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A Qualitative Study of the Mobile Application Concept Among T2D Patients

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Abstract

Self-care is the most fundamental and vital component of diabetes management. It necessitates patient participation in disease management activities such as nutrition, physical activity, medication adherence, and foot care procedures. However, developments in smartphone technology have created new options for diabetes self-management and diabetes education. The purpose of this study is to gain an overview of the mobile application concept that is expected among T2D patients in order to build application-based therapies based on the research site. This research method employs qualitative approaches in conjunction with a grounded theory approach. The approach employed is the sampling quota selection method. A Focus Group Discussion (FGD) was held with all qualified participants. A grounded theory technique was used to analyze the data. The findings of the study highlighted six themes: 1) Diet, 2) psychological activity, 3) medication alarms, 4) blood glucose monitoring, and 5) reduced worry (knowledge about health problems), 6) Consulting with health-care providers and asking questions. Self-care management can improve the quality of life of T2D patients. Diabetes patients in Indonesia are treated in a variety of ways; a link between patient experience, care, and health support is required.

Keywords: Mobile Application Concept, Type 2 Diabetes Mellitus, A Qualitative Study

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1. Introduction

Diabetes Mellitus (DM) is one of the leading causes of death worldwide (Moien Abdul Basith Khan et al., 2020). However, the prevalence of diabetes is rising, and the International Diabetes Federation predicts that by 2045, there will be 783.2 million people living with the condition (International Diabetes Frderation, 2021). The rising prevalence and consequent mortality place an emotional and financial burden on sufferers and the country. The costs that must be incurred each year total 327 USD, with inpatient charges accounting for 97 billion USD (Yang et al., 2018). Diabetes is the main cause of cardiovascular disease, blindness, kidney failure, depression, and suicide. Leg amputation is another risk factor that occurs at an advanced stage. Individual predisposing factors such as obesity, poor lifestyles, a lack of physical activity, and frequent eating of high-sugar meals are also causes of diabetes in adults (Azeem et al., 2022; Seidu et al., 2022).

The significance of patients learning about their disease, adhering to treatment, adhering to a recommended diet, engaging in physical activity, and periodically monitoring blood sugar levels (Celik et al., 2022). Aside from that, active engagement of patients and family, as well as effective communication between them, will result in optimal treatment (Mutyambizi et al., 2020; Onyango et al., 2022). Patient noncompliance is a common issue with diabetics. This is due to a variety of factors, including the drug's exorbitant price, a lack of knowledge about the consequences of drug usage, a misunderstanding of the amount required, and the psychological impact felt (Berkoh et al., 2022).

Self-care is the most fundamental and necessary component of diabetic management. It necessitates patient participation in disease management, such as diet, physical activity, medication adherence, and foot care routines (Agidew et al., 2021; Riegel et al., 2021). As the foundation of patient-centered diabetes treatment and education, the American Association of Diabetes Educators (AADE) has highlighted seven self-care behaviors: healthy eating, physical exercise, monitoring, medication administration, problem-solving, healthy coping, and risk reduction (Kolb, 2020; Paudel et al., 2022). Individuals with self-care experience will have an opinion about the sickness they are experiencing, decide priorities that must be met, and seek support or advice in carrying out

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self-care procedures. Beliefs, knowledge, health literacy, social support, and access to health care all influence experience (Bogale et al., 2022). Although recommended adjustments produce desirable effects, treatment adherence needs to be improved. According to one study, an increase in HbA1c in patients was significantly connected with patient non-compliance, a lack of knowledge of the need for therapy, and a lack of communication between patients and health providers (Pokhrel et al., 2019). However, advancements in smartphone technology have created new options for diabetes self-management and diabetes education. Mobile Application (Mobile App) is a promising method. Medical and public health practices assisted by mobile devices such as cell phones, patient monitoring devices, personal digital systems, and other wireless devices are referred to as mobile apps (Petersen & Hempler, 2017). Other advantages include providing health information, remote monitoring, allowing patients to participate in treatment, simplifying communication between patients and Health Care Providers, and boosting access to the health care system (Bellei et al., 2018; Karduck & Chapman-Novakofski, 2018; Kleinman et al., 2017).

The general public's use of smartphones has skyrocketed. Central Statistics Agency data reveals that 67.88% of Indonesians aged 5 and up already own a cell phone or mobile phone (Sutarsih Tri, 2022). Despite this increase in quantity, it can support diabetic management diabetes applications that are now accessible in over eleven thousand applications (Apps) that are used to help self-management of DM (Böhm et al., 2020). In one study, Zai and Yu discovered that using a mobile application as a self-management medium increased HbA1c levels and self-efficacy in the intervention group compared to those who did not (Zhai & Yu, 2020). Another study showed a significant rise in self-care behavior ratings (blood glucose monitoring, general diet, and physical activity) in the group that did not utilize the app (Kebede et al., 2018; Kebede & Pischke, 2019).

