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Original Research

STRESS ADAPTATION MODEL FOR UNCERTAIN PROCESS OF DIABETES MELLITUS DISEASE

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ABSTRACT

Introduction: Uncertainty Diabetes mellitus shows the inability of individuals to determine the meaning of events related to the disease process. Uncertainty Diabetes mellitus causes stress due to uncertainty around the disease, disease process, treatment and side effects. The purpose of this study was to develop a stress adaptation model to the uncertainty of the diabetes mellitus disease process.
Method: The design of this research is an explanatory survey with a cross sectional approach.Methods: The sample size of the study was 250 Diabetes mellitus clients who were recruited using simple random sampling technique. The research variables are cognitive, biophysical, social, psychological factors, structure providers, illusions, inferences, uncertainty, psychosocial coping and adaptations. Data were collected by questionnaire and analyzed by SEM-PLS.
Results: The results of this study indicate that cognitive, biophysical, psychological factors, structure providers and the illusion of inference have a significant effect on uncertainty. Social factors have no effect on uncertainty. Uncertainty has a significant effect on coping and psychosocial adaptation. Coping has a significant effect on psychosocial adaptation. The test criteria state that if the T-statistics T-table value (1.96) or the P-value <significant alpha 5% or 0.05, it is stated that there is a significant effect of the independent variable on the dependent variable.
Conclusions: The finding of the stress adaptation model to the uncertainty of the disease process Diabetes mellitus is associated with that uncertainty is a cognitive condition, indicating the inadequacy of existing cognitive factors to support the interpretation of disease-related events.Then adaptation in the context of uncertainty reflects the continuation of the normal biopsychosocial behavior of Diabetes mellitus clients and is the expected result of coping efforts to reduce uncertainty which is assessed as a danger.

Keyword: coping; diabetes mellitus; psychosocial adaptation; uncertainty

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1. INTRODUCTION

The uncertainty of the Diabetes Mellitus disease shows the inability of individuals to determine the meaning of events related to the disease process. The uncertainty of diabetes mellitus causes stress because of the uncertainty surrounding the disease, the disease process, treatment and side effects (Davies, 2019). The results showed that objective or subjective indicators of the severity of a disease symptom were associated with uncertainty (O'Brien and Ski, 2016). Objective or subjective indicators of diabetes mellitus clients include the results of examination data and client responses regarding the disease process (O'Brien and Ski, 2016). Diabetes Mellitus is a chronic, complex disease and management requires significant self-control, making it difficult for clients to manage Diabetes Mellitus. Diabetes Mellitus clients are required to face the challenges of understanding the nature of the condition, how to best manage the disease, adjusting to behavioral, intellectual and emotional demands (Davies, 2019). In line with the results of the study, it

shows that uncertainty has an influence on psychological outcomes, characteristics of anxiety, loss of hope and psychological distress on clients with Diabetes Mellitus (Chen, Kao and Cheng, 2018).

Patients with Diabetes Mellitus worldwide in 2017 reached 451 million (aged 18-99 years). This figure is expected to increase to 693 million by 2045 (Caruso, Giammanco and Gitto, 2014). According to Health Research (Riskesdas, 2018) the public has checked blood glucose as much as 10.9% aged 15 years and over diagnosed with Diabetes Mellitus (Kementerian Kesehatan, 2018). This figure has increased by 4% compared to the results of the According to Health Research in 2013 which was 6.9%. Data from the East Java Health Office (2018) states that the total number of people with Diabetes Mellitus is 2.0%. According to data from the Jember Health Office (2019), the total number of DM sufferers in Jember Regency is 12,000 people with Diabetes Mellitus, the number is increasing from the previous year. Diabetes Mellitus clients are at high risk for decreased psychological well-being. More than 40% of people with diabetes mellitus experience psychological distress (Davies, 2019). An International survey of Attitudes, Wishes and Needs (DAWN2), covering more than 16000 in 17 countries on four continents, reported that the proportion of people with diabetes mellitus tend to experience depression related to diabetes mellitus between 13.8% and 44.6%, respectively. Symptoms of depression increase affecting one in four adults with diabetes mellitus by 27%. The level of depression in Diabetes Mellitus clients ranges from 8-15% representing the severity of depression that involves a decline in social and occupational functioning (Chew, BH; Vos, RC; Metzendowf, MI; Scholten, 2017).

