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Original Research

## A Qualitative Inquiry into The Adherence of Adults Type 2 Diabetes Mellitus with Dietary Programs

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### ABSTRACT

**Introduction:** Diabetes mellitus (DM) is a chronic disease with the characteristic of treatment complexity. The toughest challenge for DM patients is dietary adherence. On the other hand, the socio-culture is one of the factors that influences dietary adherence. The aim of this study was to examine the dietary adherence of adults with type 2 Diabetes mellitus (T2DM), particularly to dietary programs.

**Methods:** This study used a qualitative case study design with a positivist approach. The total participants consisted of 14 T2DM patients obtained through snowball sampling. The research phenomenon was the adherence of adults with type 2 Diabetes mellitus to dietary programs. The data collection was conducted through in-depth interviews with question guidelines analyzed using qualitative thematic analysis.

**Results:** This study obtained five themes regarding the dietary adherence of T2DM patients such as activity, motivation, intention, behavior, and the benefits of dietary adherence. The focus points were activity, motivation, and the intention to comply with the dietary recommendations, including reducing the fatty and fried foods consumed. The patients who felt the benefits of complying with the dietary program found following the dietary adherence to be easier.

**Conclusion:** Activity, motivation, intention, behavior and the benefits of the dietary adherence program all make it easier for the patient to comply with their diet. This result suggests that health workers should provide education to the patients on the importance, benefits and the way to comply with the T2DM dietary program.

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### INTRODUCTION

Diabetes mellitus (DM) is a health problem with the characteristic of hyperglycemia due to abnormal insulin secretion, insulin action or both. DM symptoms include polyuria, polydipsia, polyphagia, weight loss and blurred vision (ADA, 2017). The most common problem in T2DM is dietary non-adherence. One of the causal factors of this is socio-cultural, which drives the T2DM patients to not comply with the dietary recommendations (Basu & Garg, 2017). Whether the patients comply or not depends on the intention of the person (Ajzen, 2005).

The incidence of T2DM in Indonesia has been rising every year. The data from the Baseline Health Research of Indonesia showed that T2DM patients

aged  $\geq 15$  years in 2013 had an incident rate of 6.9%. This increased in 2018 to become 8.5%. The prevalence was higher in women at 12.7% than in men at 9%. The T2DM patients who did not take medicine made up 11% (National Institute of Health Research and Development Indonesia, 2018). The data from the Public Health Center in Sidoarjo showed that the doctors had diagnosed 66,077 DM patients. From the 10 T2DM patients in Porong and Krembung Public Health Center, 70% of patients feel that it is difficult to comply with the suggested diet and 50% feel bored with the DM treatment.

The research conducted by (Storz & Iraci, 2019) showed that patients who adhere to a diet for a short time can reduce their blood sugar concentration and increase their insulin sensitivity. Dietary adherence is

highly effective when it comes to achieving better glycemic control in patients with type 2 diabetes. Adherence is supported by the environment and their family (Hilliard, McQuaid, Nabors, & Hood, 2014). Strengthening the resilience of dietary adherence in the T2DM patients will provide enthusiasm and a better ability to treat themselves. This is in addition to improved self-esteem and behavior (De Souza Ribeiro et al., 2017)

The T2DM patients' dietary adherence can reduce the incidence of hyperglycemic crisis (PERKENI, 2015). The success of dietary adherence depends on the compliant behavior and intentions of the patients — compliance consists of close and open submissive behavior. Close compliant behavior is a stimulus that has not been clearly seen that is still limited to the form that the knowledge, attitude, perceptions and feelings takes. Open submissive behavior is a reaction to the stimulus in a way of practice that is visible (Notoatmodjo, 2007). Intention can be explained as motivational factors and they have a strong impact on behavior change. The firm intention of T2DM patients will increase their compliance in terms of carrying out dietary management properly (Pinidiyapathirage, Jayasuriya, Cheung, & Schwarzer, 2018). Based on the description above, this study aims to examine the dietary adherence of adults with type 2 Diabetes mellitus (T2DM) on dietary programs.

## MATERIALS AND METHODS

This study was a qualitative case study design used to inquire into the adherence of adults with type 2 diabetes mellitus to dietary programs with a positivist approach. The aim of a positivist approach is to explore a good story or experience from a participant related to their adherence to dietary programs. A case studies is a form of investigation and exploration that looks into a case in-depth and in detail. It allows the researchers to get a complete and detailed picture of the phenomenon that is to be studied. It involves the understanding of a person's events and activities (L Mccaslin & Scott, 2003). The following steps are a part of case studies in order to ensure the best possible outcome: 1) information organization, 2) reading all of the information and coding, 3) writing a detailed description of the case and its context, 4) interpreting and developing generalizations naturally from the cases and 5) presentation in narrative form (Vanwynsberghe, 2007).

The participants of this study were 14 T2DM patients obtained through the snowball sampling technique. The inclusion criteria were 1) T2DM patients from the Public Health Center in Sidoarjo, East Java Province, 2) good dietary adherence according to dietary adherence screening and 3) not a pregnant woman. The exclusion criteria were 1) resident citizens from the Public Health Center in Sidoarjo, East Java Province and 2) not communicating verbally well.

The researchers themselves are the data collection tools and thus they cannot be represented or delegated. The data collection tools consisted of voice recorders, stationery, field notes and the in-depth interview guidelines. The interview questions included behavioral attitude, subjective norm, perceived behavioral control, intention, and adherence behavior. The interview data was analyzed using qualitative thematic analysis by searching for any themes that emerge. This becomes important when looking into the description of a phenomenon or case. The stages of thematic analysis include: 1) developing manual code, 2) conducting reliability tests on the code, 3) summarizing the data and identifying the initial themes, 4) applying templates to the codes and supplementary codes, 5) linking the codes and identifying themes, and 6) strengthening and validating the theme (Fereday & Muir-Cochrane, 2006).

The study was conducted in three Public Health Centers in Sidoarjo, East Java Province for two months, January 2019 - February 2019, with a high prevalence of good dietary adherence based on the successful achievement of the Public Health Center-ran programs. The participants determined the location of the interview at the time of the informed consent contract. This study was registered to research ethics board of the Health Research Ethics Commission of the Faculty of Nursing, Universitas Airlangga, letter-number: No.1194-KEPK published on 3rd November 2018.

## RESULTS

The participants in this study consisted of 14 people consisted of 1 male and 13 females aged between 45 - 85 years old. The most common education level of the participants was that of primary school. All of the participants were married. Most of the participants did not work. One participant (P12) dropped out because he didn't complete the interview stages. A total of five themes emerged from the results of the in-depth interviews concerning the dietary adherence of the T2DM patients such as activity, motivation, intention, behavior, and the benefits of doing dietary adherence. The characteristics of the participants have been summarized in Table 1.

### Theme 1: Activity

Activities which increase dietary adherence include physical exercise (P10, P14), controlling their routine in the health care centre (P02, P15), reducing their sugar consumption (P01, P04) and praying to God (P06).

"...If I want my body to feel good, I do exercises like jumping in the field after cooking..." (P10)

"...I prefer walking around in the field while looking at green scenery. I feel better..." (P14)

"...If I feel sick, I go to the health care centre to control it. Yesterday I felt unwell. Unfortunately, my uric acid was high..." (P02)

Table 1. Characteristic of Respondents

Code	Gender	Age (years old)	Marital Status	Work	Education
P01	Female	53	Married	Does not work	Junior high school
P02	Male	68	Married	Does not work	Junior high school
P03	Female	70	Married	Does not work	Primary school
P04	Female	69	Married	Does not work	Primary school
P05	Female	73	Married	Does not work	Junior high school
P06	Female	85	Married	Seller	Primary school
P07	Female	45	Married	Seller	Junior high school
P08	Female	60	Married	Does not work	Junior high school
P09	Female	66	Married	Does not work	Primary school
P10	Female	65	Married	Does not work	Primary school
P11	Female	75	Married	Does not work	Primary school
P12				Drop out	
P13	Female	60	Married	Does not work	Primary school
P14	Female	57	Married	Does not work	Primary school
P15	Female	51	Married	Does not work	Primary school

\*P=Participants

"...I want to feel healthy, so I routinely control it in the health care centre..." (P15)

"... I used to drink less sugar milk. Now I have a little sugar on my meal..." (P01)

"... No, I do not eat sweet food. Fatty food also. I reduce the amount of sugar..." (P04)

"... I sincerely undergo this sickness. I prayed to God to give me a healthy and long life..." (P06)

### Theme 2: Motivation

This theme explained that the participant get their motivation from social support, including from the health workers (P03), other T2DM sufferers (P05) and their family (P06).

"...I get motivated to adhere to the diet from the doctor. The doctor said that I have to control my diet and he suggested for me to eat or take a meal once every three hours..." (P03)

"... T2DM patients who I am acquainted with always remind me about dietary adherence and they invite me to the DM association so then I can get support and more information..." (P05)

"...My wife reminds me about reducing my rice consumption, especially hot rice. If the rice is cold, then I can eat little more..." (P06)

### Theme 3: Intention

This theme explained that the participants' intention rises after getting education from the health care provider (P01). The participants maintain adherence through considering the amount, type and time of the food consumption (P05).

"...After being educated by a health care provider, I have the intention to consider what I eat..." (P01)

"...For example, if I have eaten and someone offers me food, I reject it wisely..." (P05)

### Theme 4: Behavior

This theme explained the dietary adherence behavior done by the participants. The dietary adherence

behavior considers the amount, type and time of the food (P03, P15), the reduction of their sugar consumption (P06) and reducing the amount of fried food (P13).

"...I consider the amount of rice like 8 - 10 spoons. I only eat rice three times a day in the morning, noon, and evening. Snacking is only at 3 PM..." (P03)

"...I eat every 3 hours and start at 7 AM. It consists of three-times eating eight spoons of rice and three times snacking. I avoid eating fried food ..." (P15)

"...I reduce my sugar consumption. I do not eat sweet fruits like yam..." (P06)

"...I avoid eating fried food and fatty chicken meat..." (P13)

### Theme 5: Benefit

This theme explained the benefit of dietary adherence. The participant felt that dietary therapy could support their medical treatment (P01) and that accurate dietary therapy can reduce the signs and symptoms of sickness (P03, P05, P14).

"...I only consume medicine, but I think that it does not heal my sickness well. I combine medication and diet and hope that it can help prevent wounds..." (P01)

"...I do not comply with the diet. I feel sick like I have headache, plus tingling and pain. I comply with the diet only so then my glucose is stable and I do not feel sick anymore..." (P03)

"...My vision is a blur when my glucose is high. My vision is brighter when my glucose level is stable. My glucose level is stable when I comply with the dietary adherence..." (P05)

"...When I comply with dietary adherence, the pain and frequency of my urination decreases, my body is fit, and the tingling disappears..." (P14)

## DISCUSSION

The first theme revealed that physical exercise, controlling their routine in the health care centre, reducing the sugar consumption and praying to God emerged as activities that influence dietary adherence. (ADA, 2017) advises for people with DM to exercise at a medium to high intensity for at least 150 minutes per week. They should exercise for 15 minutes every two days and then the duration is increased slowly to at least 150 minutes per week according to the recommended amount (Colberg et al., 2016). Exercise not only reduces the blood sugar levels but it also lowers the blood pressure, reducing the levels of low-density lipids, increasing their energy, and reducing stress (Restuning, 2015). DM patients have to routinely undergo control visits to the doctor or Public Health Center every month. The time of control depends on the patient's condition. The worse their condition, the more often they have a control visit to the doctor or the health care provider. The provider will assist in their DM management through education, dietary therapy, exercise, and pharmacology therapy (Poretsky, 2017). DM patient need drugs and DM management to control their blood glucose level. Belief in God and in the power of prayer, as well as in religious instructions, is obtained in conditions of difficulty. This is proven to decrease the incidence of depression (Doolittle & Farrell, 2004). The spiritual aspect has a significant influence on changes in patient behavior and motivation. The emotional stability resulting from good spiritual integrity not only affects the achievement of positive behavior but it also contributes to physical health (Friedman, 2018).

The second theme revealed that the participants get a variety of support which includes support from their family, from fellow DM sufferers, and from the health workers. The family factor has an important role in supporting diabetes management (Delamater, 2006). For patients with chronic conditions such as diabetes, social support has been shown to provide positive outcomes in relation to glycemic control, adherence to care, and improvements in their emotional status. Patients who have good family support will experience a comfortable feeling that can increase their motivation to comply with the dietary recommendations (Ilmah & Rochmah, 2015). Social support from fellow DM sufferers has the same effect, or it was found to be better than support from their wives or friends who did not have diabetes (Van Dam et al., 2005). Interactions between the health workers and patients will lead to an understanding of the importance of treatment. Health workers give full attention to the patients, even though the consultation time is concise (Niven, 2002). Time is not a determinant of good quality interactions between the patients and health care workers. Friendliness, attention and the empathy of officers will provide a feeling of security and inner security (Moehyi, 1992). Communication is very important in the context of providing nutrition education to the patients, in their

willingness to provide explanations and in offering alternatives which will help them to fulfill their patient's needs (Wahyuningsih, 2009).

The third theme revealed that participant's intention in relation to dietary adherence is to comply with the amount, types and timing of the food recommendations. The various intentions possessed by the participants are a way to increase the persistence in dietary adherence. Humans are unique individuals; the intention of each individual is varied. Different desires called intentions represent the functions of two basic determinants, namely individual attitudes towards a behavior (a personal aspect) and the individual perceptions of the social environment (Ajzen, 2005). Practice or behavior according to the Theory of Planned Behavior (TPB) is influenced by intention, while intention is influenced by subjective attitudes and norms (Sommer, 2011).

The fourth theme revealed that the participants were just trying to keep to the dietary adherence in the beginning and they whole-heartedly complied with the suggested guidelines. The results of this study also support the Skinner theory in that behavior is a person's response to a stimulus or object. Responding depends on the characteristics and other factors of the individual (Gordan & Amutan, 2014). The acceptance of new behavior must be based on knowledge so then the behavior is long-lasting. The change or adoption of new behavior follows the following stages through the process of change: knowledge (attitude), attitude (attitude) and action (practice) (Notoatmodjo, 2003). Individuals begin with trial and error until they really want to apply it forever. According to (Green & Kreuter, 1991), behavior is determined by three factors: predisposing factors (knowledge, attitudes, values and beliefs), enabling factors (facilities and infrastructure / facilities for the formation of healthy behavior) and reinforcing factors (family support/friend /figures/groups, health workers, health insurance and decision-makers).

The fifth theme revealed that belief in the benefits of the diet in line with the results of the study shows that changing to a healthy diet can rearrange the normal insulin production process and improve the condition of type 2 diabetes (Mann, Allegrante, Natarajan, Halm, & Charlson, 2007). The excess food intake is reduced significantly through a low-calorie diet. It shows that a decrease in body fat results in the stabilization of insulin sensitivity. T2DM patients only need to lose one-sixth of their body weight to be able to remove fat from the pancreas, thus allowing the organ to produce enough insulin to return to normal levels (Sublett & Bernstein, 2011).

Other findings from the interview were that the participants expressed some positive feelings towards the diet such as feeling healthy because of self-suggestion, used to being disciplined, being interested in the dietary advice, being satisfied with the present situation, and feeling happy and healthier. DM patients who can change their perspective of suffering will be able to see the meaning and wisdom

of their illness. The meaning of life can be found in the suffering condition that cannot be avoided (Frankl, 2004). Individuals who have a meaningful life experience show a vibrant lifestyle that is full of enthusiasm and passion for life. They become more directed, more disciplined, and adapt to the environment (Bastaman, 2007).

## CONCLUSION

The findings of this study revealed the motivation, activity, intention and dietary adherence behavior. This includes complying with the amount, types and time of the diet recommendations and reducing their fat and sugar consumption as the themes. If the patient complies with the dietary advice, the easiness of meeting the dietary guidance will increase their dietary adherence too. Easiness can be gained if the participant feels the benefit of the diet or the perceived benefit of the diet. Health workers need to provide health education to every T2DM patient in order to increase the perceived benefits of dietary adherence. A good understanding of the importance of dietary adherence will improve the patients' behavior in complying with the dietary recommendation.

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Original Research

## The Affirmation – Tapping on Pain Perception and Serotonin Serum Level of Post – Caesarian Section patients

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### ABSTRACT

**Introduction:** Affirmation - tapping interventions have been shown to reduce pain complaints in post-operative patients completing conventional treatment. This is thought to be due to serotonin performance but clinical studies have not been conducted. The aim was to compare the mean perception of the pain reported by post-operative patients given affirmation- tapping treatment with another treatment as a complementary nursing intervention. This was to see if the performance of the serotonin serum level is different from in other treatments.

**Methods:** We used a randomized post-test only control group design carried out in parallel in post-caesarean section patients. The sample totaled 40 patients divided into four groups (10 in affirmation, 10 in tapping, 10 in affirmation-tapping and 10 in the control). They were obtained through simple random sampling. The instruments included affirmation-tapping guidelines, Elisa kits and the McGill - Melzack Pain Questionnaire short-form (MPQsf). The independent variable was the intervention of affirmation-tapping and the dependent variables were pain perception and serotonin level. The data was analyzed using simple linear regression.

**Results:** The average variant of the serotonin levels in the affirmation-tapping treatment group was higher and thus differed significantly from the other groups.

**Conclusion:** Affirmation-tapping as a complementary nursing intervention can increase the serotonin serum levels of the post-caesarean section patients by complementing conventional treatments. Participant pain complaints were lowest in the affirmation-tapping group with the highest serotonin levels present and these were significantly different to the other groups. Affirmation – tapping was recommended as a complementary intervention in nursing post-operative patients that complements conventional treatment.

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### INTRODUCTION

Post-operative acute pain complaints result in tachycardia, increased blood pressure, decreased alveolar ventilation, and ultimately, wound healing disorders. Acute pain complaints can be chronic if it is not treated immediately. Due to neural sensitization centrally and peripherally from the N-Metil-D-Aspartate (NMDA) activation process, this results in long-term potentiation (long-term potentiation), so the pain complaint lasts longer (Argoff., 2014).

Despite the treatment, there are still many complaints of post-operative pain felt by the client.

Severe pain after cardiac surgery was reported by 28% of patients (Bordoni, Marelli, Morabito, Sacconi, & Severino, 2017), pain after thoracic surgery was reported in 25% of patients, even to be point of it being chronic. Moderate post-sectional caesarean pain was reported in 48.2% of patients, and the incidence of pain was 92,7% (IC 95%: 90,9 -94,2). The average level of pain intensity at the time of worst pain was 6,6 (dp=2,2) (Silva, Silva, & Tatagiba, 2017). Complaints of pain result in a disruption of the healing process, wound healing (Argoff., 2014) and a disruption of productivity (Kawai, Kawai, Wollan, &



Yawn, 2017). An incomplete pain intervention will reduce a person's quality of life (Gibbs et al., 2019).

Affirmation - tapping has been proven to deal with pain complaints, but the scientific proof and how its mechanism of action works needs to be examined. Post-operative pain from moderate to severe levels is still perceived by more than half of all patients who have undergone surgery, despite receiving treatment as a standard post-operative patient (Ward, Guest, Goodall, & Bantel, 2018; Komann, Weinmann, Schwenkglens, & Meissner, 2019). Recommendations for post-operative pain management with treatment includes both drugs and non-drugs, as well as treatment-free therapy (Chou et al., 2016) and complementary approaches with affirmation - tapping (Mudatsyir, K, & Sundari, 2012; Wijiyanti, 2010). Post-operative nursing care management with affirmation-tapping has been done through the Spiritual Emotion Freedom Technique (SEFT) method in post-operative patients and it provides good benefits (Mudatsyir et al., 2012; Wijiyanti, 2010). Reciting Qur'anic verses as a prayer has also helped to reduce the pain of post-operative patients (Beiranvand, Noaparast, Eslamizade, & Saeedikia, 2014).

The complementary nursing approach has consistently been in line with the nursing care policy, particularly for managing nursing pain. This is still rarely done due to the limited scientific support regarding the performance and effectiveness of complementary affirmative nursing interventions (Chou et al., 2016; WHO, OECD, 2018). The aim was to compare the mean perception of pain reported by post-operative patients given the affirmation - tapping treatment with another treatment as a complementary nursing intervention. This proves that the performance of the serotonin serum level is different from how it is in other treatments, where the affirmative sentences are used as a prayer. They take verses from the Qur'an and this is still combined with the stimulation of several acupoints simultaneously.

## MATERIALS AND METHODS

This study used a Randomized Post-test Controlled Group design in parallel for all treatment groups. The sample of the study was a portion of post-operative caesarean patients taken through simple random sampling for as many as 40 respondents (Sakpal, 2010). Randomized Assignment was then carried out so then there were ten respondents for each group of affirmation, tapping, affirmation-tapping and the control. The criteria for inclusion in the sample was 1) Muslim patients post-caesarean section who volunteered to participate after obtaining an explanation and 2) they were approached on the first day after surgery, 3) they were aged 18 - 41 years, 4) they had no complications outside of pregnancy and childbirth and 5) they received anti-pain treatment according to hospital standards

The independent variable was the intervention of affirmation-tapping and the dependent variables

were pain perception and serotonin level. The data collection tools were 1) the guidelines of the affirmation - tapping procedure, 2) the McGill - Melzack Pain short-form questionnaire with permission from Prof. Melzack, with the language adjusted accordingly (Katz & Melzack, 2011)(Hargiyanto, 2008) and 3) the equipment used for taking venous blood specimens (Simundic et al., 2017). The serotonin level was analyzed using ELISA kits (Elabscience, 2019), carried out by the Institute of Tropical Disease (ITD) Universitas Airlangga. The ELISA kit used the Competitive-ELISA principle. The micro ELISA plate provided in this kit was pre-coated with ST/5-HT. During the reaction, ST/5-HT in the sample or standard competes with a fixed amount of ST/5-HT on the solid phase supporter for sites on the Biotinylated Detection Ab specific to ST/5-HT. Excess conjugate and unbound sample or standard were washed from the plate, and Avidin conjugated to Horseradish Peroxidase (HRP) was added to each microplate well and incubated. An TMB substrate solution was then added to each well. The enzyme-substrate reaction was terminated by the addition of a stop solution and the color change was measured spectrophotometrically at a wavelength of  $450 \text{ nm} \pm 2 \text{ nm}$ . The concentration of ST/5-HT in the samples was then determined by comparing the OD of the samples to the standard curve (Elabscience, 2019).

All groups got standard treatment, with the affirmation treatment groups getting these plus affirmations for 10 minutes. The tapping group added tapping for 5 minutes while the affirmation group - tapping added affirmations and tapping at the same time for 10 minutes. The control group only received standard treatment four hours after the end of the anesthesia. The distance between the treatments was 8 hours, and they were given four treatments. Following this, 10 minutes after the last treatment, the pain perception data was collected using MPQsf. The venous blood specimen was then taken for the examination of the serotonin levels using the ELISA method.

The data analysis was directed at examining the different effects of serotonin on pain perception due to affirmation - tapping. The serotonin data processing and pain perception of the four groups was performed through simple linear regression with a defined level of significance of 95%. The research protocol obtained an ethical approval certificate from the Surabaya Ethics Hospital Health Research Commission, Number 073/37/KOM.ETIK/2017.

## RESULTS

The characteristics of the participants from all groups have been listed in the following table. The oldest mean age was  $32,1 (\pm 5,8)$  and the youngest was  $29,3 (\pm 6,1)$ . The highest body weight was  $56,5 (\pm 7,8)$ . The highest body height was  $164,5 (\pm 8,8)$  and the lowest was  $159,6 (\pm 4,6)$ . The highest systolic pressure was

Table 1. Characteristic of Respondents (n=40)

Variables	Groups							
	Affirmation (n=10)		Tapping (n=10)		Affirmation-tapping (n=10)		Control (n=10)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age (year)	32.1	5.8	31.1	6.4	31.4	5.1	29.3	6.1
Body weight (kg)	55.7	4.9	54.4	7.9	56.5	7.8	52.9	6.4
Body height (cm)	164.5	8.8	161.6	5.9	159.6	4.6	160.5	4.2
Systolic pressure (mmHg)	126.8	4.7	127.9	4.3	125.9	6.5	125.5	5
Diastolic pressure (mmHg)	79.6	1.3	78.6	5.1	81.5	6.9	84	7
Pulse rate	88.2	0.6	88.2	3.8	84.6	3.8	87.2	2.7
Respiration rate	21	3	20.8	2.5	20.4	2.1	21.2	2.1

\*SD: Standard Deviation

Table 2. Serotonin levels (ng / mL) and pain perception per group (n=40)

Variables	Groups							
	Affirmation (n=10)		Tapping (n=10)		Affirmation-tapping (n=10)		Control (n=10)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Serotonin	0.50	0.02	0.37	0.06	0.69	0.13	0.19	0.03
Pain perception	3.93	0.59	4.79	0.6	3.2	0.83	4.92	0.52

\*SD: Standard Deviation

127,9 ( $\pm$  4,3) and the lowest was 125,5 ( $\pm$  5,0). The highest diastolic pressure was 84,0 ( $\pm$  7,0) and the lowest was 78,6 ( $\pm$  5,1). The highest pulse frequency was 88.2 ( $\pm$  0,6) and the lowest was 84,6 ( $\pm$  3,8). The highest respiratory rate was 21,2 ( $\pm$  2,1) and the lowest was 20,4 ( $\pm$  2,1). The data on age, weight, height, systolic and diastolic pressure, pulse and breathing is normally distributed ( $-2 <$ Skewness Ratio  $<2$ ), so comparative analysis can be performed between the groups in Table 1.

From Table 2, it can be seen that the highest serotonin mean was found in the affirmation-tapping treatment group ( $0,69 \pm 0,13$ ) with the lowest pain perception ( $3,20 \pm 0,83$ ). In order to test the effect of treatment on pain perception related to the serotonin serum levels, simple linear regression analysis was performed. The normality regression requirements are that there is normally distributed residual data. The normality test results obtained an unstandardized residual Sig = 0,072 ( $> 0,05$ ), so it can be concluded that the distribution is normal. The simple linear regression analysis results obtained a Sig value = 0.00 ( $<0.05$ ). This means that there is an influence between serotonin and pain perception as a result of affirmation - tapping.

## DISCUSSION

The data processing proves that affirmation - tapping treatment can help the patients to reduce pain perception after caesarean section surgery. The clinical trial studies conducted in the hospital prove that affirmative-tapping as a complementary approach has been able to reduce the pain of traumatized patients. The most complementary approach was to utilize integrative medicine for the postoperative care of patients (Moon, Shin, Shin, Kwon, & Lee, 2017). Research on affirmative-tapping approaches has also helped to reduce dysmenorrhoea

pain in adolescents (Lenni Sastra, Jasmarizal, 2016). Research conducted by Wijiyanti has also proven that the affirmation-tapping approach can reduce pain after caesarean section surgery (Wijiyanti, 2010). The affirmation-tapping approach has also been proven to reduce the pain suffering of cancer patients (Taber, Klein, Ferrer, Kent, & Harris, 2016), control fibromyalgia pain complaints (Benor, Rossiter-Thornton, & Toussaint, 2017) and control the pain and depression complaints of war veterans (Beiranvand, Noparast, Eslamizade, & Saedikia, 2014; Church, 2014).

The biological perception of pain is an accumulation of stimulus and response performance results that are controlled consciously or outside of the consciousness by the brain, especially the forebrain and the central nervous system including the spinal cord (Bushnell, Ceko, & Low, 2013; Thakur, 2015). By utilizing the descendent and ascendant mechanisms of action, the journey of the stimulus and pain response can be controlled using neurotransmitter media via the forebrain and amygdaloid (Bourbia, 2015; Thompson & Neugebauer, 2017).

The empowerment of the forebrain by affirmation can eliminate the default - inhibition (inhibitory functional work as a necessity) from the amygdaloid (Bourbia, 2015) so as to activate the descendent pathway that blocks pain signals that lead to the dorsal horn spinal cord. This means that pain transduction through the ascendant pathways to the central nerves and brain can be prevented (Neugebauer, 2015). Praying by focusing one's attention and thoughts on God followed by acupoint stimulation through affirmation-taping will increase the level of serotonin (Liu, Tan, Molassiotis, Suen, & Shi, 2015; Ménard, Pfau, Hodes, & Russo, 2017). This will modulate their pain perception (Martin et al., 2017).

Affirmations using prayers that are uttered with sincerity and confidence can double the empowerment in the forebrain and amygdaloid, boosting performance so then the function of pain control becomes better and more effective (Beiranvand, Noparast, et al., 2014; Fajarudin, 2006; H.M. Amin Syukur; Fathimah Usma, 2012; Neugebauer, 2015). Tapping as a form of acupoint stimulation can inhibit the transduction of pain from various areas of the body to the center, thereby the pain stimulation from surgical wounds can be inhibited. Consequently, the participants do not suffer from pain (Liu et al., 2015).

Affirmations - tapping increases serotonin levels, thereby it is able to strengthen the performance of descendent pain inhibition, thus inhibiting the transduction of pain from the peripheral to the center, thus overcoming the pain complaint (Emami, 2018). The limitation of this study is that no screening for participants with diabetes mellitus was performed.

Affirmations done using prayers from Al-Fatihah followed by tapping on several acupoints can reduce the complaint of post-surgical pain. Affirmation-tapping interventions can be continued and recommended by nurses who have been trained and licensed to do so.

