary	5 (10.4%)	6 (12.5%)	11 (11.5%)
Family structure	2 parents living together	35 (72.9%)	33 (68.7%)	68 (70.8%)
	Single parent	10 (20.8%)	12 (25.0%)	22 (22.9%)
	Not living with parents	3 (6.3%)	3 (6.3%)	6 (6.3%)
Primary caregiver	Mother	38 (79.2%)	38 (79.2%)	76 (79.2%)
	Father	7 (14.5%)	8 (16.7%)	15 (15.6%)
	Others (relatives, friends)	3 (6.3%)	2 (4.1%)	5 (5.2%)
Primary caregiver	None	3 (6.3%)	2 (4.1%)	5 (5.2%)
Education level	Primary	3 (6.3%)	5 (10.5%)	8 (8.3%)
	Secondary	18 (37.4%)	24 (50.0%)	42 (43.8%)
	Tertiary	24 (50.0%)	17 (35.4%)	41 (42.7%)

Table 2:
Diabetic-Specific Characteristics of the Respondents

Variable	Category	Control n (%)	Intervention n (%)	Total n (%)
Duration of T1DM in Years	1-5	37 (77.1%)	39 (81.2%)	76 (79.2%)
	6-10	11 (22.9%)	9 (18.8%)	20 (20.8%)
Body mass index (kg/m ²)	Underweight (< 18.5)	7 (14.6%)	6 (12.5%)	13 (13.5%)
	Normal (18.5 -25.0)	37 (77.1%)	39 (81.2%)	76 (79.2%)
	Overweight (> 25.0)	4 (8.3%)	3 (6.3%)	7 (7.3%)
Family history of Diabetes	None	4 (8.3%)	5 (10.4%)	9 (9.4%)
	Present	44 (91.7%)	43 (89.6%)	87 (90.6%)
Insulin regimen	2 daily injections	33 (68.8%)	32 (66.7%)	65 (67.7%)
	Multiple daily injections	15 (31.2%)	16 (33.3%)	31 (32.3%)

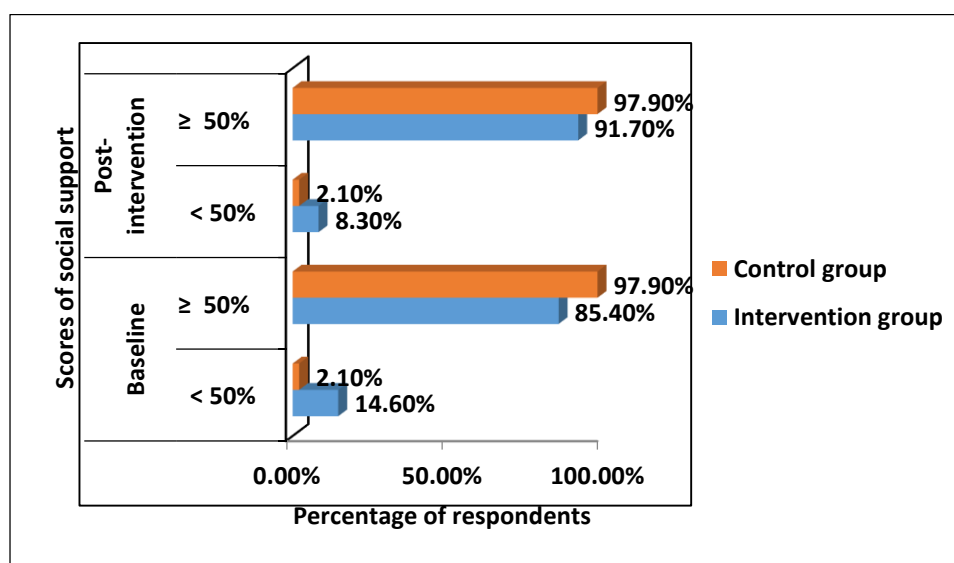


Figure 1:
Social Support of Respondents

Independent-samples t-test was performed on pre-test scores for mean scores of social support. The mean score difference was not significant in all sub-scales of MOS-SSS and social support (Table 3).

Independent-sample t-test was performed on post-test scores for mean scores of social support. The mean score difference of positive social interaction and emotional/informational support was significant. However, the mean score

difference of tangible support, affectionate support and social support was not significant (Table 4).

Paired-samples t-test was conducted to compare the effect of education intervention based on self-care model on post- and pre-test mean scores of social support for the intervention group. The mean score difference was significant in all sub-scales of MOS-SSS and social support (Table 5).

