KEMAS 20 (3) (2025) 408-417

Jurnal Kesehatan Masyarakat

http://journal.unnes.ac.id/nju/index.php/kemas

# Health Belief Model in The Prevention of Type-2 Diabetes Mellitus in Fertile Age Couples

Achmad Lukman Hakim[1*] ✉, Agustina Sari[2]
[1]Faculty of Health Sciences, University of Indonesia Maju, Jakarta, Indonesia
[2]Faculty of Vocational, University of Indonesia Maju, Jakarta Indonesia

**Article Info**

*Article History:*
Submitted July 2024
Accepted September 2024
Published January 2025

*Keywords:*
Diabetes Mellitus;
Health Belief Model;
Fertile Age Couple

**DOI**
https://doi.org/10.15294/kemas.v20i3.8900

**Abstract**

*Sufferers with diabetes want to well recognize the threat of diabetic headaches and the shape of the Health Belief Model (HBM) recognition to construct suitable interventions*. This study aims to determine the effect of the health belief model on the prevention of type 2 diabetes mellitus in fertile-age couples. The research design was cross-sectional. The research sample was a fertile age couple who are in the area of Depok City, West Java as many as 399 respondents. Data analysis used a structural equation modeling approach with the partial least squares method. The results showed that there was a perceived effect on the prevention of type-2 diabetes mellitus with a t-statistic of 13.331880, there was an effect of self-efficacy on the prevention of type-2 diabetes mellitus with a t-statistic of 2.221879, there was an effect of cues to action on the prevention of type-2 diabetes mellitus with a t-statistic of 2.482949, and the perceived indicator that has the most influence on the prevention of type-2 diabetes mellitus was barriers with a t-statistic of 180.528565. Based on the value of R2, the magnitude of the effect of perceived, self-efficacy, and cues to action on the prevention of type-2 diabetes mellitus was 89.52%. From the Q2 value, the model in this study has a relevant predictive value, where the model used can explain the information contained in the research data by 89.52%. There was an effect of the health belief model on the prevention of type 2 diabetes mellitus in fertile-age couples. Another dominant variable that influences the prevention of type 2 diabetes mellitus in fertile-age couples is perceived and the indicators of barriers.

## Introduction

Diabetes mellitus (DM) is a significant global public health concern due to its increasing prevalence and associated health risks (Purwanti, Nursalam & Pandin 2024). The International Diabetes Federation (IDF) estimates that approximately 537 million individuals globally are affected by diabetes, with this number projected to rise to 783 million by 2045 (Duan *et al*., 2022). The prevalence of DM is particularly high in low- and middle-income countries (LMICs), where nearly 80% of the diabetic population resides (Jiang *et al*., 2021). Diabetes mellitus, a chronic medical condition, is rapidly spreading globally, posing a significant public health challenge. Type 2 diabetes, a common form of the disease, primarily affects individuals who are overweight, lead a sedentary lifestyle, and have a genetic predisposition to the condition. It is crucial to recognize that several risk factors contribute to the development of type 2 diabetes (Shooka *et al*., 2018).

Between 2010 and 2030, the prevalence of type 2 diabetes was expected to increase by 70% in developing countries and 20% in developed countries. The International Diabetes Federation (IDF) predicts that the global population of people with diabetes will reach 415 million in 2015 and increase to 642 million by 2040 (Balgis *et al*., 2023). There are almost 4.6 million people with diabetes. Diabetes in Iran

✉ Correspondence Address:
Jl. Harapan, Lenteng Agung, Jakarta Selatan, DKI Jakarta, 12610, Indonesia
Email: achmadlukmanhakim@gmail.com

pISSN 1858-1196
eISSN 2355-3596

accounts for 8.5% of the country's population (Roglic 2016). The prevalence is 7.3% to 7.7% in people over 30 years of age. More than 90% of people with diabetes have some form of type 2 diabetes. The World Health Organization WHO has estimated that the number of people with diabetes will increase from 135 million in 1995 to 300 million people by 2030 (Prasetyowati, Tamtomo & Murti 2018).

Diabetes mellitus (DM) is a common degenerative disease. This is indicated by an increase in blood sugar levels. Indonesia ranks second only to India in the number of diabetics in Southeast Asia. Diabetic complications in fertile-age couples with gestational diabetes can affect mothers and babies. DM in fertile-age couples is an important problem because of the high proportion of new cases and the impact is also dangerous because married fertile-age couples have a chance to get pregnant (Tawfik 2017). DM during pregnancy affects the condition of the baby, namely, the baby is more at risk for stillbirth, premature birth, high birth weight, low Apgar score, high level of resuscitation, hospitalization in intensive care, and requires a longer stay in hospital than babies born from mothers without DM. In addition, if a woman with DM becomes pregnant, her unborn child also has a high risk of developing DM as an adult (Shabibi *et al*., 2017).

