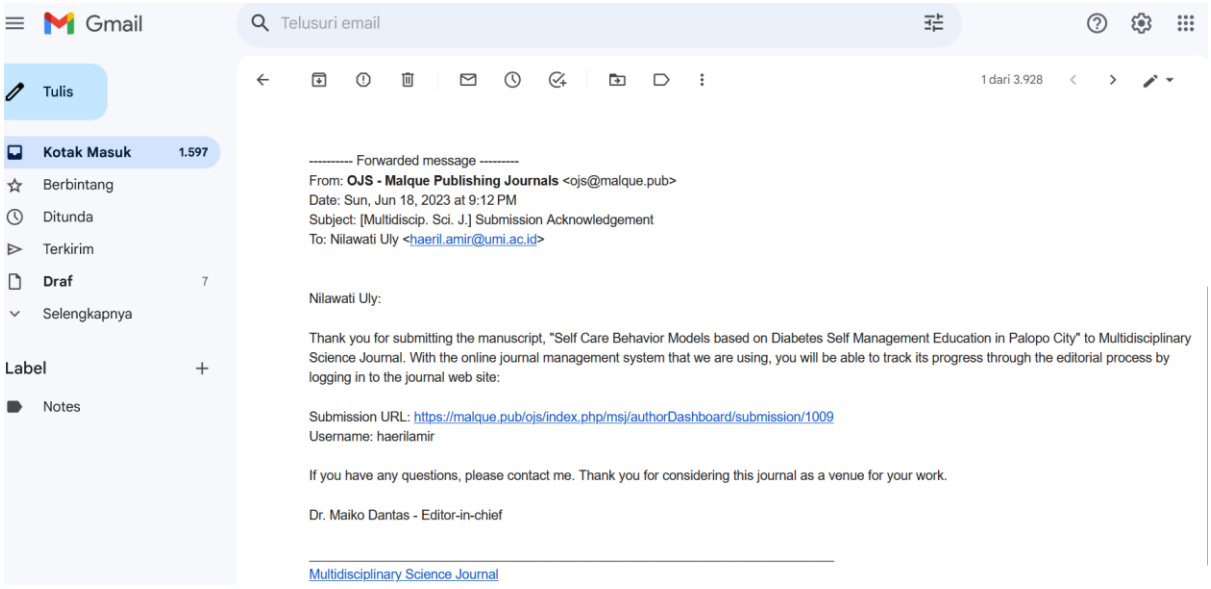
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Subject: [Multidiscip. Sci. J.] Submission Acknowledgement
To: Nilawati Uly <haeril.amir@umi.ac.id>
Nilawati Uly:
Thank you for submitting the manuscript, "Self Care Behavior Models based on Diabetes Self Management Education in Palopo City" to Multidisciplinary Science Journal. With the online journal management system that we are using, you will be able to track its progress through the editorial process by logging in to the journal web site:
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If you have any questions, please contact me. Thank you for considering this journal as a venue for your work.
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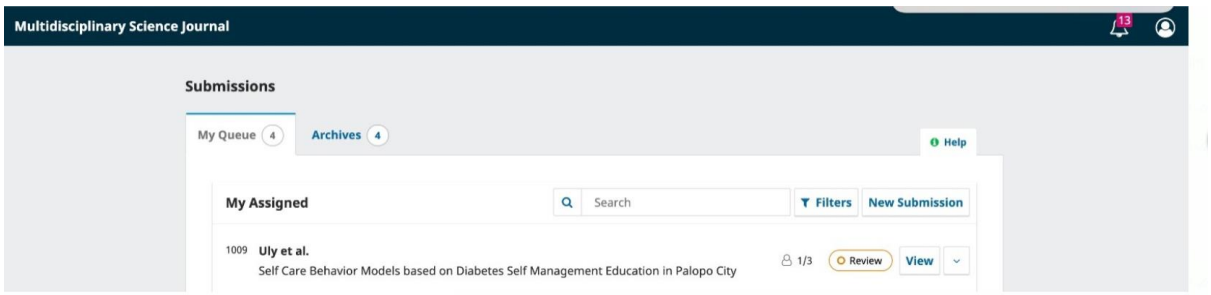
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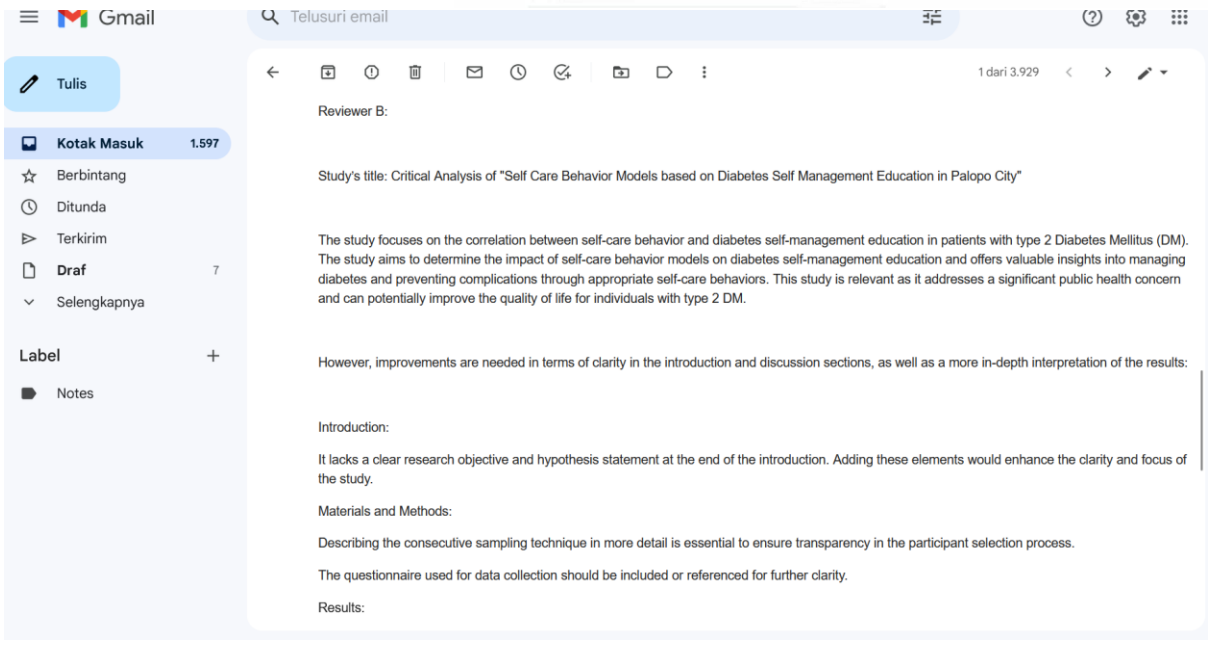
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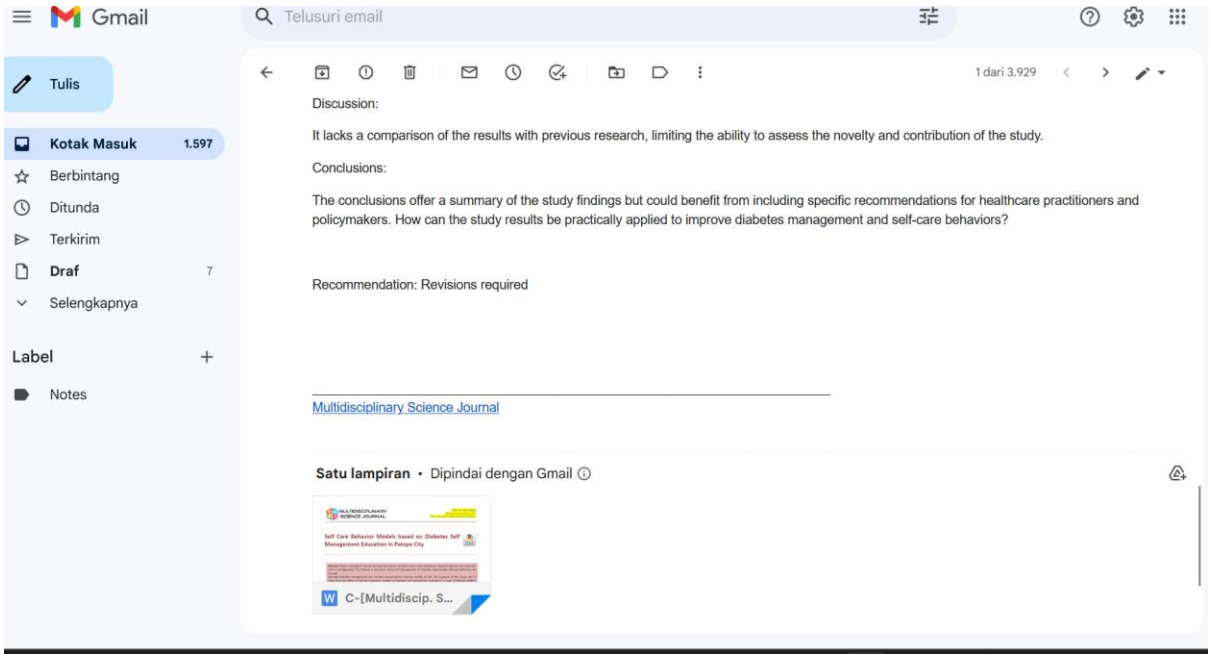
Reviewer B:
Study's title: Critical Analysis of "Self Care Behavior Models based on Diabetes Self Management Education in Palopo City"