Table 3:
Independent Samples T-Test on Pre-Test Scores for Social Support

Variable	Group	N	Mean	SD	Social Support Scores		T-test value	df	P-value	95% C.I.	
					Mean difference					Lower	Upper
Tangible support	Intervention	48	78.65	20.74	-2.73		-0.755	94	0.452	-9.921	4.452
	Control	48	81.38	14.09							
Affectionate support	Intervention	48	70.49	20.41	-3.29		-0.960	76	0.340	-10.09	3.527
	Control	48	73.78	12.02							
Positive social interaction	Intervention	48	62.37	16.78	1.78		0.592	94	0.555	-4.179	7.731
	Control	48	60.59	12.25							
Emotional/informational support	Intervention	48	71.80	21.04	4.29		1.271	68	0.208	-2.444	11.03
	Control	48	67.51	10.21							
Social support	Intervention	48	70.83	17.88	0.02		0.005	69	0.996	-5.738	5.764
	Control	48	70.81	8.90							

Table 4:
Independent samples T-test on post-test scores for social support

Variable	Group	N	Mean	SD	Social Support Scores		T-test value	Df	p-value	95% C.I.	
					Mean difference					Lower	Upper
Tangible support	Intervention	48	82.42	16.24	0.39		0.126	94	0.900	-5.784	6.565
	Control	48	82.03	14.16							
Affectionate support	Intervention	48	76.57	15.15	2.26		0.823	88	0.413	-3.200	7.718
	Control	48	74.31	11.52							
Positive social interaction	Intervention	48	68.92	22.66	7.63		2.021	75	0.047	0.108	15.14
	Control	48	61.29	13.04							
Emotional/informational Support	Intervention	48	75.11	16.06	7.15		2.596	80	0.011	1.668	12.63
	Control	48	67.96	10.30							
Social support	Intervention	48	75.75	15.78	4.35		1.667	74	0.100	-0.852	9.563
	Control	48	71.40	8.88							

Paired-samples t-test was performed for mean scores of social support post and pre-test in the control group without any intervention. The mean score difference was not significant in all subscales of MOS-SSS and social support (Table 6).

Discussion

Type 1 diabetes mellitus treatment entails strict management of blood glucose through a variety of self-care behaviours. Social support provided to adolescents enhances diabetes self-management (11). The majority of the study respondents had satisfactory social support. Similarly, studies done in Europe, South Africa, Iran

and Mexico reported that most diabetic patients had satisfactory social support (12, 13, 14) because family members and peers offered social support to the diabetic patients. Contrary, studies done in the United States of America and Japan, reported that a minority of patients with diabetes had satisfactory social support (12, 15, 16).

The majority of the study respondents reported they received tangible support while the minority had positive social interaction. Coherently, a study done in India, noted that the majority of diabetic patients received tangible support (13).

Table 5:
Paired Samples T-test on Post and Pre-Test Scores for Social Support in the Intervention Arm of the Study

Social Support Scores										
Variable	Group	N	Mean	SD	Mean difference	T-test value	Df	p-value	95% C.I.	
									Lower	Upper
Tangible support	After	48	82.42	16.24	3.77	2.821	47	0.007	1.083	6.469
	Before	48	78.65	20.74						
Affectionate support	After	48	76.57	15.15	6.08	4.737	47	<0.001	3.495	8.654
	Before	48	70.49	20.41						
Positive social interaction	After	48	68.92	22.66	6.55	3.884	47	<0.001	3.156	9.938
	Before	48	62.37	16.78						
Emotional/informational support	After	48	75.11	16.06	3.31	3.011	47	0.004	1.098	5.522
	Before	48	71.80	21.04						
Social support	After	48	75.75	15.78	4.92	6.457	47	<0.001	3.392	6.462
	Before	48	70.83	17.88						

Table 6:
Paired Samples T-Test on Post and Pre-Test Scores for Social Support in the Control Arm of the Study

Social Support Scores										
Variable	Group	N	Mean	SD	Mean difference	T-test value	Df	p-value	95% C.I.	
									Lower	Upper
Tangible support	After	48	82.03	14.16	0.65	0.726	47	0.472	-1.154	2.456
	Before	48	81.38	14.09						
Affectionate support	After	48	74.31	11.52	0.53	1.837	47	0.073	-0.051	1.119
	Before	48	73.78	12.02						
Positive social interaction	After	48	61.29	13.04	0.70	1.000	47	0.322	-0.706	2.102
	Before	48	60.59	12.25						
Emotional/informational support	After	48	67.96	10.30	0.45	0.934	47	0.355	-0.523	1.429
	Before	48	67.51	10.21						
Social support	After	48	71.40	8.88	0.59	1.818	47	0.075	-0.062	1.230
	Before	48	70.81	8.90						

Tangible support received included material aids or behavioural assistance. Similarly, in South Africa, the highest and lowest mean scores were reported on tangible support and positive social interaction respectively among patients with diabetes (12). Contrarily, in the United States, a study showed that the highest and lowest mean score was reported on affectionate and tangible support respectively (15). In Iran and Ethiopia, studies done agreed with the above findings (17, 18). Diabetes self-management outcomes improved when diabetic patients were offered social support (19), and when diabetic patients receive social support from significant others, they have controlled blood sugar levels.