Prevention of type 2 diabetes mellitus is very important, especially among couples of childbearing age, because it can prevent chronic complications and improve quality of life. One effective way to prevent type 2 diabetes mellitus is to change daily behavior, such as reducing sugar and fat consumption, increasing physical activity, and controlling body weight (Khosravizadeh *et al*., 2021). To lessen the headaches of diabetes, a few research emphasize that healthcare employees ought to now no longer simply offer expertise to humans, however, do not forget the belief of the threat as a vital idea for knowledge of healthful behaviors and making adjustments in conduct (Esquives, Ramos & Stoutenberg 2021). So, sufferers with diabetes want to well recognize the threat of diabetic headaches and the shape of the Health Belief Model (HBM) recognition to construct suitable interventions (Shabibi *et al*., 2017). HBM as a theoretical framework for this research, is one of the handiest fashions of fitness education, particularly targeted on prevention of sicknesses and adoption of behaviors to keep away from infection and disorder chains and it's by far one of the essential particular fashions that is used to decide the connection among fitness ideals and behaviors (Ong *et al*., 2023).

The Health Belief Model was used as a theoretical framework to understand people's behavior in preventing and managing type 2 diabetes. Various factors such as risk perception, severity perception, and self-efficacy are analyzed to understand how individuals understand and apply diabetes prevention behavior (Duan *et al*., 2022). The results show that the Health Belief Model can be an effective tool in increasing awareness and diabetes prevention behavior among type 2 diabetes patients, as well as in encouraging changes in community behavior to reduce the risk of diabetes (Jones *et al*., 2015). HBM is a theoretical framework used to understand people's behavior in preventing and managing disease. The HBM focuses on four main components: risk perception, severity perception, self-efficacy, and behavior. By using HBM, researchers can understand how individuals perceive the risk of type 2 diabetes mellitus, how they assess the severity of the disease, and how confident they are in changing behavior to prevent type 2 diabetes mellitus (Afrasiabi *et al*., 2022). In the context of couples of childbearing age, HBM can be used to understand how they perceive the risk of type 2 diabetes mellitus, how they assess the severity of the disease, and how confident they are in changing behavior to prevent type 2 diabetes mellitus. Thus, HBM can be an effective tool in increasing awareness and diabetes prevention behavior among couples of childbearing age (Jiang *et al*., 2021).

The HBM posits that humans would take motion to save you infection if they regard themselves as liable to a condition (perceived susceptibility) if they trust it'd have doubtlessly extreme consequences (perceived severity) if they trust that a selected path of motion to be had to them could lessen the susceptibility or severity or result in different fine outcomes (perceived benefits), and if they understand few bad attributes associated with the fitness

motion (perceived barriers) (Melkamu, Berhe & Handebo 2021). Additionally, HBM pupils later cautioned that cues to the action-self-efficacy perception that you may efficiently entire the conduct of a hobby regardless of taking into consideration barriers introduced to the versión (Pipatpiboon *et al*., 2024). It was hoped that this research could contribute to the development of more effective prevention strategies for type 2 diabetes mellitus among couples of childbearing age. It was also hoped that the results of this research would help increase public awareness about the risks of type 2 diabetes mellitus and the importance of changing daily behavior to prevent this disease. Fertile-age couples who contracted diabetes mellitus, their offspring have risk factors for developing diabetes later in life. The purpose of this study was to determine the effect of the health belief model on the prevention of type 2 diabetes mellitus in fertile-age couples.

**Method**

The research design was cross-sectional, namely a type of research that emphasizes measuring/observing independent and dependent variable data only once at a time (Sugiyono 2019), that aims to determine the effect of the health belief model on the prevention of type 2 diabetes mellitus in fertile age couples. The study population was all fertile age couples aged 15-49 years in Depok City totaling 213.716 couples. The minimum sample size needed was determined by the Slovin formula. A total of 399 samples were collected in sub-districts around Depok City using the multistage sampling method. There were eleven sub-districts included in this study, namely Bojongsari, Sawangan, Limo, Cinere, Cipayung, Pancoran Mas, Beji, Cilodong, Sukmajaya, Cimanggis, and Tapos. Several variables and indicators were included in the Structure Equation Modeling (SEM) analysis to see the Health Belief Model in the Prevention of Type 2 Diabetes Mellitus. Exogenous variables consist of Cues to Action, Self Efficacy, and Perceived with indicators of Barriers, Benefits, and Severity. Endogenous variables were Prevention of Type-2 Diabetes Mellitus.

Data was collected by researchers using a questionnaire. The questionnaire on the perceived variable consists of 20 questions, while the self-efficacy, cues to action, and prevention variables each consist of 15 questions. Instrument validation was tested with the Pearson product-moment correlation technique. The reliability of the instrument was tested using Alpha Cronbach. Researchers apply research ethics based on the statement letter from the Indonesian Advanced University Health Research Ethics Commission No. Number: 1650/Sket/Ka-Dept/RE/UIMA/VIII/2022 to protect the rights and obligations of respondents and researchers. Data were analyzed multivariately using Structural Equation Modeling analysis with statistical software applications using Smart Partial Least Squares (PLS).

