



The role of social networks in diabetes self-care: A cross-sectional study

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Abstract

Background: Patient involvement with diabetes self-care is critical to reducing complications, morbidity, and mortality. Social media, as one of the most important forms of digital health, has always been available for diabetes self-care, although the role of these media in supporting patient self-care is unclear.

Aims: The aim of this study was to investigate the role of social networks in diabetes self-care. In this study, the most important social networks used to receive self-care services, diabetes self-care behaviors, diabetes self-care educations and benefits of using various services provided through social networks were identified.

Methods: The present study is a cross-sectional study that was conducted through an electronic researcher-made questionnaire in 2021. Two hundred and eighteen patients were selected to participate in the study from centers of diabetes of Fasa city, south of Iran. Sampling was performed by convenience sampling and in accordance with inclusion and exclusion criteria. Data were analyzed by descriptive statistics and analytical tests.

Results: In the data analysis section on Diabetes self-care behaviors, there was no significant relationship between gender ($p = 0.292$), age ($p = 0.49$), type of diabetes ($p = 0.909$) and duration of diabetes ($p = 0.076$) with the use of self-care services provided through social networks. There was a significant relationship between education level and the use of self-care services provided through social networks ($p = 0.01$). "Recognizing diabetes and its complications," "observing personal hygiene," and "the impact of physical activity on diabetes control" were the most important educations. "Increasing patient knowledge and understanding about diabetes and its complications," "reducing the consumption of high-calorie foods and sugars," and "observing personal and public health" were the most important social network's benefits, respectively.

Conclusions: Various self-care educations and services provided through social networks can increase the in-depth knowledge of diabetic patients about self-care

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techniques and their effective role in controlling and managing diabetes and performing more self-care processes.

KEYWORDS

diabetes, self-care, social media, social networks

1 | INTRODUCTION

Diabetes is considered to be one of the biggest health threats in the 21st century,¹ which is mostly caused by defects in insulin secretion, insulin action, or both and leads to increased levels of blood glucose and liver enzymes.² This disease is associated with numerous comorbidities due to a wide range of complications, such as retinopathy, nephropathy, neuropathy, and cardiovascular disease.³ Therefore, if diabetes as a chronic disease is not controlled and managed, it can not only affect many organs of the body but also lead to premature death.⁴ Better management and control of diabetes and following a standard treatment protocol improves the quality of life and prevents complications and premature death.¹

Successful management and control of diabetes is largely dependent on patients' self-care behaviors.⁵ Patients with diabetes need lifelong self-care behaviors because more than 95% of the treatment process is performed by the patient and the treatment team has little control over the patient between visits.^{6,7} Various studies⁸⁻¹⁰ have shown that self-care activities can control patients' blood sugar levels and reduce the acute and chronic complications of diabetes. Also, self-care-based interventions cause positive changes in people's attitudes and beliefs, increase patients' knowledge and information about controlling and managing diabetes, and improve self-care processes.¹¹

One way to help improve diabetes self-care processes is to use social networks.¹² Social networks can help management and control patients' blood sugar by providing various trainings^{13,14} and ease real-time communication and feedback of blood sugar and other physiological information between patients and treatment professionals.¹⁵ Toma et al.¹⁵ in a meta-analysis study showed that online services provided through social networks had a beneficial effect in reducing HbA1c levels, especially in patients with type 2 diabetes. Also, the Petrovski and Zivkovic¹⁴ study identified the positive effects and different outcomes of using social networks for diabetics: it promotes patients' autonomy by complete the information supplied by healthcare professionals; facilitates the patient's conversation with health care professionals; provides psychosocial aids; raises patient's authorization; collects information on patient experiences and views; boosts health education; improves healthcare and behavior change; and decreases disease stigma. To our knowledge, it seems that there are some studies that examine different aspects of social networks and diabetes. However, these studies only address the various dimensions related to the qualitative evaluation of communication content in Facebook forums,¹⁶ mobile-based diabetes self-management and social networking system,¹⁷ design of a social networking, service based tailored application for diabetes

self-management¹⁸ and intergroup discussion different stakeholders about diabetes have been done on social media by comparing and contrasting the content of patient-generated Facebook posts.¹⁸ We are not aware of any previous studies that have investigated the role of social networks in diabetes self-care.

