DIGITAL APPLICATION OF LIFESTYLE PROMOTION PROGRAM FOR PREDIABETES

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Abstract

Introduction: Prediabetes is a condition characterized by blood glucose levels higher than normal values but below blood glucose levels. Diabetes mellitus is a very significant global health problem today, where the prevalence in the three countries highest in the world, namely China (48.6 million), the United States (36.8 million), and Indonesia (27.7 million), and collectively equal one-third of the prevalence of prediabetes in the world. The potential for using program technology combining interactive mobile computing, and remote monitoring, so that the use of digital applications will make it easier to make lifestyle changes for prediabetes by being able to be applied using smartphone devices which are currently used in daily life in the Bandung city area.
Objectives: To obtain a digital application for lifestyle changes in prediabetes in the Bandung City area**.**
Method: this research is experimental, d The type of research used is Research and Development (R&D) or development research. using the ADDIE model approach by designing an Android-based digital application for lifestyle changes for prediabetes.
Result: Analysis of media needs is divided into 5 aspects, namely design, material, language, illustrations, and typography used on smartphones. Design of materials used to create software or a software program that can be run via smartphone regarding prediabetes screening. The development received an assessment by material experts of 73% with feasible criteria and by media experts of 77% with very feasible criteria. Implementation showed that the number of respondents who gave a very easy assessment of the Prediabetes application was 73.53%, while the manual instrument was 26.67%. The Prediabetes evaluation showed that all respondents using the Prediabetes application had correct results, while using manual instruments there were still 2.97% who entered incorrectly. that the Prediabetes application has good accuracy and faster filling time.
Conclusion: analysis of the location of letters and images in the middle of the media, software design smartphone screening, Development is suitable for use, Implementation is easy to implement, Evaluation has good accuracy,y and charging time is faster.
Keywords: Applications, Digital, Prediabetes, Lifestyle.

INTRODUCTION

Prediabetes is a condition characterized by blood glucose levels higher than normal values but below blood glucose levels. Diabetes mellitus is a very significant global health problem today, where the prevalence in three countries namely China (48.6 million), the United States (36.8 million), and Indonesia (27.7 million), collectively equal one-third of the prevalence of prediabetes in the world. The 2018 Riset Kesehatan Dasar (Riskesdas) results show that prediabetes in Indonesia is quite high, namely

26.3% experience impaired fasting blood glucose (GDPT), and 30.8% experience impaired glucose tolerance.

Various risk factors can cause prediabetes to become type 2 diabetes mellitus, such as obesity, body mass index (BMI), physical activity (exercise), intake of carbohydrates, fat, protein, fiber, and okin whereof these risk factors are lifestyle patterns. Prevention for the development of prediabetes based on various strong evidence is by making lifestyle changes. The first prevention program is to regulate dietary intake by reducing carbohydrates, reducing fat, and increasing consumption of foods with high fiber. Second, physical activity and training include activities that involve physical activity, while physical training includes structured and planned physical exercise. The potential to use program technology combining interactive mobile computing, and more monitoringral published studies suggests that smartphones can provide effective behavioral interventions among various age groups and for various diseases. Health coaches and inne partners support people with prediabetes to prevent or delay the onset of Type 2 diabetes. So the use of digital applications will make it easier to make lifestyle changes for prediabetes by being able to apply them using smartphone devices which are currently used in daily life in the Bandung city area.

METHODS

The type of research used is *Research* and *Development* (R&D) or development research. with the ADDIE model approach, consisting of 5 stages, namely *analysis*, *implementatimplementation*atio

RESULTS AND DISCUSSION

Analysis

Data collection through interviews conducted with the community in the Pasirkaliki Community Health Center working area on September 20, 2023, As a result of interviews conducted by researchers, it was found that health problems that occurred were the absence of early detection examinations regarding Prediabetes. Researchers conducted interviews regarding the Prediabetes Application that the public hopes to use in designing media. Interviews regarding media needs were divided into 5 aspects, namely design, material, language, illustration, and typography. In the design aspect there is a form of Prediabetes Application What is expected is an application that can be used on *a smartphone* In the language aspect, it is expected to use Indonesian in a colloquial style that is easy to understand. In the illustration aspect, there are expected images, namely animated images related to the general public, colors in the Prediabetes Application namely colors that are not flashy, not dark like pastels, the desired type of letters are clear, easy to read, and bold. In the typography aspect, there is a layout that is expected in *the Prediabetes Application*, namely the location of letters and images in the middle of the media.