**Result and Discussion**

The results of this research contain images of the research concept before it becomes a research model. Next contains the results of the calculate algorithm to evaluate whether the model is valid and reliable. After that, display the results of calculating bootstrapping to see the significance of the influence between variables. Once it is known that the model is valid, reliable, and significant, the magnitude of the influence between variables is presented and a mathematical equation is formed from the model and the validity of the model is seen in measuring the prevention of type 2 diabetes mellitus. The structural model in this study was described as follows:

The measurement model or outer model with reflexive indicators was evaluated with convergent and discriminant validity of the indicators, composite reliability for indicator blocks, and AVE, as well as composite reliability values. The outer model with formative indicators was evaluated based on its substantive content, namely by comparing the relative magnitude of the weight and seeing the significance of the weight measure. The results of the loading indicator factor for each variable can be seen in Figure 1 below. The following was the output of the initial run:

Based on Figure 1, it could be seen that the loading factor value of Barriers was 0.940, Benefits was 0.939, Severity was 0.854, and Susceptibility was 0.840 which met the

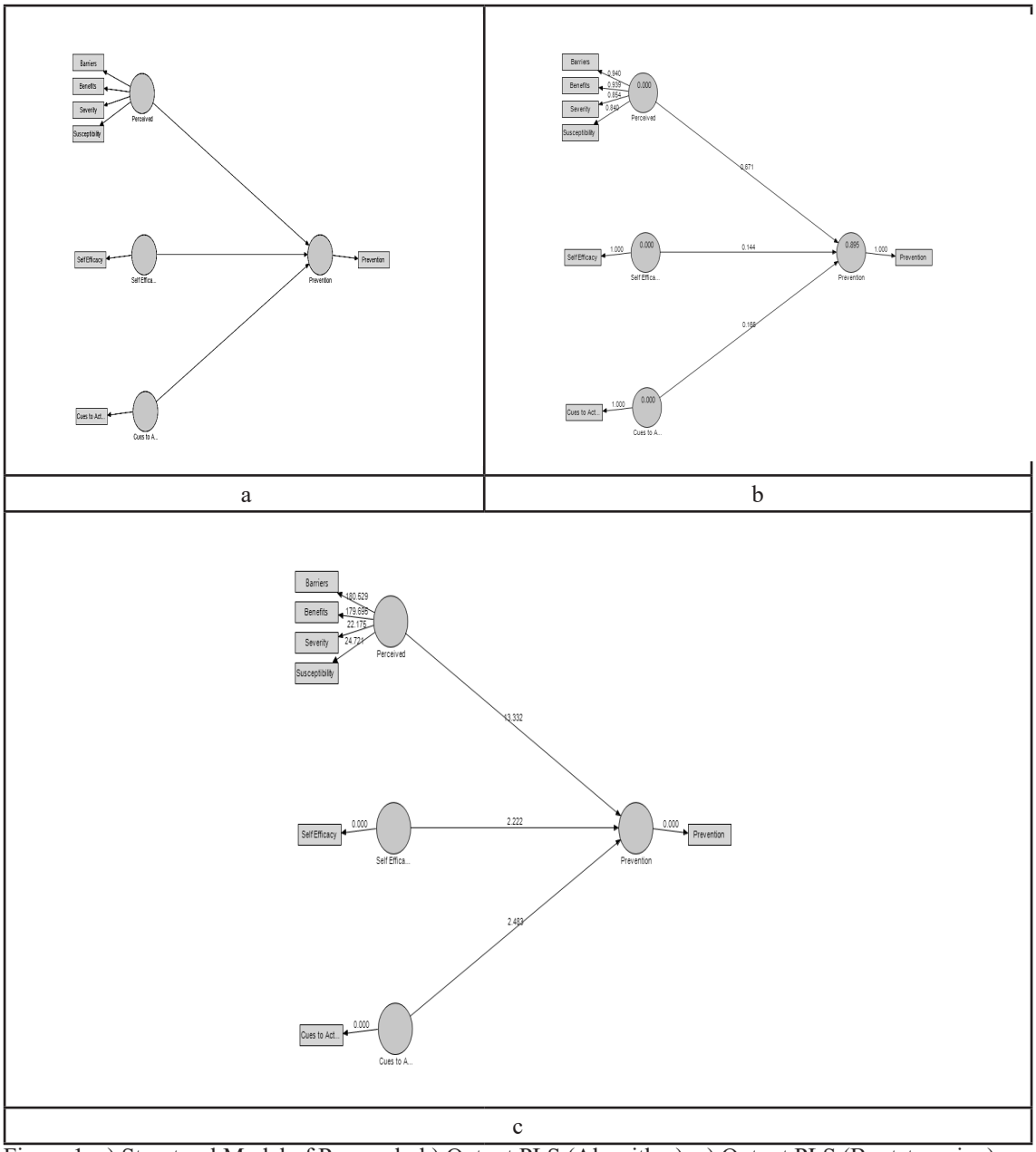


Figure 1. a) Structural Model of Research; b) Output PLS (Algorithm); c) Output PLS (Bootstrapping)