Self-care through social networks is used as a key feature in disease management and control programs that is shared between health professionals and patients.¹⁹ However, we have little information about patients' perceptions of the role of networks in diabetes self-care. The present study was conducted to fill this gap in our knowledge. Specifically, we identify the most social networks used to receive diabetes self-care services, diabetes self-care behaviors based on demographic characteristics of patients, diabetes self-care trainings and benefits of using various services provided through social networks for diabetics.

2 | MATERIALS AND METHODS

2.1 | Study population and sample

The study population included patients with diabetes in Fasa city (Fars province, Iran). Sampling was done by convenience sampling and all 500 patients referred to Fasa diabetes centers affiliated to Fasa University of Medical Sciences (Iran) were invited to participate in the study. An electronic invitation was sent via social networks (WhatsApp and Telegram) for all patients. Three hundred patients accepted our invitation. Finally, 218 people were selected to participate in the study according to the inclusion and exclusion criteria.

2.1.1 | Inclusion criteria

- Obtaining informed consent from patients to participate in the study
- At least 18 years old
- At least a diploma
- Resident of Fasa city
- No speech, mental or hearing problems
- Absence of mental retardation and psychiatric illness

2.1.2 | Exclusion criteria

- Having a serious diabetes-related complication, such as blindness

- Being diagnosed with serious mental illness or psychiatric (major depression, psychotic disorders, current schizophrenia) and cognitive disturbances such as dementia

2.2 | Questionnaire development

The data collection tool was a researcher-made electronic structured questionnaire. The questionnaire was designed using reviewing the relevant literature related to diabetes and its complications^{20–27} and diabetes self-care based on social networks^{15,16,18,28–33} and in accordance with the opinions of two medical informatics experts and 10 endocrinologist. The questionnaire was created in following four parts: demographic information (five questions), type and extent of social networks use (three questions), diabetes self-care educations provided through social networks (16 questions) and the benefits of using the services provided through social networks for diabetics (23 questions) (Appendix A).

The face validity of the questionnaire was confirmed by two medical informatics experts (with a history of scientific-research activities related to social networks) and two endocrinologists. To check the face validity of the questionnaire, a meeting was held with them at Kerman University of Medical Sciences. At the beginning of the meeting, the purpose of the questionnaire was explained to them by one of the researchers. They were then asked to assess all sections of the questionnaire based on the order of the questions, the clarity of the language, and whether the questions under each construct adequately measured the relevant structures. Order of questions was scaled as good, moderate and poor order; the clarity of the language was scaled as clear, moderate or unclear; while the properness of constructing measurement was scaled as good, moderate and poor. The evaluation results of all three sections of the questionnaire, namely the order of the questions, the clarity of the language and the properness of constructing, were reported at a good level.³⁴

One week after face validation of the questionnaire, its reliability was assessed. The reliability of the questionnaire was assessed after completing the questionnaire by 50 diabetic patients. Cronbach's alpha and Kuder–Richardson tests were used for five-option and two-option questions, respectively. After analyzing the data in IBM SPSS (version 23), the values for Cronbach's alpha and Kuder–Richardson was 0.835% and 0.85%, respectively.

The questionnaire was designed electronically and to answer all the questions of the questionnaire, the questions were defined as essential.

2.2.1 | Data collection

The questionnaire link was sent to patients from 1 to July 12, 2021. Along with the questionnaire link, we sent an audio guide file to the patients about the content of the questionnaire, objectives of the study and how to complete it. We also informed patients that their participation in the study is completely voluntary and they

could leave the data collection process at any time without any consequences. By August 21, all questionnaires were completed. After completing the questionnaire distribution process, the Excel file related to the completed questionnaires was retrieved electronically. Then, Excel file data was imported in SPSS 23.0.

2.3 | Statistical analysis

Demographic characteristics were analyzed by frequency and percentage. Also, to analyze other parts of the questionnaire, descriptive statistics (percentage, mean, standard deviation), independent *t* test and one-way analysis of variance were used (at a significance level of $p < 0.05$ and 95% confidence interval. SPSS 23.0 software was used for analysis.

3 | RESULTS

Table 1 shows the demographic information of diabetic patients. The frequency of women with diabetes was higher than men. Most of the participants were over 58 years old. 53.2% (116 patients) of the patients had a diploma. Also, most of the participants (50%) had type2 diabetes and most of them had diabetes between 20 and 11 years.