The purpose of this study is to gain an overview of the mobile application concept that is expected among T2D patients in order to build application-based therapies based on the research site.

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2. Research Method

2.1 Research desain

This study employs a grounded theory approach that includes focus group discussions (FGD). This method differs from individual interviews in that it stimulates social interaction and yields more information; participants can express their opinions, ideas, feelings, and viewpoints (Speziale et al., 2011). FGDs were conducted at two Community Health Centers in Tasikmalaya, West Java.

2.2 Study Population and Eligibility

The quota sampling approach was used to choose samples. The chronic disease control program coordinator selected the sample. After granting informed consent, individuals were chosen based on the following inclusion criteria: age 25-75 years; T2D length of 6 months; ability to converse in Indonesian; no speech, hearing, or cognitive impairment; and willingness to participate in FGD (Speziale et al., 2011).

2.3 Data Collection

The primary data collection tool is the researcher. Discussion guides, field notes, and digital audio recorders were also employed in this study to collect data. The question component deals with respondents' expectations regarding diabetes self-care mobile Apps. All FGD groups were moderated by the same person, a health education specialist with a master's degree and FGD experience. The research team conducted perception equations prior to the start of the session. FGD techniques adhere to predetermined guidelines (Benge et al., 2019; Krueger RA, 2014). A structured guide was utilized to ask the following questions: 1) What was the respondent's experience with accessing the internet? 2) What was their experience with utilizing communication tools in the form of smartphones? 3) What was the respondent's experience with downloading diabetes-related applications? 4) Why did the respondent download the application? 5) How do respondents expect the application's content to aid in their diabetes care?

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The 60-minute discussion session was held at the community health facility. The researcher explained the purpose of the FGD activity and obtained written informed consent from the respondents at the start of the session. All sessions were videotaped, and all participants were asked to remain anonymous. The moderator and crew took note of respondents' nonverbal clues to emphasize verbal comments. To acquire the most accurate data, we enlisted the help of qualitative research professionals and DM experts, and we submitted participant transcripts and analyses for review (Creswell & Creswell, 2018; John W. Creswell, 2014), the researchers prepared raw, non-anonymous research data for two months until the analysis and research process were complete.

2.4 Participant Recuiretment

Thirty-four women and two males took part in the study. They are between the ages of 25 and 75. Sundanese, Javanese, Sundanese Javanese, and Malay tribes are represented. Participants' educational backgrounds ranged from elementary school grads to university colleges. The patients' diabetes duration ranged from less than a year to more than five years. Nineteen participants did not work (homemakers); seven retired, three worked, three were entrepreneurs, three were private employees, and one was a civil servant. Twenty-four people did not use insulin, while twelve persons did. Twenty-seven people had complications, and nine persons did not. There are no patients with heart disease, one with kidney disease, two with gout, eight with cholesterol, three with eye illness, and ten with other ailments. Thirty-four people are BPJS participants, with one not having health insurance and one having alternative insurance. Prolanis participants included 32 people, whereas non-prolanis participants included four people. Twenty-four people checked their blood sugar one month ago, ten people six months ago, and two people didn't or forgot to check it. As seen in Table 1,

2.5 Ethical Considerations

Researchers evaluated three ethical concepts based on the Belmont Report: beneficence, respect for human dignity, and fairness. The benefit principle emphasizes

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that researchers must minimize damage and increase the usefulness of the study for participants (Polit & Beck, 2021). Individuals have the right under the principle of respect for human dignity to make their own decisions (self-determination) and to receive a complete explanation (full disclosure). The researchers described the aims, rewards, method, and roles to the participants, then invited them to decide whether they were interested and allowed eligible individuals. Participants who withdraw have no effect. Individuals who are willing to participate in the FGD are given priority.

2.6 Data analysi

All focus group discussions were transcribed and examined. A grounded theory approach was used to evaluate the data, which compares data obtained from various persons at different times, such as the six FGD groups in this study, to uncover consistencies and core meanings (Charmaz, 2006). Two separate reviewers read the transcript again to comprehend the content of the discussion, summarize it, and identify meaningful units in the form of phrases and sentences. Following a sequence of coding and reconciliation between coders, these units were summarized and further refined into data-driven categories and themes. All coding differences were reviewed and mutually agreed upon by the reviewers. Furthermore, the descriptive and interpretative validity of the data was validated by two consulting qualitative specialists who conducted extra data checks and participated in conversations with the research team about the interpretation of core themes across the FGD groups. Finally, a one-hour member checking session was held with a small group of research participants (three FGD participants, one person in charge of Prolanis, one person in charge of the noncommunicable disease program, and two researchers) to review and confirm the findings of the core themes (Patton, 2002). Each of these themes is discussed further below. (Note: To protect the participants' identities, the researcher does not include names in the discussion of each theme.