requirements, namely the loading factors value was greater than 0.5. A reflective indicator was declared valid if it had a loading factor above 0.5 for the intended variable based on its substantive content. Based on Figure 1 shows that all variables have a loading factor value greater than 0.5 so the test criteria for the measuring indicators were declared to be all valid. The purpose of cross-loading was to find out whether the variable can predict a higher factor loading indicator than predictions for other indicators by looking at the value of cross-loading. In addition, seeing the validity of the indicators used in the study could be done by evaluating the results of the cross-loading of all indicators, the table of results was as follows:

An indicator was declared valid if it had the highest factor loading to the intended variable compared to factor loading to other variables. Based on Table 1 above, the correlation variable was greater than the other variable sizes. This shows that the latent variable predicts the size of the block better than the size of the other blocks. The way to see discriminant

validity was by looking at the value of the square root of the Average Variance Extracted (AVE). The expected value was above 0.50. After being tested for validity and it was stated that the variables and indicators were valid, then the reliability test was carried out. The results of the outer model reliability evaluation are set out in the table below by evaluating Cronbach's Alpha and Composite Reliability values. The measurement results in this research model were as follows:

Based on the output results in Table 2, it could be seen that all variables were declared valid because they provide an AVE value above 0.50, so it could be concluded that the evaluation of the measurement model has good discriminant validity. Based on Table 2, both composite reliability and Cronbach's alpha, each variable has a value greater than 0.70, so all variables in the estimated model meet the variable reliability requirements. The results of the significant evaluation of the outer model are

Table 1. Cross-Loading Evaluation of Research Variables

| Indikator | Variabel | | | | Evaluation of Model |
|---|---|---|---|---|---|
| | Cues to Action | Perceived | Prevention | Self Efficacy | |
| Barriers | 0.801931 | 0.940230 | 0.930299 | 0.827692 | Valid |
| Benefits | 0.799768 | 0.939314 | 0.929589 | 0.826447 | Valid |
| Cues to Action | 1.000000 | 0.829027 | 0.847655 | 0.872885 | Valid |
| Prevention | 0.847655 | 0.935617 | 1.000000 | 0.881878 | Valid |
| Self Efficacy | 0.872885 | 0.884101 | 0.881878 | 1.000000 | Valid |
| Severity | 0.653477 | 0.854203 | 0.688782 | 0.748309 | Valid |
| Susceptibility | 0.690266 | 0.840030 | 0.667920 | 0.760656 | Valid |

Source: Primary Data, 2023

Table 2. AVE Measurement Results and Reliability Evaluation of Research Variables

| Variable | AVE | Cronbach's Alpha | Composite Reliability | Evaluation of Model | |
|---|---|---|---|---|---|
| Cues to Action | 1.000000 | 1.000000 | 1.000000 | Valid | Reliable |
| Perceived | 0.800414 | 0.918355 | 0.941170 | Valid | Reliable |
| Prevention | 1.000000 | 1.000000 | 1.000000 | Valid | Reliable |
| Self Efficacy | 1.000000 | 1.000000 | 1.000000 | Valid | Reliable |

Source: Primary Data, 2023

Table 3. Results of Measurement on the Effect Between Research Variables

| Effect Between Variables | Path Coefficients | T-Statistic (>1,96) | Hypothesis Null | Conclusion |
|---|---|---|---|---|
| Perceived → Prevention | 0.670681 | 13.331880 | Rejected | Positive and Significant Effects |
| Self Efficacy → Prevention | 0.144320 | 2.221879 | Rejected | Positive and Significant Effects |
| Cues to Action → Prevention | 0.165668 | 2.482949 | Rejected | Positive and Significant Effects |

Source: Primary Data, 2023

arranged in the PLS output below by evaluating the reflection of the T-statistical indicator value on the variable. The evaluation of the significance of the outer model was carried out to assess the significance of the latent variable with its variable, namely by comparing the T-Statistic value of each latent variable with a value of = 0.05 (1.96). To measure the T-Statistic value, bootstrapping was carried out on the model with the following results:

After bootstrapping was done to measure the T-Statistic value of each latent variable to its variable, the T-Statistic value was compared with the value of = 0.05 (1.96). The stipulation was that if the T-Statistic value was greater than the value of = 0.05 (1.96), then the latent variable was significant to the variable. Figure 1. The results of measuring the T-Statistic value from each indicator to the variable were greater than 1.96 with a 95% confidence level (α = 0.05), Barriers of 180.529, Benefits of 179.695, Severity of 22.175, and Susceptibility of 24.721. That means all indicators had a significant effect on the variables studied. To test the hypothesis between variables could be seen in Table 3.