According to Figure 1, WhatsApp (88.5%), Telegram (59.5%) and Instagram (46.3%) were the most used social networks among participants to receive diabetes self-care services, respectively. Also, IGap (0.9%), Baleh (1.4%) and Myspace (2.3%) were less used to receive self-care services. It should be noted that IGap, Soroush and Eitaa are among the national networks designed and used in Iran country.

Women were more likely than men to use social networks to receive self-care services. But no significant relationship was observed between gender and self-care services provided through social networks ($p = 0.292$). Younger patients were more likely to use self-care services provided through social networks, although no significant relationship was observed between age and the rate of use of self-care services provided through social networks ($p = 0.49$). There was a significant relationship between the level of education and rate of use of self-care services provided through social networks ($p = 0.01$), patients with higher education had used these self-care services more.

Also, patients with type 2 diabetes and patients with more than 21 years of duration of diabetes used more of the self-care services provided through social networks. However, in this section, there was no significant relationship between the type of diabetes ($p = 0.909$) and the duration of diabetes ($p = 0.076$) with the rate of using self-care services provided through social networks (Table 2).

Sixteen types of self-care education related to diabetes were provided to patients through social networks. "Recognizing diabetes and its complications" (4.17 (± 0.81)), "observing personal hygiene" (4.04 (± 0.95)) and "the impact of physical activity on diabetes control" (3.98 (± 0.98)) were the most common diabetes self-care educations provided through social networks. Also, "the role of regular visits and

TABLE 1 Participants' demographics (N = 218)

Variables	Total number	Percent
Sex		
Male	99	45.4
Female	119	54.6
Age		
18–27	43	19.7
28–37	41	18.8
39–48	44	20.2
49–57	33	15.1
≥58	57	26.1
Education level		
Diploma	116	53.2
Associate	16	7.3
Bachelor	38	17.4
Master	35	16.1
Doctoral	13	6.0
Diabetes type		
Type 1	79	36.2
Type 2	109	50.0
Other	30	13.8
Duration of diabetes (year)		
1–10	164	75.2
11–20	50	22.9
≥21	4	1.8
Duration of social networks member (year)		
<1	28	12.8
1–2	23	10.6
3–5	61	28
6–8	42	19.3
>8	64	29.4
Daily social networks usage (24 h a day)		
<2	99	45.4
2–4	75	34.4
5–7	27	12.4
>7	17	7.8

constant communication with treatment staff in improving diabetes" (3.26 (± 1.34)), "the role of sleep and rest in improving diabetes and its complications" (3.53 (± 1.06)) and "preventing the exacerbation of diabetes and its complications" (3.83 (± 1.07)) were the least self-care educations (Table 3).

Twenty-three benefits were identified for using the services provided through social networks for diabetics. "Increasing patient knowledge and understanding about diabetes and its complications" (4.16 (± 0.80)), "reducing the consumption of high-calorie foods and sugars" (4.01 (± 0.93)) and "observing personal and public health" (3.97 (± 0.95)) were the most important benefits of the services provided through social networks services for diabetics, respectively (Table 4).

4 | DISCUSSION

In the present study, the role of social networks in diabetes self-care was investigated. The results of the present study showed that WhatsApp, Telegram and Instagram were the most used social networks to receive diabetes self-care services. There is no significant relationship between gender, age, type of diabetes and duration of diabetes with the rate of use of self-care services provided through social networks. However, the level of education was significantly related to the rate of use of these self-care services. Younger patients with higher levels of education, patients with type 2 diabetes, and patients with more than 21 years of diabetes history were more likely to use information services provided through social networks. Among the 16 types of self-care educations provided through social networks, "recognizing diabetes and its complications," "observing personal hygiene" and "the impact of physical activity on diabetes control" were the most important educations. Also, "Increasing patient knowledge and understanding about diabetes and its complications," "reducing the consumption of high-calorie foods and sugars" and "observing personal and public health" were the most important benefits of health services provided through social networks for patients with diabetes, respectively.