At baseline, social support between the experimental and control arms had no significant difference. Similarly, a study done in Switzerland noted no significant difference in social support at the pre-test between experimental and control arms (20). At post-test, social support had a significant increase in the experimental arm. Similarly, studies done in the USA and China noted a significant increase in social support at post-test in the experimental arm after education intervention (8, 21). Promoting diabetes self-management through education is the best practice strategy for chronic conditions, which is to "educate and support patients to manage their conditions as much as possible". Diabetes self-management education improves the social support network of diabetic patients and this acts as a facilitator of diabetes self-management. However, a study that evaluated paraprofessional-led diabetes self-management coaching (DSMC) among 94 clients with T2DM recruited from a Community Care Access Centre in Ontario, Canada, reported no significant improvement in social support received by diabetic patients in the intervention group (22). Similarly, a study

done in Ethiopia showed no statistically significant difference between and within groups on functional social support, measured by the MOS-SSS (23). The variation can be explained by the different environmental, cultural, ethnic and social backgrounds.

Study Limitation

The study was limited to adolescents with T1DM in Kiambu County, which is predominantly an area inhabited by one major ethnic group. Therefore, the results may not be generalized to other populations, which may have different cultural barriers linked to their ethnicity that may influence diabetic self-management. The data was collected at the point of contact with the adolescents with T1DM up to six months and therefore long-term effects of the intervention on social support were not assessed. Randomization which is the gold standard in experimental studies was not done as the study was quasi-experimental, nonetheless, two hospitals were selected as intervention and control arms and pre-test and post-test were done. Additionally, the study respondents were randomly selected to minimise bias.

Conclusion

Educational intervention based on the self-care model significantly improved social support in the study. The mean for social support increased from 70.83 ± 17.88 to 75.75 ± 15.78 in the intervention arm and 70.81 ± 8.90 to 71.40 ± 8.88 in the control arm. The educational intervention based on the self-care model significantly improved the mean for social support in the intervention group at post-intervention ($p < 0.05$).

Recommendation

Education intervention based on self-care model needs to be implemented continuously by health professionals to

improve social support among diabetic patients.

Acknowledgements. Special thank goes to the study respondents at TL5H and KL5H.

Source of funding. The principal researcher fully funded the research.

Competing interest. The author declares no competing interests.

Availability of data statement. Data used in this study is held by the author and can be availed for access upon a written request.

References

- Glasgow, R. E., & Osteen, V. L. (2018). Evaluating diabetes education. Are we measuring the most important outcomes? *J Diabetes Care*, 15(10), 1423–1432. <https://doi.org/10.2337/diacare.15.10.1423>.
- Williams, K. E., & Bond, M. J. (2016). The roles of self-efficacy, outcome expectancies and social support in the self-care behaviors of diabetes. *J Psychology, Health & Medicine*, 7(2), 127–141. <https://doi.org/10.1080/13548500120116076>
- Belgrave, F. Z., & Lewis, D. M. (2017). The role of social support in compliance and other health behaviours for African Americans with chronic illnesses. *Journal of Health and Social Policy*, 5(10), 55–68. https://doi.org/10.1300/J045v05n03_05.
- Whitehead, L.C., Trip, H.T., Hale, L.A., & Conder, J. (2016). Negotiated autonomy in diabetes self-management: the experiences of adults with intellectual disability and their support workers. *J Intellect Disabil Res*, 60(4), 389–397. <https://doi.org/10.1111/jir.12257>
- Hackorth, N.J., Hamilton, V.E., Moore, S.M., Northam, E.A., Bucalo, Z., & Cameron, F. J. (2015). Predictors of diabetes self-care, metabolic control, and mental health in youth with type 1 diabetes. *Aust Psychol*, 48(5), 360–368. <https://doi.org/10.1111/ap.12007>
- Venancio, J.M.P., La Banca, R.O., & Ribeiro, C. A. (2017). Benefits of participation in a summer camp to self-care for children and adolescents with diabetes: the perception of mothers. *Prim Care Diabetes*, 21(1), 17–20.
- Collet, N., Batista, A.F.M.B., Nóbrega, V.M., Souza, M.H.N., & Fernandes, L. T. B. (2018). Self-care support for the management of type 1 diabetes during the transition from childhood to adolescence. *J Diabetes Care*, 13(10), 35–40. <https://doi.org/10.1590/S1980-220X2017038503376>.
- Shi, Q., Ostwald, S.K., & Wang, S. (2016). Improving glycaemic control self efficacy and glycaemic control behaviour in Chinese patients with type 2 diabetes mellitus: randomised controlled trial. *J Clin Nurs*, 19(3), 398–404. <https://doi.org/10.1111/j.1365-2702.2009.03040.x>.
- Wang, H., & Chow, S. C. (2017). Sample Size Calculation for Comparing Proportions. Wiley Encyclopedia of Clinical Trials.
- Sherbourne, C., & Stewart, A. (2018). The MOS Social Support Survey. *J Social Science and Medicine*, 32(6), 705–714. [https://doi.org/10.1016/0277-9536\(91\)90150-b](https://doi.org/10.1016/0277-9536(91)90150-b).
- Rad, G.S., Bakht, L.A., Feizi, A., & Mohebi, S. (2017). Importance of social support in diabetes care. *J Educ Health Promot*, 2(62), 45–50. <https://doi.org/10.4103/2277-9531.120864>
- Westaway, M.S., Seager, J.R., Rheeder, P., & Van Zyl, D. G. (2015). The effects of social support on health, well-being and management of diabetes mellitus: a black South African perspective. *Ethn Health*, 10(4), 73–89. <https://doi.org/10.1080/1355785052000323047>
- Katia, G., Carmen, G., Carlos, A. D., Yvonne, N. F., & Jorge, S. (2019). Relationship between social support and the physical and mental wellbeing of patients with diabetes. *J Diabetes Care*, 61(5), 383–391.
- Siamak, M., Mahmoud, P., & Fatemeh, R. (2018). Relationship between perceived social support and self-care behavior in type 2 diabetics: A cross-sectional study. *J Educ Health Promot*, 7(48), 32–37.