The study focuses on the correlation between self-care behavior and diabetes self-management education in patients with type 2 Diabetes Mellitus (DM). The study aims to determine the impact of self-care behavior models on diabetes self-management education and offers valuable insights into managing diabetes and preventing complications through appropriate self-care behaviors. This study is relevant as it addresses a significant public health concern and can potentially improve the quality of life for individuals with type 2 DM.
However, improvements are needed in terms of clarity in the introduction and discussion sections, as well as a more in-depth interpretation of the results:
Introduction:
It lacks a clear research objective and hypothesis statement at the end of the introduction. Adding these elements would enhance the clarity and focus of the study.
Materials and Methods:
Describing the consecutive sampling technique in more detail is essential to ensure transparency in the participant selection process.
The questionnaire used for data collection should be included or referenced for further clarity.
Results: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Discussion:
It lacks a comparison of the results with previous research, limiting the ability to assess the novelty and contribution of the study.
Conclusions:
The conclusions offer a summary of the study findings but could benefit from including specific recommendations for healthcare practitioners and policymakers. How can the study results be practically applied to improve diabetes management and self-care behaviors?
Recommendation: Revisions required
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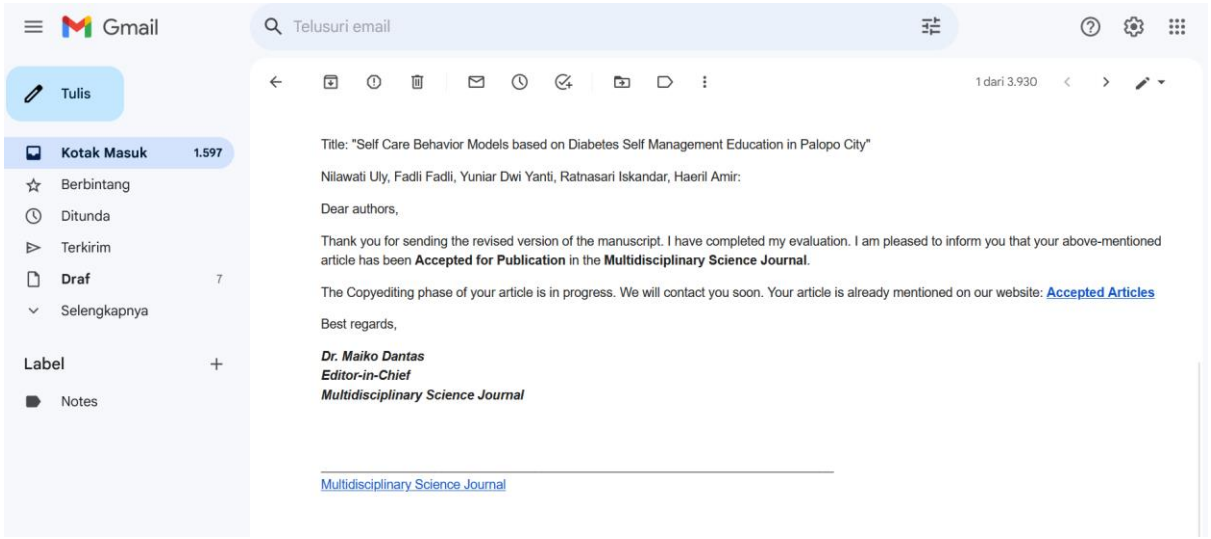
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Nilawati Uly, Fadli Fadli, Yuniar Dwi Yanti, Ratnasari Iskandar, Haeril Amir:
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Thank you for sending the revised version of the manuscript. I have completed my evaluation. I am pleased to inform you that your above-mentioned article has been Accepted for Publication in the Multidisciplinary Science Journal.
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# Self Care Behavior Models based on Diabetes Self Management Education in Palopo City

