

Analysis of Psychosocial Factors Affecting Physical Activity Behaviour of People with Type 2 Diabetes Mellitus in Indonesia

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ABSTRACT

Physical activity exercise is an essential component in comprehensive diabetes management. Non-adherence to physical activity exercises can lead to poor metabolic control, causing increased complications, morbidity, and premature death due to diabetes. One of the factors that can determine the behavior of physical activity is the psychosocial factor of people with T2DM. The study aims to assess the effect of psychosocial factors on physical activity behavior. This study was an analytical observational with a cross-sectional approach. The sample size was 138 respondents with multistage random sampling. The dependent variable was physical activity behavior, and the independent variables were psychosocial factors (knowledge, coping, distress, perceptions of family support, and perceptions of nurse support). Data analysis used multiple linear regression ($\alpha=0.05$). Psychosocial factors that influenced the physical activity behavior were distress ($p=0.001 < \alpha=0.05$). Meanwhile, knowledge, coping, perceived family support, and perceived nurse support did not affect physical activity behavior ($p=0.684$; $p=0.919$; $p=0.235$; $p=0.108 > \alpha=0.05$) with Adjusted $R^2=0.113$ ($F=4.502$; $p=0.001 < \alpha=0.05$). Psychosocial factors that influence physical activity behavior in T2DM patients are diabetic distress. Therefore, health workers, in providing health services as much as possible, must be able to prevent and reduce diabetes distress to increase the physical activity behavior of people with T2DM.

Keywords: psychosocial; physical activity; behaviour; type 2 diabetes mellitus

INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a metabolic disease with hyperglycemia characteristics, occurring due to abnormalities in insulin secretion, insulin action, or both (American Diabetes Association, 2020; International Diabetes Federation, 2021). Physical activity exercise is an essential component in comprehensive diabetes management. Physical activity is one of the main pillars of T2DM management (International Diabetes Federation, 2021). Non-adherence to physical activity exercises can lead to poor metabolic control, causing increased complications, morbidity, and premature death due to diabetes. Low physical activity causes blood sugar to become out of control and can cause complications (American Diabetes Association, 2022; Sigal et al., 2018). Several previous studies show that most people with T2DM have not demonstrated physical activity behavior as recommended by health workers (American Diabetes Association, 2022; International Diabetes Federation, 2021). A previous study in Southwest Ethiopia showed that 50.8% of people with T2DM had poor self-care behavior (Kassahun et al., 2016). More specifically, another study in Saudi Arabia showed that 31.05% had physical activity behavior in the poor category (Babikr et al., 2017). The study results in Iran show that only 13.6% of people with T2DM adhere to physical activity according to recommendations (Mirahmadizadeh et al., 2020). Various factors can influence physical activity exercise compliance among people with T2DM. One of the dominant factors influencing the adherence of people with T2DM patients in carrying out physical activity exercises is psychosocial factors (Ishak et al., 2017), including diabetes knowledge (Ang et al., 2019; Kassahun et al., 2016; Kim & Lee, 2019), coping (Albai et al., 2017; Fidan et al., 2020), distress (Jannoo et al., 2017), family support (Kim & Lee, 2019; Luthfa et al., 2020), and nurse support (Alshammari et al., 2021).

Diabetes management requires self-management skills that are based on self-awareness, self-efficacy and self-control (Kokoszka et al., 2022). Knowledge in diabetes management, such as diet adjustments, foot care, exercise and smoking cessation, is an essential part of improving self-care activity behavior to reduce further complications. (Ang et al.,

2019; Kassahun et al., 2016; Kim & Lee, 2019). People with T2DM must also have good coping skills. Adaptive coping can increase self-awareness, problem-solving skills and appropriate emotional expression, minimize diabetes distress, and reduce symptoms of depression, thereby increasing awareness and behavior of self-care activities and helping health professionals provide better care (Edraki et al., 2018; Jannoo et al., 2017). Apart from that, adequate social support from the surrounding environment, such as family and health workers, such as nurses, is an essential component in managing chronic diseases, such as diabetes. Family support, in the form of informational, assessment, emotional and instrumental support, can be a buffer system in life (Kaakinen & Denham, 2015). Family support can improve general self-care behavior and the physical activity behavior of people with T2DM in daily life (Kim & Lee, 2019; Luthfa et al., 2020). Support from nurses can also increase self-awareness, self-efficacy, and self-control (Hansen, 2016), so that it can increase empowerment (reducing the dominance of health workers, increasing participation, reducing challenges, and increasing the ability to collaborate) in managing T2DM (Rondhianto et al., 2020). Nurses can provide appropriate interventions to improve psychosocial outcomes, such as self-efficacy and self-care (Rondhianto et al., 2018), and also improve glycemic control, thereby reducing the risk of complications and improving quality of life (American Diabetes Association, 2022; Sigal et al., 2018)