As mentioned above, the results of the present study showed that WhatsApp, Telegram, and Instagram were the most used social networks to receive diabetes self-care services. The results of studies by Sap et al.³⁵ and Kamel Boulos et al.³⁶ showed that most patients use Instagram and WhatsApp to get health instructions. Petrovski et al.¹⁴ also noted that social network platforms such as Facebook, Twitter, WhatsApp, Instagram, Skype, and Dropbox are very popular among young people and offer unique opportunities for online diabetes education, intervention and support. Some studies^{35,36} have considered easy access to care information, the ability to understand information due to the use of audio and video capabilities and sharing experiences as the most important reasons for patients' tendency to use Instagram and WhatsApp. These results suggest that the power of social networks should not be underestimated due to various benefits such as access to up-to-date health information, information sharing, cost reduction, availability, ease of use and online interactions. According to Kaplan and Heinlen,³⁷ the more social networks are rich in networks and socializing, the more people will tend to that network. The results of the Ukoha³⁸ study also showed that features such as up-to-date health information provided, data sharing, ease of use of social networks and speed of access to information will attract users.

FIGURE 1 Social networks used to receive diabetes self-care services. Note: participants could select more than one social network

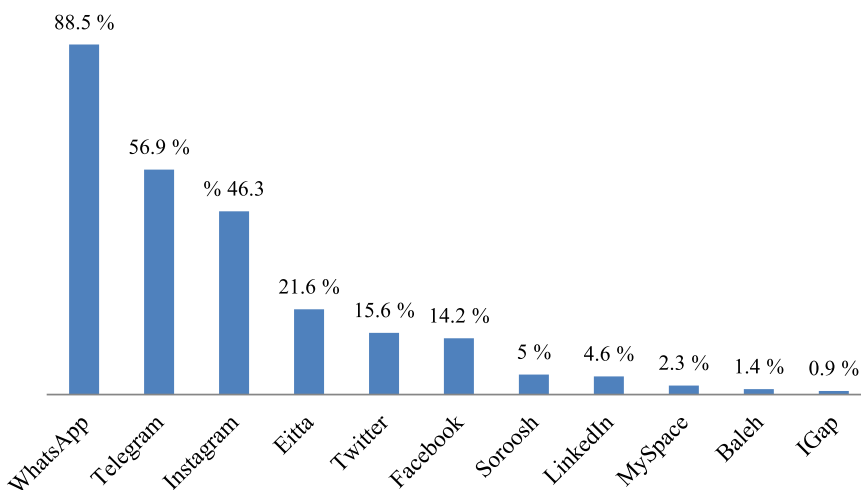


TABLE 2 Diabetes self-care behaviors based on demographic characteristics of patients

Variables	Mean	SD	95% CI		Test results	p value
			Lower	Lower		
Sex						
Male	91.06	23.24	-0.519	-0.083	T = -1.05	0.29
Female	93.99	17.67				
Age						
18-27	96.44	17.13	-0.246	1.062	F = 0.85	0.49
28-37	95.46	18.91				
39-48	92.36	17.87				
49-57	91.78	23.95				
≥58	88.59	23.19				
Education level						
Diploma	86.06	21.99	-0.973	0.240	F = 1.46	0.012
Associate	90.96	23.97				
Bachelor	93.97	16.54				
Master	97.97	16.66				
Doctoral	98.76	18.36				
Diabetes type						
Type 1	91.92	19.68	-0.351	0.247	F = 0.095	0.90
Type 2	95.23	22.50				
Other	90.50	13.46				
Duration of diabetes						
1-10	94.19	19.24	-0.786	0.042	F = 2.59	0.07
11-20	87.08	23.44				
≥21	99.50	17.07				

Abbreviation: CI, confidence interval.

Another result of the present study was the lack of a significant relationship between gender, age, type of diabetes and duration of diabetes with the rate of use of self-care services provided through social networks. In the study of Vosoghi et al.,³⁹ as in the present study,

the average self-care ability of women was higher than men, but this difference was not statistically significant. Parham et al.⁴⁰ also examined the effect of self-care behaviors in diabetic patients and concluded that there is no significant relationship between gender, age