**Abstract** Type 2 diabetes is caused by impaired insulin secretion and insulin resistance. Aspects that play an important role in management. This disease is education about self-management of diabetes. Appropriate self-care behaviors are enough Manage diabetes management and prevent complications improve quality of life. The purpose of this study was to determine the effect of self-care behavior models on diabetes self-management education in type 2 Diabetes Mellitus patients. The method used in this study was a quantitative approach using cross-sectional methods. The sample used was 120 patients with type 2 DM in Palopo City. The analytical method used is the structural equation model using Amos 2.0 and SPSS 20 (IBM Corp). The results of the study showed that self-care behavior in patients with type 2 DM was influenced by 87% of knowledge factors, 83% of motivation factors, 85% of family support factors, and 81% of self-efficacy factors. On the other hand, diabetes management in patients with type 2 DM was influenced 76% by the treatment factor, 89% by the glycemic control factor, 75% by the diet factor, 88% by the physical activity factor, and 62% by the foot care factor. The structural model of this study explains variable self-care behavior with a self-care management rate of 48%. Diabetes management therefore needs to be more proactive in educating people with diabetes so that they and their families can increase their knowledge and understand how diabetes care can be properly administered.

**Keywords:** self-care behavior, diabetes self-management education, type 2 DM

## 1. Introduction

Type 2 diabetes is a chronic and complex disease that requires multifactorial behavioral and pharmacological treatments to prevent or delay complications and maintain quality of life (American Diabetes Association 2022)(Davies et al 2022). Type 2 DM is a chronic disease and a global health problem affecting approximately 422 million people worldwide (Khan et al 2019). The global prevalence of diabetes is about 5% for those aged 35-39, 10% for those aged 45-49, 15% for those aged 55-59, and about 15% for those aged 20 and over. 20%. Group from 65 to 69 years old. Southeast Asian countries such as Indonesia, Malaysia, Thailand and Vietnam have risen in the rankings over the past two decades. Due to their large populations, China (88.5 million people with type 2 diabetes), India (65.9 million people) and the United States (28.9 million people) remain the countries with the highest total prevalence of the disease (Saeedi et al 2019).

Based on the 2018 results of the Basic Health Survey (Riskesdas), the prevalence of diabetes in Indonesia in 2013 was 6.9%, of which TGT was 29.9% and GDP was 36.6%. In 2018, there was an increase of 10.9%, including TGT 30.8% and GDP 26.3%. Presence of diabetes was based on age groups: 15-24 years (21.2%), 25-34 years (27.2%), 35-44 years (31.9%), 45-54 years (32.1%). South Sulawesi is one of the Indonesian provinces where the prevalence of diabetes reached 1.2% in 2013 and increased to 1.8% in 2018 (Kementerian Kesehatan RI 2018). The increasing number of people with diabetes indicates that diabetes is a serious public health problem and needs to be a public health priority in Indonesia.

