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Android-Based Diabetes Foot Care Education Application: A User Satisfaction Study on Various Demographic Profiles

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Abstract: Smartphone educational applications have been developed as an alternative when educating patients. Although many similar applications have been developed, they focus on services and information about diabetes management. For this reason, this research aims to create an educational application in an Android-based smartphone called Rawat focused on diabetic foot wound prevention care. This is based on the fact that the incidence of foot wounds can be prevented by conducting education. Seeing that application users have diverse demographic profiles. It must be a concern that all users benefit so that educational goals can be achieved. Therefore, it is necessary to examine users' satisfaction with foot wound application seen from various demographic profiles. The research design used a Descriptive Comparative, purposive sampling technique with a total sample of 140 respondents as members of Persadia (Indonesian Diabetes Association) at RSUD: Salatiga City, Surakarta City, Surakarta Regency, Prambanan Yogyakarta and Klaten Islamic Hospital. Data were collected using the EUCS questionnaire and analyzed using the Chi Square test and Logistic Regression. The results showed that there was no difference in satisfaction with the Rawat Kaki application in the job profile. For the education, job and age profiles, there were differences in satisfaction. The profiles that were closely related to influencing respondent satisfaction were gender, education and age, while work had no effect.

Keywords: diabetics, demographics, android app, satisfaction.

▪ INTRODUCTION

One of the non-communicable diseases (NCDs) that is currently increasing in number is Diabetes Mellitus (DM). This disease is a precursor to other diseases, such as hypertension, heart disease, and stroke. To manage DM disease, good knowledge, attitudes, and actions are needed from patients and families to avoid complications by providing health education. This can be done by using information technology such as applications on smartphones that have been proven to improve the knowledge, attitudes, and behavior of DM sufferers(Budhiwardoyo Najib & Kusumo Mahendra Prasetyo. 2023).

Currently, many applications have been developed, especially on smartphones, which are advances in communication and information technology that provide opportunities for DM sufferers to access information and nursing services easily. Smartphones that already have special applications for DM sufferers greatly facilitate diabetes counseling services as well as home care services for treating foot wounds at home, even though they have weaknesses and shortcomings (Santoso, B. J et al., 2022). So that existing applications continue to be tested and refined so that they can be used easily(Kilic M & Karadağ A. 2020).

This is in accordance with the expert opinion which states that nursing services in educating DM sufferers can be developed using Android-based applications to improve foot care behavior (Cheng Yi-Jun, et al., 2023). Educational applications forDM patients that are currently available, especially for preventive care for foot wounds, are not widely

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available, so their development is needed so that nursing services for DM patients are better. As stated in a study, the applications that currently exist are not fully educational applications to prevent foot wounds.

The features in the application consist of: Recording insulin and medication, sending and recording data, recording diet and weight management. Education is not included in the main function in both cases.(Chomutare et al., 2011). In other studies, it has also been found that applications developed for self-care consist of text messages, blood glucose monitoring, insulin dose suggestions, educational messages, metabolic management, pedometer counts, and reporting (Mehraeen et al., 2022). Thus, there is no specific educational application available for preventive care for foot wounds considering various demographic profile.The use of an android-based operational system was chosen because it is more cost-effective, and many people use it. (Mehraeen et al., 2022). Another advantage is that many smartphone users are looking for the information they need without any time or place restrictions, and quickly accessing anytime and anywhere is a current phenomenon (Sugandi M.A & Halim Nasrul R.M, 2019). For this reason, this study aims to develop an Android-based smartphone application to educate diabetic foot wound prevention care from various demographic profile backgrounds of DM sufferers who use smartphones in their daily activities.

▪ METHOD

Participants

The study population consisted of 980 patients with type 2 diabetes who were members of Persadia (Indonesian Diabetes Association) at Salatiga City Regional General Hospital, MrsFatmawati Sukarno Hospital, Surakarta City, Sragen Regency Hospital, Sleman Regency Hospital, Yogyakarta, and Klaten Islamic Hospital. The sample size was calculated using the Slovin formula using a purposive sampling technique with a 95% confidence level to obtain a sample size of 140.

Research Design and Instruments

The design used is a comparative test to explore differences in user satisfaction of the Rawat Kaki education application based on demographic aspects. Respondent satisfaction data were collected using the End User Computing Satisfaction instrument (Doll W J & Torkzadeh, 1988) which consists of the following aspects: Content consisting of 5 questions about the content of the application, Accuracy consisting of 4 questions about the accuracy of the application needed by users, Format consisting of 5 questions about the form and appearance of the application, Ease of use consisting of 5 questions about the ease of using the features and Timeliness consisting of 5 questions about the time needed when using the application.