One of the obstacles in its management is the lack of diabetes knowledge, which leads to a lack of awareness of the importance of physical activity behavior. Poor coping strategies due to ongoing stress also lead to low physical activity behavior. Besides that, the role of family support and nurses in maintaining physical activity behavior is also essential. If this support is absent or lacking, it will trigger anxiety and increase stress, impacting decreased physical activity behavior. The low behavior of physical activity will accelerate the occurrence of complications, increasing morbidity and mortality and reducing the quality of life of people with T2DM. Research on psychosocial factors that influence physical activity behavior in people with T2DM in Indonesia is rarely conducted and shows inconsistent results. Therefore, this study analyzes psychosocial factors influencing physical activity behavior in people with T2DM.

METHOD

The study was an analytical observational with a cross-sectional approach. The study was conducted in Jember Regency, East Java, Indonesia, from May to July 2022. The sample study was people with T2DM with inclusion criteria: (1) 40-65 years old; (2) have diabetes for more than one year; (3) not currently undergoing treatment at a hospital or other health institution; (4) does not have barriers to communication such as deaf, blind, and speech impaired; and (5) Willing to be a respondent. The sample size was 138 respondents calculated using G Power ($f^2=0.15$; $\alpha=0.05$, and power $(1-\beta)=0.95$). The sampling technique used is multistage random sampling. We divide the Jember Regency into five regions (east, west, north, south, and middle). We then selected two community health centers from each region randomly. We randomly selected five villages from each community health center and 2 - 3 people with T2DM from each village.

The instruments used in this study were:

1. Spoken Knowledge in Low Literacy patients with Diabetes Scale (SKILLDS) (Rothman et al., 2005). SKILLDS was used to measure diabetes knowledge. The results of the validity and reliability tests were $r=0.354-0.836$, Cronbach's $\alpha=0.904$. Knowledge was categorized into low (<6), medium (6–11), and high (≥ 11);
2. The Coping Scale (Hamby et al., 2015). This questionnaire was used to measure the coping skills in managing diabetes. The results of the validity and reliability tests were $r=0.294-0.685$, Cronbach's $\alpha=0.711$. Coping was categorized into low (<32.34), moderate (32.34–40.66), and high (≥ 40.66);
3. Diabetes Distress Scale (DDS) (Polonsky et al., 2005). DDS was used to measure diabetes distress. The results of the validity and reliability test are $r=0.305-0.812$, Cronbach's $\alpha=0.903$. Distress was categorized into low (<2.66), moderate (2.66–4.33), and high (≥ 4.33);
4. Hensarling Diabetes Family Support Scale (HDFSS) (Hensarling, 2009). HDFSS was used to measure perceived family support in managing T2DM. The results of the validity and reliability test are $r=0.708-0.904$, Cronbach's $\alpha=0.977$. Perceived family support was categorized into low (<48), moderate (48–71), and high (≥ 72);
5. Perceived nurse support questionnaire (Rondhianto et al., 2020). The questionnaire was used to measure the perceived nurse support in managing T2DM. The results of the validity and reliability tests were $r=0.712-0.880$, Cronbach's $\alpha=0.978$. Perceived nurse support was categorized into low (<48), moderate (48–71), and high (≥ 72);
6. Baecke Physical Activity Questionnaire (BPAQ) (Baecke et al., 1982). BPAQ was used to measure physical activity behavior in patients with T2DM. The results of the validity and reliability tests were $r=0.324-0.814$, Cronbach's $\alpha=0.896$. Physical activity behavior was categorized into low (<5.6), moderate (5.6–7.90), and high (≥ 7.91).