15. Tang, T., Brown, M., Funnell, M., & Anderson, R. (2018). Social support, quality of life and self-care behaviors among African Americans with type 2 diabetes. *The Diabetes Educator*, 38(2), 266–276. [https://doi: 10.1177/0145721708315680](https://doi.org/10.1177/0145721708315680)
16. Matsuzawa, T., Sakurai, T., Kuranaga, M., Endo, H., & Yokono, K. (2015). Predictive factors for hospitalized and institutionalized care-giving of the aged patients with diabetes mellitus in Japan. *Kobe J Med Sci*, 56, 173–83.
17. Habebo, T.T., Pooyan, E.J., Mosadeghrad, A.M., Babore, G.O., & Dessu, B. K. (2020). Prevalence of poor diabetes self-management behaviors among Ethiopian diabetes mellitus patients: a systematic review and meta-analysis. *Ethiop J Health Sci.*, 30(4), 623–638. [https://doi: 10.4314/ejhs.v30i4.18](https://doi.org/10.4314/ejhs.v30i4.18)
18. Mohebi, S., Azadbakht, L., Feizi, A., Sharifirad, G., & Kargar, M. (2018). Review the key role of self-efficacy in diabetes care. *J Educ Health Promot*, 2(11), 36–38. [https://doi: 10.4103/2277-9531.115827](https://doi.org/10.4103/2277-9531.115827).
19. Litman, T. J. (2019). The family as a basic unit in health and medical care: A socialbehavioural overview. *Soc Sci Med*, 9(10), :287–304. [https://doi: 10.1016/0037-7856\(74\)90072-9](https://doi.org/10.1016/0037-7856(74)90072-9).
20. Ersoy-Kart, M., & Guldu, O. (2015). The role of social relations in health promotion. *Psychosom Med*, 57(11), 245–54. [https://doi: 10.1097/00006842-199505000-00006](https://doi.org/10.1097/00006842-199505000-00006).
21. Bovier, P.A., Chamot, E., & Perneger, T. V. (2020). Perceived stress, internal resources, and social support as determinants of mental health among young adults. *Qual Life Res*, 13(7), 161–70. [https://doi: 10.1023/B:QURE.0000015288.43768.e4](https://doi.org/10.1023/B:QURE.0000015288.43768.e4).
22. Pauley, T., Gargaro, J., Chenard, G., Cavanagh, H., & McKay, S. M. (2016). Home-based diabetes self-management coaching delivered by paraprofessionals: A randomized controlled trial. *Home Health Care Services Quarterly*, 35(4), 137–154. [https://doi: 10.1080/01621424.2016.1264339](https://doi.org/10.1080/01621424.2016.1264339).
23. Fikadu B. H., Per H., & Mhenard, A. (2021). Effect of locally-contextualized nurse-led diabetes self-management education on psychosocial health and quality of life: A controlled before-after study. *International Journal of Africa Nursing Sciences*, 15(6), 30–35. <https://doi.org/10.1016/j.ijans.2021.100325>