The Rawat Kaki education application used in this study has been tested with the validity of the content index (CVI) obtained a value of = 0.92. This Rawat Kaki application uses the Javascript, tml5, php and Mysql database programming languages and has been hosted in the Play Store service. The features in the application are: Patient biodata, foot care questionnaires and learning to care for feet presented in the form of images and videos. A reminder feature is also available as a warning or reminder for patients to care for their feet every day routinely. Then the ethical feasibility permit was issued by the Health Research Ethics Commission of Muwardi Surakarta Hospital on April 28, 2024 Number: 903/IV/HREC/2024.

Procedure and Data Analysis

First, a check was carried out to ensure that respondents had tried using the application three times in the Rawat Kaki Application data record. If there were respondents who had not tried it three times, the respondents were asked to try it again. Furthermore, data collection was carried out using the EUCS questionnaire. Demographic data and respondent satisfaction in the form of categorical data were then analyzed using the Chi Square test with a degree of error <0.05 to determine whether there were differences in respondent satisfaction based on demographic profiles of age, gender, occupation and educational background after using the Rawat Kaki education application.

Furthermore, an Ordinal Logistic Regression test was carried out in the form of a Wald Test Statistical Analysis for Partial Testing aimed at determining which demographic profiles were closely related to influencing respondent satisfaction with the Rawat Kaki application.

▪ RESULT AND DISSCUSSION

Research Overview and Results

Figures 1 and 2 below show the display of the Rawat Kaki applicataion used in this study.

Figure 1. Front view of rawat kaki app

Figure 2. View of rawatkaki app feature page

Table 1. Demographic profile of research respondents (N=140)

Demographic Profile	Frequency	Presentation (%)
Age		
< 59Years old	30	21.4
60-74Years old	100	71.5
>74Years old	10	7.1
Education		
Elementary School	50	35.7
Junior High School	50	35.7
Senior High School	30	21.4
University	10	7.2
Occupation		
Housewife	50	35.7
Civil Servants	10	7.2
Pensioners	22	15.7
Private Employee	48	31.4
Gender		
Men	40	28.5
Women	100	71.5

Table 1 shows that most respondents are between 60 and 74 years old, and their highest educational background is elementary school and junior high school.

Furthermore, it can also be seen that most respondents are housewives and in the private sector, while their gender is mostly female.

Tabel 2. Distribution of respondent satisfaction level based on EUCS dimensions

Satisfaction	**EUCS Dimensions**									
	Accuracy		**Content**		**Ease of use**		**Format**		**Timeliness**	
	n	%	n	%	n	%	n	%	n	%
Very Dissastified	2	1,4	2	1.5	15	10.7	40	28.5	5	3.6
Dissatisfies	5	3.6	5	3.5	55	39.3	6	4.4	15	10.7
Satisfied	105	75	103	73.5	50	35.7	80	57.1	100	71.4
Very Satisfied	28	20	30	21.5	20	14.3	14	10	20	14.3

Table 2 shows the respondents' satisfaction after using the Rawat Kaki education application measured using the EUCS questionnaire. It can be seen that high satisfaction is in the dimensions of content, accuracy and timeliness. While in the format dimension most are satisfied and in the ease of use dimension the respondents' satisfaction is quite low.

The following are the results of data analysis using the Chi Square test to determine the difference in satisfaction using the Rawat Kaki education application based on the demographic profile of the respondents.

Table 3. Comparative distribution of respondent satisfaction based on demographic profile after using the foot care application

Demographic profile	**Satisfaction**								p Value
	Very Satisfied		Satisfied		Dissatisfied		Very Dissatisfied		
	n	%	n	%	n	%	n	%	
Gender									
Men	14	37.5	18	45	6	15	2	5	0.047
Women	40	40	58	58	2	2	0	0	
Education									
Elementary School	30	60	11	22	5	10	4	8	
Junior High School	27	54	15	30	4	8	4	8	0.039
Senior High School	20	67	6	20	3	10	1	3	
University	2	20	7	70	1	10	0	0	
Occupation									
Housewife	35	70	9	18	3	6	3	6	
Civil Servants	4	40	2	20	2	20	2	20	0.069
Pensioners	7	34	9	40	3	13	3	13	
Private Employee	20	42	19	40	5	10	4	8	
Ages									
< 59Years old	15	50	14	47	1	3	0	0	
60-74Years old	42	42	48	48	6	6	5	5	0.038
>74Years old	3	30	3	30	2	20	2	20	

The study's results, shown in Table 2, indicate that respondents' satisfaction with the Rawat Kaki application is mostly based on the demographic profile aspects of gender, education, occupation, and age. Furthermore, when examining differences in the level of satisfaction from each aspect, only the aspect of work proves that there is no difference in satisfaction.