Researchers collected data with the help of five assistants or enumerators by conducting direct interviews with respondents. We perform informed consent to the prospective respondents before collecting the data. Before collecting

data, we explained the objectives, benefits, possible hazards, procedures, research techniques, and the rewards obtained by respondents. Then, prospective respondents were requested to sign a consent form as a form of consent to become study respondents. Data were analyzed using descriptive and inferential statistics. Descriptive statistics were used to explain respondents' characteristics and categorize study variables. At the same time, the inferential statistic used is a multiple linear regression test used to test the effect of the independent variable on the dependent variable. The classical assumption test is carried out first as a prerequisite for multiple regression tests: (1) normality test, (2) multicollinearity test, (3) heteroscedasticity test, and (4) linearity test. Health Research Ethics Committee, Faculty of Nursing, Universitas Jember, approved the study with certificate number of 118/UN25.1.14/KEPK/2022.

RESULT

Most respondents were 56-65 years old (48.5%), female (64.4%), had primary education (39.1%), and low income (60.1%) (Table 1). Most respondents had a moderate category in knowledge (45.6%), distress (55.1%), perceived family support (53.6%), and perceived nurse support (63.7). Most respondents had coping skills in a low category (68.8.6%) (Table 2). Table 2 shows that most respondents had a moderate category in physical activity behavior (55.8%). Table 3 shows a simultaneous influence of psychosocial factors on physical activity behavior ($p=0.001$). Partially, there was no influence between knowledge, coping, perceived family support, and perceived nurse support on dietary behavior ($p=0.684$; $p=0.919$; $p=0.235$; $p=0.108$). There was an influence of distress on physical activity behavior ($p=0.001$). The value of the Adjusted R Square was 0.113. Psychosocial factors can explain 11.3% of the variation in diabetic dietary behavior. At the same time, 88.7% explained other factors outside of psychosocial factors (Table 3).

Table 1. Characteristics of Respondents in Jember Regency, May-July 2022 (n=138)

Demographic Characteristics	n	%
Age (years)		
≤ 45	17	12.3
46-55	54	39.1
56-65	67	48.5
Gender		
Female	89	64.4
Male	49	35.5
Education		
No school	17	12.3
Basic	54	39.1
Middle	53	38.4
High	14	10.1
Income		
> District Minimum Wage	55	39.8
< District Minimum Wage	83	60.1

Table 2. Respondents Distribution Based on Mean, SD, Min-max on Behavioral Variables of Physical Activity, Knowledge, Coping, Distress, Perception of Family Support, Perception of Nurse Support in Jember, May-July 2022 (n=138)

Variable	Category	n (%)	$\mu \pm SD$	Min-Max	CI (95%)
Physical Activity Behaviour	low	36 (26.1)	6.57±1.57	3.75 – 10.25	6.30-6.83
	medium	77 (55.8)			
	high	25 (18.1)			
Knowledge	low	15 (10.8)	9.76±2.98	2 – 15	9.26-10.26
	medium	81 (58.6)			
	high	42 (30.4)			
Coping	low	95 (68.8)	29.31±5.74	16 – 41	28.34-30.28
	medium	39 (28.2)			
	high	4 (2.8)			
Distress	low	54 (39.1)	2.94±0.95	1 – 6	2.78-3.10
	medium	76 (55.1)			
	high	8 (5.8)			
Perceived Family Support	low	22 (15.9)	63.97±15.95	24 – 96	61.29-66.66
	medium	74 (53.6)			
	high	42 (30.4)			
Perceived Nurse Support	low	24 (17.3)	60.84±15.67	24 – 96	58.20-63.48
	medium	88 (63.7)			
	high	26 (18.8)			

Table 3. Fisher test, Adjusted R Square, and t-test

Fisher test			Adjusted R Square	Model	t-test		
F	p	Description			B	t	p
4.502	0.001	Fit	0.113	(Constant)	9.857	8.491	0.001
				Knowledge	0.019	0.407	0.684
				Coping	0.002	0.102	0.919
				Distress Diabetes	-0.667	-4.331	0.001
				Perception of Family Support	-0.011	-1.192	0.235
				Perception of Nurse Support	-0.014	-1.619	0.108