Type 2 diabetes is caused by an unhealthy lifestyle and an unbalanced diet Regulation and lack of physical activity. This influences self-care behavior. Factors that influence self-care behavior are those that originate from the patient himself. i.e.: knowledge, attitudes, motivation, family support, finances, self-efficacy (Putra et al 2020). Other studies have found that behavior has a significant impact on self-care in DM patients. Appropriate self-care behaviors play an important role in managing diabetes, especially in preventing diabetic complications (Bintoro et al 2019). This research is important because the main self-care behaviors that can prevent acute and chronic long-term complications related to diabetes include health eating, regular exercise, medication management, foot care, and adaptation to psychosocial challenges.

The application of self-management is one of the key aspects of the management of type 2 diabetes, including diet, physical activity/exercise, blood glucose monitoring, medication adherence, and self/foot care (Saminan et al 2020). According to Kurniawan, Sari, and Aisyah (2020), out of 123 respondents, 62.6% had low self-management on blood sugar monitoring indicators. Meanwhile, a Chinese study showed a moderate category of self-management behavior in 50.4% of diabetes patients, and 33.6% had low self-management (Kurniawan, Sari and Aisyah, 2020). Considering this, some patients do not still know about self-management in-depth and correctly. Various interventions to improve patients' self-management are carried out in the form of diabetes mellitus self-care and self-management education, but no optimal results have been obtained yet,

and many people have not shown independence in managing their disease . The process of health education for individuals or families in managing Diabetes mellitus type 2 is provided by nurses to effectively improve clinical outcomes and quality of life for patients with the Diabetes Self-Management Education (DSME) method (Ernawati et al 2021). Another study states that DSME plays an important role in preventing the progression of neurovascular complications in DM patients whit type 2, thereby helping to reduce the risk of diabetic foot injury. The purpose of this study was to determine the effect of self-care behavior models on diabetes self-management education in type 2 Diabetes Mellitus patients.

## 2. Materials and Methods

This type of research is observational correlation with a cross-sectional approach, carried out from August to September 2022 in Palopo City. The variables used in this study are diabetes self-management education as dependent variables, including dietary adjustments, physical activity/exercise, blood sugar monitoring, medication adherence, and self/feet care and the independent variables are self-care behavior, namely knowledge, motivation, family support, and self-efficacy.

The sampling technique was determined using the consecutive sampling technique. The number of samples examined in the research topic was 120 that met the research criteria. The criteria for respondents used as subjects in this study were outpatient type 2 diabetic patients treated in both hospital and community health centers, communicative and aged between 35 and the patient was 60 years old and had a blood glucose level of 71-71. 380 mg/dl and all participants agreed to the study protocol and provided written consent.

This study focuses on knowing the correlation between self-care behavior and diabetes self-management education for DM patients with type 2 using a research instrument in the form of a questionnaire. This research questionnaire is divided into three parts, namely the first part is demographic data, the second part is the diabetic management questionnaire to measure self-management using the diabetes self-management questionnaire (DSMQ), including diet regulation, physical activity/exercise, blood sugar monitoring, compliance with medication consumption, and self/foot care (Schmitt *et al.*, 2013) that has been tested for validity and reliability on the value of Alfa Cronbach's 0.709. The third part of the questionnaire about the self-care behavior of DM patients with type 2, namely knowledge, motivation, family support, and self-efficacy (Garcia et al., 2001) that, has been tested for validity and reliability on the value of Alfa Cronbach's 0.792. Information directly from the respondent who agreed to participate filled the informed consent. Respondents were informed that the collected information would be kept confidential and that the questionnaire was anonymous. The researcher gave a sociodemographic questionnaire for attaining respondents' demographic data, a diabetic management questionnaire to measure self-management using the diabetes self-management questionnaire (DSMQ), and a questionnaire about the self-care behavior.

The analysis test used is a linear regression test to determine the relationship between the variable self-care behavior and the diabetes self-management education variable for DM patients with type 2 with a value and significance of <0.05, which is considered significant and looked at the structural model of research using the Structural Equation Model (SEM) with Amos 2.0 and SPSS 20 (IBM Corp).