3. Results and Discussion

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a) Results

a. Respondent characteristics

Table 1 shows that participants ranged in age from 25 to 75 years. Most were between the ages of 61 and 75, 94.5% were women, 83.3% were Sundanese, 41.7% had elementary to middle school education, 58.3% had diabetes for more than five years, 52.8% do not work/homemakers, 66.7% do not use insulin, 75% have comorbidities, 27% have comorbidities other than heart, kidney, uric acid, cholesterol, eyes, 94.4% are BPJS insurance and 66.7% of individuals checked their blood sugar one month ago. Twenty-eight participants used smartphones, twenty-one used the internet, and thirteen downloaded health-related applications.

Table 1. The participants included in the study

No	Respondent's Characteristic	Total	Presentage (%)
1	age		
	a. 25-44 years old	9	25
	b. 45-60 years old	13	36.1
	c. 61-75 years old	14	38.9
2	Gender		
	a. Man	2	5.6
	b. Women	34	94.4
3	Ethnic group		
	b. Sundanese	30	83.3
	c. Javanese	4	11.1
	d. Javanese Sundanese	1	2.8
	e. Malay	1	2.8
3	Pendidikan		
	a. Elementary-Junior High School	15	41.7
	b. Senior Hight School	11	30.6
	c. Bachelor's degrees	10	27.8
4	Diabetes duration		
	a. < 1 years	5	13.9
	b. 1-5 years	10	27.8
	c. > 5 years	21	58.3
5	Employment		
	a. Government employees	1	2.8
	b. Private sector employee	3	8.3
		3	8.3

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No	Respondent's Characteristic	Total	Presentage (%)
	c. Businessman	3	8.3
	d. Daily laborer	7	19.4
	e. Retired	19	52.8
	f. Not working/Housewife		
6	Using insulin		
	a. Yes	23	33.3
	b. No	24	66.7
7	Have complications		
	a. Yes		
	b. No		
8.	Complication type		
	a. cardiovascular disease	3	8.3
	b. Kidney disease	1	2.8
	c. Gout	2	5.6
	d. Cholesterol	8	22.2
	e. Retinopathy	3	8.3
	f. Others	10	27.8
	g. None	9	25
9	Participants in BPJS (Social Security Administering Agency)		
	a. Yes	34	94.4
	b. No	1	2.8
	c. Others	1	2.8
10	PROLANIS (Chronic Disease Management Program) Participant		
	a. Yes	32	88.9
	b. No	2	11.1
11	Check blood sugar levels.		
	a. one month ago	24	66.7
	b. six months ago	10	27.8
	c. forgot/didn't do it	2	5.6
12	Memiliki Smartphone		
	a. ya	28	77.8
	b. tidak	8	22.2
13	Internet untuk mencari informasi kesehatan		
	a. ya	21	58.3
	b. tidak	15	41.7
14	Pernah unduh aplikasi kesehatan		
	a. ya	13	36.1
	b. tidak	23	63.9

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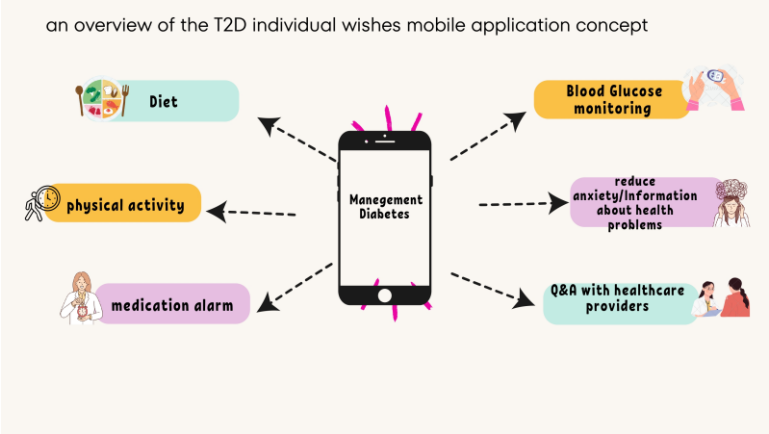
c. Theme

Several themes emerged, figure 1 depicts the thematic framework explaining the mobile application concept that is expected among T2D patients in order to design application-based therapies based on the research site.

Figure 1. A theme scheme explains the mobile application concept that is expected among T2D patients to design application-based therapies based on the research site



Theme 1: Diet

The majority of participants want to know how much food they should eat based on their body's demands.

"... I'm not sure whether my food intake is correct or not...". Therefore, I need knowledge of the amount of food to consume based on my body's needs.