TABLE 3 Diabetes self-care educations provided through social networks

Types of diabetes self-care education	Mean (\pm SD)	95% CI	
		Lower	Lower
1. Recognizing diabetes and its complications	4.17 (\pm 0.81)	4.06	4.28
2. Observing personal hygiene	4.04 (\pm 0.95)	3.91	4.17
3. The impact of physical activity on diabetes control	3.98 (\pm 0.98)	3.85	4.11
4. Consume low-calorie foods	3.95 (\pm 0.97)	3.82	4.08
5. The effectiveness of self-care on physical and mental health	3.93 (\pm 1.05)	3.79	4.07
6. Maintaining a healthy lifestyle	3.93 (\pm 0.96)	3.79	4.06
7. Fasting blood sugar and hemoglobin A1c tests	3.92 (\pm 1.00)	3.79	4.05
8. Regular monitoring of fasting blood sugar and hemoglobin A1c	3.92 (\pm 0.95)	3.79	4.05
9. The importance of regular control and monitoring of cholesterol and blood pressure	3.92 (\pm 0.95)	3.79	4.05
10. Increase self-confidence and reduce stress and anxiety in diabetics	3.91 (\pm 1.02)	3.78	4.04
11. Importance of taking medications correctly and regular	3.90 (\pm 0.98)	3.77	4.03
12. Regular insulin injections	3.85 (\pm 1.04)	3.72	3.98
13. Protects the kidneys, eyes and feet against diabetes	3.85 (\pm 0.98)	3.72	3.99
14. Preventing the exacerbation of diabetes and its complications	3.83 (\pm 1.07)	3.69	3.97
15. The role of sleep and rest in improving diabetes and its complications	3.53 (\pm 1.06)	3.25	3.64
16. The role of regular visits and constant communication with treatment staff in improving diabetes	3.26 (\pm 1.34)	3.08	3.44

Abbreviation: CI, confidence interval.

and duration of diabetes with self-care behaviors. It seems that significant differences in sex, age, type of diabetes and duration of diabetes with the use of self-care services provided through social networks can be affected by variables such as physical-psychological and behavioral status of patients and knowledge level. Various studies⁴¹⁻⁴³ have shown that people with physical and mental disorders and stress and anxiety have smaller social networks and use less of these social networks to receive self-care services. Also, people with multiple chronic illnesses have smaller and weaker social networks than people with a single disorder.⁴⁴

On the other hand, the present study also showed that with increasing education, the average self-care scores increase, this result was similar to the results of studies by Sloan et al.⁴⁵ and Toobert et al.⁴⁶ The results of Karter's⁴⁷ study showed that higher education and sufficient knowledge about a disease, its complications and outcomes facilitate the process of self-care. Findings from path modeling in some studies also showed that perceived sensitivity, self-efficacy, efficiency, knowledge and health literacy were important predictors ($p < 0.05$) for diabetes self-care behaviors.⁴⁸ Daryasari et al.⁴⁹ reported higher levels of education in men as a reason for their better self-care ability than women. Schillinger et al.⁵⁰ also suggested that poor health literacy was likely to lead to a poor understanding of health care guidelines, such as

daily doses, interpretation of blood glucose levels, reading labels on pill bottles, and scheduling appointments. According to the study of Reisi et al.,⁵¹ Self-efficacy is the most important parameter of self-care behaviors in diabetics with limited health literacy. Therefore, high self-efficacy in these patients leads to better and higher quality self-care. Although patients with poor health literacy experience many challenges and problems in performing health care processes, they better follow self-care behaviors if they believe in their ability to perform self-care processes.

In general, it can be said that patients with higher education have a higher awareness of the complications of the disease and how to take medication and follow a diet plan; it seems that education in groups with lower literacy should be emphasized. Health promotion and education theories and models can be used as useful tools to improve self-care behaviors and self-management behaviors in patients with diabetes.⁵² Therefore, based on the study of Ghotbi et al.,⁵³ it can be said that education of self-care processes and behaviors increases patients' awareness and knowledge, improves quality of life, reduces anxiety, reduces complications, increases patients' participation in treatment programs and their independence in daily activities. Therefore, social networks should focus on education patients self-care behaviors to increase their number of users.⁵⁴

TABLE 4 Benefits of using various services provided through social networks for diabetics