Patients with Diabetes Mellitus are constantly challenged by the demands of an urgent disease and use various approaches to overcome these problems (Mishali, Omer and Heymann, 2011). An important element of diabetes mellitus treatment is self-care and depends on the client's own responsibility for the management of personal psychology and social situations (Laugesen, Østergaard and Leslie, 2015). The results showed that chronic diseases such as Diabetes Mellitus, the resulting poor health is a source of continuous stress in addition to daily stress, and requires proper disease management. Diabetes Mellitus clients are influenced by pressures related to diagnosis, daily treatment regimens, long-term complications of the disease so that it has a negative impact on glycemic control and self-management (Parildar, Cigerli and Demirag, 2014).

Uncertainty surrounding health conditions substantially affects the way individuals understand, integrate, and communicate about illness, although the uncertainty associated with acute illness may subside through cure or treatment, chronic illness poses unique challenges for individuals as doubt can persist or become cyclical over time (Brown, 2018). The theory of uncertainty in disease provides a comprehensive framework for viewing the experience of chronic illness and serves to promote optimal adjustment. This theory helps explain stress related to diagnosis of treatment, chronic illness, the process by which individuals assess the uncertainty inherent in the experience of illness and the importance of caregivers providing information in understanding the uncertainty of illness (Melhado and Bushy, 2011).

One of the interventions to increase the success of treatment in overcoming the psychological problems of Diabetes Mellitus clients is using the uncertainty in illness theory approach. Previous research has been carried out with the uncertainty in illness approach, which has been done on Diabetes Mellitus clients to improve self-care and psychosocial adjustment. Based on the descriptions and theories that support the researchers interested in developing a stress adaptation model to the uncertainty of the Diabetes Mellitus disease process in the Jember Health Center area.

2. METHODS

2.1 Design

The design of this research is an explanatory survey with a cross sectional approach. The population of this study were all Patients with Diabetes Mellitus at the Patrang Health Center.

2.2 Population and sampling

A large sample of 250 Patients with Diabetes Mellitus were recruited using a simple random sampling technique with the criteria of Patients Diabetes Mellitus who have unstable blood sugar regulation, Patients Diabetes Mellitus who have been diagnosed with Diabetes Mellitus > 5 years, Patients Diabetes Mellitus with an age range of 26-60 years, the client's minimum education level is graduate junior high school. The data collection process was carried out using a questionnaire, then tested using SEM-PLS.

2.3 Variable

The research variables are cognitive, biophysical, social, psychological factors, structure providers, illusions and inferences, uncertainty, psychosocial coping and adaptations. Collecting data with a valid and reliable questionnaire.

2.4 Instrument

The design of this research is an explanatory survey with a cross sectional approach. The population of

Table 1. Variables of the Adaptation Stress Model to the Uncertainty of Diabetes Mellitus at the Jember Regional Public Health Center

Variable	Description	Sub Variable
Exogenous Variable (X).	X1 Cognitive	X1.1 Knowledge X1.2 Self Empowerment
	X2 Biophysics	X2.1 Age X2.2 Gender X2.3 Genetics X2.4 Complications X2.5 Long Sick
	X3 Social	X3.1 Tribe X3.2 Work X3.3 Residential area X3.4 Spiritual
	X4 Psychological	X4.1 Hope X4.2 Stress X4.3 Anxiety
	X5 Structure Provider	X5.1 Communication X5.2 Social support X5.3 Education
	X6 Inference and Illusion	X6.1 *Self Efficacy* X6.2 Self *Esteem*
Endogenous Variable Y	Y1 *Uncertainty*	Y1.1 Probability Y1.2 Ambiguity Y1.3 Complexity
	Y2 Coping	Y2.1 *Problem Focus* Y2.2 *Cognitive focus* Y2.3 *Emotion focus*
	Y3 Psychosocial Adaptation	Y3.1 *Sosial and leisure activities* Y3.2 *Job and household duties* Y3.3 *Pshycologic distres* Y3.4 *Relationship with pathner and family* Y3.5 *Health care orientation*