"... I'm unsure how much my body requires..."

"... I'm not sure what type of food is best for diabetics like me..."

Theme 2: Physical Activity

The majority of participants believed they required information on the amount of physical activity that was acceptable for their situation.

"...sometimes I do daily physical activities like sweeping, washing, and so on...."

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"...walk for 30 minutes in the morning, I'm not sure if that's right or not...."

Theme 3: Medication Alarm

Many of the participants forgot to take their prescription, or when their medication ran out, forgot to come to the health center to receive more;

"...I sometimes forget to take my medicine..."

"...I'm not always sure how to use insulin and how much to take..."

Theme 4: Monitoring Blood Glucose

Many of the participants did not understand the significance of checking blood sugar levels, so they were unable to control what they ate;

"...I only do blood sugar checks if there is an invitation from a health facility..."

"..I don't know the results of checking my blood sugar levels once a month..."

Theme 5: Reduce Anxiety/Information about Health Problem

After receiving a diabetes diagnosis, their emotions of fear and alienation led individuals to say things like,

"..I'm ashamed of my next door neighbor...,"

"...I'm afraid to die," and "I'm afraid that both of my legs will be amputated."

Theme 6: Questions and Aswear with Health Care Providers

Some participants stated that lack of support, inability to manage self-care (diet, exercise, stress reduction, blood sugar control), poor health insurance services, and insufficient physical activity were common barriers to diabetes management and that they required direct communication to help them manage their disease.

...I need to understand the food rules I must adhere to or the recommended amount of physical activity...'

'...I struggle with controlling my diet, sleeping patterns, exercise, worry, and tendency to become stressed...'

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"...if possible, I would like to ask by telephone or message directly if I experience obstacles in managing my illness..."

b) Discussions

Based on the findings of eleven months of research on the description of the mobile application concept that is expected among T2D patients to design application-based therapies depending on the research location. Individuals with diabetes who own a smartphone may be targeted for intervention, according to information obtained from respondents. Every second person uses health applications. However, roughly 77.8% of people with T2D who are considered potential receivers of diabetic management interventions possess a smartphone. Health apps are used by 58% of the 28 smartphone owners interviewed.

NCD patients in rural locations can receive mobile app therapies, according to a study by Miyashita et al. (2022). The intervention, in the form of text messages, must be effective, culturally appropriate, and applied consistently and sustainably. Furthermore, memory-based learning for patients through billboards, radio, or television can reach more people and provide better prevention (Miyashita et al., 2022).

The self-management application is intended to help patients with diabetes manage their treatment by monitoring blood glucose, physical activity, and eating habits, as well as taking advantage of behavioral milestones via tailored messages delivered by smartphone. According to the American Diabetes Association, a study by Salari et al. (2021) created an application consisting of five modules that provide a platform to facilitate diabetes management. Log-in and data management, logbook, analysis, summary, and teaching are all part of this module. A module is a bundle of connected features used to carry out a function in a mobile application. In other words, each module contains a set of features that perform a given task. For example, the overview module can show a summary of treatment parameter results over various periods, such as weeks, months, and years (Salari et al., 2021).

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We adopted the first strategy in our study, concentrating on critical self-management behaviors of patients with diabetes and tracking the stages of progress. According to the International Diabetes Federation's recommendations, these behavioral factors include physical activity, blood glucose monitoring, diet and nutrition, and treatment (International Diabetes Federation, 2021) and American Association of Diabetes Educators (AADE) (Kolb, 2020).

The Mediterranean diet pattern is one example; this section reiterates MedDiet's health benefits and informs and encourages its application. Three factors support or inspire MedDiet implementation: eating habits, which highlight the necessity of researching overall eating behaviors, particularly in T2D persons, and weight management. Furthermore, MedDiet attributes such as adaptability, palatability, and safety drive MedDiet adoption (Alaufi et al., 2022). Diet has a significant impact on various cardiovascular risk factors in diabetics (Hariharan et al., 2022).

3. Conclusion

Diabetes patients who manage their care are more likely to prevent complications. Individuals with T2D aspire to be able to manage their disease autonomously without being limited by distance or time, according to the findings of this study. With the advancement of science and technology, smartphone use has become necessary, particularly for the majority of Indonesians; thus, in situations like these, a tool is required to manage their ailments. Mobile apps can connect patients with healthcare institutions, allowing them to take an active role in disease management. The findings of this study can be utilized to guide the development of a mobile app for T2D patients.

4. Compliance with Ethical Standards

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Disclosure of conflict of interest

This research collaboration is a positive thing for all researchers so that conflicts, problems and others are absolutely no problem for all writers.

Statement of informed consent

Every action we take as authors is a mutual agreement or consent.

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