## CONCLUSION

Participant pain complaints were lowest in the affirmation-tapping group with the highest serotonin levels. This is significantly different from the other groups. Affirmations - tapping has been proven to have a therapeutic effect in the context of overcoming post-caesarean section pain complaints. The novelty of the study is the affirmation-tapping performance when dealing with pain complaints associated with increased serotonin. Affirmations - tapping with Al-Fatihah prayers can thus be recommended to overcome pain complaints as a complementary approach to nursing.

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Original Research

## Analysis of the Risk Factors Related to the Occurrence of Juvenile Delinquency Behavior

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### ABSTRACT

**Introduction:** Nowadays, juvenile delinquency is increasing in terms of number and type. Delinquency and criminality among teenagers is generally categorized as deviant behavior in society and this can be interpreted as a form of teenage resistance to the normative rules and values that apply in society. Many risk factors are related to deviant behavior. This study aimed to analyze the risk factors that influence the occurrence of juvenile delinquency.

**Methods:** This study used a cross-sectional design and a simple random sampling technique. The calculation results involved 295 samples, consisting of 235 students in junior - senior high schools and vocational schools in Malang, and 60 teenagers in the 1<sup>st</sup> class Children's Prison of Blitar. The independent variables were the individuals, their families, the school environment, their peer groups, coping mechanisms, lifestyle and technology. The dependent variable was juvenile delinquency. The data was collected using a questionnaire. The analysis used a logistic regression test with a significance level of  $\alpha < 0.05$ .

**Results:** There were six variables that significantly influence juvenile delinquency, namely individual, family, school environment, peers, life style and technology. Technology is the variable that has the greatest influence on the occurrence of juvenile delinquency.

**Conclusion:** Technology is the most influential factor related to the cause of juvenile delinquency. These results indicate that significant shift in the causes of juvenile delinquency from family and peer factors to technological factors. This is quite reasonable because technology is a major need and it is a trend for teenagers at this time.

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### INTRODUCTION

Juvenile delinquency has occurred since the early 19th century and it has become a global problem, including in Indonesia. Juvenile delinquency is included in several social disorders and the incidence rate has continued to increase. This phenomenon occurs in all levels of society, in both men and women, in cities and in villages and within high or low socio-economic circles (Steketee & Gruszczynska, 2010). Delinquency and crime among teenagers is generally categorized as deviant behavior in society. These behavioral deviations can be interpreted as a form of teenage resistance to the normative rules and values that apply in society

(Badan Pusat Statistik, 2010). Juvenile delinquency is one form of mental health disorder in the community, which directly or indirectly can affect the degree of mental health of the community as a whole. Short-term impacts can be dangerous directly to the safety of teenagers and groups. Fights, brawls and speeding will potentially lead to injury and possibly even death. Narcotics can threaten their lives and society, while potential free sexual behavior can incur the risk of sexually transmitted diseases, and other harmful effects. The long-term impact is the threat of future loss meaning that they cannot take part in the development of the nation and state. This is not in line with the expectation that

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teenagers are the spearhead of development and the next generation of the nation (Anjaswarni, 2014).

It is explained that adolescents have a difficult time. Adolescence is a period of transition from childhood to adulthood that is full of responsibility, where they are required to be able to adapt to these changes (Stuart, 2014). Adaptation failure will lead to problems and behavioral disturbances in the future. This is relevant to the coping mechanisms owned by individuals because coping mechanisms are a measure of the ability of the adolescent to solve problems.

Furthermore, the factors that play a role in juvenile delinquency refer to the actors who originate from their individual factors. Individual factors are internal factors that are related to the abilities and abilities of individuals in running their roles and social activities. Individual factors that were measured in this study include life skills, self-efficacy, religion and academic competencies. A factor that also acts as a risk factor for juvenile delinquency is the family. The family is an external factor related to psycho-educative and sociocultural influences which are given by the family to the individual (children), which can impact their development. The family factor is related to the attitudes and habits of the parents when educating and caring for their children including how the parents facilitate the economic needs of the child, including in terms of personal communication patterns and proximity (bonding) (Calhoun, Glaser, & Bartolomucci, 2001; Stuart, 2014). The next external factor is the school environment and peer groups. School is an environmental situation that can affect the children's development and health. School factors that become a risk factor for juvenile delinquency are related to various things that exist in the school environment including child relationships with the teachers and their peer group, the presence of children in the school, and adherence to school rules. For the peer group factors that are risk factors for juvenile delinquency, there is the frequency of children being exposed to harmful substances, both through directly seeing and by seeing events in the mass media. Included in the peer group factor is attitude and relationship patterns (Calhoun et al., 2001).

The development and use of technology today also plays a role in the occurrence of delinquency. The incorrect use of technology can have the effect of deviating behavior including violence, theft, and so on. Research shows that playing violent video games correlates with the occurrence of aggression in juvenile delinquents that are imprisoned (DeLisi, Vaughn, Gentile, Anderson, & Shook, 2013). Another factor that contributes to juvenile delinquency is

lifestyle. Changes in lifestyle due to environmental differences in the past and present will affect their psychological well-being. Individuals who are not able to adapt to these lifestyle changes will experience welfare problems (Heath & Berman, 2008). A bad lifestyle has the potential to trigger juvenile delinquency. Based on the background above, it is necessary to analyze the various risk factors that play a role in juvenile delinquency. The purpose of the study was to analyze the risk factors that influence juvenile delinquency. There are seven factors that will be analyzed in this study, including the individual, coping mechanism, family, school environment, peer, lifestyle and technology factors.

## MATERIALS AND METHODS

This type of research was observational with a cross-sectional design (Nursalam, 2014). Data retrieval was carried out from November 2018 to January 2019. The population was teenagers aged 12-19 years. The number of samples consisted of 295 teenagers who attended schools in Malang City, East Java - Indonesia, and teenagers who were undergoing coaching in 1<sup>st</sup> class Children's Prison of Blitar (235 students and 60 adolescents in the children's prison). The sampling technique was a simple random sampling.

The researchers applied for ethical clearance first. After they had been declared to have passed the ethical test, they then administering the research permit to the National and Political Unity Agency, the Education Office and the schools selected according to the sampling map. Permission was asked of the East Java Province Ministry of Law and Human Rights (KEMENKUMHAM) to provide a research permit recommendation to the 1<sup>st</sup> class Children's Prison of Blitar. After getting permission, this was followed by the retrieval of the data that began with providing an explanations and informed consent to the students as the respondents with their parents and/or teachers representing the parents. The teenagers in 1<sup>st</sup> class Children's Prison of Blitar were with their prison providers or parents to allow the researcher to provide an explanations and to request parental consent through telephone contact or as part of a direct interaction. The data was collected using a questionnaire. The respondents provided an assessment of her or himself by giving an appropriate score. The data was recapitulated, entered into the SPSS program and analyzed.

Table 1. Distribution of Respondent's Characteristic Based on Gender, Age, Level of Education, Living With, and Law Case

Characteristic	Adolescent students		Adolescent in children's prison		n
	n	%	n	%	
Gander					
Male	110	46,8	60	100	295
Female	125	53,2	0	0	
Age					
12 - 15 years old	73	31,1	8	13,3	
> 15 - 18 years old	117	49,8	28	46,7	295
> 18 - 19 years old	45	19,1	24	40,0	
Level of Education					
No School / Elementary	0	0	18	30	
Junior High School	122	51,9	30	50	295
Senior High School / Vocational Educational	113	48,1	12	20	
Living With					
Nuclear Family	191	81,3	22	38	
Father and brothers/sisters	15	6,4	12	20	
Mother and brothers/sisters	11	4,7	10	16	295
Grandfather / Grandmother	4	1,7	8	13	
Extended family	2	0,9	3	5	
Alone	12	5,1	5	8	
Law Case (Adolescents in children's prison)					
Fight/Brawl/violence			12	20	
Theft/Snatching/Robbery			15	25	
Substance abuse			16	26,7	
Vandalism / destruction			1	1,7	60
Obscene/ free sex/ sex abuse			8	13,3	
Murder			8	13,3	

The data was collected using a questionnaire tested for validity and reliability. This instrument was valid at  $r = 0,312$  and reliable at  $\alpha = 0,570 - 0,935$ . The instrument was developed by referring to the Juvenile Counseling and Assessment Program Model (JCAP Model). The risk factors included the factors of the individual, family, school, and peer group, coping mechanisms, lifestyle and technology. Individual factors include lifestyle, self-efficacy, religious and academic competencies. Family factors include economic status, family communication and relations, family function, parenting and bonding. The school environment includes school policy, presence pattern, the teacher-student relation and the child's relationship with the school. Peer group includes the pattern of peer relations, exposure to substances, and peer attitude. Coping mechanism includes problem-focused coping, emotion-focused coping, and dysfunctional coping. Lifestyle includes physical activities, sleep pattern, free time utilization, and recreation. Technological factors include using gadgets, spectacles, and video games (Abdulkarim, Zainul, & Maryani, 2014; Baqutayan, 2015; Calhoun et al., 2001; Heath & Berman, 2008;

Henggeler, Edwards, & Borduin, 1987; Stuart, 2014). The juvenile delinquency instruments were developed based on theory (Anjaswarni, 2014; Heilbrun, Goldstein, & Redding, 2005; Kratcoski & Kratcoski, 1990).

The respondents assessed the independent variable associated with himself as the risk factors and their behavior was the dependent variable. The subject circled number 1 (strongly disagree), 2 (disagree), 3 (agree) or 4 (strongly agree) regarding the measured independent variables. For the instruments related to the dependent variable, the respondents were asked to rate the degree of frequency associated with their behavior by circling the numbers 0 (never), 1 (sometimes), 2 (often) and 3 (always).

All of the data was analyzed using the SPSS 20.00 software. The analysis was done in two ways, descriptive and through the bivariate analysis of the risk factors (independent variables) on juvenile delinquency (dependent variable). The logistic regression test used the enter method to find out the magnitude of the influence (Odds Ratio) of each risk factor on the occurrence of juvenile delinquency.

Table 2: Descriptive Analysis of the Seven Risk Factors

Variable (Risk Factors)	Juvenile delinquency		n
	Not	Yes	
<b>Individual Factors</b>			
Lack	33(43.4%)	43(56.6%)	76(100%)
Good	77(52.7%)	69(47.3%)	146(100%)
Very Good	47(64.4%)	26(35.6%)	73(100%)
Total	157(53.2%)	138(46.8%)	295(100%)
<b>Coping Mechanism</b>			
Maladaptive	70(47.3%)	78(52.7%)	148(100%)
Adaptive	87(59.2%)	60(47.3%)	147(100%)
Total	157(53.2%)	138(46.8%)	295(100%)
<b>Family Factors</b>			
Less	32(41.6%)	45(58.4%)	77(100%)
Supportive	83(56.5%)	64(43.5%)	147(100%)
Very Supportive	42(59.2%)	29(40.8%)	71(100%)
Total	157(53.2%)	138(46.8%)	295(100%)
<b>School Environmental Factors</b>			
Less	23(28%)	59(72%)	82(100%)
Support	84(57.5%)	62(42.5%)	146(100%)
Very Supportive	50(64.4%)	17(35.6%)	67(100%)
Total	157(53.2%)	138(46.8%)	295(100%)
<b>Peer Group Factors</b>			
Lack of Solidity	70(80.5%)	17(19.5%)	87(100%)
Solid	79(57.7%)	58(42.3%)	137(100%)
Very Solid	8(11.3%)	63(88.7%)	71(100%)
Total	157(53.2%)	138(46.8%)	295(100%)
<b>Lifestyle Factors</b>			
Lack	31(34.4%)	59(65.6%)	90(100%)
Good	87(60%)	58(40%)	145(100%)
Very Good	39(65%)	21(35%)	60(100%)
Total	157(53.2%)	138(46.8%)	295(100%)
<b>Technology Factors</b>			
Poor/Low	78(83.0%)	16(17.0%)	94(100%)
Enough	66(51.6%)	62(48.4%)	128(100%)
High	13(17.8%)	60(82.2%)	73(100%)
Total	157(53.2%)	138(46.8%)	295(100%)

This research was approved by the Health Research Ethics Commission (KEPK) of the Faculty of Public Health, Airlangga University Surabaya, number 534/EA/KEPK/2018. Based on the results of the ethical review, the research protocol was declared to have passed the ethical test and thus the study could be continued to the next research process.

## RESULTS

The data obtained consists of interval data converted into categorical data. The following describes the results of the descriptive analysis on the Distribution of the Respondent's Characteristic and each variable. It also shows the results of the bivariate analysis and the effect of the risk factors (independent variables) on juvenile delinquency (dependent variable).

### Distribution of the Respondent's Characteristics

The respondents consisted of two groups, 1) respondents who were adolescents in junior and senior high school, and vocational school and 2) respondents who were adolescents in the 1<sup>st</sup> class children's prison of Blitar, see Table 1.

### Descriptive Analysis of the Risk Factors (Independent Variables)

The results of the cross-sectional analysis (cross tabulation) between the seven risk factors are related to the individual, coping mechanism, family, school environment, peer group, lifestyle and technology factors, as shown in table 2.

The results of the individual factors are divided into three categories, namely individuals with competence that is lacking, good and very good, as seen in Table 2. Based on Table 2, it is known that most individuals have competencies in the good and very good categories. Based on cross-tabulation, it is known that juvenile delinquency tends to occur where there are lacking or poor individual characteristics. Coping mechanism ranges from



adaptive to maladaptive. The results of this coping mechanism analysis have been grouped into two

Table 3. Overview of Juvenile Delinquency Based on the Type of Deviant Behavior

Type of Deviant Behavior	Low	low - moderate	Serious
Violent Behavior	101 (34.2%)	126 (42.7%)	68 (23.1%)
Theft/ Deprivation	143 (48.5%)	103 (34.9%)	49 (16.6%)
Use of drugs	140 (47.5%)	84 (28.5%)	71 (24.1%)
Destructive an property	80 (27.1%)	174 (59.0%)	41 (13.9%)
Sexual Abuse / Harassment	120 (40.7%)	115 (39.0%)	60 (20.3%)
Murder	250 (84.7%)	33 (11.2%)	12 (4.1%)

Table 4. Analysis Test Results of the Risk Factors on the Occurrence of Juvenile Delinquency

Risk Factors	B	P-value (sig)	Odds Ratio (Exp B)
Individual	-0.039	0.008	0.962
Coping mechanism	-0.038	0.186	0.963
Family	-0.020	0.005	0.980
School environment	-0.116	0.000	0.891
Peers	0.268	0.000	1.307
Lifestyle	-0.111	0.000	0.895
Technology	0.346	0.000	1.413

trends; adaptive or maladaptive using certain cut-off points. Based on Table 2, it is known that juvenile delinquency tends to occur in adolescents with maladaptive coping mechanisms.

The results of the family factor analysis can be divided into three categories of support; less family support, supportive, and very supportive. The results in Table 2 show that most of the support that the families give to their teenagers is supportive and very supportive. Based on percentage, it is known that juvenile delinquency tends to occur in families that are less supportive. The results of the analysis of the school environment factors have been divided into three categories of support, namely that the school environment is less supportive, supportive and very supportive. Based on Table 2, it is known that the school environment mostly provides support and that it is very supportive. Based on percentage, it is known that juvenile delinquency tends to occur in a less supportive school environmental.

The results of the analysis of peer groups are divided into three categories, namely the influence of peers who are lack solidity, who are solid and who are very solid. Based on percentage, it is known that juvenile delinquency tends to occur in

adolescents who make peer friendships that are very solid.

The results of the analysis of the lifestyle factors are divided into three categories, namely that their lifestyle is lacking, good or very good. Most of the teenager's lifestyles are in the good and very good categories. Based on percentage, it is known that juvenile delinquency tends to occurs in teenagers with a lack of lifestyle. The results of the analysis of the technology factors are divided into three categories, namely the poor use of technology by teenagers, using it enough and using it to a high degree. Based on Table 2, it is known that most teenagers use technology to a high degree. Based on percentage, it is known that juvenile delinquency tends occurs in adolescents who use a lot of technology.

### Descriptive Analysis of Juvenile Delinquency (Dependent Variable)

Juvenile delinquency, which is the indicator in this study, contains the 6 types of hate based on the results of the previous studies. The description of juvenile delinquency based on type is as shown in Table 3. Based on Table 3, it is known that the most juvenile behavior refers to substance use including narcotics, alcohol, psychotropics and other addictive substances (NAPZA) in groups, in addition to violent behavior and sexual abuse or harassment. Next, to find out the effect strength of the independent variables on the occurrence of juvenile delinquency, logistic regression tests were conducted using the enter method.

### Logistic Regression Test Analysis Risk Factors for Juvenile Delinquency

The analysis results used to determine the power of influence of the risk factors (independent variable) on juvenile delinquency (dependent variable) can be identified based on the value of the *Odds Ratio* (OR) as in Table 4. Based on Table 4, the results of the analysis of the individual factors, showed that the P-value = 0.008 at alpha = 0.05, so it can be concluded that the individual factors significantly influence the occurrence of juvenile delinquency. The results of the analysis of coping mechanism, obtained a P-value = 0.186 at alpha = 0.05, so it can be concluded that the coping mechanism factors not significantly influence the occurrence of juvenile delinquency. The results of the analysis of the family factors obtained a P-value = 0.005 at alpha = 0.05, so it can be concluded that family factors significantly influence the occurrence of juvenile delinquency. The results of the analysis of the school environmental factors obtained P-value = 0.000 at alpha = 0.05, so it can be concluded that the

school environmental factors significant influence the occurrence of juvenile delinquency.

The results of the analysis of the peer group factors obtained P-value = 0.000 at alpha = 0.05, so it can be concluded that peer group factors significantly influence the occurrence of juvenile delinquency. The results of the analysis of lifestyle factors obtained P-value = 0.000, at alpha = 0.05, so it can be concluded that lifestyle factors significantly influence the occurrence of juvenile delinquency. The results of the analysis of technological factors obtained P-value = 0,000 at alpha = 0.05, so it can be concluded that technological factors significantly influence the occurrence of juvenile delinquency.

Based on Table 4, it is known that of the seven risk factors, those that have a significant effect on juvenile delinquency total six, namely the variables of the individual, family, school environment, peers, lifestyle and technology. Coping mechanisms do not have a significant influence on the occurrence of juvenile delinquency. The results of the analysis also show that technology is the most influential factor in terms of the occurrence of juvenile delinquency with an Odds Ratio (OR) of 1.413. This means that the use of technology in adolescents by 1,413 times will increase the occurrence of juvenile delinquency. Based on the OR value, it is known that after the technological factors, the factors that influence juvenile delinquency are their peers, family, the individual, lifestyle and the school environment.

## DISCUSSION

Based on the results of the analysis, it is known that individual factors significantly influence juvenile delinquency. This is quite reasonable because every individual has the right to have the opportunity to do what they want. Individuals who do not have the ability or competencies for certain life skills (hard skill and soft skill), who do not have confidence in their success in the future, who do not have a good foundation of faith, have the potential to act according to their wishes. This is in accordance with the researcher's opinion that life skills or individual competence affects juvenile delinquency (Calhoun et al., 2001). This is in line with the opinion of Robles that life skills in the form of soft skills are the interpersonal qualities and personal attributes that a person has (Robles, 2012). Soft skills are a personal and interpersonal behavior related to developing and maximizing human appearance or performance. This opinion means that if an individual has life skills or competencies, then they will show their quality of life and avoid inappropriate behavior. Conversely, if individuals do not have the ability then they will do something to meet their needs by justifying any means.

Coping mechanism factors do not have a significant influence on juvenile delinquency. This is not in accordance with the theory that maladaptive coping mechanisms have the potential for delinquency. An individual failure when solving problems will have the potential for behavioral disorders including juvenile delinquency. The problem of juvenile delinquency when it occurs is not only determined by the tendency to use coping mechanisms. It depends on the results of the problem solving that they do and this is supported by the environment, namely the family environment, especially the role of their parents, peers and the school environment, in this case the teacher's role. Folkman & Lazarus cited by Baqutayan (2015) explained that coping mechanisms are cognitive and behavioral efforts to master, reduce, or tolerate demands and stress. Coping mechanisms are used by individuals to ease the burden of the effects of stress. This opinion is in accordance with experts who have explained that coping mechanisms are a direct effort in stress management in order to defend themselves to create adaptive behavior. Coping mechanisms can be constructive or destructive (Stuart, 2014).

The results of the family factor analysis found that there is a significant effect on juvenile delinquency. This is accordance with the opinion of experts that the family is a risk factor that affects the occurrence of juvenile delinquency. Families that influence juvenile delinquency have high levels of family dynamics, violence, poverty, family dysfunction, and poor family communication and relations (Henggeler et al., 1987). This result is also in accordance with the opinion of experts who stated that parenting and bonding has an impact on the children's development. Poor parenting results in poor mother-child bonding (poor bonding) which can eventually lead to criminal behavior in children (Tremblay & Craig, 1997). In the opinion of the researchers, family factors are a risk factor that has a great potential for juvenile delinquency. This should get serious attention. Currently, family factors are not a dominant risk factor. There are other factors that are more dominant. This opinion is quite reasonable because each individual child learns life starting from the family environment. Families have a significant role in the success of their children in both the present and future.

School environment factors significantly influence juvenile delinquency. This is in accordance with experts who state that the school environment is an environment outside of the family that contributes to juvenile delinquency (Calhoun et al., 2001). In the opinion of researchers, this is quite reasonable because schools are places where their peers meet, which also has a strong influence on adolescent behavior. The incompatibility of the school policies or rules and the pattern of the teacher-student relations creates the potential for adolescents to rebellion against the existing rules.

Peers have a significant effect on juvenile delinquency. This is also in line with the researcher

who found that juvenile delinquency is related to peer influence, antisocial behavior, and the quality and level of relationships in the group (Howell & Lipsey, 2012). This is further explained by other experts where bad friendships can result in problems in schools which can eventually lead to criminal behavior in children (Tremblay & Craig, 1997). In the opinion of the researcher, this is quite reasonable because peers have a big influence. This is because friendships are their main concern. At the age of adolescence, children are more likely to gather with their peers than with their parents. Teenagers are comfortable if they gather with their peers because they have the same problems. Thus, if the peer group is bad, then it will also have a negative impact on the individual adolescents.

Lifestyle factors significantly influence juvenile delinquency. This is in accordance with the theory that a good lifestyle will have a good impact on adolescents. Conversely, a bad lifestyle will have an adverse effect on adolescents. Sleep rest patterns explain that sleep disorders or poor sleep patterns will interfere with emotional stability. Individuals become irritable as a result. Emotional disorders that occur due to disturbances related to sleep patterns that are not good will have the potential for violence (Taylor, Lillis, LeMone, & Lynn, 1997). Likewise, the habit of an exercise activity or recreation can reduce tension so as to make the individual behavior more adaptive. The inappropriate use of leisure time and recreational culture will have an impact on health (Tekin, 2010).

Technological factors significantly influence juvenile delinquency. This is in accordance with the opinion which explains that the development of information and communication technology through the internet and cellphones (cellphones) is a phenomenon of modern society that cannot be stopped. This can have an impact on society, both positive and negative (Abdulkarim et al., 2014). This result is quite relevant because of the phenomena of life in today's technological era, making the internet and cellphones a necessity. Individuals are more pleased with cyberspace than the world of reality by using the internet and cell phone facilities that they have.

Related to the six indicators of juvenile delinquency behavior, it is known that most juvenile behavior relates to the use of substances including narcotics, alcohol, psychotropics and other addictive substances (NAPZA). This is in addition to violent behavior and sexual abuse. In the opinion of the researchers, this is quite reasonable because adolescence is a period of crisis. It is a period where the person is always curious, and it is a period of trial and error. The amount of information from the various media about substance users (drugs) can stimulate the teens to try them. Likewise with violence and sexual abuse. For violence, it is usually driven by a high tolerance for the group or self-esteem that is too high so then they are very sensitive to criticism. Regarding sexual abuse, they

are usually driven by curiosity and trial and error after being exposed images or videos obtained from downloads from electronic media.

Furthermore, the results of the logistic regression test with the enter method make it known that there are six risk factors that significantly influence juvenile delinquency, namely individual, family, school environment, peers, lifestyle and technology variables. Coping mechanisms do not have a significant influence. Associated with coping mechanisms not having a significant effect, in the opinion of the researchers, this is because these factors are not dominant in terms of influencing adolescent attitudes and they are internal. It is known that external factors are factors that have a more powerful influence on adolescents. The possibility of a coping mechanisms will be maladaptive if the external push is too strong in adolescents. The problem of juvenile delinquency is not only determined by the tendency to use coping mechanisms, but it also depends on how they are supported by the environment, especially the family environment, which relates to the role of the parents.

The results of the analysis also show that technology is the most influential factor in juvenile delinquency when compared to the other factors. This is in accordance with the opinion that explains that the development of information and communication technology through the internet and cellphones (cellphones) is a phenomenon of modern society which can have an impact on society itself both positively and negatively (Abdulkarim et al., 2014). There has been a significant shift in social life related to the cause of adolescent problems. Previous research explains that the family is a dominant factor related to the causes of adolescent problems. At this time, the cause of problematic youths (juvenile delinquency) has shifted from the original family and peer factors as the dominant factors to the technological factor. This is quite reasonable because currently, technology has become a major requirement for adolescents. Every day, every person and not only teenagers but also children, adults and even old people, use gadgets for their needs. These needs can include games, socializing, communication, or for educational, work and business needs. Nowadays, technology is a vital thing.

According to the results of the study, prevention efforts are needed to prevent the occurrence of juvenile delinquency. One of the suggested prevention methods is early detection of risk or potential juvenile delinquency by examining the influential risk factors. Adolescents should be wise when utilizing technology and choosing their peers. Their parents and teachers could and should provide good relations and communication in order to create a conducive environment at home and in school.

## CONCLUSION

Technology is the factor that has the most influence on juvenile delinquency. Inappropriate use of technology, for example, the wrong use of gadgets, has the potential for juvenile delinquency. This shows that in the current digital era, there has been a significant shift in the causes of juvenile delinquency, from family and peer factors to technological factors. This is reasonable because technology is now a major need for teenagers. Based on these results, further analysis is needed regarding the indicators of the factors that influence juvenile delinquency in order to develop new instruments for the purpose of the early detection of juvenile delinquency behavior.

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Original Research

## The Effectiveness of Prone and Supine Nesting Positions on Changes of Oxygen Saturation and Weight in Premature Babies

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### ABSTRACT

**Introduction:** Stress experienced by the baby will affect the body's function by increasing the body's metabolism. Nesting is used to reduce stress in premature babies. Nesting can be done in a supine or prone position. Few studies have examined the effects of body position on body weight and oxygen saturation. The objective of the study was to determine the difference in oxygen saturation and weight change on the use of nesting in the prone and supine positions in premature babies.

**Methods:** The research used a quasi-experimental design. The sample consisted of 30 premature babies, which was obtained using a consecutive sample technique. The independent variables were nesting positioning (supine and prone), and the dependent variables were oxygen saturation and body weight. The data of oxygen saturation and the baby's weight were collected using pulse oximetry; the baby's weight scale used observation sheets. The data was analysed using the t-test, Wilcoxon Sign Ranks Test, and Mann Whitney U Test.

**Results:** The results showed that there was a difference in oxygen saturation before and after the use of nesting in the supine ( $p=0.001$ ) and prone position ( $p=0.000$ ). There was a weight difference before and after the use of nesting in both supine ( $p=0.000$ ) and prone position ( $p=0.000$ ). There was no difference in oxygen saturation value and infant weight, before or after, between the supine position and the prone position ( $p=0.18$ ;  $p=0.9$ ).

**Conclusion:** The use of nesting in both positions (supine or prone) can increase oxygen saturation and infant weight. Researchers recommend the use of nesting with supine or prone positions routinely in premature babies.

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### INTRODUCTION

The process of environment adjustment for premature babies is going to be more difficult. This difficulty of adjustment is due to immaturity of the organ system (Sari, 2018). Immunity of organs in premature babies includes immaturity of the nervous system and low stability in the physiological functions of the infant, low ability to solve stress in the infant will affect the body's function, and will affect the function of the hypothalamus, which will adversely affect growth, heat production and neurological mechanisms (Hockenberry & Wilson, 2013). Stress in the baby will affect the function of the body by increasing its metabolism, so it requires more oxygen consumption to stabilize physiological functions.

The WHO stated that 44% of infant deaths in the world in 2012 occurred within the first 28 days, and the major cause was premature birth, accounting for approximately 37% (WHO, 2012). In Indonesia, based on data from the Health Profile of Indonesia in 2014, it states that the highest incidence of deaths in babies occurred during the neonatal stage. Basic Health Research (Ministry of Health of the Republic of Indonesia, 2018) showed that 78.5% of deaths occurred in neonates at 0-6 days).

Increased oxygen consumption will cause a risk of respiratory distress, acidosis and hypoxia (Hockenberry & Wilson, 2013). Physiological changes in increasing stress hormones increase pulse rate and decrease oxygen saturation (Oken, Chamine, & Wakeland, 2015). Another impact of stress

experienced by premature babies can lead to excessive use of energy, causing barriers to energy conservation resulting in weight gain difficulties (Hockenberry & Wilson 2013). Low-weight babies will have a much heavier adaptation than high-weight babies (Bayuningsih, 2011).