DISCUSSION

This study showed that most people with T2DM were aged 56-65, female, had an elementary school, and had an income level less than the minimum wage. The study is in line with the International Diabetes Federation report, where the most significant percentage of people with T2DM are in the 55–65 year age range. The aging of the world's population will increase the proportion of people with T2DM over the age of 60 years, thereby increasing the risk of T2DM associated with a decrease in the body's metabolic function, insulin sensitivity due to obesity, and a decrease in pancreatic beta cell work (American Diabetes Association, 2020; International Diabetes Federation, 2021). The study results also align with previous studies, which showed that most people with T2DM were female (Rondhianto et al., 2019). The prevalence of T2DM in Indonesia in women is greater than in men (2.4% Vs. 1.7%) (Indonesian Ministry of Health, 2019). Women are more at risk of T2DM due to low physical activity and obesity, which can trigger insulin resistance to impact the incidence of T2DM (American Diabetes Association, 2020). Most respondents in this study had an elementary school. This study is in line with a previous study that stated that most people with T2DM in Indonesia had low education (Indonesian Ministry of Health, 2019). Low education relates to low health awareness and disease prevention and control capabilities. Education is an essential factor in understanding disease, self-care, disease management, overcoming symptoms that arise with proper treatment, and preventing complications (Jangra et al., 2019). In this study, most respondents had incomes less than the minimum wage. It is in line with a previous study that stated that most people with T2DM had earned below the minimum wage. Lower socioeconomic status is one of the risk factors for T2DM. Low socioeconomic status can lead to an increased risk of complications and premature death due to low access to health services. In addition, people with

T2DM with low incomes are less likely to be involved in diabetes self-management education activities, resulting in lower self-management abilities. People with high socioeconomic status have a better ability to manage diabetes concerning their ability to finance health and access health services (International Diabetes Federation, 2021).

Most respondents had moderate diabetes knowledge (Table 2). Knowledge plays a vital role in disease management. This is in line with a previous study that stated that most people with T2DM had moderate knowledge (Zowgar et al., 2018). The low level of knowledge is one of the causes of the high number of disease cases. People with high knowledge tend to have a deeper understanding of maintaining their health.

On the other hand, people with limited education have minimal access to this information, making it difficult to recognize the diabetes signs and symptoms (Ang et al., 2019; Kassahun et al., 2016; Kim & Lee, 2019). This study revealed that most respondents had low coping (Table 2). Coping skills have a close relationship with self-care adherence. This study aligns with a previous study that stated that most people with T2DM had low coping skills (Albai et al., 2017; Edraki et al., 2018; Fidan et al., 2020). People with T2DM will face various requirements, including changing their lifestyle and behavior. Barriers to coping mechanisms must be identified to encourage adherence to diabetes self-management (Fidan et al., 2020). The tendency to use passive coping mechanisms is also an obstacle to self-care behavior and compliance with medical treatment. Depression tends to regulate their negative emotions by overeating and overeating, which can exacerbate chronic diseases such as diabetes. A person with a chronic illness, such as DM, generally uses emotion-focused coping after being diagnosed with the disease. Patients will experience a feeling of denial, accompanied by signs and symptoms of DM (Albai et al., 2017; Edraki et al., 2018).

Most respondents experienced moderate distress (Table 2). A previous study found that 25% of screened people with T2DM had moderate to high diabetic distress. Regarding the components of diabetes distress, emotional distress is the most commonly experienced by people with T2DM (Jannoo et al., 2017). Diabetes distress is related to problems or emotional burdens and concerns for people with diabetes to manage their disease. Diabetes distress is a major psychological problem in diabetic patients related to self-management. Sudden life changes cause feelings of worthlessness, increased anxiety, and stress. Stress affects self-care behavior and disease management (Edraki et al., 2018; Fidan et al., 2020). Most respondents feel moderate family support (Table 2). Family support is essential in compliance with chronic disease management and an indicator of self-care in diabetic patients. The support provided by the family to people with type 2 diabetes mellitus includes four dimensions, one of which is instrumental support (International Diabetes Federation, 2021). The family is the most important source of information. Support from family members can increase knowledge and self-efficacy and can reduce distress and depression, thereby increasing T2DM management behavior (Kim & Lee, 2019; Luthfa & Ardian, 2019).