Based on Table 3, perceived has a positive effect on the prevention of Type-2 Diabetes Mellitus, the test results show that there was a positive effect of 0.670681, while the T-Statistic value was 13.331880 and was significant at =5% (1.96). Self-efficacy has a positive effect on the prevention of Type-2 Diabetes Mellitus, the test results show a positive effect of 0.144320, while the T-Statistic value was 2.221879 and was significant at =5% (1.96). Cues to Action has a positive effect on the prevention of Type-2 Diabetes Mellitus, the test results show a positive effect of 0.165668, while the T-Statistic value was 2.482949 and was significant at =5% (1.96). After the T-Statistic was known, then measurements were carried out to determine the magnitude of the direct and indirect influence between variables with the following results:

Table 4 states that a perceived has a direct effect on the prevention of Type-2 Diabetes Mellitus by 62.75%. Self-efficacy has a direct effect on the prevention of Type-2 Diabetes Mellitus by 12.73%. Cues to action directly affect the prevention of Type-2 Diabetes Mellitus by 14.04%. If together they show conformity with the R Square value or in other words, this states that the perceived, self-efficacy and cues to action variables were able to explain the prevention of Type-2 Diabetes Mellitus variable (62.75% + 12.73% + 14.04%) = 89.52%. Mathematically, the form of the structural equation of this research model is as follows:

**Prevention of Type-2 Diabetes Mellitus = 0.670681 x Perceived + 0.144320 x Self Efficacy + 0.165668 x Cues to Action + 0,104798**

Prevention of Type-2 Diabetes Mellitus was influenced by the perceived 0.670681, self-efficacy of 0.144320, cues to action of 0.165668, and influenced by other factors of 0.104798 meaning that there was a positive influence of perceived, self-efficacy and cues to action on the prevention of Type 2 Diabetes Mellitus. The better than perceived, self-efficacy and cues to action, the better than to the prevention of Type-2 Diabetes Mellitus. The Q-Square ($Q^2$) test aims to assess the amount of data diversity or variation in research data on the phenomenon being studied. The formula used to measure $Q^2$ was as follows:

Table 4. Percentage of Effect Between Variables

| Effect Between Variables | Latent Variable Correlation | Path Coefficients | Direct Path | Direct % |
|---|---|---|---|---|
| Perceived → Prevention | 0.935617 | 0.670681 | 0.6275 | 62.75 |
| Self Efficacy → Prevention | 0.881878 | 0.144320 | 0.1273 | 12.73 |
| Cues to Action → Prevention | 0.847655 | 0.165668 | 0.1404 | 14.04 |
| Total | | | 0.8952 | 89.52 |

Source: Primary Data, 2023

$Q^2 = 1-(1-R_1^2)$

$Q^2 = 1-((1-0.895202)$

$Q^2 = 0.895202 \Rightarrow 89{,}52\%$

Based on the results of these calculations, it could be concluded that the model was able to explain the data variability of 89.52%, while 10.48% was explained by other variables not examined in this study. Perceived has a positive effect on the prevention of Type-2 Diabetes Mellitus, the test results show that there was a positive effect of 0.670681, while the T-Statistic value was 13.331880 and was significant at =5% (1.96). Perceived has a direct effect on the prevention of Type-2 Diabetes Mellitus by 62.75%. The results of measuring the T-Statistic value from each indicator to the variable were greater than 1.96 with a 95% confidence level (α = 0.05), Barriers of 180.529, Benefits of 179.695, Severity of 22.175, and Susceptibility of 24.721. That means all indicators had a significant effect on the variables studied. The construct of perceived susceptibility (perceived risk) also affects the emergence of healthy behavior. When a person knows that it was at risk for a disease, then a belief is formed that it was indeed at risk. Therefore, it will try to do things it deems able to reduce the potential risk (Rossen *et al*., 2015). The higher the risk a person believes, the higher the tendency to behave healthily in the hope of reducing the risk. Unfortunately, this also applies the other way around. When a person feels that he/she is not at risk of disease, it was also more likely to behave unhealthily. However, the statement was not absolute law. Sometimes beliefs about the risk of disease do not have implications for healthy or unhealthy behavior (Afrasiabi *et al*., 2022).

Perceived susceptibility is a person's perception of the risk of contracting a disease. Someone will take preventive and treatment measures because there is a perception that there is a vulnerability to the disease. Individual health beliefs depend on the individual's perception of the disease (Oktora & Butar Butar 2022). The perception of susceptibility obtained from the study followed what was revealed by the participants, namely the perception of the belief that DM is a disease that is passed on to other family members. Where someone who has a family history of suffering from DM has a greater chance. Unhealthy lifestyle factors also cause a person to be vulnerable to DM, especially on the wrong or unhealthy diet that causes an increase in blood sugar levels in pre-DM patients (Githinji & Murimi 2022).