One effort in the provision of developmental care is to set a comfortable position on the neonate using nesting. Nesting is a material made of phlanyl fabric with the length adjusted to the baby's body length which acts as a protective position for the baby so that it is not in an extension condition, and also keeps the baby's position changing as a result of gravity (Kahraman, Başbakkal, Yalaz, & Sözmen, 2018). The benefit of using nesting in neonates is to facilitate hand to hand and hand to mouth position patterns so that the flexion position is maintained (Priya & Biljani, 2005).

Another study on the benefits of nesting explains that nesting is effective in improving comfort and hemodynamic stability in weight babies in the Neonatal Intensive Care Unit (NICU) (Anju & Paulose, 2015). The use of nesting in premature babies is done in the prone or supine position. Bayuningsih, Rustina, & Widyatuti (2011) conducted a study of the effectiveness of nesting and prone position against oxygen saturation and pulse frequency in premature babies. It was found that there was a significant difference in oxygen saturation in infants using nesting in the prone position. Based on studies in the perinatology room of one of the referral hospitals in Bandung, where nesting is used with supine position, the baby looks more comfortable, sleeps longer and allows the nurse to observe it. Based on a previous study on 6 infants with 3 infants using the prone position while in nesting, and 3 infants positioned in supine flexion. It was found that oxygen saturation was increased in all infants, but increases were found in oxygen saturation in 2 infants in the prone position, which is lower than the others because the two infants look uncomfortable and always moved; after their position was changed in the supine, they did not move much, and oxygen saturation increased. From the results of previous study and existing phenomena in the room, researchers were interested in examining whether using nesting and the supine baby position influences oxygen saturation and infant weight in response to physiological stability. Thus, the objective of this study was to identify oxygen saturation and body weight in premature babies before and after using nesting in the supine and prone positions.

## **MATERIALS AND METHODS**

The design of this study used a quasi-experimental design. The population in this study were premature babies treated in the perinatology ward in one of the referral hospitals in West Java Province, and the average number of babies undergoing treatment each month was 40 babies. The research sample used a consecutive sampling technique. The sample

inclusion criteria were premature babies weighing 1500-2000 grams, premature babies get nutrition through sonde, premature babies are treated in incubators and the baby's parents allowed the baby to be the subject of the research. Sample exclusion criteria are premature babies with NEC (necrotic enterocolitis), anemia, sepsis and hyperbilirubinemia, premature babies with lung problems and respiratory function and premature babies with congenital abnormalities. Drop out criteria is premature babies who died during ongoing research. Based on inclusion and exclusion criteria, 15 infants were in the supine position and the other 15 infants were in the prone position.

The instruments used in this study include an observation sheet, pulse oximetry and a baby weight scale. The observation sheet contains patient data consisting of name, gender, gestation, age. Further data are vital signs such as temperature, type of nutrition, oxygen saturation and weight. Pulse oximetry was used to measure oxygen saturation and used a new pulse oximetry, with a blue brand fingertip pulse oximeter - pulse rate and SpO<sub>2</sub> monitor, which was calibrated at the time of removal by the manufacturer. The baby weight scale was used to measure the baby's weight, that is in Perinatology room that was scale calibrated on 28 March 2016.

Before data collection, the researcher gained informed consent from the parents of premature babies; all the parents had been informed and signed the consent form. Data retrieval began by determining the respondent according to the criteria. Oxygen saturation and weight gain had been recorded before using nesting in the supine and prone positions and then documenting them on observation sheets. The nesting position is the position where premature babies are placed in a circle, similar to a position taken when in the womb with two hands in front of the chest, with the chin touching the chest. With this same position the baby in nesting can be placed in a supine or prone position.

In the final stage, data for oxygen saturation were collected before the premature babies slept in the nesting position (pre-test) and then they were positioned nesting supine (for group supine) and prone (for prone group) for 20 minutes. Their saturation were measured, after which they were positioned into the nesting prone position and supine position (post-test nesting supine and prone). This intervention was only held once a day for 7 days. After 7 days the baby slept in the nesting position, baby weight was weighed and the result of the assessment was written on the observation sheet. Data analysis used in this research is univariate analysis, normality test, and bivariate analysis. Univariate analysis explains and describes characteristics of variables to be studied, that is oxygen saturation frequency distribution before and after using nesting and distribution of frequency of body weight before and after using nesting.

Table 1. Characteristic Demographic (n=30)

Characteristics	Supine		Prone	
	n	%	n	%
Sex				
Male	4	26.67	10	66.67
Female	11	73.33	5	33.33
Gestational Age				
32 Weeks	4	26.67	3	20
33 Weeks	6	40	4	26.67
34 Weeks	5	33.33	8	53.33
Body temperature				
36.5 °C	4	26.67	1	6.67
36.6 °C	3	20	3	20
36.7 °C	4	26.67	4	26.67
36.8 °C	3	20	6	40
36.9 °C	1	6.66	1	6.66
Food supply				
Breast milk + Formula Milk	15	100	15	100

The data normality test used *Shapiro Wilk*. Bivariate analysis was conducted to see the effect of nesting (supine and prone) toward oxygen saturation and body weight in premature babies in the perinatology room. Prone position data including oxygen saturation and weight had normal data distribution and they were tested by a paired t-test, and supine position data had abnormal data distribution, so the test was conducted using Wilcoxon difference test. To see the differences of oxygen saturation value change and body weight between using nesting at prone position and supine position they were tested using the Mann Whitney test. Then the results of the analysis were interpreted by using significance test  $\alpha = 0.05$  and confidence interval (CI) 95%.

Ethical clearance for data collection had been obtained from the research ethics committee of the General Hospital No. LB.02.01/C02/1329/1/2017. All respondents had been informed consent and agreed to participate in the research.

## RESULTS

Based on the table 1, it can be explained that the respondents in supine groups were mostly female, as many as 11 premature babies (73.3%) with 33 weeks' gestation age of 6 premature babies (40 %). However, the respondents in prone groups were mostly male, as many as 10 premature babies (66.67%) with 34 weeks' gestation age of 8 premature babies (53.33 %). All the respondent's body temperatures were within the normal body temperature range, which is between 36.5°C - 36.9°C and for the type of food given to infants as a whole (100%), respondents were given a similar type of food, namely breast milk and formula milk.

Table 2 showed that oxygen saturation of infants after 20 minutes using nesting in supine and prone positions increased oxygen saturation. In the supine position, the minimum oxygen saturation after intervention was 93%, and in some of the infants the saturation could increase up to 98%. Furthermore,

there is a difference in oxygen saturation before and after using nesting in the supine position ( $p = 0.001 < 0.005$ ). Otherwise, after a prone position, the infants' oxygen saturation was in the range of 95% to 98%, and there is a difference in oxygen saturation before and after using nesting in the prone position ( $p = 0.000 < 0.005$ ). Based on the Mann Whitney test, there is no difference in oxygen difference between the supine and prone positions ( $p = 0.180 > 0.005$ ).

Based on table 2, it can be seen that after seven days using nesting in the supine and prone position, the baby's increased their weight. The amount of babies who reached their weight of more than 2000 grams was increased. There are differences in body weight before and after using nesting both in the position of supine ( $p = 0.000 < 0.005$ ) and prone position ( $p = 0.000 < 0.005$ ), but there was no difference in weight gain in the supine and prone positions ( $p = 0.900 > 0.005$ ).

## DISCUSSION

### Effect of nesting on oxygen saturation

Based on Table 2 the results showed that the baby's oxygen saturation after 20 minutes using nesting in supine and prone positions increased oxygen saturation. The results of this study are reinforced by the results of different test analyses, considering the change in oxygen saturation value after using nesting. According to Table 2 there is no decrease in oxygen saturation between before and after using nesting in the supine position. In 15 respondents there was an increase in oxygen saturation before and after using nesting in the supine position. As can be seen on Rank Ties, which is 0, so there is no equal oxygen saturation value between before and after using nesting in the supine position. Furthermore, the value of p-value, which is 0.001, then p-value < alpha value (0.05) shows that there is difference in oxygen saturation before and after using nesting in the supine position.

In the supine position, increases in oxygen saturation are due to the supine position having

Table 2. Oxygen Saturation and weigh Before and After Using Nesting in supine and prone position (n=30)

Variables	Supine Position (n=15)				Prone Position (n=15)			
	Before		After		Before		After	
	n	%	n	%	n	%	n	%
Saturation								
90	1	6.7	0	0	0	0	0	0
91	2	13.3	0	0	2	13.3	0	0
92	0	0	0	0	3	20	0	0
93	2	13.3	1	6.7	2	13.3	0	0
94	3	20	0	0	4	26.7	0	0
95	3	20	4	26.7	3	20	6	40
96	4	26.7	3	20	1	6.7	5	33.3
97	0	0	4	26.7	0	0	2	13.3
98	0	0	3	20	0	0	2	13.3
Mean ± SD	93.4±1.549		96±1.069		93.4±1.549		95.00±1.604	
p*	0.001							
p**					0.000			
p***					0.180			
Body Weigh								
1500-2000	13	86.7	9	60	14	93.3	12	80
> 2000	2	13.3	6	40	1	6.7	3	20
Mean ± SD	1782±193		1919±175		1724±162		1870±161	
p**	0.000				0.000			
p***					0.900			

p\*: Wilcoxon; p\*\*: Paired t test; p\*\*\*: Mann-Whitney U Test; Body weigh in gram

better respiratory muscle strength and low episodes of hyposexuality. This occurs mainly in the supine position with a 45 degree head elevation, where the development of the lungs becomes maximal (Spooner et al., 2014). The use of nesting in the supine position may affect the increase in oxygen saturation value in premature babies because using nesting can adjust the infant in a flexible position. The flexible position can serve as a safety measure to prevent heat loss caused by body surfaces exposed to room temperature. Heat loss in premature or hypothermic infants will require many calories for the stability of body temperature, so it will cause increasing oxygen consumption, and nesting ensures the flexible position, so the metabolic rate will be decreased, the oxygen in the body is enough, so the saturation rate will be increased. The flexible position in premature babies is a good position because it will affect relaxation and reduce metabolism (Kahraman et al. 2018).

The use of nesting in prone positions in Table 2 indicates that there is a difference in oxygen saturation before and after using nesting. This is proven by a higher mean value in oxygen saturation after using nesting and p-value (0.000) <alpha value (0.05), indicates that there is an influence of using nesting in prone position to oxygen saturation value. The results of this research are in line with another study (Bayuningsih et al., 2011), that using nesting affects the increase of oxygen saturation by p value = 0.001. In the study (Bayuningsih et al., 2011) the baby position in nesting is prone. The prone position can reduce pressure on the diaphragm, decrease the apneic period and reduce the esophageal reflex, so it can increase lung volume capacity (Abdeyazdan, Nematollahi, Ghazavi, & Mohamadizadeh, 2010).

Based on the results of the study, it showed that the use of nesting in supine and prone positions influences the change of oxygen saturation value. This research conducted a different test to the oxygen saturation value change between nesting in prone position and nesting in supine position. This is conducted to find out the best position to get a better oxygen saturation value. Based on table 7 it is found that there is no difference in the difference value of oxygen saturation change in the supine and prone positions, it is proven by p-value > alpha (0.05).

The results of this study contrast with (Abdeyazdan et al., 2010)'s research that the prone position obtained oxygen saturation value is higher than in the supine position (Abdeyazdan et al., 2010). In a study conducted by Abdeyazdan, oxygen saturation measurement was performed for 120 minutes of using nesting, while in this research it is only measured oxygen saturation after nesting for just 20 minutes. The inhabitant factor of nesting can affect the increase in oxygen saturation. Several studies have shown that there is an increase in the oxygen saturation value during the use of nesting in the prone position of about 1.18 to 4.36% (Rivas-Fernandez, Roqué i Figuls, Díez-Izquierdo, Escribano, & Balaguer, 2016)

Based on the results of the research, it showed that the use of nesting in infants has an effect on increases in the oxygen saturation value. Differences in supine or prone positions in using nesting do not differ in effect on increasing oxygen saturation, since both cause an increase in oxygen saturation value in nesting usage. Nesting is a barrier that serves to support the baby's body. Nesting can reduce acute stress in infants due to sudden and surprising movements (Borle, 2015). Another study proves that nesting can reduce stress in premature babies.



Nesting can reduce stress and pain levels in premature babies compared to non-nesting infants at the time of diaper replacement (Comaru & Miura, 2009). The use of nesting has a positive impact on reducing stress in premature babies, because stress in premature babies can activate the stress hormone which will further affect the increase in pulse rate and decrease oxygen saturation (Maguire et al., 2009).

Factors of oxygen saturation according to (Brooker Chris, 2009) are body temperature, hemoglobin, hyperbilirubin and hypoxemia. Body temperature can affect oxygen saturation because if there is an increase or decrease in body temperature this will increase metabolism. Increased metabolism requires more oxygen levels and will cause a decrease in oxygen saturation. In this research preterm babies, as the sample of the research, had a normal body temperature, which is 36.5-36.8, it will not affect the results of this research. Another factor that affects oxygen saturation is anemia. Anemia is decreasing of hemoglobin, so it will decrease oxygen levels that bind to Hb and will decrease the oxygen saturation value. In addition, hyperbilirubin and hypoxemia will affect oxygen saturation, but in this study the three factors did not affect the results of the study because infants with anemia, hyperbilirubin and hypoxemia were included in the exclusion criteria.

Oxygen saturation levels in infants are very important to be known because when the oxygen saturation level in infants is low, there is a risk of hemodynamic abnormalities. Normal values of oxygen saturation range from 95% to 100%, at 28-34 weeks of normal oxygen saturation value 88% to 94% and in infants with gestational age, <28 weeks, the normal value of oxygen saturation 85% to 92% is still considered normal (Snoek et al, 2016).

### Effect of nesting on oxygen saturation

Table 2 shows that after 7 days of using nesting in supine and prone positions weight was gained. The results of this research are reinforced by the results of different test analyses by considering changes in infant weight after using nesting in supine and prone positions. Based on table 2, it can be concluded that there are differences in body weight before and after using nesting both in prone and supine positions, evidenced by the value of p-value (0.000) <value alpha (0.05), but the difference in average infant weight gain before and after using nesting is greater in preterm infants positioned in the prone rather than the supine position.

The research also compared differences in changes in infant weight gain between using nesting in the supine and prone positions. This is done to find a better position to increase the weight of premature babies. The comparison of the difference in oxygen saturation value difference between the two positions (supine and prone) was explained in table 2., it is found that there is no difference in the difference value of change and there is no difference of weight in

supine and prone position, it is proved by p-value > alpha (0.05).

Based on the results above, it can be concluded that the use of nesting in supine position and prone positions affect weight gain. Different positions during the use of nesting for infant weight gain show no significant difference in outcome, so nesting can be used in either the supine or prone position. Nesting facilitates the baby in a flexible position that protects the baby from increased metabolism due to stimuli from the environment that can lead to stress and improve the quality of the baby's sleep, so there is no excessive use of energy. Energy that is not used by the body will be stored in the adipose system and increases body weight (Reyhani, Ramezani, Boskabadi, 2016).

Nesting can increase infant growth. It is known from several studies including research of (Kahramen *et al.*, 2017) that improving the quality of sleep will reduce energy consumption or resting energy expenditure (REE). Decreasing REE will improve efficiency and metabolism, thereby increasing the weight of premature babies. Nesting will increase growth because the use of nesting can facilitate the baby to have a longer deep sleep period (Prasanna & Radhika, 2015). In a deep sleep state, 75% of the growth hormone is produced. This is in line with (Reyhani, Ramezani, Boskabadi, & Mazlom, 2016) study that deep sleep in premature babies reduces the crying period which can lead to excessive energy consumption, so no extra energy can be stored, finally it can lead to weight loss (Reyhani, Ramezani, Boskabadi, 2016).

Human growth hormone is an anabolic hormone that plays a very big role in the growth and formation of the body, especially in childhood and puberty. Growth hormone (GH) plays a role in increasing the size and volume of brain, hair, muscles and organs in the body. GH is responsible for human growth from birth. The growth secretion of growth hormone is physiologically regulated by the hypothalamus. The hypothalamus produces Growth Hormone Releasing Factor (GHRF) which stimulates the secretion of growth hormones. The secretion is increased in the state of deep sleep (Kim et al 2015).

According to (Indriansari, 2011) using a quasi-experimental method with a sample of 15 low birth weight babies results in an increase in sleep duration in infants using nesting compared to infants in the control group. Achieving deep sleep is very important in infants as it facilitates low birth weight infants to grow and develop optimally (Rahmawaty, 2016)

Deep sleep is essential for energy conservation, decreased peripheral muscle tone and arterial blood pressure, decreased pulse rate, and resting muscles during deep sleep. Infants who fall asleep in nesting as an indicator of decreased stress due to stress reduction will elicit a relaxed response induced by muscle relaxation and sleep. The sleep phase is a very important phase for the baby because during this phase the secretion of growth hormone and body immunity occurs (Irwin, 2015) .

In general, in this research the weight of respondents experienced an increase after using nesting. The median weight of infants before using nesting was 1753.5 grams and after using nesting was 1894 grams, the weight of premature babies rose in 140.5 grams for 7 days, this is in line with (Mohrbacher, N. & Stock, 2010) that the baby's weight gain will increase by 15-20 grams/day in early life. This happens either in term infants or in premature babies.

Body weight is the result of increasing or decreasing all existing system in the body and a parameter can provide a picture of body mass. Body mass is very sensitive to sudden changes, such as infectious diseases, decreased amount of food consumed and increased metabolism (Drassinower, Friedman, Običan, Levin, & Gyamfi-Bannerman, 2016). Factors that affect weight gain are nutrients because the fulfilment of nutritional and fluid needs in premature babies in the room are adjusted for weight and gestational age. Fulfil the needs of infants by 60-80 cc/kg BW/day which gradually increases up to 100-200c/kg BW/day after the first week. The initial fluid given early in the baby's life is breast milk. If no breast milk is given, then pregestimil with 2x dilution is provided. Premature babies have only a small amount of energy reserves because of the lack of glycogen reserves under the skin. The need for premature babies is divided into 2 important components that need to be maintained for body functions and the need to grow (Johnson & Marlow, 2017). All respondents in this research obtained a combined nutrition between breast milk and formula milk. Nutrition obtained by all respondents is the same, so the nutritional factors have no effect on the results of the study.

## LIMITATION

This study has limitations, the number of respondents in this study was small, besides saturation measurements were only performed once for saturation oxygen, even though the intervention was carried out for seven days.

## CONCLUSION

Nesting in a supine position and in a prone position affects oxygen saturation and weight gain. This is proven by the difference in oxygen saturation and weight gain that increases before and after using nesting. Differences in the position of infants during the use of nesting did not affect the difference in the increase in oxygen saturation values and body weight. Furthermore, it is recommended that nesting in supine and prone positions can be chosen as one of the interventions to care for premature babies in improving oxygen saturation and weight. The results of this study can be used as a reference for the manufacture of standard operating procedures in the NICU ward because the process involves nurses, doctors, families and other officers, so it can run well. Future researchers should conduct research in more

samples and with a longer observation time (120 minutes) using the control group of supine and prone positions on the use of nesting, so the results will be more significant.

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Original Research

## Analysis of Sociodemographic and Information Factors on Family Behaviour in Early Detection of High-Risk Pregnancy

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### ABSTRACT

**Introduction:** Pregnancy and childbirth are physiological processes experienced by women, but they sometimes have risky conditions. There are still many pregnant women and their families who are unable to detect a high-risk of pregnancy early. This study aims to determine family behaviour in conducting early detection of a high-risk of pregnancy in terms of sociodemographic and information factors.

**Methods:** This study uses an explanatory survey design with a cross sectional design. The sample size of this study was 146, with simple random sampling. The independent variables were sociodemographic factors (age, gender, ethnicity, education, income and religion) and information factors (experience, and media exposure) while the dependent variable is family behaviour. The instrument with the questionnaire used the Likert scale. The data was analysed using partial least square.

**Results:** The results showed that Structural Equation Modelling-Partial least square (SEM-PLS) statistical analysis, through Confirmatory Factor Analysis (CFA), obtained sociodemographic factors on family behaviour of 1,999, and information factors on family behaviour of 13,78. The value of the influence of sociodemographic factors (0.102) and the value of the influence of information factors (0.754).  $R^2$  (0.63) and  $Q^2$  value of 0.65.

**Conclusion:** Sociodemographic factors and information factors significantly influenced family behaviour factors in early detection of high-risk of pregnancy. Information factors have a greater effect on family behaviour than sociodemographic factors. Midwives as health service providers at the health care centre need to optimize family empowerment through health information efforts in health promotion efforts. Further research requires the involvement of other factors to improve family behaviour, especially in the ability of families to detect early high-risk pregnancies.

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### INTRODUCTION

Pregnancy and childbirth are physiological processes experienced by a woman, but sometimes there are risky conditions (Holness, 2018). The ability of pregnant women to detect early high-risks is still below the average, which is one of the causes of complications that can endanger the welfare of the mother and foetus (Lee, Ayers, & Holden, 2016).

For this reason there is a need for social support from family, friends, colleagues and health care providers to provide support to pregnant women, especially in risky conditions. This is especially important given the importance of maternal mental health during pregnancy (Wei et al., 2018).

National maternal mortality rate (MMR) from 1991-2015 has fluctuated. The results of the Indonesian Demographic and Health Survey (IDHS) 2017 showed a decrease in MMR during the 1991-

2007 period from 390 to 228 per 100,000 KH, in 2012 it increased to 359 per 100,000 KH, in 2015 it decrease to 305 per 100,000 KH. Results of the 2015 Intercensal Population Survey (SUPAS) again showed a decline in MMR to 305 per 100,000 KH. The reduction in mortality has not yet reached the MDGs (Millennium Development Goals) target of reducing MMR to 102 per 100,000 KH in 2015 and is still far from SDGs (Sustainable Development Goals) output to reduce MMR to 70 per 100,000 KH in 2030 (Ministry of Health Republic Indonesia, 2017).

Surabaya City is the highest regency / city in East Java with pregnant women experiencing obstetric complications of 9,496 out of 47,480 pregnant women in 2016 (Health Office of East Java Province, 2017). The number of high-risk pregnant women in 2015-2017 continued to increase, in 2015 amounted to 17,656 pregnant women, in 2016 amounted to 17,928 pregnant women, and in 2017 amounted to 19,698 pregnant women (Health Office of Surabaya, 2017).

The phenomenon in the community at this time is that there are still many pregnant women and their families who do not and are not able to perform early detection of a high-risk pregnancy. This is proven by the low coverage of early detection of high-risk by the community. Lack of community participation in early detection of high-risk of pregnancy is due to low levels of education and family knowledge, behaviour that is less supportive such as social position, economic ability and thus causes families to experience powerlessness in carrying out early detection of high-risk pregnancy (Khadijah & ., 2018).

The factors affecting individuals as well as family, act among other things: personal factors (general attitudes, personality traits, values of life, emotions and intelligence), sociodemographic factors (age, gender, ethnicity, education, income and religion) and information factors (experience, knowledge, and media exposure) (Nursalam, 2017). Sociodemographic factors such as income and education can influence the condition of pregnant women and even depression (Biaggi, Conroy, Pawlby, & Pariante, 2016).

The impact of early detection of high-risk pregnancy is not done optimally by the family, among others, is the occurrence of delays called 3 late. The first is late in recognizing danger signs of pregnancy and childbirth, the second is too late to make decisions, the third is too late to get to the hospital or referral is late. 3 late results in a higher maternal mortality rate (MMR) and infant mortality rate (IMR) (Fatkhayah, Kodijah, & Masturoh, 2018).

The family is expected to act as the closest support system for pregnant women, because in the family there are strong emotions to help take care of the mother during her pregnancy including in detecting abnormalities and danger signs (Joyce, Tully, Kirkham, Dicker, & Breathnach, 2018). Early detection of symptoms and danger signs during pregnancy is the best effort to prevent the occurrence of serious disruption to pregnancy and maternal

safety. Conducting early recognition of risk factors in pregnancy and childbirth as far as possible by pregnant women themselves, their husbands and families (Klugman, Li, Barker, Parsons, & Dale, 2019).

Family behaviour in terms of sociodemographic factors and information can improve the ability of families, in this case the husband to participate in the care of pregnant women in recognizing the high-risk of pregnancy, and important aspects in caring for these pregnant women, as well as increasing family involvement in family empowerment. The purpose of this study was to determine family behaviour in conducting early detection of a high-risk of pregnancy in terms of sociodemographic and information factors.

## MATERIALS AND METHODS

In this study, the design is an explanatory survey design with a cross sectional design. The population and sample are family. The independent variables are sociodemographic factors (age, gender, ethnic, education, income and religion) and information factors (experience, and media exposure) while the dependent variable is family behaviour.

The sample size of 146 respondents from the population pregnant women in the area around the Dupak Health Center is obtained by simple random sampling. This research was conducted in August to September 2019 in Puskesmas Dupak Health Center Surabaya, East Java. With the inclusion criteria of families who live together with pregnant women, and who play an important role in family decision maker. The questionnaire used the Likert scale. Exogenous variables (sociodemographic and information) and endogenous variables (family behaviour).

Valid indicators of social factors are education (0.76) and income (0.91), religious indicators (0.22) and gender (0.22) are quite valid. Education and income indicators have a significant effect on sociodemographic factors, religious and gender indicators also have a significant effect. Information factors are validly explained by experience indicators (1.00) and media exposure (0.30). So, the indicators of experience and media exposure have a significant effect on the information factor. Based on the composite reliability and Cronbach alpha values above which are worth more than 0.6 for sociodemographic factors (0.61), information (0.75) and family behaviour (1.0), it can be concluded that these factors are reliable (reliable) or consistent.

Data collection is done directly / primary data, and analysed by SEM-PLS, through CFA (Confirmatory Factor Analysis). Ethical clearance has

been issued by the Airlangga University Faculty of Nursing Ethics Team No. 1752-KEPK in August 2019.

## RESULTS

Data obtained from 146 respondents are presented in the Distributed Table.

Table 1 shows that the age of the respondents spread in all groups. Where the most age groups are 36-45 years and 26-35 years, respectively 35.6% and 30.8%. The gender of the majority of male respondents was 89%, education was spread at all levels, with the highest level of education being elementary education (SD-SMP) as much as 56.8% and secondary education (high school) as much as 31.5%. The ethnic origin of respondents are almost entirely Javanese at 76%, then Madura at 23.3%. The income of the respondents is almost entirely in the sufficient category which is 80.8%; and the religion practiced by almost all Islam/Muslims is 83.6%.

Related information variables with experience indicators (54.8%) had received counselling and for indicators of media exposure almost all (89.7%) were exposed to media in the form of posters. In regard to family behaviour related to actions taken by family members in carrying out family tasks in early detection of a high-risk of pregnancy, it is known that the achieved or positive behaviour is 52.7%, while that which is not achieved or the behaviour towards negative is 47.3%.

### Analysis of measurement models

The process of analysing the measurement model is done by testing the validity and reliability of the factor variables. Indicator criterion indicators concluded valid measuring the factor variables, if the loading factor value has the value of  $t$ -statistics  $\geq t$ -table or if the value of  $t$ -statistics of the weight of influence  $\geq t$ -table =  $t_{(n-1; 5\% / 2)} = t_{(92; 0.025)} = 1.96$ . While it is concluded invalid if the factor loading value and the influence weight value both have  $t$ -statistic values  $< 1.96$ . The next tests the consistency / reliability of the factor variables by using composite reliability and alpha Cronbach values. The criterion that the factors concluded reliable is explained by the indicator variables, if the composite value  $> 0.7$  then the consistency of the factors is good, and if the value of 0.6 to 0.7 is still acceptable. It is known that all indicator variables have  $t$ -statistics values more than  $t$ -table values = 1.96. There are only 2 indicators that do not reach 1.96 and are still above 1, so the conclusion is quite significant.

Indicators of valid sociodemographic factors are education and income, religious and gender indicators are valid enough to explain sociodemographic factors. Education and income indicators have a significant effect on

Table 1. Frequency distribution of socio-demographic, information, and family behaviour variables (n=146)

Indicator	Sub Indicator	n	%
Sociodemographic			
Age (years old)	17-25	16	11.0
	26-35	45	30.8
	36-45	52	35.6
	46-55	27	18.5
	56 - 65	5	3.4
Gender	>65	1	0.7
	Male	130	89.0
Education	female	16	11.0
	Basic	83	56.8
	Intermediate	46	31.5
Ethnic	High	17	11.6
	Java	111	76.0
	Madura	34	23.3
	China	1	0.7
Income	Batak	0	0
	High	28	19.2
	Enough	118	80.8
Religion	Islam	122	83.6
	Christian	24	16.4
	Catholic	0	0
	Hindu	0	0
Experience	Buddha	0	0
	Ever	80	54.8
	Not yet	66	45.2
Media exposure	Poster	131	89.7
	Leaflet	7	4.8
	Not exposed	8	5.5
Family behaviour			
Family behaviour	Reached	77	52.7
	Not achieved	69	47.3

sociodemographic factors, religious and gender indicators have a significant effect. Information factors are explained validly by indicators of experience and media exposure. So, it can be concluded that the indicators of experience and media exposure significantly influence the information factor.

Based on the value of composite reliability and Cronbach alpha. which are worth more than 0.6 for sociodemographic factors, information and family behaviour, it can be concluded that the factors mentioned above are reliable (reliable) or consistent.