The study result showed that most respondents feel the support of nurses in the moderate category (Table 2). Nurses play a significant role in influencing patients' health to achieve better health status. Nurses give education to people with diabetes mellitus regarding lifestyle changes and self-care. Educating nurses can lead to perceptions that determine the patient's health behavior towards their disease, increase motivation, and increase the understanding and confidence of patients in managing the disease. The nurses in providing patient-centered care can be done by empowering and encouraging diabetes management. Patients who receive support from nurses feel that the part of nurses is to contribute to providing patient-focused interventions and resulting in a better quality of life (Alshammari et al., 2021; Fidan et al., 2020; Rondhianto et al., 2020). Most respondents had a moderate adherence to physical activity behaviors. The results align with previous research that stated that most people with T2DM had moderate physical activity behavior (Mirahmadizadeh et al., 2020). Less active physical activity can affect the body's physiology, increasing glucose production and decreasing muscle use of glucose, so there is a risk of experiencing uncontrolled blood sugar conditions. The low physical activity behavior will accelerate complications, impact morbidity and mortality, and decrease the quality of life of people with T2DM. Physical activity can improve insulin sensitivity and help glucose enter cells. People with T2DM who practice regular physical activity help to regulate blood sugar and reduce hyperinsulinemia, increasing insulin sensitivity, decreasing body fat, and decreasing blood pressure (American Diabetes Association, 2022; Sigal et al., 2018).

There was no significant effect of knowledge, coping, perceived family support, and perceived nurse support on physical activity behavior (Table 3). Control of behavior in patients with T2DM does not come from the concept of knowledge. Previous studies stated that the higher the level of knowledge, the higher the person's success in dealing with stress. However, many people with T2DM cannot implement their knowledge because of many factors. Therefore, diabetes education needs to consider the background, socio-cultural and daily habits of the people with T2DM themselves so that later this can help develop realistic and sustainable strategies (Ang et al., 2019; Nurkamilah et al., 2018). Various coping mechanisms, such as spirituality, become a solid coping strategy for people with debilitating health conditions such as diabetes mellitus. Tool coping with spirituality produces a positive attitude towards life, life experiences, and motivation. This coping mechanism effectively increases the acceptance of diabetes and self-care behaviors of people with DM. After

responding to things related to their condition, sufferers will experience and unconsciously apply different coping mechanisms, focusing on problem-solving or necessary emotional adjustments. If people with T2DM cannot manage their feelings or emotions for long, it will lead to an inadaptability mechanism. Inadaptability mechanisms include denial, self-blame, and self-displacement. The use of these mechanisms can increase depression and lead to unfavorable behavior (Albai et al., 2017; Fidan et al., 2020). The result of the study is in line with a previous study that stated that diabetic distress would affect physical activity behavior. DM patients with or without complications are at risk of experiencing distress in the burden of self-management. People with T2DM can easily suffer from severe mental stress and emotional burden, hindering self-management. Patients who perform self-care activities well will improve their quality of life. The level of distress contributes to increased motivation to follow behavioral and dietary recommendations (Kokoszka et al., 2022; Jannoo et al., 2017).

Lack of support from the family will adversely affect health behavior and affect the failure of diabetes management (Kim & Lee, 2019; Luthfa et al., 2020). People with T2DM will have a more positive attitude toward learning about the disease if the family supports and participates in health education. Conversely, people with T2DM will have a negative attitude if there is no support from the family. Negative attitudes towards disease and treatment will fail therapeutic management. Family support will create a sense of comfort and confidence for sick family members that will help sufferers increase motivation in managing their illness (Kaakinen & Denham, 2015). This study aligns with previous studies that say health workers do not affect the physical activity behaviour of people with T2DM (Naik et al., 2017). Nurses find it challenging to provide psychological support due to time constraints, workload, language barriers, and lack of family involvement. Nurses with inadequate knowledge about diabetes cannot provide proper education about diabetes. Nurses with less knowledge can lead to insufficient healthcare instructions for people with T2DM (Alshammari et al., 2021; Rondhianto et al., 2020).

CONCLUSION

Psychosocial factors, especially distress, significantly influence physical activity behavior in T2DM patients. Therefore, efforts to improve diabetes self-management behavior, especially physical activity, must consider psychosocial factors, especially aspects of distress. Nurses and other health workers can make efforts to reduce distress so that people with T2DM can perform optimal physical activity behavior. It certainly has a positive impact on improving self-management and the quality of life of people with T2DM. Further researchers can re-identify the influence of psychosocial factors on physical activity behavior, especially knowledge, coping, perceived family support, and perceived nurse support factors, to strengthen this study's results. Further research using other designs (cohort study, experimental study, and others) can identify other factors influencing physical activity behavior, such as sociodemographic factors, situational treatment factors, and others.

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