Table 2. The questionnaire instrument

Variable	Instrument
Exogenous Variable (X).	Knowledge questionnaire Diabetes Empowerment Scale Spiritual questionnaire *hert hope index* Diabetes distres scale Hospital Anxiety and Depression Communication questionnaire Social Support questionnaire Self Efficacy questionnaire Self Esteem questionnaire
Endogenous Variable Y	Uncertainty questionnaire Coping mechanism questionnaire Psychosocial adaptation questionnaire

this study were all Patients with Diabetes Mellitus at the Patrang Health Center.

2.5 Analysis

The data were analyzed by using the Structural Equation Modeling- Partial Least Square (SEM-PLS) test. The strategic issues obtained from the results of the SEM-PLS analysis are used as a reference for conducting Focus Group Discuss (FGD). The results of strategic issues, FGDs and the results of the development of stress adaptation models to the uncertainty of Diabetes Mellitus disease become a reference for making modules. The module resulting from the development of the stress adaptation to uncertainty model was adopted using a client-centered approach and consists of psychosocial support and a skill base designed to maintain optimal Diabetes Mellitus disease management and is packaged in the form of an optimal health program module so that it can be used as a guideline by health workers.

2.6 Ethical Clearance

Ethics in research with the topic of adaptation stress models to the uncertainty of the Diabetes mellitus disease process in the Jember Health Center area refers to the guidelines and ethical standards of

Table 3. Results of Observing Variable Construct Testing of Adaptation Stress Models to Uncertainty

Variable	Indicator	Loading Factor	*P. Value*	*Cut Off*	Description
Cognitive	X1.1	0,844	0.000	0,500	Valid
	X1.2	0,918	0.000	0,500	Valid
Biophysics	X2.1	0,814	0.000	0,500	Valid
	X2.2	0,762	0.000	0,500	Valid
	X2.3	0,780	0.000	0,500	Valid
	X2.4	0,795	0.000	0,500	Valid
	X2.5	0,763	0.000	0,500	Valid
Social	X3.1	0,726	0.000	0,500	Valid
	X3.2	0,886	0.000	0,500	Valid
	X3.3	0,762	0.000	0,500	Valid
	X3.4	0,664	0.001	0,500	Valid
Psychological	X4.1	0,894	0.000	0,500	Valid
	X4.2	0,918	0.000	0,500	Valid
	X4.3	0,663	0.000	0,500	Valid
Structure Provider	X5.1	0,898	0.000	0,500	Valid
	X5.2	0,883	0.000	0,500	Valid
	X5.3	0,446	0.006	0,500	Valid
Inference and Illusion	X6.1	0,870	0.000	0,500	Valid
	X6.2	0,888	0.000	0,500	Valid
Uncertainty	Y1.1	0,840	0.000	0,500	Valid
	Y1.2	0,861	0.000	0,500	Valid
	Y1.3	0,682	0.000	0,500	Valid
Coping	Y2.1	0,913	0.000	0,500	Valid
	Y2.2	0,907	0.000	0,500	Valid
	Y2.3	0,859	0.000	0,500	Valid
Psychosocial Adaptation	Y3.1	0,633	0.000	0,500	Valid
	Y3.2	0,790	0.000	0,500	Valid
	Y3.3	0,684	0.000	0,500	Valid
	Y3.4	0,740	0.000	0,500	Valid
	Y3.5	0,687	0.000	0,500	Valid

Table 4. Hypothesis Testing Results of the Adaptation Stress Model to the Uncertainty of the Diabetes Mellitus Disease Process