Perception of severity is a perception or opinion about the seriousness, risks, and impacts of diabetes mellitus. The results of the interview, Participant One, Participant Two, Participant Three, and Participant Five explained that the seriousness of DM can cause a person to experience amputation (Li *et al*., 2022). Someone with DM has difficulty maintaining a diet because it should not be careless and must be considered. In addition, participants revealed that they were afraid of DM because of the experience of a family member who died of DM (Ağralı & Akyar 2022). Then the construct of perceived benefit, means that the individual behaves healthily because it believes that something it does will provide benefits, especially in reducing the potential for getting a disease. Healthy behavior carried out by individuals because of beliefs about the benefits of a new activity usually was to prevent disease (Joiner *et al*., 2022).

Perceived benefits are the positive impact that a person feels from carrying out disease prevention behaviors such as a sugar diet, exercise, and consumption of herbal medicines. Participants revealed that having a sugar diet can reduce the risk of diabetes mellitus and become healthier. Participants said that exercise can improve physical health because the body is healthier, and fitter (Chowdhury *et al*., 2023; Chowdhury *et al*., 2024). Consumption of both medical and traditional medicines was felt to provide benefits for participants. Participants said that medical and traditional medicines have various benefits such as making the body feel better (Jones *et al*., 2015). Another construct in the Health Belief Model was the perceived barrier. This construct explains that changing behavior and undergoing a new activity to become, maintain, or improve health is not easy because there are obstacles. The obstacle was the personal evaluation itself. The four constructs, alone or together, could be used to explain healthy behavior (Khodaveisi *et al*., 2021).

Perception of obstacles is an obstacle experienced by a person in taking diabetes mellitus prevention measures such as doing a sugar diet and exercising. The results showed that participants knew what to do to control their blood sugar levels, namely with sugar diet and exercise behavior, but on the other hand, there were obstacles to exercise because participants were busy working, taking care of children, and doing household chores (Bowen *et al*., 2018). Self-efficacy has a positive effect on the prevention of Type-2 Diabetes Mellitus, the test results show a positive effect of 0.144320, while the T-Statistic value was 2.221879 and was significant at =5% (1.96). Self-efficacy has a direct effect on the prevention of Type-2 Diabetes Mellitus by 12.73%. Self-efficacy (individual's perception of their abilities) was considered to affect their healthy behavior. If the individual feels that it was able to do new things that would make him/her live a healthier life, then this belief is most likely to be true in his behavior. However, if the individual wants a change by living a healthier life but feels unable to carry out these activities, then the possibility of this belief in inability makes the individual discouraged, then the targeted healthy behavior does not appear (Ong *et al*., 2023).

Low self-efficacy and negative perceptions of the health belief dimension are some of the reasons behind the discordant prevention of diabetes. Controlled levels of anxiety help patients make better decisions about their diabetes and increase treatment adherence and health beliefs. It was used as a lever to help improve patient beliefs and adherence to treatment and medication, diet, and diabetes management(Gregory *et al*., 2022). Cues to Action has a positive effect on the prevention of Type-2 Diabetes Mellitus, the test results show a positive effect of 0.165668, while the T-Statistic value was 2.482949 and was significant at =5% (1.96). Cues to action directly affect the prevention of Type-2 Diabetes Mellitus by 14.04%. HBM was also influenced by the presence of cues to action. Cues to action are events, people, or objects that make someone change their behavior such as sick family members, health advertisements, and advice from others (Cho *et al*., 2018). Constructs or components in the HBM are also influenced by other factors (motivating factors) in supporting Cues to Action such as culture, education level, experience, expertise, and motivation. These factors are personal characteristics that differ from one individual to another (Deylami *et al*., 2018).

Cues to action is an action that makes someone feel the need to take real action to carry out healthy behavior. Cues to action also mean support or encouragement from the environment for individuals to carry out healthy behavior (Handayani, Kurnia & Fathonah 2021). The results of the study stated that participants showed efforts to behave healthily by following a sugar diet to regulate sugar intake from food and drink, exercising, and taking traditional medicine to reduce the risk of DM (Melkamu *et al*., 2021). The limitation of this research was that the research instrument uses a questionnaire, so there may be subjectivity in filling out the questionnaire. The weakness of this research was that it did not include analyzing how HBM could be used to understand type 2 diabetes mellitus prevention behavior among couples of childbearing age. Further research is needed which aims to find out how risk perception, perceived severity, self-efficacy, and behavior of couples of childbearing age towards type 2 diabetes mellitus, as well as how HBM can be used to increase awareness and diabetes prevention behavior among couples of childbearing age, for example through mobile applications.

## Conclusion

There was an effect of the health belief model (perceived, self-efficacy, and cues to action) on the prevention of type 2 diabetes mellitus in fertile-age couples. Another dominant variable that influences the prevention of type 2 diabetes mellitus in fertile-age couples is perceived and the indicators of barriers. It was hoped that fertile age couple would manage their time and make time to exercise in between busy work, taking care of children, and doing household chores.