### Analysis of Structural Model Testing

Analysis of the structural model testing to evaluate several criteria, namely the significance criteria of the coefficient of influence of exogenous variables (sociodemographic and information) of the endogenous variable (behavioural family), then the criteria of the coefficient of determination ( $R^2$ ), and predicted relevance ( $Q^2$ ). Significance criteria of the coefficient of influence of sociodemographic factors and information factors on family behaviour factors,

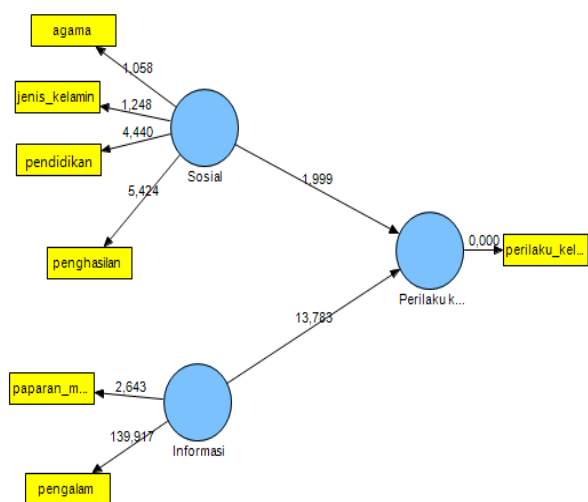


Figure 1. Value of loading factor and t-statistics value of the model

by testing using t-statistics values which are then compared with t-table values.

The results of testing the effect of the coefficient of influence between sociodemographic factors and information factors on family behaviour in early detection of high-risk of pregnancy, that the t-statistics between sociodemographic factors on family behaviour is 1.999 where above the t-table value of 1.96, it is concluded that sociodemographic factors have a significant effect towards family behaviour. Furthermore, the t-statistic value of the information factor on family behaviour is 13.78 where above the t-table value of 1.96 it is concluded that the information factor has a significant effect on family behaviour.

The value of the influence of sociodemographic factors on family behaviour is 0.102, where the value of the influence is linear in the same direction which means that if sociodemographic factors are increased by 1 unit it will increase family behaviour in the early detection of high-risk of pregnancy, with the effect of an increase of 0.102 times. The value of the influence of information factors on family behaviour is 0.754, where the value of the influence is linear in the direction which means that if the information factor is increased by 1 unit it will increase family behaviour in the early detection of high-risk of pregnancy, with the effect increasing by 0.754 times.

Results of processing coefficient of determination (R2) of the influence of sociodemographic factors and factors of information on family behavioural factors

in the early detection of high-risk pregnancies, amounting to 0.63. So this value is included in the criteria both in terms of large variations of endogenous factors (family behaviour) that can be explained by exogenous factors (sociodemographic and information). The processing results obtained Q2 value of 0.65. This value is included in the criteria of having a good ability (relevant) in predicting.

**DISCUSSION**

The sociodemographic factors examined in this study concern age, sex, education, ethnicity, income and religion. Sociodemographic factors have the effect of increasing family behaviour in the detection of high-risk of pregnancy by 0.102 times and the information factor has the effect of increasing family behaviour in the detection of high-risk of pregnancy by 0.754 times.

In this study almost half in the late adult age group 36-45 years (35.6%) and early adults 26-35 years (30.8%). In family members who are old enough the level of maturity and strength of the family will be more mature in thinking and acting. This is seen from the experience and maturity of his soul. Age is one of the factors that influence one's health behaviour (Lin, Broström, Nilsen, & Pakpour, 2018).

Support obtained from husbands, families and health workers is very important in recognizing the symptoms and responses felt by pregnant women (Zand et al., 2017). In this research, in the majority of respondent families, 89% were accompanied by their husband. Husband support is particularly beneficial in reducing anxiety and complications in pregnancy (Abdollahpour, Ramezani, & Khosravi, 2015). Support, especially from couples, is very influential in making decisions (Alemayehu & Meskele, 2017).

Family education is mostly elementary education (elementary-junior high) at 56.8%. The lack of community participation in the early detection of high-risk of pregnancy is due to low levels of education and knowledge, and low income resulting in unsupportive behaviour. Education is one way for families to receive knowledge about antenatal care, with high education and good knowledge which will make families easy to receive information and conduct early detection of high-risk pregnancies (Mehta, Zheng, & Myrskylä, 2019).

Table 2. Convergent validity of latent variables

Latent Variable	Indicator	Convergent Validity		
		Loading factor (λ)	T Statistics	Validity
sociodemographic	Religious	0,22	1,06	Valid Enough
	Gender	0,22	1,25	Valid Enough
	Education	0,76	4,44	Valid
	Income	0,91	5,42	Valid
Information	exposure media	0,30	2,64	Valid
	experience	1,00	139,92	Valid

Table 3. Path Coefficients: effect of sociodemographic and information on family behaviour

Indicators	Original Sample (O)	Sample Mean (M)	Standard Deviation	Standard Error	T-Statistics
Religious <- sociodemographic	0.215	0.210	0.203	0.203	1.058
Gender <- sociodemographic	0.225	0.212	0.180	0.180	1.248
Exposure media <- information	0.304	0.299	0.115	0.115	2.643
Education <- sociodemographic	0.764	0.713	0.172	0.172	4.439
Experience <- information	0.999	0.994	0.007	0.007	139.917
Income <- sociodemographic	0.909	0.865	0.168	0.168	5.424
Information ->Family behaviour	0.754	0.752	0.0555	0.0555	13.78
sociodemographic ->Family behaviour	0.102	0.110	0.051	0.051	1.999

The origin of respondents is almost entirely Javanese 76% and Madura 23.3%. Indigenous peoples' knowledge about health advice can be good information in supporting education and behaviour for pregnant women of certain ethnicities. For example, in Madura many dietary restrictions and food suggestions are applied for pregnant women. This affects the patterns of habits and behaviour of pregnant women and their families (Diana et al., 2018). Culture has a strong influence on decision making. Family participation in perinatal care is very important (Tobing, Afyanti, & Rachmawati, 2019).

Income shows that almost all (80.8%) respondents have a sufficient income level. It is important for financial income to meet the daily needs of households in the community, specifically with financing, then someone will be able to utilize the existing health facilities such as treatment and control that can still maintain the health of pregnant women. This income is very influential on family behaviour, including pregnant women. A good level of income allows family members to meet better needs, for example in the fields of education, health, career development and so on. Health care professionals should carefully assess the state of family empowerment of primary caregivers who are younger and those with low education, low household income, high burden of child-rearing, and ties are fragile among the members of the family. Home visits and institutional services for the provision of care and services are well coordinated (Wakimizu, Fujioka, Nishigaki, & Matsuzawa, 2018).

Religion, at almost 83.6%, is almost entirely Muslim. Religion is published about life in humans, published in humans. The existence of such rules can provide guidance to families in how to care for and respond to families who are pregnant. Spirituality strongly influences Muslims in supporting spiritual values during pregnancy and childbirth, nurses must be sensitive to women's spirituality and integrate this element in providing maternal nursing care (Budiaty & Setyowati, 2019).

The information factors examined in this study include experience and media exposure. Most respondents (54.8%) had the experience of respondents from the study results who had received counselling about risky pregnancy. In addition, most

respondents consider themselves experienced when children also have experiences about other people who have already been pregnant. A collaborative education model using multi-disciplines for patient education will be very important to provide information related to assistance provided to support maternal mortality and morbidity (Jain & Moroz, 2017).

In this study nearly half (89.7%) of respondents were exposed to the media related to high-risk pregnancies in poster form. Respondents obtained information about high-risk pregnancies from posters or leaflets provided at Puskesmas, as well as electronic media, and counselling by health workers. Media information about the detection of high-risk of pregnancy can affect one's knowledge (Dewi, 2017).

The results of this study showed the majority of family behaviour reached 52.7%. Information factors have a greater effect on family behaviour in the detection of high-risk of pregnancy. Information about high-risk pregnancies provided by health workers both print and electronic media will increase the knowledge of pregnant women and their families about the importance of early detection of high-risk pregnancies so that they can be encouraged to do so. The role of health workers in providing information about high-risk pregnancies is very important (Widarta, Cahya Laksana, Sulistyono, & Purnomo, 2015). The role of the government in providing information about high-risk pregnancies greatly helps pregnant women and families to obtain better information (Waryana, Supadi, & Haryani, 2016).

The information factor on family behaviour is 0.754 greater than the sociodemographic factor. A more proactive approach to providing information may be valuable not only for those who have a clear desire for more information, but also for those who are unsure of what information they might have missed (Baron et al., 2017).

The behaviour of the family in performing early detection of high-risk pregnancies is influenced by a person's health beliefs (Health belief) in theory HBM (Health Belief Model). HBM (Health Belief Model) is used to identify several important priority factors that have an impact on behaviour (Huang, Dai, & Xu, 2020).



Azwar (2013) stated that according to the theory of planned behaviour, among the various beliefs, the availability of opportunities and resources are the reason to determine intention and attitude. This belief can be derived from the experience, and also it can be influenced by indirect information about behaviour, for example by looking at the experience of a friend or someone else. It is also influenced by several other factors that reduce or increase the effect of the difficulty committing acts.

Human behaviour occurs through a stimulus-organism-response process. The behaviour in question is family behaviour in the early detection of high-risk pregnancies in which behaviour is associated with factors of age, education, income, knowledge, experience and media exposure. In fact, the role of the husband and the family also influences pregnant women in supporting the behaviour or actions of pregnant women in utilizing health services (Chou et al., 2018).

A person's health behaviour is determined, among other things, by the presence or absence of support from the surrounding social support, in this case midwives are the main health care providers during pregnancy, they should ideally emphasize the availability of questions during antenatal examinations (Baron et al., 2017). People who live in an environment that upholds health aspects will be more enthusiastic in maintaining their health (Yeh, Ma, Huang, Hsueh, & Chiang, 2016). Maternal and child health needs to be improved, so in an effort to improve the holistic and integrative approach is not only limited to the medical sector, but also economically, educationally and socio-culturally (Asmuji. & Indriyani, 2016). The involvement of families as caregivers is to improve their health status (Chimowitz, Gerard, Fossa, Bourgeois, & Bell, 2018). The limitation in this research is that it only relates to sociodemographic and information factors. While there are other factors that also influence family behaviour in detecting early high-risk pregnancies.

## CONCLUSION

There are social factors and information factors that need to be considered to improve family behaviour in pregnancy care. The information factor has a larger comparison than sociodemographic factors. Family problems can improve the quality of the family in approval of danger signs or problems experienced in the family. Midwives as health service providers at the health care centre need to optimize family empowerment through health information efforts in health promotion efforts. Further research needs an optimal family empowerment model that makes families need help during pregnancy and participates in preventing the presence of maternal and infant applications.

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Original Research

## The Effect of Combination Therapy of A Warm Ginger Stew Compress and Ki. 3 Point Acupressure on the Pain Level of Gout Arthritis Patients in Indonesia

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### ABSTRACT

**Introduction:** Gout arthritis is a systemic disease caused by deposition of monosodium urate crystals in the joints, causing pain. Pain management may include complementary therapy such as combination therapy of a warm ginger stew compress and Ki. 3 point acupressure to reduce pain. This research aimed to examine the effect of combination therapy of a warm ginger stew compress and Ki. 3 point acupressure on the pain level of gout arthritis patients.

**Methods:** The research design for this study is a quasi-experiment pre-test and post-test, with a control group design for 30 respondents. The respondents were assigned to an experimental group with combination therapy of a warm ginger stew compress and Ki. 3 point acupressure for about 30 minutes, and a control group with a warm ginger stew compress for about 15 minutes. Each group consisted of 15 people. The data was analysed using a paired t-test, independent t-test, and Mann Whitney test.

**Results:** The Mann Whitney test showed an average decrease of pain level in the experimental group of 1,7333 and the control group of 1,0667 so, there were differences in the decreased of pain level before and after intervention between the two groups with *p-value*=0.013.

**Conclusion:** Combination therapy of a warm ginger stew compress and Ki. 3 point acupressure were effective in decreasing the pain level of gout arthritis patients in Puskesmas 1 Purwokerto Timur. This therapy can be used for the gout arthritis patient to reduce pain level.

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### INTRODUCTION

Gout arthritis is a disease of the joints due to a metabolic disorder of uric acid that accumulates (hyperuricemia) in the body tissues (Sustrani, Nature, & Hadibroto, 2007). Gout arthritis occurs due to the deposition of monosodium urates in the joints. The deposition of monosodium urates (tophi) will cause inflammation. The prevalence of gout arthritis is expected to continue to increase.

The prevalence of asymptomatic hyperuricemia in the general population in the USA is about 2-13%. Based on the results of basic health research by Riskesdas (2013), joint disease is currently the third (24.7%) leading disease that is not contagious after stroke (57.9%) and hypertension (36.8%), which increases as a person gets older. The prevalence of gout arthritis in Bandung, Central Java, as

reported by the collaborative research of the World Health Organization International League of Associations for Rheumatology Community Oriented Program for Control of Rheumatic Disease (WHO-ILAR COPCORD) among 4,683 people aged 15-45 years, was 17.6% incidence of gout arthritis, experienced by men at 24.3% and women at 11.7% (Kurniari, 2011). The results of a survey conducted in Clinics 1 Purwokerto Timur, for 10 months (January-October 2017) found as many as 33 patients with hyperuricemia. The survey results showed severe pain (28.60%), moderate pain (42.85%), and mild pain (28.5%) of the joint. The definition of pain, according to the International Association for the Study of Pain (IASP) is "as subjective knowledge and an unpleasant emotional experience associated with actual tissue damage or potential or perceived in the events which occurred

the damage" (IASP in Potter & Perry, 2005). Pain that is not immediately handled could lead to discomfort, broad limitations in joint motion, distractions, and other activities of daily living (Handono & Richard, 2013). These impacts indicate that efforts need to be made to control the pain.

It may be managed by pharmacological and non-pharmacological pain therapy. Pharmacological therapy is often used to reduce joint pain, for example by non-steroidal anti-inflammatory drugs (NSAIDs) to control inflammation, which has a bitter taste (Gliozzi, Malara, Muscoli, & Mollace, 2016). There are some side effects from consuming these drugs such as nausea, vomiting, kidney failure, and even death if it is taken without proper instruction in the long term (Misnadiarly, 2008). Nonpharmacological therapy can be used as a complementary therapy, which is effective and safe, for example the use of warm ginger stew compress therapy and acupressure.

The warm ginger stew compress is a warm compress combined with ginger that contains oleoresin, where there is substance in the oleoresin gingerol. Gingerol serves as a compound that is not volatile. Gingerol induces pharmacological and physiological effects of antioxidants that could inhibit prostaglandins and cyclooxygenase which may reduce pain (Nahed & Tavakkoli, 2015). In addition to the warm ginger stew compress, there are other therapies that can be used to handle pain, for example acupressure. The acupressure massage techniques through stimulation of acupressure points will enable the modulation of pain in opioid systems, non-opioid systems, and inhibition on sympathetic dystrophy to reduce nerve pain.

In view of the benefit of warm ginger stew and acupressure to control pain rather than using only single method, this research was conducted to identify the effect of combination therapy of compress of the decoction of warm ginger and acupressure point Ki. 3 on the level of pain among patients suffering from gout arthritis at clinics in region I of Purwokerto Timur.

**MATERIALS AND METHODS**

This research used a quasi-experimental research design with pretest and posttest, with a control group design. The data was collected from March to April 2018 in the region and Arcawinangun, Mersi Purwokerto. The sample in this study is 30 respondents, where the respondents are patients from clinics I Purwokerto Timur. The respondents were divided into experiments group with the combination therapy intervention compresses of warm ginger stew and acupressure point Ki. 3 for 30 minutes and the control group with intervention therapy of warm ginger stew compress for 15 minutes. Each arm of the of the intervention and

control group had 15 respondents. The therapy was conducted by the researcher. The Standard of Operational Procedure can be seen in the supplemental file of this manuscript. Nonprobability sampling techniques of convenience sampling were used to recruit participants. The research was of the variable of a combination of warm ginger stew compress therapy and acupressure point Ki. 3 against gout arthritis pain scale. The research instrument used was a numerical scale on the observation sheet. Data were analysed using the Mann Whitney bivariate test.

**RESULTS**

Table 1. shows the majority of respondents in this study were aged >60 years and the majority of uric acid levels of respondents were > 8.5 mg/dl. Both groups showed a p-value of >0.05 meaning they are homogenous using the Shapiro Wilk test.

Table 2. indicates respondents of this research according to the gender of the majority of women, at 26 respondents (86.7%), and according to the majority who do not work totalled 17 respondents (56.7%). Characteristics of respondents according to the gender and employment shows a p-value of 0.05 > meaning in both groups they are homogeneous using the Chi Square test.

Table 3. shows that the test based on the paired t-test experimental group and the control group had a p-value of 0.001. Both the experimental group and the control group pain levels were decreased. However, it indicates that there is no difference in the scale of pain in experimental and control groups. After that, a Mann Whitney test was done to see the difference in decreased pain of both groups.

Table 1. Respondent characteristics based on age and blood urea levels (n=30)

Characteristic	Experiment group		Control group		p
	Mean	SD	Mean	SD	
Age	64,5	8,4	61,6	9,5	0,847
Blood urea levels	8,7	2,3	8,6	1,8	0,620

Table 2. Respondents' characteristics according to gender and jobs (n=30)

Characteristic	Experiment		Control		p
	n	%	n	%	
Gender					
Man	2	13,3	2	13,3	1,00
Women	13	86,7	13	86,7	0
Jobs					
Do not work	8	53,3	9	60	0,71
Work	7	46,7	6	40	3

The table 4 test results showed Mann Whitney p-value = 0,013 (p-value of 0.05 <) which means that there is a difference in the level of pain between the two groups after the intervention. Those results were reinforced with a mean decrease in pain in the experimental group, i.e. 1.7333 and in the control group 1.0667.

## DISCUSSION

The majority of respondents from this study were aged 60 years and above. The average age of respondents for intervention and control groups were respectively  $64,47 \pm 8,391$  year and  $61,60 \pm 2,467$  years. This is in line with the research by Untari (2017) that shows the majority (85.71%, n=12) of respondent are women (86.7%, n=26). This is in accordance with the research by Untari (2017) that shows that the majority (71.4%, n=10) of respondents experiencing gout arthritis older woman is aggregating. This is good for further research to know the differences of pain level between men or women who suffer from gout arthritis.

Hermawati & Probosari (2015) showed that the majority of the respondents were women age 60-years-old and above. The relationship of age increased with levels of uric acid due to the presence of the aging process resulting in decreased organ functions in the body, such as kidney filtration speed, excretion, and reabsorption against the metabolism of uric acid. Increased levels of uric acid in women occur due to the process of the menopause that results in decreased production of the hormone oestrogen. The hormone oestrogen serves as an uricosuria agent that helps the expulsion of uric acid via the kidneys (Setyoningsih, 2009). Meiyetriani, Hamza, & five (2016) explained that during puberty males have higher uric acid levels, whereas women will have an increase in uric acid level when approaching menopause due to oestrogen uricosuria.

The uric acid levels of respondents showed a mean of uric acid levels of respondents of  $8.720 \pm 2.2693$  mg / dl in the experimental group and  $8.633 \pm 1.7971$  mg / dl in the control group. Gout arthritis occurs due to the deposition of uric acid crystals in the joint tissues that affects the inflammatory reaction. The presence of uric acid crystals allows the interaction of the phospholipid membrane and the serum factors that contribute to the inflammatory reaction (Martillo et al, 2014).

The results showed most respondents did not work, at 17 respondents (56.7%). This is in contrast to the research of Meiyetriani et al (2016) that showed the majority of arthritis gout experience was in those who were working, as much as 60% compared to not working as much as 11.7%. Darmawan (2016) explains that less physical activity can cause metabolic syndrome which causes insulin resistance, leading to disorders of the excretion of uric acid. Insulin resistance causes the occurrence of

Table 3. Effect of The Scale of Pain Before and After The Intervention of The Experimental and Control Group (n=30)

Group	Variable	Mean	SD	p
Experiment	Pretest Pain level	6,5	1,8	0
	Posttest Pain level	4,8	1,5	
Control	Pretest Pain level	5,0	2,2	0
	Posttest Pain level	3,9	2,1	

Table 4. The difference of pain scale decrease between experimental and control group (n=30)

Variable	Group	Mean	SD	p
The difference pain scale of pre and post intervention	Experiment	1,7	0,8	0,013
	Control	1,1	0,7	

oxidative phosphorylation disorders which will increase the concentration of adenosine systemic resistance, i.e. sodium, fibres, and water.

The results of the p-value show the experiment group and the control group equally mean the pain scale decreased. But based on the value of the mean, a significant decrease in pain occurred in the experimental groups. Based on the test results of the p-value, this shows that the experimental group and the control group equally mean that the pain scale decreased. But based on the value of the mean, a significant decrease in pain occurred in experimental groups, obtaining a combination therapy of warm ginger stew compress and acupressure point Ki. 3 than the control group who simply got the warm ginger stew compress therapy.

The average decrease in pain in the experimental group is significantly more than the control group. Chinomso & Faluso's research (2014) stated that a combination of massage therapy and hot compresses against chest pain on chronic bronchitis patients effectively lowers the pain with a p-value < 0.001. Lestari et al.'s (2014) qualitative research also states that the granting of a therapeutic massage and ginger compresses provide stimulation of the skin and the relaxing effect so effectively as to lower osteoarthritis pain. According to Hidayat & Son (2016), ginger compresses effectively increase blood flow to get the analgesic and muscle relaxant effects of reducing inflammatory processes. This is confirmed by research from Dwi Putri et al. (2017) stating that the influence of giving a ginger compress against the intensity of the pain gout arthritis in the older people in the prosperous South Kalimantan PSTW Budi is more effective than with a warm

compress, with p-value = 0.000. The research on acupressure points used is point Ki. 3. it works by giving local effects in the form of decreased pain on the area around the point of emphasis. It stimulates that the receptor stimulation activates a system of modulation of pain in the central nervous system that will stimulate the hormone endorphins to suppress transmission and perception of pain so that pain can be reduced (Majid & Rini, 2016).

Research of combination therapy of warm ginger compresses stew and acupressure point Ki. 3 proved effective in lowering pain. This has been supported by previous studies which prove that the warm ginger stew compress therapy and acupressure can be used as a selection for non-pharmacological therapy for reducing pain in sufferers of gout arthritis.

## CONCLUSION

The characteristics of respondents who experienced gout arthritis in the area of public health 1 Purwokerto Timur are mostly aged 60 years and above, with average levels of uric acid more than 8 mg/dl, most of them were female and not working. There is a significant difference in the scale of pain before and after intervention in the control group. The result from this study suggested that patients receiving combination therapy of warm ginger stew compresses and acupressure point Ki. 3 had reduced their pain level more than the group that were only given the warm ginger stew compress therapy.

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Original Research

## Ethnic Foods Diet Program Improve Self-efficacy and Diet Compliance Among Type 2 Diabetic Patients

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### ABSTRACT

**Introduction:** A well-balanced diet is one of the four pillars of diabetes self-management. Patient's culture strongly influences intake food. Diabetic dietary guidelines which fit with the patient's culture is expected to improve patient's self-efficacy and diet compliance. This study was aimed to analyze the effect of ethnic foods diet program in improving self-efficacy and diet compliance among Type-2 Diabetes Mellitus (T2DM) patients.

**Methods:** This was quasy experiment research with pre and post-test control design. The population was 112 T2DM patients from Sasak Tribes, West Nusa Tenggara. Samples were 36 respondents, divided into intervention (18) and control (18) groups. The independent variable was the ethnic food diet (EFD) program, while the dependent variables were patient's self-efficacy and diet compliance. Data were collected using self-efficacy questionnaire and a 24-hour dietary recall form. Data were then analyzed using Wilcoxon Signed Rank Test and Mann Whitney U Test. The result showed differences in self-efficacy between pre and post-test in the treatment group ( $p=0,001$ ), but there were no differences in the control group.

**Results:** There were differences in diet compliance in the treatment group ( $p=0,001$ ), but there were no differences in the control group. There were differences between treatment and control groups on self-efficacy ( $p=0,000$ ) and diet compliance ( $p=0,000$ ).

**Conclusion:** Ethnic foods diet program can improve self-efficacy and diet compliance among T2DM patients because more comfortable and easier to be applied. Nurses can apply ethnic foods diet program as an intervention to promote healthy diet for T2DM patients.

### ARTICLE HISTORY

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### INTRODUCTION

Diabetes is the third leading cause of death in Indonesia. The prevalence of T2DM patients increase from 1.5% to 2.0% during 2013-2018 (Ministry of Health Indonesia, 2018). Previous research explained that more than 50% patient with T2DM did not comply with their diet (WHO, 2003). A non-compliance can lead to health complications and increase healthcare expenditures (ODPHP, 2018). The T2DM patients need reinforcement through health education program, to encourage them to understand T2DM management, including dietary management,

for appropriate care and better quality of life (Sami, Ansari, Butt, & Hamid, 2017).

A well-balanced diet is one of the four pillars of diabetes self-management. International Diabetes Federation (IDF) published a dietary guidelines for T2DM patients, with the right schedule, amount, and type of food (Hu, 2011). PERKENI (Indonesian Endocrinology Association) also had arranged dietary guidelines for T2DM patients (PERKENI, 2015). But, everyone has their own culture, likewise in choosing and preparing their meals. Culture can be influenced by their social environment, such as tribal groups (Hiza, Casavale, Guenther, & Davis, 2013). Patient's culture strongly influences intake food. By

Table 1 The Level of Self-efficacy (n = 18)

Categories	Treatment group				Control group			
	Pre Test		Post Test		Pre Test		Post Test	
	n	%	n	%	n	%	n	%
Strong	6	33.3	17	94.4	6	33.3	6	33.3
Weak	12	66.7	1	5.6	12	66.7	12	66.7
Wilcoxon Signed Rank test	p=0.001				p=0.317			
Mann-Whitney U test					p=0			

Table 2 Dietary Compliance (n = 18)

Categories	Treatment group				Control group			
	Pre-test		Post-test		Pre-test		Post-test	
	n	%	n	%	n	%	n	%
Calories								
Compliance	6	33.3	13	72.2	8	44.4	9	50
Incompliance	12	66.7	5	27.8	10	55.6	9	50
Meal time								
Compliance	12	66.7	12	66.7	11	38.9	9	50
Incompliance	6	33.3	6	33.3	7	61.1	9	50
The type of food consumed								
Compliance	13	72.2	17	94.4	14	77.8	14	77.8
Incompliance	5	27.8	1	5.6	4	22.2	4	22.2
Dietary compliance								
Compliance	7	38.9	12	66.7	7	38.9	5	27.8
Incompliance	11	61.1	6	33.3	11	61.1	13	72.2
Wilcoxon Signed Rank test	p=0.025				p=0.157			
Mann-Whitney U test					p=0			

tailoring the patient's specific cultural foods, it is hoped that their compliance and adherence would increase. Thus, leading to improved glycemic values and reduced complications from T2DM (Ramsameer, 2016). So that, dietary guidelines which are concerning with patient's culture were needed.

Sasak Tribes is one of a tribe in Indonesia who lived at Lombok Island, province of West Nusa Tenggara (Syarifaturrahman & Hanafi, 2017). The ingredient of Sasak meals was vegetables (32.46%), spices (29.82%), sweeteners and confectionaries (10.53%), legumes (9.65%), root crops (7.02%), cereals (4.39%), fruits (2.63%), oils (1.75%), and others (1.75%). The typical characters of most Sasak meals are spicy and tasty, which can increase appetite. Generally, its contain plain staple, main dish (vegetable, meat, or mixed), side dish, and condiment. *Sambel* (chili sauce) is a condiment that must be available for most people. Sasak Tribes also have a culture named *begibung*, which means eat together in a large plate (Sukenti, Hakim, Purwanto, & Matthews, 2016). This culture cannot be avoided, so people with T2DM should manage their diet. There were no dietary guidelines for T2DM patients from Sasak Tribes.

According to Leininger's Transcultural Nursing Theory, culturally-based nursing care which is harmonious with an individual or group's cultural beliefs, practices, and values can enhance client's well-being (McFarland & Wehbe-Alamah, 2018). Ethnic foods are defined as foods originating from the heritage and culture of an ethnic group who use their knowledge of local ingredients of plants and/or animal sources (Kwon, 2015a). Ethnic foods diet

(EFD) program based on Sasak Tribes culture were expected to improve T2DM patients' self-efficacy and diet compliance through dietary guidelines and regular meeting. By choosing the healthy meals based on their ethnic food, they were expected to be more comfortable and have higher self-efficacy level in complying with their dietary guidelines. Subsequently, they will have a controlled blood glucose level. This study aimed to analyze the effect of EFD program on the level of self-efficacy and diet compliance among T2DM patients.

## METHOD

This was a quasi-experimental pretest-posttest with the control group design. There were two groups, one intervention group (EFD program) and one control group (standard dietary guidelines for T2DM on primary health care).

The population were patient with T2DM patients from Sasak Tribes (N=112). Samples were taken by using purposive sampling. Eligibility criteria included: 1) aged 40-60 years old; 2) living at home; 4) have no complication; 4) not on a current diet; 5) able to speak and write in Bahasa, and 6) a willingness to participate. While the exclusion criteria included: 1) patient with cognitive impairment; and 2) patient who referred to the hospital. Eventually, 36 patients completed the study. Divided into treatment group (n=18) and control group (n=18). Matching was conducted by using age, gender, and present diet compliance level.