## 3. Results

**Table 1** Distribution Characteristics of Respondents (n=120)

| Variable | Mean±SD | n (%) |
|---|---|---|
| Gender, n (%) | | |
| Male | - | 46 (38,3) |
| Female | - | 74 (61,7) |
| Disease Complications, n (%) | | |
| No complications | - | 58 (48,3) |
| There are complications | - | 62 (51,7) |
| Ages, Years (±Up to) | 50.7±8.41 | - |
| Long suffering from DM, years (±Up to) | 4.8±3.60 | - |
| Blood sugar while, mg/dL (±Up to) | 255.2±44.06 | - |

Table 1 shows that the majority of women have type 2 diabetes and often do not have complications such as hypertension or stroke. The DM type 2 patient's median age is presenile, and her median duration of type 2 diabetes is 4 years and 6 months. On the other hand, when they were still in the abnormal category, their blood glucose averaged 255.2mg/dL.

**Table 2** A Results of Data Test Analysis (Validity and Reliability) Variables of Self Care Behavior and DMSE

| Variable | Standardized Loading | C.R. | *p** | Description |
|---|---|---|---|---|
| Self-Care Behavior ➔ Knowledge | 0.043 | 12.824 | 0.000 | Valid and Reliable |
| Self-Care Behavior ➔ Motivation | 0.082 | 11.789 | 0.000 | Valid and Reliable |
| Self-Care Behavior ➔ Family Support | 0.081 | 12.646 | 0.000 | Valid and Reliable |
| Self-Care Behavior ➔ Self Efficacy | 0.042 | 13.615 | 0.000 | Valid and Reliable |

| | | | | |
|---|---|---|---|---|
| DMSE ➔ Treatment | 0.436 | 4.558 | 0.000 | Valid and Reliable |
| DMSE ➔ Blood sugar control | 0.432 | 5.146 | 0.000 | Valid and Reliable |
| DMSE ➔Diet | 0.264 | 4.006 | 0.000 | Valid and Reliable |
| DMSE ➔ Physical activity | 0.408 | 5.156 | 0.000 | Valid and Reliable |
| DMSE ➔ Foot care | 0.097 | 5.154 | 0.000 | Valid and Reliable |

The data in Table 2 are accepted or declared valid and reliable for all measures, in this case the factors that make up variable self-care behavior and DMSE, because the test results show all p-values for each measure. It shows what you can do. 0.05 (≤ 0.05) for values below 0.05 (≤ 0.05), and CR values for each index that constructs self-care behavior and DMSE are greater than 0.07 (≥ 0.07). Another determination that the indices that make up fluctuating self-care behaviors and DMSE have been declared valid and reliable is that all stress factor values ( standardized loading) are greater than 0.03 (>0.03). All indicators were accepted and declared suitable for measuring various self-care behaviors and DMSE and will be included in the next full model test.

**Table 3** Test Results of Regression Weight

| Variable | Estimate | *p** | Description |
|---|---|---|---|
| Self Care Behavior ← Knowledge | 0.894 | 0.000 | Significant |
| Self Care Behavior ← Motivation | 0.830 | 0.000 | Significant |
| Self Care Behavior ← Family Support | 0.852 | 0.000 | Significant |
| Self Care Behavior ← Self Efficacy | 0.786 | 0.000 | Significant |
| DMSE ←Treatment | 0.757 | 0.000 | Significant |
| DMSE ← Blood sugar control | 0.884 | 0.000 | Significant |
| DMSE ←Diet | 0.629 | 0.000 | Significant |
| DMSE ← Physical activity | 0.879 | 0.000 | Significant |
| DMSE ← Foot care | 0.542 | 0.000 | Significant |

Self-care behavior variables are formed by four factors, namely knowledge, motivation, family support, and self-efficacy. From the four factors of the self-care behavior variable, information was obtained that all factors had a significant relationship with the formation of the patient's self-care behavior variable, and it was known that the knowledge factor was the most related factor or played a role in the formation of the patient's self-care behavior variable with p-value (0.000) and the estimated value of the effect is 0.894. So real and strong knowledge plays a role in forming self-care behavior variables. While the DMSE variable is formed by five factors: medication, blood sugar control, diet, physical activity, and foot care. The five DMSE variables provide information that all factors are significantly related to the formation of patient DMSE variables, with glycemic control factors being the factors most strongly related or not involved in education. It is known that We reproduced the patient with his DMSE variable with a p-value (0.000) and an estimated effect size of 0.884. Thus, glycemic control plays an important and powerful role in shaping DMSE variables (Table 3).