Further elaboration based on the results of the Chi-Square analysis to see differences in respondent satisfaction based on gender in using the Rawat Kaki application obtained a p-value of 0.047 means <0.05. This means that there is a difference in respondent satisfaction when using the Rawat Kaki applicataion based on the gender of the respondent. Then, to find out the difference in respondent satisfaction based on their educational background in using the Rawat Kaki applicataion, the p-value = 0.039 means <0.05. Thus, there are differences in respondents' satisfaction with using the Rawat Kaki applicataion based on their educational background. These results conclude that the null hypothesis is rejected, and the alternative hypothesis, stating "There are differences in user satisfaction with the Rawat Kaki applicataion based on educational background", is accepted.

To see the difference in respondent satisfaction based on their work using the Rawat Kaki application, the p-value = 0.069 means> 0.05. The conclusion is that there is no difference in respondent satisfaction when using the Rawat Kaki application based on the respondent's job. Furthermore, the analysis to see the difference in respondent satisfaction based on age group using the Rawat Kaki application obtained a p-value = 0.038 means <0.05. These results indicate differences in respondent satisfaction based on age group.

Furthermore, to see which demographic profile is closely related to influencing respondent satisfaction with the Foot Care application, an ordinal logistic regression analysis was conducted. This is based on ordinal scale research data and has more than two variables. Predictors of gender (X1), education (X2), occupation (X3) and age (X4) will be tested against the satisfaction response (Y) using the Wald Test Statistical Analysis for Partial Testing with a confidence level of 95% and p value <0.05. In the following table 4 are the results of the Wald test that has been carried out.

Table 4. Wald test results against predictors (X) of respondent demographic profiles on satisfaction

Prediktor	B	SE	Wald	Sig
X_1	0.302	1.535	0.002	0.013
X_2	1.449	1.965	2.251	0.034
X_3	2.009	1.021	0.184	0.056
X_4	2.324	1.492	2.426	0.019
Konstan	99.881	61.906	2.399	0.039

Based on the results of the Wald test in table 4, it can be seen that the predictor (X3) Job has a p Value of 0.056 > 0.05. Thus, it means that the job profile does not affect respondent satisfaction. Furthermore, the predictors Gender (X1), Education (X2) and Age (X4) have p Values of <0.05, meaning that the three predictors have a significant effect on the level of respondent satisfaction with the Foot Care Education application.

Disscussion

The use of applications as media in smartphones when conducting education aims to effectively change the knowledge, skills and behaviour of patients, such as in preventing and controlling blood sugar levels in type 2 diabetes (Andriyanto and Hidayati, 2018). This method can also be used in directing knowledge, skills and behaviours to change positively in the self-care activities of people with diabetes and is reported to provide satisfactory results (Kim Yu Jin et al., 2015)

In this industrial 4.0 era, care services for people with diabetes, especially education on foot wound prevention care, require easier management, such as utilizing information technology to minimize direct visits to the clinic. This raises the awareness that changes must be made by developing existing methods for education for diabetic patients who have a high risk of foot wounds (Miranda Cesare, et al., 2022) The following is a discussion of the research results on differences in satisfaction with the Rawat Kaki applicataion from various demographic aspects used by respondents.

User Satisfaction of Rawat Kaki applicataionBased on Gender

Respondent satisfaction, when viewed from the gender profile, shows differences between men and women. This is in line with a study that found that differences in satisfaction between male and female users occur because men need more time and technical support than women (Fu et al., 2019).

Other research states that the difference in satisfaction is because women's satisfaction tends to be influenced by the quality of service received. In men, satisfaction is more influenced by economic value (Hakim M, 2016). Meanwhile, other research on differences in satisfaction in women with a digital application is influenced by the expectation of the results they will receive (Odelia Fitri & Sembiring Sintaria., 2024). Thus, the difference in satisfaction between men and women with an application is influenced by the quality and expectations of the results obtained after using it.