Influence	Original Sample (O)	T Statistics (|O/STDEV|)	P Values
Cognitive (X1) → *Uncertainty* (Y1)	0,163	2,911	0,004
Biophysics (X2) → *Uncertainty* (Y1)	0,143	2,173	0,030
Social (X3) → *Uncertainty* (Y1)	0,057	0,933	0,351
Psychological (X4) → *Uncertainty* (Y1)	0,187	3,357	0,001
Structure Provider (X5) → *Uncertainty* (Y1)	0,188	3,327	0,001
Inference and Illusion (X6) → *Uncertainty* (Y1)	0,161	2,415	0,016
Uncertainty (Y1) → **C**oping (Y2)	0,375	6,448	0,000
Uncertainty (Y1) → Psychosocial Adaptation (Y3)	0,212	3,451	0,001
Coping (Y2) → Psychosocial Adaptation (Y3)	0,291	5,134	0,000

research and development of National health in 2017. The ethical permit for this research has been approved by the ethics committee of the Faculty of Nursing, Universitas Airlangga with number: 1841-KEPK.

3. RESULTS

Construct Evaluation Results

Evaluation of observed variables is done by calculating convergent validity and discriminant validity. The results of the observe variable construct test are presented in the following table. Based on table 3, it can be seen that all indicators produce a loading factor value greater than 0.5. Thus the indicator can be said to be able to form a latent variable.

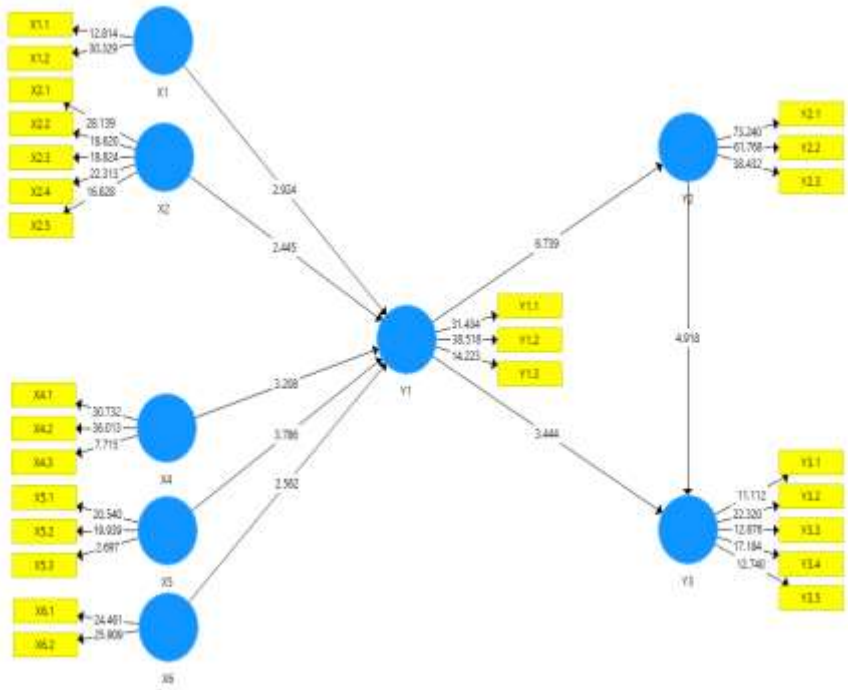

Figure 1. Results of Inner Significant Path Model of Stress Adaptation Model to Uncertainty of Diabetes Mellitus Disease Process at Jember Region Public Health Center.