Design

The design of this mobile application is strategically crafted to enhance accessibility and simplicity, ensuring that the public can easily detect prediabetes mellitus. From the initial welcome screen to the registration process, the interface is designed with user-friendliness in mind. Users are greeted with a clear invitation to either login or create an account, streamlining the onboarding process with straightforward inputs like a username, password, and re-password. The screening process itself is designed to be efficient, collecting only essential personal information, and presenting users with options

to either proceed with the prediabetes screening or exit the application. The application's approach to data input is streamlined, with easy-to-understand options for age, BMI, and blood pressure. The screening questions are carefully constructed to gather pertinent information related to prediabetes risk factors, such as physical activity and family history. Following completion, users receive instant and easily interpretable results, categorized as either low or high risk. The application doesn't just stop at identification but provides clear, actionable steps through educational messages tailored to the user's risk level, encouraging healthier lifestyle choices. In cases of high risk, the application emphasizes the importance of seeking professional medical consultation for a definitive diagnosis. Additionally, stringent privacy and security measures, in collaboration with IT experts, ensure that user data is handled with the utmost care, fostering trust among users. Overall, this design prioritizes user empowerment, education, and privacy to create a tool that significantly eases the process of detecting prediabetes for the broader public.

The process of designing the prediabetes screening software involves meticulous planning and collaboration across multiple stages. To commence, a thorough needs assessment is conducted to understand the target audience and their requirements. This is followed by extensive collaboration with healthcare professionals and IT experts to gather relevant information on prediabetes risk factors and establish technical feasibility. With these insights, the design phase begins, focusing on creating a user-friendly interface through wireframing and prototyping, emphasizing simplicity to cater to diverse user demographics. Concurrently, the development team works on crafting a screening algorithm based on the gathered health data, and a secure database structure is designed to uphold user privacy.

As the software architecture takes shape, the development phase kicks off, encompassing both front-end and back-end components. Rigorous testing follows, addressing functional, usability, and security aspects to ensure a robust and reliable application. User feedback plays a pivotal role in refining the software and guiding necessary adjustments and improvements. Upon successful testing and refinement, the software is deployed for public use, accompanied by educational materials and outreach strategies to inform the public about its purpose and benefits. Continuous monitoring and updates post-launch help maintain the software's effectiveness, incorporating new findings from ongoing research in prediabetes detection. Throughout this comprehensive process, collaboration between health and IT experts is sustained, ensuring the software's accuracy, security, and alignment with health standards.

Development

a. Material Expert Test Results

Material expert validation was assessed to obtain data in the form of material suitability *for the Prediabetes Application.* Based on the results of the Material Expert test, the score obtained was 69 points out of a maximum score of 95 points. The score is calculated using the following material feasibility test formula:

$$p = \frac{\sum \ Score\ obtained}{\sum \ Maximum\ score} \times 100\%$$

$$p = \frac{\sum \ 69}{\sum \ 95} \times 100\%$$

$$p = 73\%$$

Based on the calculations above, the material feasibility test results show a score of 73% with appropriate criteria, so the *Prediabetes Application material* is declared suitable for use.

b. Media Expert Test Results

Media expert validation is carried out on the media used. Based on the Media Expert test results, the score obtained was 81 points out of a maximum score of 105 points. The score is calculated using the following material feasibility test formula:

$$p = \frac{\sum \ Score\ obtained}{\sum \ Maximum\ score} \times 100\%$$

$$p = \frac{\sum \ 81}{\sum \ 105} \times 100\%$$

$$p = 77\ \%$$

Based on the calculations above, the media feasibility test results show a score of 77% with very feasible criteria, so it is a Prediabetes Application declared fit for use.