User Satisfaction of Rawat Kaki applicataionBased on Educational Background

This study found differences in respondents' satisfaction based on their educational background with the Rawat Kaki applicataion. This shows that educational background is a factor that must be considered in the application as a means of educating diabetic patient care.

Some studies show that an influential factor in managing the self-care of diabetics is the level of education (Kurniawan, Sari and Aisyah, 2020). Other studies also reveal that educational background factors lead to differences in satisfaction with the application used regarding the content available in the application (Izzati Vasa Annisa, 2020). Likewise, another study found that educational background factors affect user knowledge and satisfaction about foot care at risk of diabetic foot wounds (Dincer Berna & Bahçecik Nefise, 2020).

Thus, some of these research results support the results of this study and explain that the knowledge gained from the application after using it will affect satisfaction. The higher the level of education, the better the acceptance of knowledge about foot wound prevention care, allowing differences in satisfaction with the Rawat Kaki applicataion.

User Satisfaction of Rawat Kaki applicataionBased on Occupation

It has been obtained from this study that there are no differences in respondents' satisfaction with using the Rawat kaki application based on their occupation. This is not in line with the test results of a study on job variables, which are proven to affect consumer satisfaction with digital services (Ariansyah Kasmad., 2017). The purpose and usefulness of the application affect satisfaction according to the different types of work of respondents. The Rawat Kaki application aims to provide educational services so that respondent satisfaction differs from that of various respondent jobs.

A further explanation is that the respondents in this study have comparable jobs between those who work actively as civil servants or in the private sector and those who work inactive as housewives or retirees. Those who work actively and those who are no longer active have the same time opportunity because respondents can use it anytime and anywhere when there is an internet network, so their satisfaction is the same. An explanation for the absence of differences in job satisfaction with application user satisfaction has not been specifically found.

User Satisfaction of Rawat Kaki applicataionBased on Age

The users' satisfaction level of the Android-based Rawat Kaki applicataion based on age groups shows significant differences. These results can explain that respondents under 59 years of age find it easier to master the operation of the Rawat Kakise application, so they are satisfied with using the application compared to those older. Research on millennials who use health applications found significant user satisfaction (Ningrum Niken Sukma Budiani & Meita Santi., 2023). Other studies explain that user satisfaction is also found in respondents who have an average age of 44 years who state that smartphone-based applications can be a useful tool in directing self-care activities of people with diabetes to positive changes (Kim Yu Jin, et al., 2015)

Older diabetics will mostly experience obstacles in using applications on their smartphones. This is due to several factors, such as age, motivation, and economy. Although the application design has been made friendly so that it is easy to use, the applications that already exist on their smartphones are rarely used. In addition, it is also found that the available application functions often do not meet the preferences of users who are more than 56 years old (Wahyudi Candra Tri, 2019).

However, the application must still be designed and compiled by paying attention to usability aspects so that its operation can be done easily and provide user benefits and satisfaction. Applications must also pay attention to friendly aspects such as bold writing and using large fonts, especially (Hawini A.H, 2022). Especially for the elderly, the best feature design can be images (Alsana S., 2021).

Thus, the existing application needs to be evaluated, developed, and even redesigned to facilitate its use (Konda Wesley Duma et al., 2022). This can be done in various ways so that Android applications look attractive and easy to operate by involving many five senses, such as adding images, animations or videos (Dinengsih Sri & Hakim Nurzakiah, 2020), (Yustin Eli, 2020). In addition, some instructions for operating the application are designed using icons and buttons whose appearance is in the form of images or text (Wahyudi Candra Tri, 2019). Another study also found this, suggesting that application design should consider making features that use images (Suyanto & Astuti Sri Lestari Dwi, 2023).

▪ CONCLUSION

Respondent satisfaction with the Rawat Kaki application based on age group profile, gender and educational background showed differences. While in the job profile no differences were found. The profiles that have an influential relationship with satisfaction are gender, education and age, while work has been shown to have no effect.

It is recommended to conduct an evaluation and add design so that user satisfaction of the Rawat Kaki application has the same satisfaction even though they have differences in age, gender, educational background and work such as the use of larger and bolder fonts, images or animations, video and audio. It is also necessary to pay attention to the gender, education and age profiles when designing an Android-based educational application.

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