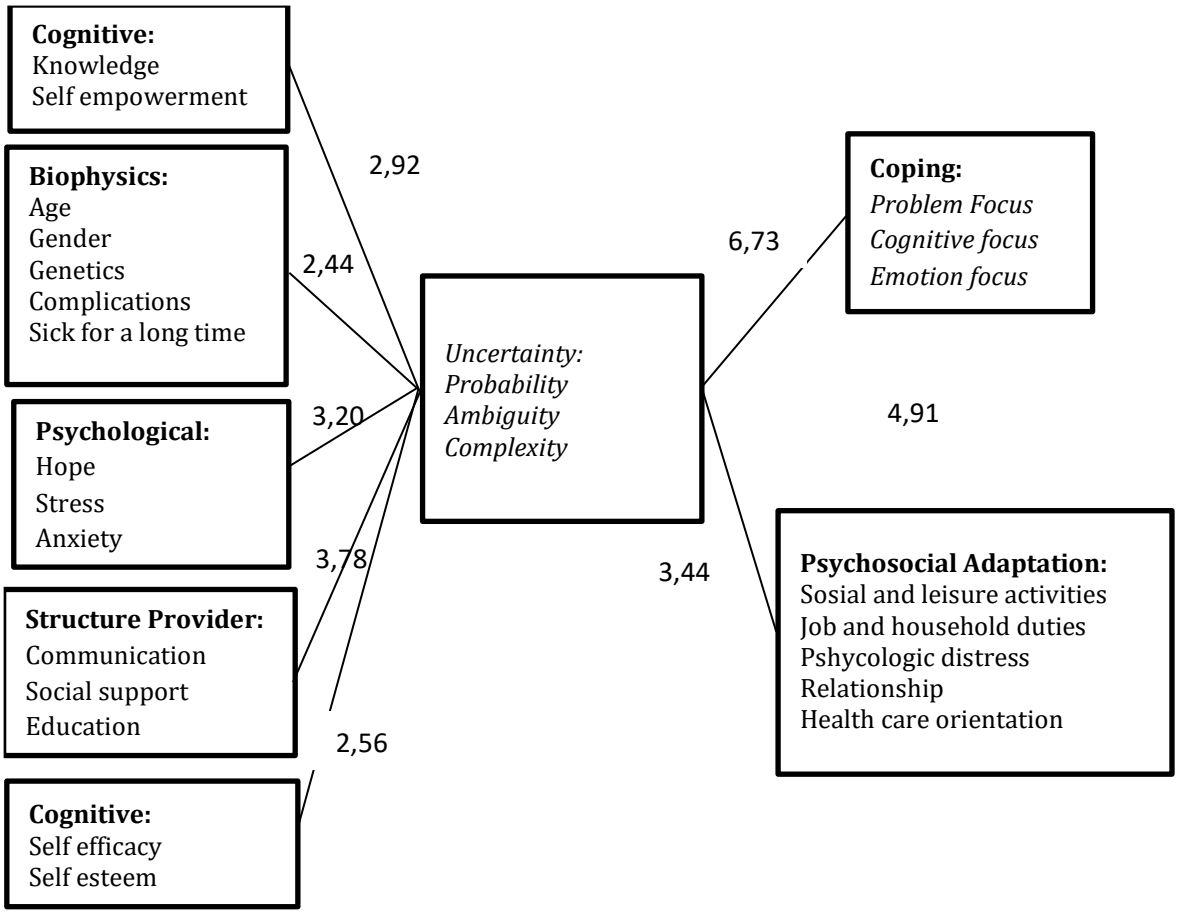

Figure 2. The Final Result Of Model of Stress Adaptation Model to Uncertainty of Diabetes Mellitus Disease Process at Jember Region Public Health Center

Evaluation of the Structural Model (Inner Model)

Hypothesis testing is used to test whether there is an effect of exogenous variables on endogenous variables. The test criteria state that if the value of T-statistics T-table (1.96) or the value of P-value < significant alpha 5% or 0.05, it is stated that there is a significant effect of the independent variable on the dependent variable. The following is an image explaining the path diagram for testing the hypothesis.

The results of the inner model analysis on the development of the adaptation stress model to the uncertainty of the Diabetes Mellitus disease process were carried out 500 times bootstrapping using the default smart partial least square. The results of the inner test show that the value of T-statistics T-table (1.96) on the variables X1, X2, X4, X5, X6, Y1, Y2 and Y3 while in X3 the value of T-statistics T-table (1.96). The following table shows the results of hypothesis testing to determine the effect between variables.

Cognitive factors have a significant effect on the uncertainty of Patients with Diabetes Mellitus. Biophysical factors have a significant effect on the uncertainty of Patients with Diabetes Mellitus.. Psychological factors have a significant effect on the uncertainty of Patients with Diabetes Mellitus. The provider factor has a significant effect on the uncertainty of Patients with Diabetes Mellitus.. Illusion and inference factors have a significant effect on the uncertainty of Patients with Diabetes Mellitus.. The uncertainty factor has a significant effect on coping with diabetes mellitus. The uncertainty factor has a significant effect on psychosocial adaptation. Coping factors have a significant effect on the psychosocial adaptation of Patients with Diabetes Mellitus, uncertainty will be better when uncertainty goes through a good coping process to produce an adaptive psychosocial adaptation process.