The independent variable in this research was EFD program. EFD program is completing nutritional needs by consuming traditional food based on the



cultural or ethnic background but still in term of the specific instructions of any illness dietary program. In this program, individual should consume T2DM diet by using any kind of food source that is still related to the traditional food in Sasak Tribe. Patients attend 2x60 minutes' health education about dietary guidelines for the T2DM patients, based on ethnic food in Sasak Tribes. Each patient has specific calorie needs per day. To calculate the number of calories needed by the patients, researcher collaborate with the nutritionist. Health education was conducted by using lecture and demonstration method, with booklet as a media. The dependent variables were patient's self-efficacy level and dietary compliance. A week after health education, the researcher has done the home visit and ask patients to complete self-efficacy questionnaire and A 24-hour dietary recall. These questionnaires took approximately 45-60 minutes to complete. Answers were immediately checked to ensure that the questionnaire was filled out. If missing value were found, the questionnaire was returned to the patient so he or she could fill in the missing item. A small gift was provided as an award.

General demographic data and disease characteristic that were collected included age, gender, education, employment, and duration having T2DM.

Self-efficacy was assessed by self-efficacy questionnaire with Likert Scale. Respondents response to 14 items on 3-point scale with the number referring to 1 = disagree, 2 = uncertain, 3 = agree for favorable questions and vice versa for unfavorable questions. The highest score was 42. A high score on a self-efficacy questionnaire corresponded to a strong self-efficacy.

A 24-hour dietary recall was used to assess the patient's dietary compliance. A 24-hour dietary recall (24HR) is a structured interview intended to capture detailed information about all foods and beverages consumed by the respondent in the past 24 hours, from midnight to midnight the previous day. This form filled within 7x24 hours at the same time for all respondents by an everyday home visit and interview by the researcher. After filling it completely, researcher reviews the calories, meal time, and the type of food consumed by T2DM patient. Compliance means their calories, meal time, and the type of food consumed already fit with their diet program that was given in a booklet as a guidance about T2DM.

An ethics committee from Universitas Airlangga approved this research (reference number 596-KEPK). All respondents were given information about the study and written informed consent was obtained from those patients who agreed to participate. The respondents complete informed consent while undergoing routine checkup at Puskesmas Narmada, West Nusa Tenggara (primary health care center). The grouping determined by several aspects, such as age, gender and diet adherence. Researcher gave nutritional instruction to respondents as a guidance to prepare the meal themselves at home.

Descriptive statistics were used to summarize the characteristics of samples. Frequencies were reported for categorical variables, and the mean were reported for continuous variables. Data were analyzed by using Wilcoxon Signed Rank Test to see the difference between pre and post-test scores on each group. Then using Mann Whitney U Test to understand the difference between post-test scores on intervention and control group. We considered  $p < 0.05$  to be statistically significant.

## RESULTS

The mean age of respondents in this study was 52.05 years old for treatment group, and 50.73 years old for the control group. Most participants in the treatment group were female (88.9%), unemployed (44.4%), had graduated from high school (44.4%), and more than three years suffer from Type 2 Diabetes (66.67%). Most participants in the control group were female (88.9%), unemployed (61.1%), had graduated from high school (50%), and more than three years suffer from Type 2 Diabetes (66.2%). Therefore, no homogeneity test were applied to the sample.

Table 1 had shown that on pretest most of the respondents on both groups have weak self-efficacy regarding with diet for Type 2 Diabetes (66.75%). Posttest score has been demonstrated that most of the respondents on treatment group already has strong self-efficacy (94.4%), but most of respondents on the control group still has weak self-efficacy (66.75%).

Statistical analysis by using Wilcoxon Signed Rank Test which compares respondent's level of self-efficacy between pre and post-test on each group had shown that there were significant differences in the treatment group ( $p = 0.001$ ), but no significant differences in the control group ( $p = 0.317$ ). Mann Whitney Test was used to compare the level of self-efficacy on post-test between control and treatment group. The result had shown  $p = 0.000$  ( $p < 0.05$ ) which means there was a significant difference in the level of self-efficacy between control and treatment group after EFD program.

Table 2 had shown the patient's dietary compliance by using a 24-hour dietary recall. Pretest result on treatment group showed most of the respondents already comply with the meal time (66.7%) and the type of food consumed (72.2%), but not comply with the amount of calories consumed (66.7%). Pretest result in the control group showed the same characteristic but varies in percentages. Posttest result in the treatment group showed that most of the respondents comply with their calories intake (72.2%), meal time (66.7%), and the type of food consumed (94.4%). While posttest result in control group showed, half of the respondents comply with the amount of calories consumed (50%) and the meal time (50%). Most of the respondents also comply with the type of food consumed (77.8%).

It can also be concluded that on pretest most of the respondents on treatment group not comply diet

program for the patient with Type 2 Diabetes (61.1%), so did most of the respondents on the control group (61.1%). After EFD program, most of the respondents on treatment group comply with their diet program (66.7%). While most of the respondents on control group who didn't get EFD program still not comply with their diet program, moreover the percentage is increasing.

Statistical analysis by using Wilcoxon Signed Rank Test which compares respondent's dietary compliance between pre and post-test on each group had shown that there were significant differences in the treatment group ( $p=0.025$ ), but no significant differences in the control group ( $p=0.157$ ). Mann Whitney Test was used to compare the dietary compliance on post-test between control and treatment group. The result had shown  $p=0.000$  ( $p<0.05$ ) which means there was a significant difference in dietary compliance between control and treatment group after EFD program.

## DISCUSSION

Perceived self-efficacy is defined as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives (Bandura & Wessels, 1997). Self-efficacy can induce motivation through efficacy expectations and determining commitment to follow T2DM care management. So, self-efficacy is very important in changing self-care behavior process, especially in nutritious behavior (Mohebi, Azadbakht, Feizi, Sharifirad, & Kargar, 2013). In this research, perceived self-efficacy referred to the T2DM patients' belief in their capabilities to follow the diet program, to control their blood glucose level. On pretest, most of the respondents in both groups have weak self-efficacy. It is understandable because most of the respondents were women. Self-efficacy can be influenced by gender. A man was more optimistic than women (Zimmerman & Martinez-Pons, 1990).

As many as six respondents on both groups indicate a strong self-efficacy on the pretest. Bandura stated that individuals acquire information about their self-efficacy from four sources, includes: 1) performance outcomes; 2) vicarious experience; 3) verbal persuasion, and 4) physiological feedback (Bandura & Wessels, 1997). Mastery experiences are the most influential source of efficacy information. If one has performed well at a task previously, he or she is more likely to feel competent and play well at a similarly associated task (Bandura, 1977). Individuals with high levels of self-efficacy approach difficult tasks as challenges to master rather than as threats to be avoided (Williams & Williams, 2010). Respondents with strong self-efficacy on pretest have had T2DM since more than three years ago. As long as dealing with T2DM and its treatments, ones will have more experience and lesson learned from their past experiences. They will be built better self-efficacy to face their health condition.

After EFD program, by seeing respondents score on post-test, can be evaluated that almost all of the respondents on the treatment group had a strong level of self-efficacy, only one respondent on a low level. Most of the respondents have a significant increase on magnitude dimension. It indicates EFD program can increase the level of self-efficacy in the treatment group. Ethnic food can be defined as an ethnic group's or a country's cuisine that is culturally and socially accepted by consumers outside of the respective ethnic group (Kwon, 2015a). EFD program is a form of health education about dietary guidelines for the patient with T2DM, which is arranged to fit with patient's culture and ethnic food, and also fulfil the amount of calories needed by each patient. According to Leininger's Transcultural Nursing Theory, nursing care that respects to patient's culture can optimise the well-being of the client (McFarland & Wehbe-Alamah, 2018). The patient can gain more knowledge about Sasak's cuisine which is still fit with dietary guidelines. So that, the barrier to comply with T2DM diet can be, and they feel easy to deal with this disease management.

EFD program can increase T2DM patient's self-efficacy to comply with their diet management. Previous research also found that culturally based diabetes self-management education can significantly increase diabetes self-management knowledge (Weldon Grunden, 2016). Bandura stated that culture could influence self-efficacy through values, beliefs, in a self-regulatory process which is functioned as a source to assess self-efficacy and also as a consequence of belief on one's self-efficacy (Bandura & Wessels, 1997). Leininger assumed nursing as a profession, contribute to the harmony of culture and health services along sick and healthy to people with various cultural backgrounds (McFarland & Wehbe-Alamah, 2018). Regarding the transcultural nursing approach, EFD program has been adapted to Sasak Tribes cultural needs, which given as a help, support, facility, or as a creative professional intervention, to help patient adapt and negotiate with their own culture which is beneficial for their health. So that, it can facilitate and increase self-efficacy to run a diet program.

Posttest result had shown that there was a significant increase in patient's dietary compliance, especially in the amount of calories consumed per day. During EFD program, respondents not only get information about dietary guidelines for the T2DM patients, but also type, portion, and recipe of food from Sasak's cuisine which can be consumed. Respondents also get a booklet to help them remind and re-read the material while at home. Health education can positively influence the health behaviour of individuals and communities as well as the living and working conditions that affect their health (Tones, Robinson, & Tilford, 2013). Dale said, by using media, such as booklet, the effectiveness of health education can be optimized (Davis & Summers, 2015).

Compliance also influenced by ethnicity or culture. Cultural differences were associated with the kind of food selected and the way in cooking it (Ettner et al., 2009). Diet for patients with Type 2 Diabetes is more manageable to comply when there is no cultural barrier (Ramsumeer, 2016). They were already familiar with the taste and the way to produce it. A healthy EFD program was lead to better dietary compliance and blood glucose level. The principle of EFD programs is maintaining the culture owned by respondents (Kwon, 2015b). So that, respondents do not need a change in many types of food they consumed, especially for Sasak's Tribe.

EFD program significantly increases the T2DM patients' dietary compliance. Educational interventions regarding dietary guidelines that are adapted to culture have a significant influence both on the stability of blood glucose levels and also increase knowledge and dietary compliance in the T2DM patients (Schäfer et al., 2014). Another previous research found that education on healthy eating with a special module, regarding patient's culture (such as fasting for Ramadhan, for moeslem) improved adherence to a healthy diet (Pratiwi et al., 2018). The best educational program for the T2DM patients is a program which meets patient's culture and contextual condition. It can help them to be more active and create strategies to deal with the barrier and stress. It also gives a positive impact on a patient's self-management. It can be seen on the research's result, the level of self-efficacy and dietary compliance of T2DM patients from Sasak's Tribes rise significantly after EFD program which is designed to meet Sasak's cuisine.

Limitation of the study includes the relatively small sample size of 36 T2DM patients, which may limit the power to generalize research's findings. Post-test measurement should have conducted more than once to do longitudinal analysis.

## CONCLUSION

EFD program can increase T2DM patient's self-efficacy to comply with their diet management. Regarding the transcultural nursing approach, EFD program has been adapted to Sasak Tribes cultural needs, which given as a help, support, facility, or as a creative professional intervention, to help patient adapt and negotiate with their own culture which is beneficial for their health. So that, it can facilitate and increase self-efficacy to run a diet program.

EFD program significantly increases the T2DM patients' dietary compliance. Educational interventions regarding dietary guidelines that are adapted to culture have a significant influence both on the stability of blood glucose levels and also increase knowledge and dietary compliance in the T2DM patients (Schäfer et al., 2014). The best educational program for the T2DM patients is a program which meets patient's culture and contextual condition. It can help them to be more active and create strategies

to deal with the barrier and stress. It also gives a positive impact on a patient's self-management. It can be seen on the research's result, the level of self-efficacy and dietary compliance of T2DM patients from Sasak's Tribes rise significantly after EFD program which is designed to meet Sasak's cuisine.

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Original Research

## Differences in Clinical Simulation with Audio-visual and Practicum-based Standard Operating Procedures in Nursing Student Competencies

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### ABSTRACT

**Introduction:** The biggest challenge in nursing education is to produce nurses who are professional and competent. Effective and efficient learning through appropriate methods and media is very important. Practical learning based on standard operating procedures (SOP) has been widely applied, but clinical simulation approaches with audio-visual media have not been scientifically proven. The purpose of this study is to compare student competencies through clinical simulation learning with audio-visual media and practicums based on SOP.

**Methods:** This was a quasi-experimental study with a pretest-posttest control group design. The sample consisted of 40 students recruited using simple random sampling and then divided into 2 groups: 20 respondents were given clinical simulation methods using audio-visual materials and 20 respondents were given practicum based on SOP. The independent variables were clinical simulation with audio-visual media and practicum based on standard operating procedures. The dependent variable was student competency, assessed using competency assessment including cognitive, affective, and psychomotor methods. Data analysis was conducted using the Wilcoxon test.

**Results:** The use of clinical simulations with audio-visual media and practicum based on SOP can increase the value of competency in nursing students, but the median value on the use of clinical simulations using audio-visual sources is higher than practicum based on SOP.

**Conclusion:** Clinical simulations with audio-visual media can be recommended as effective learning methods and media for nursing students.

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### INTRODUCTION

Nowadays, health problems are increasingly complex and demands for health services are also increasing. Nursing education must prepare competent graduates to be able to compete both nationally and globally. National nursing competency test graduation rates increased, but not significantly, in 2015 by 38%, and in 2016 by 51%. In East Java Province it increased from June 2014 (45.8%), November 2014 (68.2%), September 2015 (82.6%), but in 2016 it decreased to 51.6%. Based on a preliminary study conducted at one of the high school health sciences in Nganjuk District, it was found that the passing level of nurses' competency tests had not yet reached maximum results. Only 17 of 63 students

passed the competency test in June 2015 (26.9%), and in 2016 out of 2 competency tests students passed 32 of 98 students in April 2016 (32.6%), and 21 out of 78 students (26.9%).

One of the efforts to increase the level of graduation of students in the national competency test is through a learning process that is supported by various learning components to achieve the desired goals. The use of audio-visual media is one form of intervention that can be given in addition to conventional methods. Audio-visual media provides stimulation to hearing and vision, so that the results obtained are more optimal (Maulana, 2009). Another strategy that can be used to optimize learning outcomes is through clinical simulation methods. The use of simulation as an educational technique has

been widely adapted in the health field, both for evaluation of training and nurse performance. Initial uses of simulation include teaching psychomotor skills and competency tests (Larew C, Lessans S, Spunt D, Foster D, 2006).

Simulation plays an important role in clinical education and evaluating the competencies of graduates of nursing students. Clinical simulations were developed to provide opportunities for students to identify patients in general, think critically, and be able to show appropriate interventions (Levett-Jones & Lapkin, 2014). The application of clinical simulation with audio-visual materials is expected to be able to make students practice as in real situations so as to achieve the expected competence. The purpose of this study was to determine the effectiveness of clinical simulations using audio-visual media compare to practicums based on SOP toward nursing student competencies.

## MATERIALS AND METHODS

This study used a quasi-experimental with a pretest-posttest control group design. The population of this study were all students in one of the health sciences at a high school in Nganjuk district who were in the 6th semester and who had completed the neuro-behavioural system course. The research sample consisted of 40 nursing students recruited using simple random sampling. The samples were divided into 2 groups: 20 students who were given clinical simulations with audio-visual sources and 20 students who were given practicum based on SOP. The independent variables were clinical simulation with audio-visual media and practicum based on SOP. The dependent variable was student competence. Data collection tools used observation sheets and competency assessment sheets (cognitive, affective, and psychomotor).

The intervention for treatment group given by using simulation modules and audio-visual media (15 – 20 minutes) was conducted 8 times. While the control group were given case scenarios and standard operating procedures for 100 minutes held 4 times. All of the respondents were tested for competencies before and after intervention.

Data were analysed using the Wilcoxon test to determine differences in competency values (cognitive, affective, and psychomotor) in the clinical simulation with the audio-visual group and practicum based on SOP groups with a significance level of 95%.

The study has obtained an ethics approval certificate from the Health Research Ethics Commission of the Faculty of Nursing, Universitas Airlangga Surabaya, with the certificate number 528-KEPK in 2017.

## RESULTS

The characteristics of respondents from both groups are shown in Table 1. In both groups, 40 respondents (100%) were aged  $\leq$  25 years and had previous

practical experience and most of the 24 respondents (60%) were female.

Table 2 shows that cognitive, affective, and psychomotor abilities in the clinical simulation group with audio-visual media have a higher median value than the practicum group based on SOP. Wilcoxon test results measuring the differences in competence obtained p value 0,000 ( $<0.05$ ) in the clinical simulation group with audio-visual media and p value 0.001 ( $<0.05$ ) in the practicum group based on SOP. In both groups, both used clinical simulations with audio-visual media and practicum-based SOP have an influence on the competence of nursing students despite the difference in median values.

## DISCUSSION

The results of data analysis proves that the clinical simulation method with audio-visual media can improve nursing student competencies. These competencies include cognitive, affective, and psychomotor abilities. The selection and use of media and method is one important component in supporting the implementation of learning. Problem-based learning is one of the learning methods that stimulates students to learn independently so as to enable students to practice with real situations (Castro-Sánchez et al., 2012).

Research conducted by (Bloch & Bloch, 2013) proved that 220 emergency room nurses received written instructions and 216 with video contained significant knowledge. Instructions that use video can increase the emergency room nurse's knowledge in 2 to 5 days quicker rather than written instructions. The satisfaction of the ER nurse is also greater than in writing. In line with (Armstrong et al., 2010) audio-visual media can present informed consent and wound care instructions more effectively and produce higher satisfaction than verbally. (Lin, Khaira, & Khairuzzaman, 2014) also proved that multimedia-based health education is not only limited to information providers but can increase the motivation, skills, and self-efficacy needed in taking actions related to improving health. Rosen et al (2010) also proves that Entertainment Education (EE) through audio-visual media aims to deliver health education messages in an interesting and entertaining way. The study of hand washing through audio-visual media contributes to changing unhealthy behaviours into healthy ones. The media is able to stimulate or enter information through sensory sharing. The more stimulation, the easier the information is to accept. Audio-visual media provide stimulation through the eyes and ears. The combination of information channels through the eye reaches 75% and the ear 13%, will provide stimulation that is good enough so that it can provide optimal results (Maulana, 2009).

The use of appropriate methods in one presentation of material is very important in order to achieve the desired goals. (Levett-Jones & Lapkin, 2014) define simulation as a technique used to

Table 1 Characteristics of Respondents in Clinical Simulation Groups with Audio-visual and Practicum Groups based on Standard Operating Procedures

Characteristics	Clinical Simulation Groups with Audio-visual Media		Practicum Groups based on Standard Operating Procedures		Total	%
	n	%	n	%		
Age (year)						
a. <25	20	100	20	100	40	100
b. ≥ 25	0	0	0	0	0	0
Gender						
a. Male	7	35	9	45	16	40
b. Female	13	65	11	55	24	60
Practicum Experiences						
a. Don't Have Experiences	0	0	0	0	0	0
b. Have Experiences	20	100	20	100	40	100

Table 2 Obtaining Competency, Cognitive, Affective, and Psychomotor Scores According to Pre-test and Post-test in the Clinical Simulation Group with Audio-visual and Practicum Groups based on Standard Operating Procedures

Group	Variable		Med ±Min-Max	<i>p value</i>
Practicum Group based on Standard Operating Procedures (n=20)	Cognitive	<i>Pre test</i>	7,50±5-10	0,002
		<i>Post test</i>	8,00±5-12	
	Affective	<i>Pre test</i>	46,50±42-63	0,004
		<i>Post test</i>	47,50±42-63	
	Psychomotor	<i>Pre test</i>	42,50±29-52	0,001
		<i>Post test</i>	43,50±28-56	
	Competency	<i>Pre test</i>	97,00±84-108	0,001
		<i>Post test</i>	99,50±84-115	
Clinical Simulation Groups with Audio-visual Media (n=20)	Cognitive	<i>Pre test</i>	7,00±3-10	0,000
		<i>Post test</i>	9,00±5-13	
	Affective	<i>Pre test</i>	48,00±42-63	0,000
		<i>Post test</i>	55,50±42-67	
	Psychomotor	<i>Pre test</i>	47,00±29-63	0,000
		<i>Post test</i>	59,00±28-71	
	Competency	<i>Pre test</i>	103,00±84-120	0,000
		<i>Post test</i>	120,50±84-145	

replace or strengthen real experiences guided by experiences that evoke or replace substantial aspects of the real world in a fully interactive way. (Woodworth, Chen, Horn, & Aziz, 2014) compared respondents that were given video exposure and video-based simulations. The results showed that there was a significant increase in knowledge related to USG anatomy and skills, but in the two groups there was no significant improvement in procedures. The results of the study show that instructional videos and simulations can be effective tools to explicitly increase knowledge. Computer-based simulations combined with several types of procedural training can improve technical skills (McGaghie, Issenberg, Cohen, Barsuk, & Wayne, 2011). (Lippe & Becker, 2015) assessed the learning process of simulation in providing care to critically ill patients. The results of statistical tests show that the attitude and competency scores of students have significantly increased. Therefore, it can be concluded that clinical simulations offer strong teaching strategies to

improve students' attitudes and competencies in treating comatose patients. Other studies conducted by (Przybyl, Androwich, & Evans, 2015) showed the use of simulations proved effective in increasing nurse satisfaction, understanding of the principles of CRRT (Continuous Renal Replacement Therapy), and critical thinking skills with CRRT operations, scores increased from pre-simulation to questionnaire post simulation. (Blake, 2014) also reinforces that instructional-based simulations equip medical students with knowledge, skills, attitudes, and behaviours towards clinical conditions in various situations. (Dalton, Head, & Levett-Jones Rn, 2015) Simulation scenarios create opportunities for students to apply and practice the knowledge gained from learning materials, and collaborative and supportive arrangements. Students will more easily understand cases through scenarios rather than theory in class so that they can reduce their failure rate when taking clinical action in the hospital.

The limitation of this study is that there is no specific clinical simulation space available that is designed as a visual environment that is visually, auditory, and kinaesthetic. Implementation of clinical simulations with audio-visual media can be continued and recommended for nursing students by providing facilities and competent instructors according to their expertise.

## CONCLUSION

In both the clinical simulation group with audio-visual media and practicum groups based on standard operational procedures affect cognitive abilities, affective, and psychomotor, but the higher median values were obtained by the clinical simulation group with audio-visual media than practicum groups based on standard operating procedures. Clinical simulation methods with audio-visual media have proven to be effective on the competency abilities of nursing students.

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Original Research

## Developing Family Resilience Models: Indicators and Dimensions in the Families of Pulmonary TB Patients in Surabaya

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### ABSTRACT

**Introduction:** Family resilience is the process of adaptation and coping in the family as a functional unit. A lack of family involvement in the care programs for TB sufferers is one of the factors of concern. The purpose of this study was to analyze the indicators of the family resilience of patients with pulmonary TB.

**Methods:** This study used an observational analytical method with a cross-sectional approach. The study population was the families of new pulmonary TB sufferers in the Surabaya area, taken using the rule of the thumb guideline with a sample of 130 respondents. The sampling technique using was systematic random sampling. The variables in this study were the stages of family resilience: survival, adaptation, acceptance, growing stronger and helping others, which were measured using a questionnaire. The data was analyzed using second CFA.

**Results:** The results showed that the family resilience model is also the fit model. This refers to the results of the goodness of fit test. Family Resilience = 0.724 Survival, Family Resilience = 0.762 Adaptation, Family Resilience = 0.945 Acceptance, Family Resilience = 0.783 Growing Stronger and Family Resilience = 0.879 Helping Others.

**Conclusion:** The results of this study provide information on the stages of family resilience and the ability of each stage so then it can be used as a reference when developing family nursing care plans for patients with pulmonary TB.

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### INTRODUCTION

The family has a very important role in maintaining optimal levels of patient health in the face of illness (Samal, 2016). The family support received by the pulmonary TB patients plays an important role in improving treatment adherence. Lack of family and social support predicts poor treatment adherence (Py et al., 2013). Good support and care from the family becomes a consideration when paying special attention to the daily routine of patients with pulmonary TB, especially in terms of medication adherence (Kaulagekar-nagarkar, Dhake, & Jha, 2012). The family as a system can cause problems and at the same time, be effective in overcoming problems (Friedman, 2010). Family resilience is the process of

adaptation and coping in the family as a functional unit. Resilience involves dynamic processes that help them adapt to significant problems. It is this strength and the available resources that enable individuals and families to successfully face crises and problems. It is important to learn the stages of family resilience related to the pulmonary TB sufferers as well as the strength or ability in each stage of family resilience itself. In the previous studies that have discussed the stages of family resilience, they did not test the indicators of each stage

Tuberculosis (TB) is the leading cause of death in the world. An estimated 10.4 million people became ill with TB in 2016 of which 90% were adults, 65% were men, 10% were people living with HIV (74% in Africa) and 56% were in the following five countries:

India, Indonesia, China, the Philippines and Pakistan (WHO, 2017). The detection rate of TB cases, also known as the Case Detection Rate (CDR), in Indonesia in 2020 is estimated to be > 70% while the success rate of TB treatment, or the Success Rate, is estimated to be (SR) >85%, even though Indonesia is still included in the ten countries that contribute to TB cases in the world. The number of TB sufferers in Indonesia ranks third in the world after India and China (WHO, 2017).

Surabaya is the second largest city in Indonesia. In 2015, the number of new cases of pulmonary TB disease in Surabaya was 2,330 patients, the cure rate of BTA+ was 70.43%, and the success rate of the treatment provided was 79.21% (Dinkes, 2015). Data from the Surabaya City Health Office in 2016 showed that the total number of TB patients in the Surabaya city area was 5,389 patients, with 3,421 patients were reported by 63 Public Health Centers and 1,968 patients reported by 33 public and private hospitals in the Surabaya City area (SITT data source online version 10.04).

Family resilience is expected to be able to increase the independence of the family when caring for family members suffering from pulmonary TB with the end result expected that the patients will have a support system in the form of their family during the treatment process. Family resilience through the 5 stages or processes indicates that when the family is faced with various problems that simultaneously occur in the family, the family will go through 5 phases of resilience. The first stage of the family resilience process is survival (survival). The second stage is where the family begins to adapt to the problems that occur, the third stage is where the family begins to accept the problems and family condition and the next stage is where the family will become stronger because they have experience handling problems. The fifth stage is where the families are able to help others who face the same problems (Lietz & Strength, 2016).

Every family going through the stages of family resilience does not always follow a sequential process. When the family has stepped into the next phase, it is possible to be thrown back to the initial phase when a new crisis occurs. In addition, in this phase, not every family will be in the same phase to begin with. The accuracy of knowing the current phase of the family and the strength of the family itself helps the family to adapt and to develop in relation to their needs (Lietz & Strength, 2016). Family resilience shows that the family is able to be independent when caring for the family member suffering from pulmonary TB with the expected result that the patient will have a support system in their family which complies with the care process. The purpose of this study was to analyze the development of a family resilience model in the family of pulmonary TB patients.