**Table 3** Test Results of Research Hypotheses

| Relationship Between Variables | Estimate | SE | $R^2$ | *t* | *p** |
|---|---|---|---|---|---|
| Self-Care Behavior ➔ DMSE | 0.571 | 0.197 | 0.478 | 2.902 | 0.000 |

In table 4, it can be seen that self-care behavior has a significant effect on DMSE of type 2 Diabetes mellitus patients. To see the percentage of the effect is R2 = 0.478, meaning that self-care behavior effect on DMSE by 47.8%, while the remaining 52.2% is the influence of other variables not studied. The overall model validation value can be seen from the goodness of fit value obtained by 0.571 (which tends to be moderate), so this value indicates a good fit between the model and the theory used, namely the theory of Orem.

## 4. Discussion

In this study, researchers have succeeded in developing components of self-care behavior for DM patients with type 2: knowledge, motivation, family support, and self-efficacy for diabetes self-management education (DMSE). A DM patient has good self-care behavior if he has good knowledge about diabetes and its management, has a positive attitude, gets positive support from family and people around him, has a strong motivation to recover, and has good self-efficacy. The results of this study have proven what components form self-care behavior and how strong the relationship is with DMSE. The implementation of self-care behavior towards DMSE can play an essential role in managing diabetes type 2, including dietary regulation, physical activity/sports, monitoring blood sugar, compliance with medication consumption, and self/foot care (Kumah et al 2021).

Improving self-care behaviors is the first step in helping patients better control their disease. It highlights the importance of understanding the factors that influence self-care behavior in diabetic patients and requires the design and strengthening of interventions related to self-care behaviors. Also, it helps caregivers to treat illnesses better and reduce complications (Hailu, Moen and Hjortdahl, 2019). According to the American Association of Diabetes (ADA), people with diabetes need to adopt self-care behaviors to improve their quality of life because it is an indicator of diabetes control outcomes while reducing complications related to their disease (Powers et al 2020).

According to behavioral theory, self-care behavior in diabetes is an evolutionary process of developing knowledge or awareness by studying survival with the natural complexities of diabetes in a social context. The theory of self-care behavior makes patients have to change their lifestyle to a healthier lifestyle, including diet, physical activity, blood glucose monitoring, and medication adherence with the help and close monitoring of nurses so that it can be carried out properly (Oluma et al 2020). Patients with diabetes mellitus who carry out self-care continuously will shape their way of life in preventing, recognizing, and managing their disease so that with the hope that good and sustainable self-care behavior will have a positive impact, namely improving one's welfare. The degree of well-being is due to taking the right treatment according to their condition (Shrivastva et al 2020). Therefore, good self-care behavior can contribute to patients in managing diabetes, especially in preventing diabetes complications through diabetes self-management education.

Previous research stated that social support with patient self-care behavior showed a significant relationship so that diabetes self-management education would be more effective for DM patients with type 2 (Mohebi et al 2018; Fadli et al., 2023). One behavioral intervention that can be applied to DM patients is the Diabetes Self Management Education (DSME) program (Mikhael et al 2020). DSME is an ongoing process to facilitate DM patients' knowledge, skills, and ability to carry out self-care (Hailu 2019). Other studies have shown that DMSE affects knowledge and self-care behavior.

## 5. Conclusions

This study provides evidence that diabetes self-management education is influenced by self-care behaviors in type 2 DM patients. The structural model created in this study can explain more than half of the self-care behavioral variables compared to other uninvestigated variables. Knowledge factors are the most closely associated factors or roles in shaping self-care behavioral variables in patients with type 2 DM. This means that the more a patient knows about her type 2 DM, the better their self-care behaviors and self-care. Therefore, in the treatment of diabetes, it is necessary to be more active in educating diabetics in order to broaden the knowledge of the patients themselves and their families.

## Ethical considerations

This research has been approved by the Ethics Committee of Mega Buana University and takes into account the principles in the research process

## Conflict of Interest

The authors declare that they have no conflict of interest.

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