4. DISCUSSION

The researcher's assumption in the discovery of the stress adaptation model to the uncertainty of the Diabetes Mellitus disease process is that uncertainty is a cognitive condition, indicating the inadequacy of existing cognitive factors to support the interpretation of disease-related events. Then adaptation in the context of uncertainty reflects the continuation of the normal biopsychosocial behavior of Diabetes Mellitus clients and is the expected result of coping efforts to reduce uncertainty that is assessed as dangerous (Li, XinLi, X. (2019) 'Illness uncertainty, social support, and coping mode in hospitalized patients with systemic lupus erythematosus in a hospital in Shaanxi, China', PLoS ONE, 14(2) *et al.*, 2019). The incidence of illness, uncertainty, coping and adaptation has a linear relationship from situations that promote uncertainty to psychosocial adaptation (Middleton, LaVoie and Brown, 2012).

In line with the uncertainty model, Mishel (2009) explains how prolonged uncertainty can serve as a catalyst to change one's perspective on life and illness. Uncertainty over time, associated with a serious illness, serves as a catalysis for fluctuations in the system and threatens existing predictable and controllable cognitive models (Bailey, Jr., D. E., & Stewart, 2014). Uncertainty is absorbed in almost all aspects of a person's life, the effect becomes concentrated and eventually threatens the stability of the system. The system must change for the sake of the sustainability of the system in response to the confusion and disorganization born of ongoing uncertainty (Aligood, 2014).

Another finding in this study is that uncertainty greatly influences psychosocial adaptation. Uncertainty is associated with psychosocial stress. Clients perceive that an open system exchanges energy in their environment and individuals with Diabetes Mellitus are likely to move toward a complex world orientation, rather than trying to return to a stable state, thus forming new meaning for their lives (Han, 2013). Uncertainty is considered a normal view of life. , uncertainty becomes a positive force that produces a psychosocial adaptation response for Diabetes Mellitus clients (Middleton, LaVoie and Brown, 2012).

Uncertainty can be positively managed by increasing cognitive abilities to reduce feelings of concern about the uncertainty of the disease process experienced (Ogurtsova, Guariguata and Whiting, 2015). Acceptance of Diabetes Mellitus in clients can be achieved by making clients understand the course of the disease process and understand current conditions through information, increasing communication between clients and providers and increasing resources aimed at increasing client knowledge about the disease process (Middleton, LaVoie and Brown, 2012). The cognitive component can be assessed from how the Diabetes Mellitus client interprets events related to the disease so that the treatment process can run well (Laugesen, Østergaard and Leslie, 2015).

The uncertainty of the disease process that occurs in Diabetes Mellitus clients is an uncertain event because individuals cannot determine things related to the disease (Chen, Kao and Cheng, 2018). Uncertainty in DM clients occurs when individuals cannot assign definite values to events due to lack of signs and information. Uncertainty according to Mishel (1983) is a novelty, complexity, ambiguity, and unexpected lack of information (Acuff and Jabson, 2016). This can be seen in this study which shows that clients who have good cognitive abilities have the ability to access information about the disease so that they are able to minimize the state of uncertainty in themselves.

According to the reconceptualized theory of uncertainty in disease, a longer duration of Diabetes Mellitus should be associated with less uncertainty as

individuals are perceived to become more skilled in chronic disease self-management. The study conducted (Acuff and Jabson, 2016) found differences in uncertainty at different duration intervals. In this study, uncertainty increased 5 to <10 years after diagnosis, decreased and then persisted between 10 to <40 years. After 10 years of disease duration, uncertainty was the lowest of all duration intervals. In this study, it was shown that the duration of illness > 10 years had a good level of uncertainty because Diabetes Mellitus clients were able to apply all the treatment processes they underwent so that they were able to adapt well.