## MATERIALS AND METHODS

Table 1. Variables and Sub Variables

Variable	Sub-Variable
Survival (B)	B.1 Respect the family
	B.2 Worship
	B.3 Resolve the problem yourself
	B.4 Dependent
	B.5 Consulting each other
	B.6 Strong when facing problems
	B.7 Strong faith
	B.8 Mutually keep feeling
	B.9 Family will help when there is a problem
	B.10 Be aware that the family presence is important
	B.11 Seeking advice from religious experts
Adaptation (A)	A.1 Families can overcome things that are not desirable
	A.2 Open minded to new ways in the family
	A.3 Understanding among the family members
	A.4 Asking for clarification if there are things not understood
	A.5 Sharing responsibility
	A.6 Awakened family confidence
	A.7 Trying new ways to solve problems
Acceptance (P)	P.1 Accept TB disease-related difficulties as a part of life
	P.2 Belief that they can overcome the problem and this becomes a family commitment
	P.3 Honest to the family
	P.4 Compromise if there is a problem
	P.5 Communicating in a relaxed and warm, even humorous, way
	P.6 Can ask the purpose of the message that is conveyed by the family related to the success of the treatment
	P.7 Solve the problem by discussion
	P.8 Discussing the problem until there is a solution that can be completed and there is successful treatment
	P.9 Open to expressing their opinion to get insights
	P.10 Have the power to solve the problem
	P.11 Hearing honest information
	P.12 Understand the intentions of the other family members
Growing Stronger (G)	G.1 Becoming part of a complete family
	G.2 Making important decisions related to the treatment of disease, especially in the family
	G.3 Able to cope with pain and to mutually understand the effects of the disease

Helping Others (H)	G.4	Able to adapt to the demands that befall them as a family in the presence of disease
	G.5	Able to solve problems due to the disease correctly
	G.6	Able to resolve the issue positively
	H.1	Helping each other with the neighbors who have pulmonary TB
	H.2	Able to survive if other problems are encountered
	H.3	Interacting with the family and others
	H.4	Sincerity to help others
	H.5	Feel secure living in the family and in the social environment
	H.6	Feel free when becoming a family member and in the social environment
	H.7	Mutual learning from mistakes and sharing with others
	H.8	Participate in social activities
	H.9	Providing assistance to those in need
H.10	Caring for their family members and others	
H.11	Caring for the family members of others	
H.12	The family is a place that is good for the members of the family	

Family Resilience (Y)

Table 2. Demographics of the Respondents (n=130)

Indicator	n	%
Family type		
Nuclear	88	67.7
Extended	27	20.7
Other Type	15	11.6
Socioeconomic family		
High	3	2.3
Medium	30	23.1
Low	97	74.6
Position in the family		
Husband	20	15.4
Wife	47	36.2
Children	31	23.8
Other	32	24.6
Supervisor the taking of medicine (PMO)		
Family	93	71.5
Other	37	28.5

Analytical observational research with a cross-sectional approach was used in this study. The population in this study was the families of pulmonary TB patients who had just been diagnosed in the data collection period in the working area of the Public Health Center in the city of Surabaya. Samples

were taken through systematic random sampling and calculated using the rule of the thumb with a total sample of 130 respondents. The research instrument used was a questionnaire. The variables in this study are the following dimensions of the family resilience: Survival (B), Adaptation (A), Acceptance (P), Growing Stronger (G) and Helping Others (H) as well as the Dependent Variable (Y) of family resilience. The indicators of each dimension (sub-variable) are as follows:

The data was analyzed using Second Confirmatory Factor Analysis (2CFA). This study has received the recommendation to carry out the research from the National Unity, Politics and Community Protection Agency of Surabaya City. It obtained ethical approval from the Health Research Ethics Commission of the Faculty of Nursing, Airlangga University

RESULTS

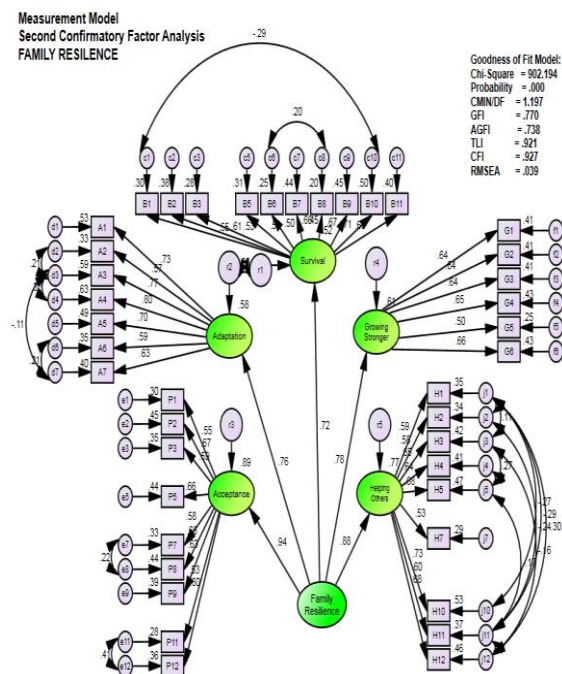


Figure 1. Family Resilience Measurement Model

Table 3. Results of Testing the Family Resilience Model

Criteria	Cut-off value	Calculati on results	Information
Chi-Square	Expected to be small	796.978	$\chi^2$ with df = 754 is 818,991 Well
Significance Probability	$\geq 0.05$	0.135	Well
RMSEA	$\leq 0.08$	0.039	Well
GFI	$\geq 0.90$	0.907	Well
AGFI	$\geq 0.90$	0.838	Pretty good
CMIN / DF	$\leq 2.00$	1,057	Well
TLI	$\geq 0.90$	0.921	Well
CFI	$\geq 0.90$	0.927	Well

The results of the study focused on 130 families of pulmonary TB sufferers showed the follow results. Table 2 shows that the most family type is that of a nuclear family (67.7%). Most families of the pulmonary TB patients have a low socioeconomic level (74.6%). The position of the family members who were the respondents was mostly that of a wife (36.6%). The majority were the supervisors of the patients with pulmonary TB when taking their medicine (71.5%)

The indicator description includes the minimum, maximum, average and standard deviation value of each indicator as presented in Table 3. CFA modeling requires multivariate normally distributed data. The results of the analysis show that the CR multivariate value of 0.07 lies between the -1.96 values up to 1.96, thus showing the multivariate normal distribution of the data (Table 4). Next, the 2CFA modeling is presented in the following figure.

The results of testing the measurement model with the complete AMOS program can be seen in the following table.

Table 3 shows that the 7 (seven) criteria used to assess the feasibility of the model were good. It can be said that the measurement model for 2CFA is acceptable, which means that there is a match between the model and the data.

From the appropriate model, each path coefficient can be interpreted. The path coefficients are the hypotheses in this study which can be presented in the following structural equation:

Family Resilience = 0.724 Survival  
 Family Resilience= 0.762 Adaptation  
 Family Resilience= 0.945 Acceptance  
 Family Resilience= 0.783 Growing Stronger  
 Family Resilience= 0.887 Helping Others

## DISCUSSION

The families who were respondents in this study were the families of pulmonary TB patients recently diagnosed with pulmonary TB. The analysis shows that most of the families were in the 'acceptance' and 'helping others' phases. This proves that not all families undergo the series of family endurance stages sequentially. Previous studies discussed the stages of the resilience of the families but they did not test the indicators of each stage. The indicators in the family resilience stages will be explained in the following discussion.

### Survival

When a family faces a crisis, loss or trauma, they will usually experience a period of time in which the family members only try to do the minimum of what is needed throughout the day. In this phase, the family has not been able to make adjustments and accept reality. The family is only trying to survive. The survival phase is the phase where the family is only able to get through the problem as it comes every day. Many families explained that before making adaptations to their family life, they just have to find a way to survive. The main family strength in this

phase is spiritual power and social support (Lietz & Strength, 2016).

The results show that the respondents stated the spiritual and religious strength of the family was their most important ability in terms of overcoming and finding meaning in their struggle. During this phase, many families stated that prayer and worship were an important part of survival in the beginning of the crisis. The loading factor of each indicator shows that there are behaviors among the family members who care for each other's feelings, who feel strong when facing problems and who feel the presence of their family. This is a translation of family support and the indicator of asking for help from religious leaders had a greater value than the other indicators. Following this, 67,7 % of respondents with a nuclear family type had a positive impact on family support. When an individual in a family experiences illness, all of the family members are affected because they are connected. The effect on each family member varies in terms of intensity and quality.

During the survival phase, emotional support is very important. Social support in this phase is more about getting help from outside of the family system, including from the extended family, friends, support groups and professionals. In this stage, the family feels an increase in the burden on the family, especially if the sick individual is the husband or wife. The results showed that 47 respondents (36.2%) were husbands. The husband, as the head of the family, has the main role of providing a decent life for their family so when the husband is sick, it will have an impact on the family. Thus when a family member is sick, the rest of the family feel this as a burden. This is in line with the results of previous studies that showed that the burden of care felt by the family is related to confusion about the illness, emotions, physical, time, and financial and social burdens. This leads to a decrease in the quality of life of family and family functionality. There are opportunities for negative outcomes in relation to family resilience (Fitryasari, Yusuf, Dian, & Endang, 2018). In this stage, the family needs support from outside of the family, especially from the environment and health workers, to help the family to identify the burden of care and to improve their coping as a part of recovering from adversity.

The problem for the families of TB sufferers is the misunderstanding of the family and community which leads to discrimination related to the disease (Kaulagekar-nagarkar & Aarti, 2012). Discrimination felt at the beginning of the diagnosis is one of the causes of depression in TB patients and their families (Li-Yun Lee, Heng-Hsin Tung, Shu-Ching Chen, 2017). Social support from the community will be meaningless if there is still stigma and discrimination felt by the TB patients and their families. Fear of contracting TB is often the reason for this discrimination. In subsequent studies, this will be further investigated in terms of the effect of stigma on family resilience. In this study, the indicator which states that families are interdependent when others

keep away for fear of contracting the disease has no significance. This shows that at this stage, the family is still oriented towards the impact of any problems internally. This is where the family is more focused on surviving with the problems that they face, which are related to one family member suffering from pulmonary TB. The results of the analysis of the survival stage provide a 0.72 effect on family resilience in the families of pulmonary TB patients.

### **Adaptation Phase**

This phase refers to the time that the families need to readjust their lives in order to accommodate the crisis that they face. At this time, the family may not really accept new challenges and they begin to find that they need to immediately start making changes. The adaptation phase is the time when changes are made, even before the family really accepts the nature of their current situation. The most relevant family strengths during this period were initiative, flexibility/creativity, and limitation management. Initiative refers to the willingness of the families to take responsibility and to handle situations while the management of restrictions refers to the ability of the families to separate themselves from unhealthy influences (Lietz & Strength, 2016)

Family creativity is the ability to find several solutions to a problem. Flexibility is the desire of families to try new things when dealing with problems or crises in the family. The results showed that all of the indicators can significantly measure the adaptability of families of the pulmonary TB patients. At this stage, the biggest loading factor value is the family clarifying a problem that is not understood (0,80). Other indicators that have a large enough value include starting to understand each other (0.77), starting to try new things (0.63) and solving problems (0.73). At this stage, the family in this study - by as much as 36.2% - shows that the representation of the wife is in accordance with the culture in the Surabaya Region. This is how most of the Javanese tribes will act after obtaining approval from the husband as the head of the family who is given authority by the family as decision maker. The analysis shows that the adaptation stage ranks fourth with the structural equation stating that adaptation has an effect of 0.76 on family resilience in the families of patients with pulmonary TB.

### **Acceptance**

The family strengths in this stage include commitment, insight, communication, and humor. Family commitment refers to the dedication and strong desire of the family as a whole. The family is the first priority. When the family faces difficulties, the strength of the family commitment will make it easier for the family to keep trying to get out of trouble. The provision of interventions that facilitate social support from the family's internal system will foster close relationships and commitment among the family members, especially families at risk. Insight refers to the ability of the families to gain an understanding of the problems that they face.

When the families discuss accepting their situation, they identify communication as a family strength that helps them to achieve acceptance. Affective communication includes expressions of love and attention. Attention and is very important to foster a sense of family cohesiveness. A sense of humor is a family strength that refers to the family's ability to be light in the face of adversity. Humor is discussed as something that helps them to accept their difficulties. Similar to communication, this is also a sign that the reception phase is in progress. Families can make their situation light. This activity reduces their pain while also showing that they are starting to accept what they are facing.

The results showed that indicators P4, P6, and P10 were not significant in terms of measuring the acceptance of the family resilience stage. The indicators show that the family can be compromised if there is a problem, that they can ask for the purpose of the message delivered by the family related to the success of care, and that the family has the power to solve the problem. The four indicators above show that at this stage, the family does not have power. The indicators showing commitment, openness to discussion and communication have a great value. When the families discuss in order to accept their situation, they identify communication as a family power that helps them to achieve acceptance while also showing that acceptance does occur (Walsh, 2017). The results of the analysis show that the acceptance stage ranks first with the structural equation stating that it has an effect of 0.94 on family resilience in the families of pulmonary TB patients.

### **Growing Stronger**

Growing stronger is when the families acknowledge and experience reinforcement related to the changes they have made so far. The most important family strength during this stage is assessment. When the families experience loss and difficulties but also find meaning in them, they seem to be better able to avoid the negative consequences that are usually associated with high risk situations. This stage is seen when the families move from their initial anger and fear to acceptance, and finally to a place where they can assess the situation positively. The results showed that all indicators that were built can significantly measure the phase of family growth. All of the competencies that show the strength of the family when taking on a positive decision to solve a problem, to accept pain and the impact of pain, and to beginning to feel that they have the ability to resolve the issue properly as a family unit intact. Each indicator above has a value of a loading factor that is almost the same. According to McCubbin (1996) cited by (Chapin, 2015), positive movements are referred to by McCubbin as "bonadaptation", namely behavior that shows changes that move towards growth and maturation. Growing the family resilience ability is not an easy effort. The family should be able to identify any risk factors and manage them in order to achieve a dynamic family situation. In the stage of

resilience, there is the ability of families to cope with stressors from outside the family, known as risk factors. They respond using the family strength, family resources, and the ability to solve problems within the family, which are collectively referred to as protective factors (Taylor & Distelberg, 2016). The results of the analysis showed that the stage of growing stronger ranks third with the structural equation stating an effect of 0.78 on the family resilience of the families of patients with pulmonary TB.

### Helping Others

When families can assess their difficulties in a positive way, the family reaches a point where they want to help others. Some suggest that altruistic pro-social behavior helps families to find meaning in adversity (Lietz, 2018). In other words, the families describe their participation in some pro-social behaviors as an effort to help others while also helping themselves. Families have a major contribution towards the pulmonary TB patients. When the nuclear family and extended family provide mutual support, the family resources of education, employment and socioeconomic level also influence this support in accordance with the previous research which states there is a significant relationship between the family factors of family type, level of education, employment, income, healthy home and stressors in the family with the quality of life of pulmonary TB patients (Rachmawati, 2018).

Providing social support is a family strength associated with this phase. The process of resilience grows from the survival stage where families are desperate to receive social support where they help others in turn to give back. The results show that indicators H6, H8, and H9 - which state that the family feels free to be a family member in the social environment, that they provide assistance and gifts for neighbors in need, that they show love and concern for their family members - are not significant in terms of measuring the stage of helping others. This is because the three indicators are still focused on the abilities of the family internally. More precisely, when the family needs support while in this stage, it is more to provide support to others who have similar problems to those experienced by the family. The indicators that show the ability of the families to help others who have similar problems while continuing to show internal efforts to strengthen the family resources, in addition to a sense of security and comfort in the family and environment, plus the social relationships. These are all indicators with high loading values. The results of the analysis show that the stage of growing stronger ranks second with the structural equation stating an effect of 0.88 for the family resilience of the families of pulmonary TB patients.

### CONCLUSION

Based on the results of this study, it can be concluded that the family resilience model is a fit model. This

refers to the results of the goodness of fit test. The indicators of each phase of family resilience, which is the development of indicators in the family resilience model as the observed variables in the model, are valid based on the results of the validity test conducted on the measurement model. The construct as described by the observed variable is reliable. The construct of family resilience can be measured clearly using its dimensions or phases which are, sequentially from the greatest value, as follows: acceptance, helping others and growing stronger. Following these three, the adaptation and survival phases have a relatively similar value. The results also showed that not all of the families passed the family resilience stage.

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Original Research

## Factors Influencing the Success of the National Nursing Competency Examination taken by the Nursing Diploma Students in Yogyakarta

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### ABSTRACT

**Introduction:** Yogyakarta is a province with the highest percentage of achievements over the past five years. It is argued that it has been affected by many factors. This study was conducted to analyze the factors that influence the success in the national nursing examination of the 3-year nursing diploma students in Yogyakarta.

**Methods:** This study was a descriptive correlation design with a total sample of 755 participants. The variables in this study were mental preparedness and the learning strategy used by the examinees before the exam (internal factors). This is in addition to the management strategy used three months before the exam, the learning methods used within the 3-year process and the environment where the exam is done (external factors) and also the results of the national nursing competency examination. The questionnaire used in this study was developed by the researcher with a Cronbach's Alpha = 0.82. The data was analyzed with the frequency distribution, Pearson correlation and R2 for the determinant analysis unit obtained.

**Results:** This study found that the management strategy and exam room/environment were significantly correlated with the results of the exam ( $p=0.05$ ). The learning methods used were also correlated with the results of the exam ( $p=0.00$ ). The learning strategies used before the exam was a significant factor influencing the success of the national competency examination with a higher coefficient value.

**Conclusion:** Various factors are related to the success of the national nursing competency examination in Yogyakarta. This study implies that the nursing diploma management and the students should manage the learning strategies used before the exam to achieve better results in the national nursing competency examination.

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### INTRODUCTION

The implementation of the Mutual Recognition Arrangement (MRA) affects the dynamics of the Association of South East Asia Nations (ASEAN) and the Economic Community (AJCCN Forum, 2016). The Global Competitiveness Index in 2017-2018 shows that Indonesia was in 36<sup>th</sup> place from among 137 countries globally (World's Economic Forum, 2018). Nursing and tourism are some of the free flowing services ready to compete in the free market competition. The current global situation of the nursing workforce is experiencing an undersupply of nursing staff (Marc, Bartosiewicz, Burzynka, Chmiel, and Januszewicz, 2018). The increasing elderly population and decreasing number of births, which

influences health policies and health care systems around the world, will affect the human resource demand of nursing. To deal with this condition, some nursing institutions should adapt their strategies to manage their institutions. Nurses who graduate within a similar nursing education system who want to work overseas will take a nursing competency examination and gain professional certification or recertification in order to update their professional competencies to meet the standards of the origin country. This certification can be achieved through bridging programs and certain nursing courses. It ends in the nursing licensure examination (Covell, Primeau, Kilpatrick, and St.Pierre, 2017).

Unfortunately, Indonesia, while producing a great number of nurses each year, has not been able to



fulfill the demands of the market yet. The government should be aware that after five years of the national examination for the health care profession ongoing, it still has a big problem. The facts indicate that from the first results of the examination until 2018, the results did not meet expectations. About half of the students - who came from many different health education institutions who participated in the examination - still failed. The low pass rate of the national nursing examination is a burden for many nursing institutions and the government. Some of the nursing institutions in the West and East provinces of Indonesia even had a 0% - 25% passing grade. Another problem is the mental preparedness of the re-taker examinees who have still failed the examination many times. Almost 50% of the participants in the national competency examination were found to be incompetent (re-taker participants) at the time of the study (PNUK, Nakes, 2018)

This performance still needs to be increased significantly in order to be able to reach a higher level of nursing passing grade in the national examination, thus increasing the level of the competency of the nursing students. A higher level passing grade will reflect the level of competency of the graduate nursing students. If this higher passing grade is achieved well, then hopefully the Indonesian nurses can compete with the other ASEAN countries, particularly Singapore and the Philippines. The Indonesian Ministry of Health is mandating all nurses who work in the healthcare services to have a registration document that can be obtained through the national nursing examination after finishing all credits in the degree program (Indonesian Ministry of Health, 2014).

Responding to this situation, nursing education in Indonesia has changed the curricula into a competence-based curriculum based on *Kerangka Kualifikasi Nasional Indonesia* (KKNI), or the Indonesian National Qualification Framework, in order to have equal parameters of competency that are synchronous and equivalent in the ASEAN scope. The National Competency Examination for the health profession is an examination held by the National Competency Examination committee. It consists of elements from the Indonesian National Nurse Association, the Association of Nursing Education Institution, the Ministry of Research, Technology, and Higher Education, the Ministry of Health, and stakeholders. This examination is a requirement to obtaining a nursing certificate. It is conducted three times a year in the form of paper-based and computer-based examinations. Every student must pass the examination. The examination is taken after the nursing students finish their education and before they apply for work. The conclusion on the

passing grade of the examination is determined by the agreement of the expert panel. They are all well-established and independent scientists with over 10 years of professional and multidisciplinary experience in health (Kemenristekdikti, 2016).

The performance and results of the competency examination are influenced by several variables and predictors related to either the internal factors inside of the participants or to the external factors. The internal factors, such as the psychological or mental readiness of the students, the learning strategies used to face the examination several months before until a night before the exam day and the physical conditions of the students while taking the examination are believed to be the important factors affecting the examination score. The demographic profiles of the students such as gender, academic achievements and the cognitive ability of the students, especially their problem-solving ability and critical thinking are also important internal predictors that influence the examination score. Shin, Kim, Suh, Jung, Kim, and Yim (2017) stated that construct analysis and a validity test might be significant contributors that affect success in the national competency examination. In order to have a clear understanding of the question, students need to have ability to understand the test construction in many steps of the case reviews.

Some external factors can also influence success in the nursing competency examination. These factors, such as the role of the management in developing the competency test, the registration process, miscommunications and the absence of specific strategies in preparing the students, need to be explored more seriously in order to achieve the best score in the competency examination performance. Kim, Nikstaitis, Park, Amstrong and Mark (2019) said that some students predicted that they will succeed in the nursing licensure exam because they took review courses, made aggressive use of the practice questions and studied hard. A strategic review is done by many nursing institutions at the end of the nursing program stimuli by the student to collect and form an early understanding of the essential nursing courses. Robert (2018) also supported the statement that an accomplishment in all of the essential nursing subjects will lead the students to achieve a higher grade in the national nursing licensure examination. Palompon, Ong and Banico (2012) found that many variables such as their college entrance examination performance in the IQ test, their college grade point average and their preboard examination performances had a correlation with licensure examination performance. The last two variables significantly predicted their licensure nursing examination score.

Other external factors include support from their family, peers, friends or classmates, the class room environment where the examination is held, the behavior of the lecturers, and the weather. The quality of the clinical instructors, lecturers and the learning methods provided along the program and the location where the competency examination is held are also important variables that affect the examination process (Okanga, Ogur and Arudo, 2017). Considering that there are so many factors affecting the performance of graduate nurses, especially in the national examination process, the researcher is interested in exploring the variables and predictors that affect the results of the national nursing competency examination of the 3-years nursing diploma in Yogyakarta. Yogyakarta was chosen because it is a province that has always had the highest performance in the nursing competency examination in the country since the first time when the examination was held. Although Yogyakarta has only 9 institutions that offer a nursing diploma, this province is always the best province that achieves the highest score and highest percentage in the national nursing diploma competency examination. It also had the highest passing grade of more than 98% from 2015 until 2018 (PNUK,Nakes, 2018).

## MATERIALS AND METHODS

This quantitative research used a descriptive-correlative analytical design. The first description was to determine the demographic profile of the participants, the results of the examination, the mental strategies and examination strategies of the participants, the strategies of the managers in preparing the examination and the environment during the examination. This descriptive process was then followed by the correlative analysis process and the analysis of the impact value of the variables in order to explore the most significant predictors of the examination results more deeply and to see the correlations between and among the variables that affect the results of the national competency examination 3-year. The independent variables in this study were mental preparedness, learning strategies, management strategies (preparation of the management), learning methods, and the environment/room where the competency test was held. The dependent variable was the results of the competency examination.

The research was conducted in the Special Region of Yogyakarta, Indonesia, and the target population was all of the students participating in the national competency examination at that time. Through the total sampling technique, 766 students doing the 3-year nursing diploma participating in the national competency examination in Yogyakarta were chosen as the sample. The instrument used in this research was a questionnaire that was developed by the researcher consisting of 100 items or statements as follows: 1) The first segment consisted of 20 items exploring the physical, mental, and cognitive

Table 1. The Demographic Profile of the Participants (N=755)

Variable	N	%
Gender		
Male	165	21.9
Female	590	78.1
Age		
20 – 24 years old	689	91.3
25 – 29 years old	16	2.1
30 – 34 years old	3	0.4
35 – 39 years old	13	1.7
40 – 44 years old	23	3.0
45 – 49 years old	11	1.5
Province of Origin		
South Sumatera	14	1.9
West Sumatera	1	0.1
Bengkulu	3	0.4
Lampung	13	1.7
Banten	2	0.3
DKI Jakarta	3	0.4
West Java	7	0.9
Central Java	102	13.5
Yogyakarta	515	68.2
East Java	11	1.5
Bali	22	2.9
West Nusa Tenggara	14	1.8
East Nusa Tenggara	14	1.8
West Kalimantan	14	1.8
East Kalimantan	4	0.5
Central Kalimantan	9	1.2
South Kalimantan	2	0.3
North Maluku	1	0.1
Papua	4	0.5
Senior High School Background		
Natural Sciences	336	44.4
Social Sciences	261	34.6
Health vocational high school	50	6.6
Non-health vocational high school	108	14.3
GPA		
2.00 – 2.99	24	3.1
3.00 – 3.99	731	96.9
Types of housing		
Private house/with parents	493	65.2
Boarding house	210	27.9
Rented house	36	4.8
Student dormitory	16	2.1

preparation of the students before taking the national nursing competency examination; 2) the second segment contained 20 items used to explore the learning strategies of the students when facing the examination in which every statement led to the steps and readiness of the students to face the national competency examination; 3) the third segment, consisting of 20 items, showed the strategies of the managers of the study program in preparing the students to do the final exam; 4) the fourth segment of the instrument consisted of 20 items that explored the types of learning method experienced by the students alongside the learning process of the three-year nursing diploma program

Table 2. The Distribution of the Levels of Mental Preparedness, Learning Strategies, Management Strategies, Learning Methods, and the Environment/Room Used by the Participants (N=755)

Variable	N	%
Mental Preparedness		
Ready	395	52.3
Not ready	360	47.7
Learning Strategies		
Effective	397	52.6
Ineffective	358	47.4
Management Strategies		
Helpful	355	47.0
Unhelpful	400	53.0
Learning Methods Used		
Suitable	298	39.5
Unsuitable	457	60.5
Condition of the Room		
Conducive	264	35.0
Unconducive	491	65.0

and 5) the last segment had 20 items that explored the condition of the place or room where the examination took place. Every sentence in the questionnaire was filled in by the participants using dichotomy/ binary category scales. This means that the participants could only answer 'yes' or 'no'. Yes had a value of 1 and no had a value of 0. To make sure that the instruments reliable and valid, a pilot study was performed to test the questionnaire. The results of the reliability test showed that Cronbach's Alpha = 0.82. Every participant was asked to fill in a document of agreement stating that they were willing to participate in the study.

This study implemented ethical principles of human research such as confidentiality, justice and beneficence. The data collection was carried out in two steps. The first was when the researcher gained a permit for the research from the institutions and when they gathered information from the management of 3-year nursing diploma. The second was at the event briefing for the examination, which was the day before the real examination was held in October 2016. The data was collected by the researcher and a research assistant at Poltekkes Kemenkes, Yogyakarta (a place chosen as a site for the national 3-year nursing diploma examination). The secondary data was collected from the formal announcement of the results of the national nursing competency examination from the committee of the national competency examination. In total, 766 examinees from 9 institutions administering the 3-3-year nursing diploma in Yogyakarta filled the questionnaires. After the data were sorted, 755 eligible questionnaires were analyzed; 10 participants did not fill in the questionnaires completely, so the data could not be used. To describe the data through a frequency distribution, the data was then analyzed using SPSS 20 and descriptive analysis. Multiple linear regression was

employed to examine the predictors of success in the national competency examination.

## RESULTS

The characteristics of the demographic profile of the participants are presented as follows.

The results of the univariate analysis conducted in Table 1 indicates that 590 (78.1%) of the participants were female. The most dominant age range was of 20–24 years old for as many as 689 participants (91.3%). For province, 515 participants (68.2%) came from Yogyakarta and 419 participants (55.4%) had an educational background of senior high school in a non-science program. The GPAs of 731 participants (99%) were between 3.00 and 3.99. As many as 493 participants (65.2%) stayed in their parents' house.

The results regarding the variables that affect the students when facing the examination are presented in the table below. Table 2 shows the predictors affecting the results of the examination. In terms of the mental preparedness of the participants, 395 participants (51.3%) said that they did not feel ready to take the examination while 397 participants (52.6%) used good learning strategies before the exam. On the other hand, 400 institutions (53 %) had bad management when preparing for the examination. In addition to this, 457 participants (60.5%) used bad learning methods in their 3-year study in campus and 491 places (65%) or the rooms used for the examination were unconducive.

After the demographic profile of the participants was tabulated, the data on the correlation of the results of the national nursing competency examination with mental preparedness, learning strategies, management strategies, and learning methods in the bivariate statistical data has been presented as follows.

From Table 3, it can be seen that the variable of learning strategies has a significant correlation with the mental preparedness of the participants when facing the examination with a p value = .01. The correlation exists at the moderate level with a value of  $r = .092^*$ . The learning strategies also have a significant correlation with the preparations performed by the director of the 3-year nursing diploma program with a p-value = .000 and an r - value = .225 \*\*. The data also shows that the variable of the environment during the examination also has an important role in the success of the students facing the competency test. This variable is significantly correlated with mental preparedness with a p value = .000 and an r - value = .144 \*\*, along with the learning strategies (p value = .000 and r value = .246 \*), management strategies (p value = .000 and r value = .255 \*\*) and learning methods (p value = .000 and r value = .476 \*\*). The results show that the learning strategies before the examination are accepted as the dominant predictor affecting the nursing competency examination.

**DISCUSSION**

This study has identified that the extrinsic factors correlated with success in the national nursing competency examination are management capability, the learning methods used in the learning process and the environment where the exam is done. The first extrinsic factor is the ability of the managers/directors of the 3-years nursing diploma program in preparing the students from the first semester through to the last semester. These abilities include their inspirational value, enthusiasm, the clarity of the materials used, the plan, the organizational skill materials, the method of learning, and the method of judging and evaluating the learning processes. The capabilities of the managers in strengthening the learning strategies (including the learning processes and the accurate use of learning methods/strategy) are important keys to passing the final competency examination. Nursing managers are also required to be advanced in terms of providing good facilities and infrastructures in the learning process, to employ up-to-date information technology and to update the learning resources used. Pence and Wood (2018) underline that using software and being skillful at managing information technology in the examination will also lead the students to success in the examination, especially in the computer-based test (CBT) examination. Murphy, Goossen, and Weber (2015) also said that educators should have a vision to focus on confirming what informatics competencies are applicable and needed for helping the students in their study and their examination.

The other ability of the manager is planning, managing, and evaluating the learning process of the lecturers. Okanga, Ogur, and Arudo (2017)

emphasize that the experience of the faculty has a significant correlation with success in the competency examination. McDonald (2017) adds that nursing educators should provide the students with many opportunities to master the knowledge required for the licensure. Finkelman (2017) also adds that lecturers should be able to serve as a partner for the managers in preparing the nurses for the future.