Benefits of health services provided through social networks	Mean (\pm SD)	95% CI	
		Lower	Upper
1. Increasing patient knowledge and understanding about diabetes and its complications	4.16 (\pm 0.80)	4.05	4.26
2. Reducing the consumption of high-calorie foods and sugars	4.01 (\pm 0.93)	3.92	4.26
3. Observing personal and public health	3.97 (\pm 0.95)		
4. Increase physical activity and mobility of patients	3.94 (\pm 0.97)	3.82	4.07
5. Increase self-care exercises and activities	3.93 (\pm 1.05)	3.80	4.06
6. Planning for making a healthy lifestyle	3.92 (\pm 0.96)	3.79	4.05
7. Regular monitoring of fasting blood sugar and hemoglobin A1c	3.91 (\pm 0.95)	3.78	4.05
8. Diabetic foot ulcers regular treatment and control	3.91 (\pm 0.96)	3.78	4.05
9. Encourage patients to regularly monitor and control cholesterol and blood pressure	3.90 (\pm 0.95)	3.76	4.04
10. Refer to medical centers regularly	3.89 (\pm 0.98)	3.76	4.03
11. Boosting Patients Self-Esteem and self-confidence	3.88 (\pm 1.02)	3.74	4.01
12. Reduce stress and anxiety caused by diabetes and its complications	3.88 (\pm 1.03)	3.73	4.01
13. Regular use of medications	3.87 (\pm 0.98)	3.72	4
14. Facilitate sharing information and resources related to diabetes	3.86 (\pm 1.06)	3.72	4.00
15. Insulin regular injections	3.85 (\pm 1.04)	3.72	3.99
16. Increase communication between patients with others	3.84 (\pm 1.01)	3.70	3.97
17. Control and check their kidney functions regularly	3.83 (\pm 0.99)	3.69	3.98
18. Improve adherence to vision monitoring	3.82 (\pm 1.05)	3.68	3.97
19. Prevent exacerbation of the disease and its complications	3.81 (\pm 1.04)	3.66	3.95
20. Reduce treatment and medical costs	3.77 (\pm 1.11)	3.62	3.92
21. Reduce sleep disorders	3.51 (\pm 1.05)	3.22	3.61
22. Online consultation with physician	3.24 (\pm 1.31)	3.06	3.41
23. Increase communication between patient and health Professionals	3.18 (\pm 1.39)	2.99	3.37

Abbreviation: CI, confidence interval.

According to the results of the present study, 16 different types of self-care education were provided through social networks for patients with diabetes. Also, 23 social networks benefits for diabetics were identified. Elnagga et al.¹² and Shaffer et al.⁵⁵ examined the role of social media in diabetes self-care and concluded that social media can improve clinical outcomes, behavioral outcomes, quality of life, and self-efficacy factors,¹² users gain knowledge, making friends, finding humor, and improving blood sugar control by providing a variety of services.⁵⁵ The results of Alanzi et al.'s⁵⁶ study also showed that social networks can provide fast and efficient communication between users, reduce costs and provide patients' easy access to various information about diabetes self-care and its complications. Greene et al.¹⁶ concluded that adequate training and information on diabetes control and management has been provided

through social media, but what needs to be considered is the quality and accuracy of this information. Patients' use of social networks not only has beneficial effects, but also increases the risk of misinformation and challenges related to information reliability; information quality; confidentiality and privacy and disclosure of personal information online.¹⁴ Other studies⁵⁷⁻⁵⁹ have reported risks such as access to misinformation, difficulty interpreting medical or scientific results for patients, threats to privacy, information security, and patient distraction from advertising. Therefore, it should be said that although there were positive consequences of using social networks in this study, but the risks of using these networks should also be considered. Also, when communicating with patients, health care providers must be careful to keep patients' information confidential. In addition, when health care providers communicate with patients

through social networks, providers must enforce rules regarding the confidentiality of patient information.⁶⁰ Health care providers should assess any potential risks and consider communication as part of the patient's health record before encouraging patients to make extensive use of social networks as a means of communicating with patients and their families.¹⁴

On the other hand, the distribution of unreliable or inaccurate information shared through social networks should also be monitored.⁶¹ Policymakers have traditionally focused on the concept of "cybercitizenship," a concept originally associated with online safety and risk management, although it has now been extended to how users interact in digital environments. Social networking services (SNS) policies today are primarily aimed at monitoring and controlling the use of social networking services, however, increasing support for these services is essential to take advantage of the potential health benefits of small online patient communities.¹⁵ There is increasing support for SNS from governmental and nongovernmental organizations with effective and sufficient evidence to support SNS in mental illness. This represents a valuable opportunity in future policies to apply SNS to other areas of health care, including diabetes and its complications.⁶² Therefore, consideration of the cost, quality, safety, security, scalability, and stability of the SNS is a necessary process to decide whether the implementation and application of the SNS are appropriate for diabetes care.⁶³