Problem solving is done to overcome diabetes mellitus, among others, by making changes to diet, carrying out routine controls, changing activities, exercising, and seeking information about diabetes mellitus (World Health Organization (WHO), 2016). Through various information from social support received, it is possible to find solutions to problems to overcome diabetes mellitus, namely through changes in a positive direction (Bilous R, 2015). Problem solving is one of the coping strategies through efforts to solve the problems faced, namely diabetes by taking actions that can improve conditions caused by diabetes. Problem solving is an attempt to change a situation that is considered pressing in a careful, gradual, and analytical way. Individuals seek to obtain solutions and then take direct action to resolve the problem (Garrett and Doherty, 2014).

Based on the results of this study, the researcher argues that this psychological change can occur if the coping of an individual who has a problem or disease considers this a burden that cannot be solved. However, if someone who is affected by this degenerative disease tries to take this as a challenge and has a positive view of it, psychological changes will not occur.

The results of the analysis show that uncertainty is closely related to coping where one of the coping mechanisms is the provider of structure, information and social support, this is in accordance with Mishel (2009) describing that the process of uncertainty becomes a new view of life where uncertainty arises from being seen as a danger seen as an opportunity. To adopt this new outlook on life, clients must be able to rely on social resources for social support and health care providers who take into account the possibilities (Mullins *et al.*, 2017). between health care providers and clients should focus on client services how to use uncertainty to provide different explanations for surrounding events so that the resulting output is how clients deal with health problems wisely seen from the client's own coping (Aligood, 2014).

Patients with Diabetes Mellitus can take positive meanings from the diabetes they suffer such as being grateful for what they have experienced, taking lessons from experiences in nature, being able to deal with the illness they are suffering from by focusing more on how to overcome the problems that arise due to the disease. Diabetes Mellitus clients must be more active in dealing with the disease by preventing complications and using a positive frame of mind. Optimistic individuals are more focused on problems in dealing with stress, are more active and planned in dealing with stressful events and use a positive frame of mind (Mullins *et al.*, 2017).

Adaptation reflects the continuation of an individual's normal biopsychosocial behavior and is the expected result of coping efforts to reduce uncertainty that is assessed as a danger or maintain uncertainty that is considered an opportunity. Ideally, someone who is in a chronic state of uncertainty gradually abandons the attitude of avoiding uncertainty evaluation to interpret a new perspective on life that accepts uncertainty as a fact. Therefore, uncertainty can affect the process of psychosocial adaptation of clients with chronic diseases because of the client's inability to the structure and perspective of a new life with Diabetes Mellitus (Bertolin, Pace and Cesarino, 2015).

Implications for providing psychosocial support go beyond mental well-being. Psychosocial welfare will reduce uncertainty so that clients can adapt well. Based on the results of interviews with their Diabetes Mellitus clients, they said that the experience of DM and treatment was the basis that they could adjust to the long process of Diabetes Mellitus treatment. Stress associated with the diagnosis and treatment of Diabetes Mellitus means that the process of assessing and responding to the uncertainty inherent in the experience of the disease and the importance of care in providing information and supporting Diabetes Mellitus clients in understanding and managing uncertainty (Bertolin, Pace and Cesarino, 2015).

The researcher 's assumption related to the finding of uncertainty affects psychosocial adaptation in Diabetes Mellitus clients . The assumption is based on the assumption that the coping stage depends on the assessment of the individual involving various types of targeted strategies towards psychosocial adaptation. Uncertainty in illness provides a comprehensive framework for viewing the experience of illness and for organizing treatment interventions to promote optimal psychosocial adaptation.

5. CONCLUSSION

.The uncertainty of the disease process that occurs in Diabetes Mellitus is an uncertain event because individuals cannot determine things related to the disease. Uncertainty in Diabetes Mellitus clients occurs when individuals cannot assign definite values to events due to lack of signs and information. Uncertainty is associated with psychosocial stress. Patients with Diabetes Mellitus view that an open system exchanges energy in their environment and individuals with Diabetes Mellitus are likely to move towards a complex world orientation, rather than trying to return to a stable state, thus forming new

meaning for their lives. Uncertainty is considered a normal view of life, uncertainty becomes positive force that produces a psychosocial adaptation response for Patients with Diabetes Mellitus.

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