Pulito (2017) states that in order to be successful in the licensure/competency examination, deep learning is important. Deep learning can be achieved by choosing suitable and accurate learning methods. The deep learning level of the students will be affected by the style of the nursing management used to direct the faculty in teaching and constructing the evaluation/examination. Learning methods are how a person learns something as a part of achieving a certain competency and they are usually designed by the lecturers to achieve a learning outcome in particular course/subject (Mc Donald, 2017). Stojanovic et all (2018) said that students need professional help and support to increase their understanding of some clinical nursing subjects. This idea is supported by Quin, Smolinsky and Peters (2018) who emphasized the role of the nursing faculty is to take steps to prepare the nursing students for success on this difficult examination. The role of the nursing lecturer starts at the beginning of the nursing program and it is focused on the fundamental nursing courses through to the advanced nursing courses at the end semester of the program. The mastery in clinical nursing subject through appropriate learning methods designed by the lecturers and clinical instructors will build a good understanding and mental capacity in the students. Proper learning methods utilized from

Table 3. The Correlation of Mental Preparedness, Learning Strategies of the Students, Management Strategies, Learning Methods and the Environment (Room Condition) with the Results of the National Nursing Competency Examination in Yogyakarta

		Examination results	Mental preparedness	Learning Strategies	Management Strategies	Learning Methods	Environment
Results of the Examination	Pearson	1	-.05	.06	.05	.02	.05
	Sig.(2-tailed)		.14	.06	.11	.44.	.12
Mental Preparedness	Pearson	-.05	1	.09*	.03	.15*	.14*
	Sig.(2-tailed)	.14	.14	.01	.28	.00	.00
Learning Strategies	Pearson	.06	.09*	1	.22*	.21*	.24*
	Sig.(2-tailed)	.06	.01		.00	.00	.00
Management Strategies	Pearson	.05	.03	.22*	1	.20*	.25*
	Sig.(2-tailed)	.11	.28	.00		.00	.00
Learning Methods	Pearson	.02	.15*	.21*	.21*	1	.47
	Sig.(2-tailed)	.44.	.00	.00	.00		.00
Environment	Pearson	.05	.14*	.24*	.25*	.47	
	Sig.(2-tailed)	.12	.00	.00	.00	.00	1

\* The correlation is significant at the 0.05 level (2-tailed)

\*\*The correlation is significant at the 0.01 level (2-tailed)

first year will increase their verbal and critical thinking skills. The capability to verbalize and understand some of the courses critically builds the mental and emotional capabilities of the students. Suitable and accurate learning methods can cultivate curiosity and their manner of being proactive and communicative. Students can also learn to develop their arguments and reasoning, and ability to see correlations (associations), including the ability to see cause and effect. Therefore, the management skills used to arrange their learning methods are needed.

The management skills could also cover the management activity, person, finances and facilities of the successful exam. Park et al (2017) states that the quality of the question items in the examination is influenced by the methods used to develop the test items. Thus, it needs there to be workshops, brainstorming, verification, and content validity from the experts in order to create quality question items. The nursing education field in Indonesia has enforced many nursing institutions to allow them to have the capability to develop items or questions as part of the basic material of the examination package. For reference, one package of items/questions in the examination book consists of 180 items. After the lecturers write the question items, professional nurses review the questions and send them to the panel expert meeting for them to determine the national passing grade. The quality of the test items determines the quality of the test item package. If the quality of the test items improves, then the possibility of having a good passing grade will increase and thus their chance to pass the exam will be higher.

Shin, Kim, Suh, Jung, Kim, and Yin (2017) explain that management should also consider using simulators or a standardized patient-based method as the most suitable format to increase the students' understanding of the patients' condition. Simulations and patient-based methods in a nursing laboratory practicum or in a clinical nursing setting, such as a hospital and primary health care services, will increase the nursing students' communication abilities and nursing care skills, especially when conducting a nursing assessment about the patients' health problems. Communication, critical thinking, clinical judgment, and competency in relation to their nursing skills/procedures are the key components for success in the nursing competency examination. Critical thinking and clinical judgment are very important skills for nursing students.

The second factor that influenced the results of the examination was the learning methods used by the lecturers in the teaching and learning process. Unsuitable learning methods in the process of education (from the first year up until the third year of the nursing diploma program) leads to failure when doing the competency examination. Some of the learning methods used in nursing education that emphasize critical thinking and clinical judgment are

case studies, simulations, problem-based learning, project based learning, debriefing, the ability to reflect, peer review scenarios, writing skills and clinical experience/experimental (Kaddaura, Flint, Van Dyke, Yang and Chiang, (2017), Synder (2018) and Caputi (2019)). Zapko et al (2018) emphasizes that serial simulation and having the student's experience a simulation more than once in consecutive years is the best way to increase their clinical practice in the context of nursing education. On the other hand, a lack of experience in using the learning methods focused on student activities (students centered learning), poor case study methods, and a lack of ability and clinical practices will blunt the abilities of the students in terms of making good inferences and reflecting low critical thinking and clinical judgment skills.

It is urgent to reform the nursing program by enhancing the learning methods in terms of clinical judgment and critical thinking. These skills can be achieved through practicing and applying clinical judgment and critical thinking in some thinking competencies. Hence the case study method and real practices in the real field become important factors in these processes, but not all students can generate the meaning of the experience well. In addition, the satisfaction of the students when they engage in experiential learning in the clinical practice area can increase their self-confidence and their ability to resolve their duties and tasks in the examination. Cowen, Hubbard, and Hancokck (2018) identify that having enough experience to communicate effectively with patients and other health professionals, and their experience of many skills/nursing procedures and observations through clinical courses, will increase their critical thinking and clinical judgment.

The third extrinsic factor that was correlated with success in the nursing examination results was the environment where the exam was done. A conducive environment is a significant factor in terms of increasing the mental preparedness of the examinees which will lead to success in the examination (Sanches, Costa, Agea, Izguerdo, and Rodriquez (2018). The environment or the room for the examination must be well prepared and meet the standards as follows: the room should have good circulation, and the distance between the students should at least be 1 m<sup>2</sup>. The room must also have a clear and visible clock/timer that can be seen by all of the participants during the examination (Pnuknakes, 2018). In addition, the room should facilitate a good, calm, and conducive environment, which means that the room should be quiet, as well as being clean, and comfortable with enough lighting and ventilation. Good circulation will facilitate the examinees in terms of having enough oxygen. The oxygen inhaled will be distributed via the blood flow in the body including to the brain of the person. This will increase the brain's metabolic rate and this will increase the work of the brain in terms of

concentrating, recall and memorizing, in addition to understanding and reasoning in the examination. The cognitive activities in the brain contribute to the mental preparedness of the examinees. This mental state in the examination is very important to attain success.

Another standard of the environment refers to clear directions and information about the building which will affect success in the examination. When the examinees do not know the location or the room for the test, they will be confused and anxious. Moreover, when the examinees are late and get lost, they might panic and be more stressed. The anxiety and panic will affect their mental cognitive capacity and capability to understand the test which will influence the results of the examination. The position of the toilet is also important. The examinees should know the location of the toilet. The anxious feeling of the examinees while they are taking the examination will trigger them to urinate more often than usual. The location, cleanliness, and comfort of the toilet will help them to reduce their tension. Appropriate lockers for storing their goods, including hand-phones, is also an important environmental factor that contributes to success in the exam indirectly (Pnuknakes, 2018). In fact, on the day of the examination, the examinees often find that the room is still dirty and hot because of poor ventilation, poor lighting and noise. The noise sometimes comes from the neighborhood of the campus such as the music from a wedding party, motorcycles on the main road, and building construction going on around the campus. The noise will disturb the concentration of the examinees and this will influence the results of the exam indirectly. They cannot concentrate on the examination. Hence, the environment will influence the results of the competency examination indirectly.

The intrinsic factors that were found in this study include mental status and the learning strategies before the exam were used by the examinees. The good mental status of students will decrease their anxiety as well as expand and strengthen their personal competency when the nursing students face the examination. Good psychological wellbeing and emotional security affects cognitive capacity and this can lead to better achievements in the examination. When the students have mental preparedness to face the examination, the chance for them to be successful in the competency test will be higher. Students need help and support to expand and strengthen their psychological wellbeing in terms of improving the level of their competencies. Sanchez, Costa, Agea, Izquierdo, and Rodriquez (2018) explained that social-emotional competencies consist of communication skills, the ability to cope with stress, and engagement in both learning activities and self-efficacy. The process of building their critical thinking and clinical judgment in accurate and suitable learning methods correlates with the mental construction of the nursing students. Nursing students who have a firm mental capacity will have a good emotional security and sense of

psychological wellbeing. Psychological wellbeing is an important factor in the examination. Some aspects of psychological wellbeing include good motivation, confidence, the state of being free of panic and anxiety, and the willingness or strong desire to pass the examination. The examinees should be free from anxiety because this will influence their performance in the examination (Stojanovic et al, 2018). Students who have good motivation to become nurses will do their best to pass the examination. The higher their motivation, the better the results of the examination. A person with good motivation will have more enthusiasm and effort and they will struggle more to graduate as soon as possible and to pass the final competency examination. The calling to become a professional nurse and the desire to serve humanity is the highest motivation needed to attain good results in the nursing examination and finally, to become a professional nurse.

Another intrinsic factor was the learning strategies used when facing the exam. It refers to the strategies used by the nursing students to prepare themselves to face the examination from three months up until the day before the competency examination. The learning strategies chosen by the students are a kind of intrinsic factor that can be very specific and personal in the short-term before the examination. Learning only some days before the examination will not fully help the students to pass the nursing competency test. Individuals who use good learning strategies to face the examination are slightly higher in terms of result than those who have poor learning strategies. A few students still did not understand the tips and tricks used to pass the examination. Trying to learn all of the materials in only one night is not a smart strategy. Instead, students can have a course resume, discuss the test questions in a group, attend nursing review classes, and try to answer the test questions on the computer (CBT test questions).

Most students will attend the review class delivered by the management on a very strict schedule several weeks before the examination. Kim, Nikstaitis, Park, Amstrong and Mark (2019) said that some students predicted that they would succeed at the nursing licensure exam because they took review courses, which makes aggressive use of practice questions paired with studying hard. The Health Education System Inc (HESI) test is frequently used as a standardized test in nursing programs. Many students stated that the review course provided by HESI is helpful for achieving a higher passing grade in the nursing licensure examination. Taking review courses seems to be rarely done in Indonesia. The lecturer gave the questions before the exam happened. Some institutions gave them within a week, some within one, two or three months. At the end of the review session, the student did their test taking package and some of them used a computer-based test. The student should be afforded many opportunities to engage in remediation, test taking

and any other support associated with tutoring. These question review methods helped the students to deal with the questions and as a result, they got a higher passing grade in the nursing exam.

Robert (2018) also supported the finding that there was a significant correlation between the pre-admission examination scores and success in the NCLEX-RN (National Council Licensure Examination – Registered Nurse) on the first attempt. Program completion had also a positive correlation with their pre-admission science grade and HESI score. Students who had a higher grade in their pre-admission science course were significantly accomplished in all of the essential nursing subjects and this leads them to achieve a higher grade in the national nursing licensure examination. Czekanski, Mingo and Piper (2018) noted that the preparation strategy for success in the nursing licensure examination consists of at least content review and test-taking strategy. A content review will lead the student to have more of a deep understanding of the essential nursing subjects and it will stimulate their critical thinking and clinical judgment when answering the questions. The test-taking strategy will sharpen the student's skills in terms of managing their time, choosing the best answers and managing stress alongside the examination processes themselves. The preparation review-strategy needs to begin from the early semester of the nursing program and continue until after program completion. The learning strategy will improve the students' understanding of the test questions. The better the learning strategies used by the students, the better their mental preparedness and psychological well-being, thus better results in the examination can be achieved.

## CONCLUSION

This study concludes that the factors that influence the success of the nursing students in achieving high results in the nursing competency examination are the learning methods used in the 3-year nursing program, the environment (conducive rooms/places where the examination is held, the direction of the building, and a comfortable room), the strategies of the nursing diploma managers/directors in preparing the examination, and the learning strategies employed by the students from three months up until the day before the examination. The factors of mental preparedness and the learning strategies used from the first semester until the last semester are also important factors that contribute indirectly to success in the national competency examination.

The learning strategies used should be considered a critical aspect in achieving the best results in the national nursing exam. The study then

recommends that the nursing students who take the competency examination should have effective learning strategies (personally or institutionally) implemented at least three months before the examination. The institution should improve the learning methods taught during the 3-year nursing program, have a special preparation strategy or treatment available before the examination, and provide a conducive environment/room for the examination which meets the standards as a place of examination.

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Original Research

## The Impact of Self Efficacy on the Foot Care Behavior of Type 2 Diabetes Mellitus Patients in Indonesia

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### ABSTRACT

**Introduction:** Diabetes mellitus (DM) often causes complications, one of which is diabetic foot ulcers (DFUs). One of the factors involved in preventing diabetic foot injuries is performing foot care behavior. To improve patient behavior in terms of performing foot care is to improve self-efficacy. The purpose of this study was to determine the effect of the self-efficacy of diabetes patients on foot care behavior.

**Methods:** This study used a descriptive correlational design to reveal the correlative relationships between the variables with a sample of 106 respondents using probability sampling in the form of cluster random sampling. The data was collected using questionnaires, the foot care confidence scale (FCCS), and the foot care behavior scale for diabetes (FCBS for Diabetes). The independent variable of this study was the self-efficacy of DM sufferers and the dependent variable of this study was the behavior of foot care. The data analysis used the Spearman Rho correlation test ( $\alpha=0.05$ ).

**Results:** Spearman Rho correlation test showed there to be a relationship between the self-efficacy of people with diabetes mellitus and foot care behavior p value = 0.001 ( $p<0.05$ ),  $r = -0.542$ .

**Conclusion:** The implication of this study is that a high self-efficacy in people with diabetes mellitus will improve the behavior related to foot care, thereby reducing the risk of behaviors that damage the feet.

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## INTRODUCTION

DM has complications that have a great chance of causing death. DFU is one of the most common complications of DM which is the main cause of many hospitalizations due to a lack of foot care behavior. This subsequently leads to the amputation of the lower extremities (Pourhaji *et al.*, 2016). Foot care behavior is often neglected, especially by adults and the elderly. Foot care education is one of the best tools available to increase the awareness of people with diabetes mellitus on the matter of proper foot care behavior (Zaman, Shah and Hussein, 2018). Some of the most common cases of DM include the problem of DFU every year. The number of people suffering from DM is increasing due to limitations in terms of self foot care behavior. One of the limitations is that the health workers have counseled them about diabetes mellitus but without any follow up, it is uncertain

whether the DM sufferers have understood and are convinced of what is being delivered by the health workers. Many DM sufferers seem to have not cut their nails straight, the skin of DM sufferers' feet looks dry and some of the sufferers are not sure that they can take care of the feet because of the lack of a support system from their family and the environment around them. There needs to be a support system when a patient forgets. It is expected that they will have someone to remind and convince them that they are able to take preventive behavior steps in relation to their illness. If proper foot care is not carried out, then certain chronic complications of diabetes mellitus, especially diabetic foot ulcers, can occur in people with DM. The existence of these limitations is influenced by self-efficacy. This is one's belief in their ability to perform a behavior that is expected to change one's health behavior (Sharoni *et al.*, 2018).

The WHO (World Health Organization) estimates that 108 million people live with DM. This number increased in 2015 to 415 million people, while the estimates for 2017 - 2045 according to the IDF showed a total of 7.5-9.5 billion world population. The prevalence of diabetes is 425 - 628.6 million people around the world. According to the WHO data in 2017, the prevalence of DM sufferers with neuropathic disorders reached 50% and those with leg injuries reached 15 - 25% (International Diabetes Federation (IDF), 2017). The results of research conducted in Arabic states that 70% of lower extremity amputations are DM sufferers with leg injuries (Al-Hariri *et al.*, 2017). Indonesia ranks 7th in the world with the highest number of DM sufferers and the estimates reach 6.7 - 11.1 million sufferers. The results of the 2018 Riskesdas survey showed that the prevalence of DM in the Indonesian population aged > 15 years old has increased to 8.5%. East Java ranks 5th in the number of DM sufferers in Indonesia at 7.6% (Depkes RI, 2018). DM patient data from the Surabaya district/city Health Office in 2018 for the working area of the Puskesmas in Wonocolo District, namely Siwalankerto Puskesmas, showed that there were 1,140 DM patients and for Sidosermo Puskesmas, there were 2,790 DM patients (Dinas Kesehatan Kota Surabaya, 2018).

Behavior is very much involved in preventing the complications of DM. Behavior is a complex process and it is influenced by several factors such as knowledge, self-confidence, attitudes, skills, motivation and social support. This is needed to make improvements in self-care behavior. One of the determining factors in achieving a behavior is self-efficacy (self-confidence). Self-efficacy is a person's self-confidence in their ability to perform a behavior that needs to be done to achieve goals, tasks, and challenges set. Self-efficacy describes the interaction between the behavioral, personal, and environmental factors in the context of health and chronic diseases. This is also a belief that affects people with diabetes mellitus concerning whether they are able to perform health behaviors. People with high self-efficacy believe that they are able to do difficult tasks well, as something that must be mastered is not something that should be avoided. It can be estimated that the DFU risk will decrease with the increase in foot care behavior (Hamedan, Hamedan and Torki, 2012). The purpose of this study was to determine the impact of diabetes self-efficacy on foot care behavior in Surabaya.

## MATERIALS AND METHODS

This study used a descriptive correlational design that reveals the correlative relationship between variables, which is related to getting to know the relationship between the self-efficacy of diabetics and foot care behavior. This research was conducted in the working area of Wonocolo District Health Center (UPTD Siwalankerto Health Center and Sidosermo Health Center) in May - July 2019. The population

consisted of 3,930 respondents. The sampling technique in this study was probability sampling where the cluster random sampling approach was done twice, first based on the number of villages and second based on age range. A sample of 106 respondents was finally obtained. The instrument used in this study was the Foot Care Confidence Scale (FCCS) questionnaire (Sloan, 2002) used to measure the self-efficacy of diabetics consisting of 12 questions. The interpretation of the results was that high scores indicate high self-efficacy and low scores indicate low self-efficacy. After testing the reliability and validity by calculating the coefficient between the item scores and total scores in the range of 0.30 and 0.70, Cronbach's alpha was 0.90 for the 12 question items. They showed strong content validity and construction when performing foot care behavior based on the confidence scale (Pourhaji *et al.*, 2016). The FCBS for Diabetes (Foot Care Behavior Scale for Diabetes) questionnaire was used to measure foot care behavior consisting of 17 questions evaluating two behaviors, namely prevention and risk behavior with the interpretation of the high score results indicating the risk of high destructive behavior and with a low score indicating that the damage risk was low (García-inzunza *et al.*, 2015).

The data collection was carried out using a questionnaire addressed to all Type 2 DM patients in the community. The previous respondents received an explanation of self-efficacy and foot care behavior, so it was hoped that the questionnaire would be filled in correctly. The authors found 126 people willing to become respondents, although 20 people resigned for the reason of not being able to do foot care because of their age, weakness and moving out of town. We got 106 respondents in total. The inclusion criteria were as follows: DM type 2 sufferers, control done at the Puskesmas and aged 15-60 years. The exclusion criterion were that the patient dropped out before the end of the study, there were complications regarding their leg injury, mental disability and decreased health/awareness. The analytical test used was the Spearman Rho Correlation Test ( $\alpha = 0.05$ ) with SPSS v-23. A statement of medical research ethics was issued by the Health Research Ethics Commission (KEPK) of STIKes Hang Tuah Surabaya in accordance with number: PE/38/V/2019/KEPK/SHT.

## RESULTS

Based on the table 1, the characteristics of the respondents in this study included age, sex, last education stage, occupation, duration of diabetes mellitus, understanding every month, and had received counseling. It can be explained that the characteristics of the respondents showed that most were aged 51-60 years (52.8%) and most were female sex (65.1%). The majority were also educated at the high school/equivalent level (34.9%), in private employment (54.7%), had suffered from diabetes mellitus 2-3 years (40.6%), had a monthly income of

Table 1. Characteristic of Respondents (n=106)

Characteristics of the respondents	n	%
Age		
15-23 years old	1	0.94
24-32 years old	4	3.77
33-41 years old	8	7.55
42-50 years old	37	34.91
51-60 years old	56	52.83
Sex		
Male	37	34.91
Female	69	65.09
Educations		
Primary school	11	10.38
Junior high school	35	33.02
Senior high school	37	34.91
Bachelor	23	21.70
Work		
Not working	2	1.89
Private	58	54.72
Employee	20	18.87
Others	26	24.53
Duration Suffering from DM		
<1 years	1	0.94
>1-2 years	30	28.30
2-3 years	43	40.57
4-5 years	24	22.64
>6 years	8	7.55
Income		
<1 million (IDR)	7	6.60
>1-2 million (IDR)	22	20.75
2-3 million (IDR)	30	28.30
3-4 million (IDR)	30	28.30
4-5 million (IDR)	17	16.04
Counselling		
Yes	42	39.62
No	64	60.38

2-4 million IDR (56.6%), and had never received counseling (60.4%) regarding foot care behavior.

Based on Table 2, it shows that out of 106 respondents, people with diabetes mellitus with low self-efficacy were as many as 21 respondents (19.8%). Those with high self-efficacy were as many as 85 respondents (80.2%). DM sufferers with low self-efficacy were as many as 21 respondents out of the total of 106 respondents. The results of the questionnaire showed that the respondents mostly had low self-efficacy because they were not sure after washing the feet if they had to dry the feet between the toes. Having wet feet can cause a fungus, resulting in damage to the cells of the feet. The respondents were not sure that they should cut their nails straight. They preferred to follow the shape of the nails if they were done often. This can cause lesions and infections that we usually call 'slants'. This shows that out of the 106 respondents, there are people with diabetes mellitus who have a low risk of destructive behavior (as many as 83 respondents; 78.3%) and those who have a high risk of destructive behavior (as many as 23 respondents; 21.7%). The DM sufferers who have a low risk of destructive behavior totaled 83 respondents.

## DISCUSSION

The respondents were less confident when examining the inside of their shoes before using it. This can harm their feet as there may be foreign objects that can cause lesions on the feet. Patients who have low self-efficacy tend to doubt their abilities and they encounter difficult problems because they usually assume that any problem is a threat (Bahador *et al.*, 2017). Someone with low self-efficacy tends to be slow at getting their self-efficacy back when it causes them to fail to deal with problems (D'Souza *et al.*, 2017). Someone with low self-efficacy does not think of the best way to deal with the tasks that must be done, especially foot care in order to prevent complications. They will be disturbed by doubts about their abilities and they will easily give up when faced with difficulties doing the task. Chronic illness can be a trigger for low self-efficacy because the longer the illness is suffered from, the more problems will be faced by the sufferers. Someone who has low self-efficacy is usually busy thinking about deficiencies in themselves. They quickly give up when faced with problems. There were 21 respondents with low self-efficacy, there were 14 respondents also with a high risk of destructive behavior and 7 have a low risk of damage. This will be much influenced by

Table 1. Impact of Self-Efficacy on Diabetic Foot Care Behaviors (n=106)

Self-efficacy of DM patients		Foot care behavior		Total
		Low risk destructive behaviors	High risk destructive behavior	
Low Self-efficacy	n	7	14	21
	%	6.6	13.2	19.8
High Self-efficacy	n	76	9	85
	%	71.6	8.4	85.8
Total	n	91	15	106
	%	78.3	21.7	100

Spearman's rho test; 0,001( $\rho < 0.05$ ) Correlation coefficient; -0.542\*

the behavior that is often done in their daily lives. They can gain experience because of discussing things with fellow sufferers or seeing related topics through mass media. The daily behavior that has been done will affect the behavior when someone is in a state of experiencing an illness.

The results of the questionnaires showed that some of the respondents chose behavior used for prevention, namely the frequent checking of the feet, often washing their feet and drying them using a small towel, often checking the inside of their shoes before using them and measuring their foot size first before buying new shoes. Good behavior in terms of foot care can be done in several ways: 1) clean, dry and gentle foot care, 2) skin care, 3) nail care and 4) using the right shoes (Heitzman, 2010). A low risk of destructive behavior can occur when the respondent already knows and can perform good foot care behavior in the way that is available. Based on these results, the DM sufferers said that they already knew how to take care of their feet and some of them had applied this well. For the results of filling in the FCBS for diabetes questionnaire, many of the respondents answered question no. 2 about how often they had wash their feet in the past week; some of the respondents answered 2x/day while in reality, other respondents washed feet 5-10x/day. This is done by the respondents when they feel that their feet are dirty and dry. They do so to moisturize their feet. They prefer washing their feet instead of using foot lotion, which according to them means that their feet will feel more comfortable, not dry, fresh, and clean. After washing their feet, the respondents did not forget to dry them with a small towel. The most frequent statement within the category of risky behavior done by the respondents was walking barefoot in the room. According to them, if they are in their house, then they do not have to use footwear because the house is clean and has a ceramic floor. Thus there is no need to use footwear inside the house, except when performing prayer at the time of ablution when they usually use footwear from the bathroom through to the place of prayer in the house (Maslakpak, 2017).

Correlation coefficient(r) shows the result of -,542 \* which means that there is a significant relationship between the two variables. This shows that there is a negative correlation, so the higher the self-efficacy, the lower the risk of destructive behavior and vice

versa. The lower the self-efficacy, the more that the risk of destructive behavior will be high. The negative sign indicates that the direction of the correlation is the opposite, which means that the higher the self-efficacy of people with diabetes mellitus, the lower the risk of destructive foot care behavior. Self-efficacy is known as one of the resources used by someone when carrying out their personal tasks. Self-efficacy is not related to the skills possessed by individuals but it instead relates to individual beliefs in the things done (Brown, Malouff and Schutte, 2013). The results of this study are supported by the research which has revealed that patients who have higher self-efficacy will have good self-care behavior. Other studies support this research (Sharoni *et al.*, 2018). These studies have revealed the existence of a self-efficacy program that can improve the self-care foot behavior in relation to the program delivered. Research by (Pourhaji *et al.*, 2016) concludes that the belief in performing foot care by improving the physical self-concept can help to improve the foot care behavior among people with diabetes mellitus. According to researchers, the existence of good self-care behavior can reduce the risk of destructive behavior. The self-efficacy of diabetics in foot care is needed to maximize the foot care behavior to prevent diabetes mellitus complications. Patients are expected to be able to apply self-efficacy optimally through foot care behavior. Perceived self-efficacy can also have an impact on the efforts made when handling a task or problem, especially health problems. Health education must continue to be done to improve sufferers' self-efficacy of foot care behavior. The characteristics of individuals who have high self-efficacy include where they feel able to deal effectively with the events and situations faced, that they persevere in completing their existing tasks, that they are always confident in their abilities and that they view difficult situations as challenges rather than as threats. This is in addition to designing their own goals, increasing their strong commitment to themselves increasing the strong effort to do everything, increasing the effort needed to deal with failure, thinking to strategize in the face of adversity, quickly restoring the sense of being able to fail, and being able to deal with stressors.

Out of the sample, 23 DM sufferers have a high risk of destructive behavior. This can be interpreted as poor foot care behavior. The respondents stated that

they sometimes walked barefoot outside of the room, that they often wore shoes without socks and that they sometimes use tape on the feet to remove calluses. According to the research, it revealed that the low foot care behavior may occur when people with diabetes mellitus have difficulty checking feet; help from others may be needed (Cousart and Handley, 2017). The results of the respondents ignoring doing their routine foot care for several reasons is that they often forget, are lazy, do it in a manner that is not in accordance with what is usually done, and they feel uncomfortable in the way that it is given. One of these behaviors is where they rarely cut their nails straight to avoid lesions; some of them prefer to cut their nails according to their shape.

Meanwhile, 85 other respondents had high self-efficacy. The respondents said that they were confident in terms of protecting their feet, examining their feet every day to check for cuts, scratches, blisters, redness, or dry feet, and choosing good and suitable shoes without relying on having a suitable feeling. Patients who have high self-efficacy usually tend to choose being directly involved in solving problems even though the problems faced are difficult. This is because people with a high self-efficacy look more at the problem rather than at the threat that must be avoided (D'Souza *et al.*, 2017). Someone with high self-efficacy can overcome their problems effectively and they will try hard to deal with all of the difficulties encountered. They will persist in carrying out a task when they already have the prerequisite skills in accordance with the existing rules.

Previous research by D'Souza (2017) on foot care behavior shows that positive behavior correlates with a positive attitude and awareness of diabetes management. Patients are able to behave better in the prevention of foot injuries through the use of footwear by 47.14%, using foot moisturizer by 44.29%, walking without a pedestal by 53.57%, inspecting their shoes before use by 49.29% and cutting the nails by 60.71%. This study recommends an increase in self-efficacy that involves families in the prevention of diabetic foot injuries (D'Souza *et al.*, 2017). One of the determining factors in achieving behavior is self-efficacy. Another study stated that self-efficacy improvement programs are able to improve foot-care behavior and they recommend that the theory of self-efficacy be included in DM education programs to improve foot-care behavior (Sharoni *et al.*, 2018). Behavior arises because of the intention to behave. Intentions can be predicted from attitudes, subjective norms and the perception of self-control. The greater the intention to take preventative measures, the greater the chance of improving the health behavior (Nursalam, 2015). Self-efficacy is the human belief in their ability to perform an expected behavior, in particular control of the self-function to achieve the expected results. Self-efficacy is different from the aspirations or ideals that describe something that can be achieved, as it is more due to

the belief in one's abilities. Self-efficacy is a construct based on social cognitive theory. Human actions have a reciprocal relationship where there are individuals, the environment and behavior (Chin, Huang and Hsu, 2012). Most respondents have the assumption that with positive thinking patterns and self-confidence in their ability to deal with every problem, there is the existence of motivation and support among the family members which can increase their confidence.