## Acknowledgment

Thank you to the Faculty of Health Sciences, Indonesia Maju of University, and the Depok City Health Service for assisting with the licensing

process and the continuity of this research activity. Thank you to the Directorate General of Higher Education, Research and Technology for assisting in completing this article. I would also like to express my thanks to all the people of Depok City, West Java who have participated in this research.

## References

Afrasiabi, F., Behesht, A.F., & Kargar, J.M., 2022. Applying the Health Belief Model in Identifying Individual Understanding Towards Prevention of Type 2 Diabetes. *International Journal of Public Health Science (IJPHS)*, 11(4), 1267.

Ağralı, H., & Akyar, İ., 2022. The Effect of Health Literacy-Based, Health Belief-Constructed Education on Glycated Hemoglobin (HbA1c) in People with Type 2 Diabetes: A Randomized Controlled Study. *Primary Care Diabetes*, 16(1), pp.173–178.

Balgis, B., Handayani, S., Sumardiyono, S., & Taufan, N.K.P., 2023. Assessment of Self-Care Activities Using Diabetes Self-Management Questionnaire in Diabetes Patients. *Jurnal Kesehatan Masyarakat*, 19(1), pp.167–175.

Bowen, M.E., Schmittdiel, J.A., Kullgren, J.T., Ackermann, R.T., & O'Brien, M.J., 2018. Building Toward a Population-Based Approach to Diabetes Screening and Prevention for US Adults. *Current Diabetes Reports*, 18(11), pp.104.

Cho, N.H., Shaw, J.E., Karuranga, S., Huang, Y., Rocha, F.J.D. da, Ohlrogge, A.W., & Malanda, B., 2018. IDF Diabetes Atlas: Global estimates of diabetes prevalence for 2017 and projections for 2045. *Diabetes Research and Clinical Practice*, 138, pp.271–281.

Chowdhury, H.A., Harrison, C.L., Siddiquea, B.N., Tissera, S., Afroz, A., Ali, L., Joham, A.E., & Billah, B., 2024. The Effectiveness of Diabetes Self-Management Education Intervention on Glycaemic Control and Cardiometabolic Risk in Adults with Type 2 Diabetes in Low- and Middle-Income Countries: A Systematic Review and Meta-Analysis. *PLOS ONE*, 19(2), pp.e0297328.

Chowdhury, M.H., Aktar, Mst.F., Islam, Md.A., & Khan, N.M., 2023. Factors Associated with Stunting Status Among Under-5 Years Children in Bangladesh: Quantile Regression Modelling Approach. *Children and Youth Services Review*, 155, pp.107199.

Deylami, R., Townson, J., Mann, M., & Gregory, J., 2018. Systematic Review of Publicity Interventions to Increase Awareness Amongst Healthcare Professionals and the Public to Promote Earlier Diagnosis of Type 1 Diabetes in Children and Young People. *Pediatric Diabetes*, 19(3), pp.566–573.

Duan, L., Wang, Y., Dong, H., Song, C., Zheng, J., Li, J., Li, M., Wang, J., Yang, J., & Xu, J., 2022. The COVID-19 Vaccination Behavior and Correlates in Diabetic Patients: A Health Belief Model Theory-Based Cross-Sectional Study in China, 2021. *Vaccines*, 10(5), pp.659.

Esquives, B.N., Ramos, K.Q., & Stoutenberg, M., 2021. Exploring Strategies to Engage Hispanic Patients in Screening for a Diabetes Prevention Program at a Local Community Health Center. *Journal of Health Care for the Poor and Underserved*, 32(1), pp.487–505.

Githinji, P., & Murimi, M., 2022. P106 Effect of a Cultural and Theory-Based Diabetes Education Intervention on Improving Knowledge, Health Beliefs and Lifestyle Behavior. *Journal of Nutrition Education and Behavior*, 54(7), pp.S68.

Gregory, G.A., Robinson, T.I.G., Linklater, S.E., Wang, F., Colagiuri, S., Beaufort, C. de, Donaghue, K.C., Magliano, D.J., Maniam, J., Orchard, T.J., Rai, P., Ogle, G.D., Harding, J.L., Wander, P.L., Zhang, X., Li, X., Karuranga, S., Chen, H., Sun, H., Xie, Y., Oram, R., Magliano, D.J., Zhou, Z., Jenkins, A.J. & Ma, R.C., 2022. Global Incidence, Prevalence, and Mortality of Type 1 Diabetes in 2021 with Projection to 2040: A Modelling Study. *The Lancet Diabetes & Endocrinology*, 10(10), pp.741–760.

Handayani, O.W.K., Kurnia, A.R., & Fathonah, S., 2021. Rice Bran Substitution to Vitabran as A Snackyfication Trend Model and Diabetes Mellitus Prevention. *Jurnal Kesehatan Masyarakat*, 17(1), pp.131–138.

Jiang, L., Liu, S., Li, H., Xie, L., & Jiang, Y., 2021. The Role of Health Beliefs in Affecting Patients' Chronic Diabetic Complication Screening: A Path Analysis Based on the Health Belief Model. *Journal of Clinical Nursing*, 30(19–20), pp.2948–2959.