Implementation

The sustainability of the Prediabetes application will continue if it can be accepted by users, so to achieve this goal the application needs to carry out acceptance trials, the results of which are also used to improve the application. The acceptance trial was reviewed from ease of use. The level of ease of use of the Prediabetes application is the respondent's response to the level of ease/difficulty in carrying out early detection of the risk of Prediabetes. Respondents' assessment parameters were very difficult, difficult, easy, and very easy.

Table 1: The Level ofEasee of Prediabetes Application in the Puskesmas Working Area

NO	INSTRUMENT	LEVEL OF EASY									
		Very easy		Easy		Difficult		Very difficult		AMOUNT	
		n	%	n	%	n	%	n	%	n	%
1	Prediabetes App	25	73.53	9	26.47	0	0	0	0	34	100
2	Manual Instruments	8	26.67	18	60.00	4	13.33	0	0	30	100

Table 2 shows that the level of ease of the Prediabetes application has a higher level of ease than manual instruments in assessing the risk of developing Prediabetes. This is shown by the number of respondents who gave the Prediabetes application a very easy assessment of 73.53%, while the manual instrument was 26.67%.

Ease of use of the system means that the form is not confusing, clear, and easy to understand. The perception of ease of using a technology system influences a person's attitude towards users of the technology system. The user's attitude towards a product can be manifested in the form of use of the product. If users find it easy to operate the application, they will use the application more often. The development of media for the level of convenience of the Prediabetes application has a higher level of convenience compared to manual instruments in assessing the risk of developing Prediabetes. This is shown by the number of respondents who gave the Prediabetes application a very easy assessment of 73.53%, while the manual instrument was 26.67%.

Evaluation

Prediabetes App Regarding Prediabetes Application Screening in the Pasirkaliki Community Health Center working area, user trials have been carried out. There are 30 uses**.** The accuracy of early detection of Prediabetes is the result of the appropriateness of filling in data and concluding the results in detecting the risk of Prediabetes early. The

results of the filling carried out by respondents are in the correct and incorrect parameters. Table 3 shows the results of filling accuracy using the Prediabetes application and manual instruments. The results of the assessment of the accuracy of filling in detecting the risk of Prediabetes show that all respondents who used the Prediabetes application had correct results, while there were still 2.97% who used manual instruments who filled in incorrectly. All of the incorrect entries occurred when calculating the body mass index. Apart from this information, the long charging time shows that the Prediabetes application is faster than manual instruments. This shows that the Prediabetes application has good accuracy and faster filling time.

Table 2: Accuracy of Filling in Detecting the Risk of Prediabetes

NO	ASPECT	PREDIABETES APPLICATION				INSTRUMENT MANUAL			
		Appropriate		Not exactly		Appropriate		Not exactly	
		n	%	n	%	n	%	n	%
1	Login Filling	30	100	0	0	30	100	0	0
2	Enter Gender	30	100	0	0	26	86.67	4	13.33
3	Fill in Age	30	100	0	0	30	100	0	0
4	Charging physical activity	30	100	0	0	30	100	0	0
5	Load up on vegetables or fruit	30	100	0	0	30	100	0	0
6	Filling in a story of high blood pressure and upper and lower blood pressure	30	100	0	0	30	100	0	0
7	Charging physical activity	30	100	0	0	30	100	0	0
8	Filling in for family members who suffer from Diabetes	30	100	0	0	30	100	0	0
9	Conclusion/Results	30	100	0	0	26	86.67	4	13.33
AVERAGE		30	100	0	0	29.11	97.03	0.89	2.97

CONCLUSION

1. Analysis of Prediabetes Application needs namely colors that are not flashy, not dark like pastel and san, and the desired type of letters are clear, easy, to read, and bold. In the typography aspect, there is a layout that is expected in *the Prediabetes Application*, namely the location of letters and images in the middle of the media.
2. *Software* design or a software program that can be run via *smartphone* regarding Prediabetes screening
3. Prediabetes Application Development declared fit for use.
4. The implementation of the Prediabetes application is easy for the entire community to implement.
5. The evaluation of the Prediabetes application has good accuracy and faster filling time.

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