5 | STRENGTH AND LIMITATIONS OF THE STUDY

This study is one of the first studies to examine the role of social networks in diabetes self-care. Investigating the role of social networks in diabetes self-care is essential for designing specific social networks for diabetics, patients' useful use of social networks, and understanding the potential determinants of their role in self-care. Health planners and policymakers, by considering these findings, creating and launching dedicated channels and social networks related to diabetes and monitoring the quality of information exchanged by these networks, can help reduce face-to-face visits and save patients time and money. The unique aspect of this study was the identification and introduction of the most important social networks used to receive self-care services, diabetes self-care behaviors, diabetes self-care educations provided through social networks and benefits of using various services provided through social networks. So, by recognizing and understanding these unique aspects, the findings of this study may serve as a resource for researchers and therapists to develop their interventions in the way that social networking is currently used among patients, and/or adjust social networking platforms according to the communities in which they live.

One of the limitations of this study is the small sample size, which reduces the generalizability of the results, so it is recommended that studies be conducted with a larger population. Also, in this study, variables that can be used directly or indirectly to measure the level of self-care of diabetic patients, such as laboratory tests (e.g., A1C,

FBS, etc.) were not evaluated. It is recommended that a pre- and poststudy be performed to confirm the potential benefits of using social media to reduce or increase A1C and FBS levels or other values of laboratory tests.

6 | CONCLUSION

The present study investigated the role of social networks and showed that the influence of social networks is high among patients with diabetes and these networks will improve diabetes and its complications by providing various self-care services. Various self-care educations and services provided through social networks can increase the in-depth knowledge of diabetic patients about self-care techniques and their effective role in controlling and managing diabetes and performing more self-care processes. Performing self-care processes by diabetic patients can help prevent the early and late complications of diabetes, improve lifestyle, reduce morbidity and increase the life expectancy of these patients.

AUTHOR CONTRIBUTIONS

Conceptualization, methodology, and validation: Khadijeh Moulaei, Kambiz Bahaadinbeigy, Fatemeh Dinari. *Formal analysis:* Khadijeh Moulaei and Yunes Jahani. *Investigation:* Khadijeh Moulaei, Fatemeh Dinari, Zahra Dinari. *Data curation:* Khadijeh Moulaei, Zahra Dinari, Fatemeh Dinari. *Writing—original draft:* Khadijeh Moulaei and Kambiz Bahaadinbeigy. *Writing—review and editing:* Khadijeh Moulaei and Yunes Jahani. *Project administration:* Kambiz Bahaadinbeigy. All authors have read and approved the final version of the manuscript. Khadijeh Moulaei and Kambiz Bahaadinbeigy had full access to all of the data in this study.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENTS

For this study, the code of ethics with the number IR.KMU.R-EC.1400.068 was obtained from the ethical committee of Kerman University of Medical Sciences. All methods of the present study were performed following the relevant guidelines and regulations of the ethical committee of Kerman University of Medical Sciences.

Participation was voluntary, the consent was verbal, but all participants responded via email or text message to approve their participation. Participants had the right to withdraw from the study at any time without prejudice.

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APPENDIX A

Questionnaire investigate the role of social networks in diabetes self-care

Dear participant, this questionnaire has been developed to investigate the role of social networks in diabetes self-care. Please answer each question after reading it.

Section A: Demographic and clinical characteristics

1. **What is your age in years?.....**
2. **What is your gender?**
 - o Female
 - o Male
 - o Trans-Female
 - o Trans-Male
3. **What is your education level?**
 - o Diploma
 - o Associate
 - o Bachelor
 - o Master
 - o PhD and higher
4. **What type of diabetes do you have?**
 - o Type 1
 - o Type 2
 - o Gestational
 - o I don't know
5. **How long have you had the disease (year)?**
 - o 1-10
 - o 11-20
 - o ≥21

*Section B: Social networks used to receive diabetes self-care services***1. How long have you been a member of social networks (year)?**

- <1
- 1-2
- 3-5
- 6-8
- >8

2. How long do you spend on social networks during a day (hour)?

- <2
- 2-4
- 5-7
- >7

3. Which of the following social networks do you use to receive diabetes self-care services? (More than one social network can be selected.)