Joiner, K.L., McEwen, L.N., Hurst, T.E., Adams, M.P., & Herman, W.H., 2022. Domains from the Health Belief Model Predict Enrollment in the National Diabetes Prevention Program Among Insured Adults with Prediabetes. *Journal of Diabetes and its Complications*, 36(7), pp.108220.

Jones, C.L., Jensen, J.D., Scherr, C.L., Brown, N.R., Christy, K., & Weaver, J., 2015. The Health Belief Model as an Explanatory Framework in Communication Research: Exploring Parallel, Serial, and Moderated Mediation.

*Health Communication*, 30(6), pp.566–576.

Khodaveisi, M., Azizpour, B., Jadidi, A., & Mohammadi, Y., 2021. Education Based on the Health Belief Model to Improve the Level of Physical Activity. *Physical Activity and Nutrition*, 25(4), pp.17–23.

Khosravizadeh, O., Ahadinezhad, B., Maleki, A., Vosoughi, P. & Najafpour, Z., 2021. Applying the Health Belief Model and Behavior of Diabetic Patients: A Systematic Review and Meta-Analysis. *Clinical Diabetology*, 10(2), pp.209–220.

Li, H., Zhang, J., Wang, L., Yang, T., & Yang, Y., 2022. A Health Promoting-Lifestyle Prediction Model for Dementia Prevention Among Chinese Adults: Based on the Health Belief Model. *BMC Public Health*, 22(1), pp.2450.

Melkamu, L., Berhe, R., & Handebo, S., 2021. Does Patients' Perception Affect Self-Care Practices? The Perspective of Health Belief Model. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*, 14, pp.2145–2154.

Oktora, S.I., & Butar Butar, D., 2022. Determinants of Diabetes Mellitus Prevalence in Indonesia. *Jurnal Kesehatan Masyarakat*, 18(2), pp.266–273.

Ong, K.L., Stafford, L.K., McLaughlin, S.A., Boyko, E.J., Vollset, S.E., Smith, A.E., Dalton, B.E., Duprey, J., … & Vos, T., 2023. Global, Regional, and National Burden of Diabetes from 1990 to 2021, with Projections of Prevalence to 2050: A Systematic Analysis for the Global Burden of Disease Study 2021. *The Lancet*, 402(10397), pp.203–234.

Pipatpiboon, N., Sripetchwandee, J., Koonrungsesomboon, N., Bawornthip, P., & Bressington, D., 2024. Establishing the Feasibility and Preliminary Efficacy of A Health Belief Model Based Educational Training Program on Health Belief Perceptions and Dementia-Preventive Behaviors in People with Type 2 Diabetes. *Nursing & Health Sciences*, 26(1).

Prasetyowati, U., Tamtomo, D., & Murti, B., 2018, Health Belief Model on the Determinants of Self Care among Patients with Type 2 Diabetes Mellitus, Reaching the Unreached: Improving Population Health in the Rural and Remote Areas. *Thesis*, Masters Program in Public Health Universitas Sebelas Maret. pp.161–161.

Purwanti, O.S., Nursalam, N., & Pandin, M.G.R., 2024. Early Detection of Diabetic Neuropathy Based on Health Belief Model: A Scoping Review. *Frontiers in Endocrinology*, 15.

Roglic, G., 2016. WHO Global Report on Diabetes: A Summary. *International Journal of Noncommunicable Diseases*, 1(1), pp.3.

Rossen, J., Yngve, A., Hagströmer, M., Brismar, K., Ainsworth, B.E., Iskull, C., Möller, P., & Johansson, U.-B., 2015. Physical Activity Promotion in the Primary Care Setting in Pre- and Type 2 Diabetes - the Sophia Step Study, an RCT. *BMC Public Health*, 15(1), pp.647.

Shabibi, P., Abedzadeh Zavareh, M.S., Sayehmiri, K., Qorbani, M., Safari, O., Rastegarimehr, B., & Mansourian, M., 2017. Effect of Educational Intervention Based on the Health Belief Model on Promoting Self-Care Behaviors of Type-2 Diabetes Patients. *Electronic Physician*, 9(12), pp.5960–5968.

Shooka, M., Norimah, A.K., Ruzita, A.T., & Reza, A., 2018. The Impact of Self-Efficacy Education Based on the Health Belief Model in Iranian Patients with Type 2 Diabetes: A Randomised Controlled Intervention Study. *Asia Pacific Journal of Clinical Nutrition*, 27(3), pp.546–555.

Sugiyono, 2019. *Metode Penelitian Pendekatan Kuantitatif, Kualitatif, dan R&D.* Alfabeta, Bandung.

Tawfik, M.Y., 2017. The Impact of Health Education Intervention for Prevention and Early Detection of Type 2 Diabetes in Women with Gestational Diabetes. *Journal of Community Health*, 42(3), pp.500–510.