- WhatsApp
- Telegram
- Instagram
- Eitta
- Twitter
- Facebook
- Soroosh
- LinkedIn
- MySpace
- Baleh
- IGap

*Section C: Diabetes self-care educations provided through social networks***1) Social networks can be used to receive training on the role of regular visits and constant communication with treatment staff to improve diabetes.**

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

2) Social networks can be used to receive training on preventing the exacerbation of diabetes and its complications.

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

3) Social networks can be used to receive guidelines on observing personal hygiene.

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

4) Social networks can be used to receive training on protection of kidneys, eyes and feet against diabetes.

- Strongly Agree

- Agree
- Undecided
- Disagree
- Strongly Disagree

5) Social networks can be used to receive training on the impact of physical activity on controlling diabetes.

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

6) Social networks can be used to receive insulin injection training.

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

7) Social networks can be used to receive training to consume low-calorie foods.

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

8) Social networks can be used to receive training on the effectiveness of self-care on physical and mental health.

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

9) Social networks can be used to receive training on the importance of taking medications correctly and regularly.

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

10) Social networks can be used to receive training on maintaining a healthy lifestyle.

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

11) Social networks can be used to receive training on interpreting fasting blood sugar and hemoglobin A1c tests.

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

- 12) **Social networks can be used to receive training on regular monitoring of fasting blood sugar and hemoglobin A1c.**
- Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
- 13) **Social networks can be used to receive training on the importance of regular controlling and monitoring of cholesterol and blood pressure.**
- Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
- 14) **Social networks can be used to receive training on the role of having enough sleep and rest in improving diabetes and its complications.**
- Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
- 15) **Social networks can be used to receive training on recognizing diabetes and its complications.**
- Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
- 16) **Social networks can be used to receive training on increasing self-confidence and reducing stress and anxiety in people with diabetes.**
- Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
- 17) **If you receive other trainings regarding diabetes from social networks please mention.**
- Section D: Benefits of using various services provided through social networks for people with diabetes*
1. **Social networks can increase the physical activity and mobility of people with diabetes.**
- Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
2. **Social networks can encourage people with diabetes to regularly monitor and control their cholesterol and blood pressure levels.**
- Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
3. **Social media can reduce the consumption of high-calorie foods and sugars in people with diabetes.**
- Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
4. **Social networks can increase patient knowledge and understanding about diabetes and its complications.**
- Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
5. **Observing personal and public health is one of the benefits of using social media for patients with diabetes.**
- Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
6. **Social networks can lead to planning for a healthy lifestyle in people with diabetes.**
- Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
7. **Social networks can cause regular monitoring of fasting blood sugar and hemoglobin A1c in patients with diabetes.**
- Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
8. **Social networks can help people with diabetes to observe foot ulcers' regular treatment and control.**
- Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
9. **Social networks can increase self-care exercises and activities.**
- Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree

10. **Social networks can reduce stress and anxiety caused by diabetes and its complications.**
 - Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
11. **Social networks can boost self-esteem and self-confidence in people with diabetes.**
 - Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
12. **Social networks can encourage people with diabetes to refer to medical centers regularly.**
 - Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
13. **Social networks can increase communication of patients with diabetes with others.**
 - Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
14. **Social networks can facilitate sharing information and resources related to diabetes.**
 - Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
15. **Social networks can encourage regular intake of medications in patients with diabetes.**
 - Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
16. **Social networks can encourage regular insulin injections in patients with diabetes.**
 - Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
17. **Social networks can reduce sleep disorders in patients with diabetes.**
 - Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
18. **Social networks can improve adherence to vision monitoring in patients with diabetes.**
 - Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
19. **Social networks can prevent from exacerbation of the disease and its complications in patients with diabetes.**
 - Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
20. **Social networks can reduce treatment and medical costs for patients with diabetes.**
 - Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
21. **Social networks encourage patients with diabetes to control and check their kidney functions regularly.**
 - Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
22. **Social networks provide patients with diabetes to have facilitated counseling with physicians.**
 - Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
23. **Social networks can increase communication between patients and health professionals.**
 - Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree
24. **Please mention other possible trainings that you received from social networks regarding diabetes.**
 - Strongly Agree
 - Agree
 - Undecided
 - Disagree
 - Strongly Disagree