Self-efficacy is an individual's belief in their ability to exercise control over various self-functions and events in their environment. The ability of the individuals to improve their motivation, cognitive resources and actions is needed to meet the demands faced. Efficacy refers to the belief that an individual is able to estimate his or her ability to carry out tasks in order to achieve the expected results. Efficacy always develops continuously in someone who is in line with the ability and number of experiences or events that they experience (Bandura, 1997).

## CONCLUSION

The higher the self-efficacy of people with diabetes mellitus, the better their foot care behavior. They will have a lower risk of potentially damaging behavior related to foot care.

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Original Research

## Content Validity and the Reliability of Technological Competency as Caring in The Nursing Instrument\_Indonesian Version (TCCNI\_IV)

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### ABSTRACT

**Introduction:** The TCCNI has not been used to conduct a study in Indonesia previously. The researcher has thus conducted a study on technological competency as a caring in nursing instrument Indonesian version (TCCNI\_IV). This study aims to examine the content validity and reliability of the TCCNI\_IV.

**Methods:** An exploratory sequential mixed method research design was used in this study. The researcher used closed-ended question asked of five (5) experts on the content of TCCNI-IV. The researcher explored the expert's opinion about each statement of TCCNI\_IV, and they required suggestions for the statements that were not relevant. Furthermore, the researcher analyzed and rewrote the statements according to the expert's input. There are twenty-five (25) items in the TCCNI\_IV involving technological knowledge and technological caring as an expression of caring in the nursing dimension. Furthermore, the researcher used the TCCNI\_IV to gain quantitative data from the 135 nurses in the nursing wards of the hospitals. Based on a finite population of 208 nurses, a total of 135 samples (nurses) participated in the quantitative study. The selection of the participants was through simple random sampling. There were 135 nurses from the nursing wards in the hospitals (n=135) with experience of at least 1 year in nursing practice. The item content validity (I-CVI) and scale content validity (S-CVI) was tested. The reliability was determined using Cronbach's alpha  $\alpha$ .

**Results:** The "item content validity of the TCCNI\_IV ratings ranged from .60 to 1.0. The scale content validity index (S-CVI) was 0.936. The Cronbach's alpha coefficient of .980 indicates there to be good reliability.

**Conclusion:** The technological competency as a caring in nursing instrument Indonesian version (TCCNI\_IV) is thus found to be valid and reliable. It is recommended that the developed instrument needs to be further tested for its reliability and validity in a larger setting.

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### KEYWORDS

instrument development;  
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### INTRODUCTION

Technological advancement dominates global health care, transcribing and advancing nursing as an independent practice in human health care (Biswas, S., Kongsuwan, W., & Matchim, 2016). Technology plays an important role in health care and it helps the nurses to provide comprehensive nursing care to the patients. Another study explains that in order to sustain the life of the patient, the nurses need to use machine technology (Biswas, S., Kongsuwan, W., & Matchim, 2016). Furthermore, nurses are required to

know and use this technology in order to provide nursing care. The TCCNI\_IV has undergone a cross-cultural adaptation study with 6 steps. The process adapted by the study is based on the translation, adaptation, and validation of the instruments or scales for cross-cultural health care in the research of Sousa and Rojjanasrirat (Sousa & Rojjanasrirat, 2011). In this research, the researcher would like to examine the validity test and reliability test of TCCNI\_IV. The experts evaluated the TCCNI-IV using a rating scale: 1 = not relevant, 2 = unable to assess or in need of so much revision that it would no longer be

relevant, 3 = quite relevant and 4 = highly relevant. From these ratings, the item (I-CVI) and scale (S-CVI) statistics were calculated. I-CVI represents the "proportion of content experts giving each item a relevance rating of 3 or 4," whereas S-CVI is strictly delimited by universal agreement (UA) This reflects the "proportion of items on a scale that achieves a relevance rating of 3 or 4 by all the experts" (Denise F. Polit, 2008). The reliability test was examined through the internal consistency and stability test. TCCNI-IV was administered to 135 nurses for the purpose of determining the internal reliability.

The ability of nurses in terms of using technology has become necessity because with this ability, the nurses can improve the quality of their nursing care. Technology as a part of caring in nursing has been introduced in several theories, such as the theory developed by Locsin (2005) in "The middle-range theory of technological competency as an expression of caring in Nursing". In Indonesia, technology has also been growing rapidly in health care and in all units of the hospital setting. The use of technology such as medical devices has increased rapidly and there is no tool that has been developed to assess the technological competency of caring in nursing. Locsin (1999) developed the technological competency as caring in nursing instrument (TCCNI) and this instrument was revised by Andrew Parcel (Parcells, & Locsin, 2011).

The TCCNI instrument originally contained 30 items (Locsin, 1999). The instrument was modified based on written theory expert feedback and expert suggestions related to the clinical utility with associate and baccalaureate-prepared nurses in future investigations. Therefore, the final instrument version with 25 items had an S-CVI/UA of .72 (Parcells, & Locsin, 2011). Furthermore, the cross-cultural adaptation of TCCNI into the Indonesian Version (TCCNI\_IV) was conducted by using the process recommended by Sousa & Rojjanasrirat (2011). The process is described in 6 steps. First, there is the forward translation. Step 2 is the comparison of the two translated versions of the instrument (TL1 and TL2) in synthesis I. Step 3 is the back translation. Step 4 is the comparison of the two back-translated versions of the instrument (B-TL1 and B-TL2), namely synthesis II. Step 5 is where the preliminary psychometric evaluation of the scale will be done with a monolingual sample. Step 6 is the last step used to establish the initial full psychometric properties of the newly translated, adapted and cross-validated instrument with a sample of the target population of interest.

In Indonesia, technology has also been growing rapidly in the health care sector and in all units of the hospital setting. The use of technology such as medical devices has increased rapidly. Therefore, the researcher wants to examine the content validity and reliability of the Technological Competency as Caring in Nursing Instrument Indonesian Version (TCCNI\_IV) to see if the TCCNI-IV can be used in

Indonesia. This study aims to examine the content validity and reliability of the TCCNI\_IV.

## MATERIALS AND METHODS

### Research Design

An exploratory sequential mixed method research design was used in this study. The researcher combined the qualitative method and the quantitative method, in order to gain comprehensive, valid, reliable, and objective data. The researcher used closed-ended question put to five (5) experts and to ask them to evaluate the TCCNI\_IV using a rating scale: 1 = not relevant, 2 = unable to assess or in need of so much revision that it would no longer be relevant, 3 = quite relevant and 4 = highly relevant. There are twenty-five (25) items consist in the TCCNI\_IV.

The reliability test of TCCNI-Iv was measured using the internal consistency and stability test. The Technological Competency as a Caring in Nursing Instrument Indonesian version (TCCNI-Iv) was administered to 135 nurses for the purpose of finding the internal reliability. The measurement scales of TCCNI used a Likert scale with 5 categories ranging from 1- Novice to 5- Expert. The total score of each category ranged from 25 to 125. Each range was categorized according to Benner's level of Competency (Benner's Stages of Clinical Competence Stage 1 : Novice Stage 2 : Advanced Beginner Stage 3 : Competent Stage 4 : Proficient Stage 5 : The Expert, 2011).

### Participants of the Study

The participants of the study comprised of 5 nurse experts who participated in the qualitative study. One of them was a Doctor of Nursing, while the other experts had a Master's degree in nursing science and were the Chief Nurse of the hospitals. Based on a finite population of 208 nurses, a total of 135 nurses participated in the quantitative study. The selection of the participants was done through simple random sampling. The inclusion criteria consisted of nurses from the nursing ward of the hospital with experience totaling at least 1 year in nursing practice. The exclusion criteria consisted of pediatric department' nurses. The participants were recruited from two private hospitals in Surabaya.

### Research Instruments

The original questionnaire is from the revised item TCCNI which contained of 25 items. The TCCNI\_IV with a Likert scale ranging from Novice to Expert used to measure the responses of the participants for each item.

### Data Collection Procedure

Prior to this study, approval of the research ethics committee of St. Vincent de Paul was obtained. After approval, the researcher worked on the recommendations. Permission from the directors and administrators of the hospitals was gained to conduct the study, and so the packet containing the letter from the ethics committee, the questionnaire, and the



informed consent was presented to the nurse coordinator in the nursing wards of the hospitals. The participants who met the inclusion criteria were informed of the purpose of the study, its benefits, and finally, informed consent from the participants was obtained. Furthermore, no force or harm followed when and if the participants decided to withdraw their participation from the research out of respect to their human dignity and rights. The researcher also informed the participants that there will be no direct benefit regarding their participation in this study. The data collection was done in August 2018.

### Data Analysis

A sequential mixed method analysis was undertaken to analyze the data. The researcher analyzed the qualitative data over the quantitative data. The expert panel was asked to evaluate each item of the instrument for content equivalence (content-related validity) using the following scale: 1-not relevant, 2=unable to assess relevance, 3= relevant but needs minor alteration and 4=very relevant and succinct. Items classified as 1 (not relevant) or 2 (unable to assess relevance) have to be revised and the panel's experts were asked to provide suggestions. From these ratings, the item (I-CVI), scale (S-CVI) and Kappa coefficient of the agreement statistics were calculated. The quantitative data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 24. The reliability was determined using Cronbach's alpha. The data was gathered from the sample of 135 nurses. The Likert scale used 5 categories ranging from 1- Novice to 5- Expert. The total score of each category ranged from 25 to 125.

## RESULTS

The results of the study have been divided into two parts: qualitative and quantitative.

### The Qualitative Part

The results of the study in the qualitative part consist of the item content validity (I-CVI) and scale content validity (S-CVI) of TCCNI\_IV. Table 1 shows that there were 20 items with an I-CVI 1.00 (Items no: 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 19, 20, 23, 24 and item no.25). There were 4 items with I-CVI 0.80: item no: 2 (Technology helps the nurses to know the "who" and "what" of each person), 16 (Nurses need to assess the patient regarding his or her knowledge to him or herself and the care that he or she received), 18 (Competent nurses do follow up his or her tasks and emotions creatively when meeting patient needs) and item no: 21 (Concern in the nursing process can happen in a learning and teaching situation between the nurse, patient and family member).

There was 1 item (item No.15) with an I-CVI 0.60 (Nurses need to train his or her caring perspective when assessing and interpreting the health service data). The result also shows that the S-CVI of TCCNI\_IV is 0.936.

### The Quantitative Part

The results of the study in this quantitative part consist of the reliability test of TCCNI\_IV. This was measured using internal consistency and a stability test. Table 2 shows that the Cronbach's alpha of Technological Competency in the Caring in Nursing Instrument Indonesian Versus TCCNI\_IV is .980.

## DISCUSSION

### Qualitative Part

The researcher computed two types of CVIs, namely the content validity of individual items (I-CVI) and the content validity of the overall scale (S-CVI). For the first type of CVIs is the I-CVI. There was considerable agreement about how to compute the item-level CVI. The Content Validity Index (CVI) illustrates the degree of agreement between the expert raters (Andreou, Papastavrou, Lemonidou, Mattheou, & Merkouris, 2015). This study shows that TCCNI-IV has an adequate and representative content validity (I-CVI) for all items. The criteria for item acceptability should be 1.00 when there are five or fewer judges. However, Lynn recommended that the I-CVI's criteria should be no lower than .78. (Denise F. Polit, 2008). Therefore, the I-CVI of TCCNI\_IV in this study provides the information to guide the researcher for the next study focused on revising, deleting and substituting items, specifically items with an I-CVI less than 1.00.

Most of the items of the TCCNI\_IV have an I-CVI 1.00. This means that the items are adequate and representative of all items. This feasibly refers to the content validity of the technological competency. The caring in nursing instrument Indonesian Version (TCCNI\_IV) was examined by experts and it additionally underwent the cross-cultural translation process. Moreover, TCCNI was investigated by theory and practice experts until the instruments consisted of 25 statements that originally consisted of 30 items. The item statements were revised or eliminated based on the quantitative content validity indices and specific expert feedback (Parcells, & Locsin, 2011). Furthermore, the content validity of TCCNI\_IV confirms that the items in the questionnaires are acceptable and understandable among nurses. Several factors could influence the understanding of the nurses related to each item in the questionnaire such as the nurse playing a major role in the use of technology in the health field and in daily care (Cargnin, Ottobelli, Barlem, 2016). The nurse's use of the information technology tools is frequent in their practice (Barbara, Victoria, & Carol, 2003). Critical to this nursing practice is the understanding of the meaning of the experience of a living human while being cared for and dependent on technologies for the purpose of human care (Koszalinski, & Locsin, 2015). The limitation of this study is that the I-CVI questionnaire is less than 1.00 and it was not further analyzed.

Table 1: The *Content Validity Index (I-CVI)* and *Scale Content Validity Index (S-CVI)* of *TCCNI\_IV*

No	Items	Expert Panel					total item agreement	CVI
		1	2	3	4	5		
1	Nursing as an important part of the health service which focuses on human service	4	4	4	4	3	5	1.00
2	Technology helps the nurses to know the "who" and "what" of each person.	3	3	2	4	4	4	0.80
3	The final destinations of the nursing activity is healing, saving lives and increasing independence	4	4	4	3	4	5	1.00
4	Nurses use unique ways to serve their patients	4	4	4	4	4	5	1.00
5	Caring attitude is an interesting thing because there is mercy, physical attendance, a sense of comfort and personal appreciation	4	4	4	4	4	5	1.00
6	Technology and a caring attitude help to encourage self-esteem when it is used appropriately	4	4	4	4	4	5	1.00
7	To know what and who the patient is can mean there is an appreciation of the patient and not only his or her physical performance.	3	4	3	3	4	5	1.00
8	Nursing is a unique area of knowledge, skill and the ability to care	3	3	3	3	4	5	1.00
9	A caring attitude in nursing means there is a will to listen, to cooperate and to stay beside the patient	4	4	4	4	4	5	1.00
10	Nurses need to balance the dependency on technology usage and their ability to take care of the patient	3	3	4	4	4	5	1.00
11	Taking care means knowing the physical and emotional condition of the patient while handling them.	4	4	3	4	4	5	1.00
12	Nurses should involve the patient when arranging the nursing plan to guarantee the accuracy and completeness of the patient caring process	4	3	4	3	4	5	1.00
13	An ability in using technology is a skill to use machines in caring the patient	4	4	4	4	4	5	1.00
14	Nurses should honor the hope and dreams of every patient although it may change every time	2	3	4	4	4	4	1.00
15	Nurses need to train his or her caring perspective when assessing and interpreting the health service data	2	3	2	4	4	3	0.60
16	Nurses need to assess the patient regarding his or her knowledge of him or herself and the care he or she has received	3	3	2	3	4	4	0.80
17	Nurses should build a relationship with his or her patient when creating a safe and comfortable situation	3	4	4	4	4	5	1.00
18	Competent nurses follow up his or her task and emotions creatively when meeting patient needs	3	2	4	4	4	4	0.80
19	To understand the patient means to honor the patient as an individual every time	4	4	4	4	4	5	1.00
20	Competent nurses can anticipate patient needs and respect the patient's trust system at once. It is focused on the patient healing process	4	4	4	4	4	5	1.00

Table 1: The Content Validity Index (I-CVI) and Scale Content Validity Index (S-CVI) of TCCNI\_IV

No	Items	Expert Panel					total item agreement	CVI
		1	2	3	4	5		
21	Concern in the nursing process can happen in a learning and teaching situation between the nurse, patient and family member	3	3	2	4	4	4	0.80
22	Concern in caring may reduce the anxiety in the nurse-patient relationship	4	4	4	4	4	5	1.00
23	A sincere commitment to the patient's needs, hope and dreams is a kind of concern.	3	4	3	4	4	5	1.00
24	As a nursing concern, the ability to use technology in many ways is to know and understand one another, between patient and nurse	2	3	4	3	3	4	1.00
25	Nurses use technology and human touch together when building relationships completely, focusing their concern	4	4	4	4	4	5	1.00
Total agreement		0.88	0.96	0.84	1	1	S-CVI	0.936

Table 2. The Reliability Test of the Technological Competency of the Caring in Nursing Instrument Indonesian Versus (TCCNI\_IV).

Reliability Statistics	
Cronbach's Alpha	N of Items
.980	25

item is unable to assess the relevance (item no.15: I-CVI 0.60), this is most probably because in reality, the nurses' caring perspective when assessing and interpreting health service data is a fundamental practice conducted by all nurses. Therefore, the nurses do not need to train his or her caring perspective when assessing and interpreting the health service data. The nurses acknowledge that caring is at the core of the nursing profession. Self-awareness helps to improve the nurses' caring behavior and understanding of themselves in respect to their own values and beliefs in order to understand the client's perspectives (Biswas, S., Kongsuwan, W., & Matchim, 2016).

The second type of CVIs is scale content validity (S-CVI). The S-CVI is defined as the proportion of items given a rating of 1 - not relevant and 2 - unable to assess the relevance by the experts involved. The items were given a rating of 3 - relevant but needs minor alteration and 4 - very relevant quite/very relevant by the experts involved. According to many writers, the S-CVI's acceptable level is .80 or higher (Denise F. Polit, 2008). In this study, the S-CVI of TCCNI\_IV is 0.93, which means that the items are adequate and representative for all items in order to measure the construct of interest. The use of technology plays a significant role in the nursing service. The nurses will be able understand their patients as a whole through the help of technology.

Thus the nurses require an enormous amount of technical skills, effort and competency when managing technologies harmoniously with the intention being to result in positive human health perspectives.

**Quantitative Part**

The quantitative part consisted of the reliability test of TCCNI\_IV. It was measured using internal consistency and a stability test. Cronbach's alpha was the measure used to determine the reliability (internal consistency) of the items in the questionnaire. The range from 0.70 and 0.95 is an acceptable value for Cronbach's alpha (Beck & Gable, 2001). Another researcher used the internal consistency to refer to the interrelatedness of the items. They distinguished internal consistency from homogeneity by claiming that homogeneity refers to the uni-dimensionality of a set of test items (Tang, Cui, & Psychology, 2009).

In this study, the results show that the Cronbach's alpha of TCCNI\_IV is .980, representing a good value (Al Hadid, Abu Hasheesh, & Al Momani, 2011). This result means that the questionnaire is considered to have high reliability. This is most probably because each item has been examined by experts before being administered to the participants. Furthermore, the TCCNI\_IV underwent both development and psychometric testing.

## CONCLUSION

The technological competency of the caring in nursing instrument Indonesian version (TCCNI\_IV) is found to be both valid and reliable. It is recommended that the developed instrument is further tested for its reliability and validity in a larger setting. It is also recommended that the questionnaire can be used in a nursing ward hospital with nursing students as the sample.

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Original Research

## Determinants of Drug Adherence on Grade Two and Three Patients with Hypertension

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### ABSTRACT

**Introduction:** Compliance for taking medication has become an important activity for patients with hypertension. Compliance is needed to control blood pressure and prevent complications. The purpose of this study was to analyse determinant drug adherence on grade two and three patients with hypertension.

**Methods:** The study design was a descriptive survey using a cross-sectional approach. The sample was 225 patients with hypertension grade two and three. The sampling technique was done using a multistage random sampling technique. The coping strategy is the independent variable and drug adherence is the dependent variable. The research instrument was in the form of a questionnaire which consisted of demographic, coping strategy used, COPE inventory scale questionnaire, and drug adherence using the Hypertension Self-Care Profile questionnaire. Data analysis was performed using the Pearson test and linear regression.

**Results:** The results showed that patient adherence in taking medicine was 51.1% in the medium category. Factors influencing the adherence were ages (p-value: 0.002), return to religion (p-value: 0.011), gender (p-value: 0.016) and suppressing competition activities (p-value: 0.063).

**Conclusion:** Age, gender, return to religion and suppressing competition activities influence the taking of medication in patients with grade two and grade three hypertension. Strengthening coping strategies with transporting to coping emotions is very important and will affect drug adherence in patients with grade two and grade three hypertension.

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### INTRODUCTION

The development of the disease is now shifting from infectious diseases to non-communicable conditions. While the problem of infectious diseases has not been resolved, the prevalence of non-communicable diseases continues to increase (Atiim, G., et al, 2015). Hypertension is a non-communicable disease in which numbers continue to grow (Bell Kayce et al., 2015; Bhagani, S., et al., 2018). In Indonesia, the development of hypertension prevalence continues to grow throughout the year. The results of the Riskesdas conducted by the Ministry of Health of the Republic of Indonesia found that the incidence of hypertension from 2013 to 2018 rose sharply from 25.8% to 34.1% (Kemenkes RI, 2018). The increase

should be a concern given the increase of complications due to hypertension, such as cardiovascular disease, stroke and kidney failure (Fikriana, R., 2016; Fikriana, R., et al, 2018).

One of the causes of the increased risk of hypertension complications is due to non-compliance with hypertension treatment. Non-compliance with treatment will cause uncontrolled blood pressure and lead to the risk of complications (Fikriana, R., 2018). Studies show that 51.6% of hypertension patients taking antihypertensive drugs include in unchecked hypertension (Borghi, C., et al., 2016). Blood pressure control is also deficient, at 22.3% (Shafi, S. T., et al, 2017). As a result, the increase of uncontrolled hypertension is correlated with an increased risk of heart disease (Borghi, C., et al., 2016). Hypertension

classification are optimal blood pressure, normal blood pressure, high-normal blood pressure, grade one hypertension, grade two hypertension, grade three hypertension, isolated systolic hypertension, white-coat hypertension and masked hypertension. In patients with grade two and three, hypertension has a very high risk of complications and organ damage (Indonesian Society of Hypertension, 2019; Bhagani, S., et al, 2018).

The results of the study of adherence showed that 32.3% did not take medication regularly, 13.3% did not take medicine, and 54.4% take medicine daily. The reasons for not taking medicine are because they feel healthy (59.8%), are not routinely going to health service facilities (31.3%), taking traditional medicine (14.5%), often forgetting (11.5%), not being able to buy drugs regularly (8.1%), cannot stand the side effects of drugs (4.5%), medications do not exist in health care facilities (2.0%) and others (12.5%) (Borghini, C., et al., 2016). Patients with hypertension who take antihypertensive drugs for controlling blood pressure slightly increased by 32.3%. However, this value is also still classified as very low. Low blood pressure control is positively correlated with increasing age, body mass index and occupational status (Shafi, S. T., et al, 2017; (Fikriana, R., 2016; Fikriana, R., et al, 2018).

In a situation that is considered as stressful and requires an effort to overcome it, coping will have an effect on a person. Coping strategies aim to manage stressors or regulate emotions arising from stressful situations (Biggs, A., 2017; Nursalam, 2017). Coping strategies are related to a person's quality of life. Coping strategies that are positively associated with the right psychosocial environment and which produce good physical health will improve the quality of life of a person (Hernández-ledesma, A. L., et al, 2018). Situational assessment and conditions that occur will affect how coping strategies are effective in dealing with stress and be able to influence one's decision to perform certain behaviours. Based on the transactional theory, coping is a continuous cognitive change and a person's behavioural effort in managing the existence of both internal and external demands that are judged to be beyond one's ability. Coping is process-oriented, dynamic, and is done consciously and directed (Biggs, A., 2017; Nursalam, 2017).

Several factors influence the behaviour of hypertensive sufferers towards medication adherence. Knowledge about medication, frequency and dosage of drugs has a role in influencing adherence (Ramli, A., et al, 2012). The aim of the research was to analyse the determinant drug adherence on grade two and three hypertension patients.

## MATERIALS AND METHODS

This study was a cross-sectional design. The study was conducted from July to August 2019 in the Malang district, Indonesia. The sample was 225 people with hypertension. Inclusion criteria: 1)

hypertension patients with grade two and grade three hypertension criteria, 2) aged more than 30 years old. The exclusion criteria: 1) The patient is getting treatment in hospital, 2) patients were in the total and partial dependency level category. The sampling technique used multistage random sampling. This sampling technique uses three stages. The first step is to determine the five sub-districts in Malang Regency by simple random sampling. The second step was to determine each of the one regions from one district by simple random sampling. The third stage was to determine hypertension patients from each region by simple random sampling. Variables in this study were coping strategic (independent variable) and drug adherence (dependent variable).

The instrument used was a questionnaire. The questionnaire covers the demographic characteristics of the respondents, which include age, gender, family history of hypertension and a long duration of hypertension. The patient coping questionnaire was measured by examining problem-focused coping consisting of active coping, planning, restraint, suppression of competing activities, seeking instrumental and informational social support and reviewing emotion-focused coping consisting of positive reinterpretation, return to religion and seeking emotional, social support. The coping questionnaire was adopted from the COPE Inventory scale questionnaire (Carver, C. S, 2013). Respondents answered the coping questionnaire choices using a Likert scale consisting of four answer choices that are never, sometimes, often and always. The data scale used numeric data. The drug adherence questionnaire was adopted from the Hypertension Self-Care Profile (HBP SCP) questionnaire regarding adherence to taking antihypertensive medication (Han, et al, 2014). The drug adherence questionnaire used a Likert scale of four answer choices that are never, sometimes, often and always. The questionnaire was tested for validity and reliability, with a Cronbach alpha active coping value of 0.806 with four questions; planning value of 0.884 with four questions; restrain value of 0.700 with four questions; suppression of competing activities value of 0.737 with four questions; seeking instrumental and informational social support value of 0.921 with five questions; return to religion value of 0.884 with five questions; seeking social emotional social support value of 0.825 with five questions.

Prior to data collection, the researcher obtained informed consent for the study with each respondent. The researcher explains the purpose of the study, the benefits of the research and the procedure of conducting the research. Respondents who agreed to be involved in the research process must sign an informed consent sheet. Approval of research ethics has been carried out by the Health Research Ethics Committee of the Faculty of Nursing, Universitas Airlangga, Surabaya, No. 1468-KEPK.

Data analysis of demographic characteristics, coping, and medication adherence characteristics variables were performed using frequency distribution. The data distribution is normal. To find out the relationship between demographic and coping characteristics with adherence to medication, use the Pearson test. Determinant drug adherence was analysed by using a linear regression test.

**RESULTS**

**Demographic Characteristics**

The demographic characteristics of people with hypertension are described in terms of age, sex, family history of hypertension and long duration of hypertension. Table 1 shows that the majority of respondents, 70.7% aged 56 - 65 years and 3.1% aged 26 - 35 years. A total of 83.1% were female and the majority, namely 79.1% of respondents had no family history of hypertension. In addition, it was found that more than half the respondents, 64% had hypertension for 1-3 years.

**Coping of Patients with Hypertension**

People with hypertension are described as problem-focused coping and emotion-focused coping which is divided into eight types of coping done by the patient. The results in Table 2 shows that planning, restraint, suppression of competing activities, positive reinterpretation and seeking emotional social support found that more than half of the respondents were in the poor category, namely 52.9%, 53.3%, 54.2%, 52.9%, and 54.2 %. Whereas in the sufficient category, coping has a percentage of more than half the respondents is active coping (53.8%), seeking instrumental and informational social support (54.2%) and return to religion (51.1%). While coping is in a good category, all coping components are in a very low percentage of less than.

**Drug Adherence**

Analysis of the frequency distribution of drug administration are 74 people (32.9%) low category, 115 people (51.1%) medium category and 36 (16%) is good enough.

**Relationship between Demographic and Coping Characteristics with Drug Adherence**

Trial analysis using the Pearson test according to table 3 obtained demographics and coping related to drug testing about type variables not related to drink or drug testing. Return to religion was the variable that was most strongly associated with taking medication meetings ( $r = 0.322$ ).

**Effects of Demographic Characteristics and Coping on Medication Adherence**

Table 4 illustrates the results of the linear regression analysis of the variables that influence medication adherence. The results show that there are four variables that influence medication adherence, namely age, sex, suppression of competing activities and return to religion. The suppression of competing activities variable is retained by the model even

though  $p\text{-value} > 0.05$ . These results indicate that coping strategies that are very influential on medication adherence in patients with grade 2 and grade 3 hypertension are emotion focused coping, especially return to religion and suppression of competing activities.

Table 1. Demographic Characteristics of Patients with Hypertension (n = 225)

Variable	n	%
Age		
26 - 35 years old	7	3.1
36 - 45 years old	15	6.7
46 - 55 years old	34	15.1
56 - 65 years old	159	70.7
> 65 years old	10	4.4
Gender		
Male	38	16.9
Female	187	83.1
Family History		
Yes	47	20.9
No	178	79.1
Long suffered		
< 1 years	50	22.2
1 - 3 years	144	64.0
> 3 years	31	13.8

Table 2. Frequency Distribution of Hypertension Patients' Coping Strategy (n = 225)

Variable	n	%
Active coping		
Less	68	30.2
Enough	121	53.8
Good	36	16.0
Planning		
Less	119	52.9
Enough	74	32.9
Good	32	14.2
Restraint		
Less	120	53.3
Enough	73	32.4
Good	32	14.2
Suppression of competing activities		
Less	122	54.2
Enough	77	34.2
Good	26	11.6
Seeking instrumental and informational social support		
Less	70	31.1
Enough	122	54.2
Good	33	14.7
Positive reinterpretation		
Less	119	52.9
Enough	84	37.3
Good	22	9.8
Return to religion		
Less	84	37.3
Enough	115	51.1
Good	26	11.6
Seeking emotional social support		
Less	122	54.2
Enough	71	31.6
Good	32	14.2

Table 3. Drug Adherence (n = 225)

Variable	n	%
Drug Adherence		
Low	74	32.9
Medium	115	51.1
Good	36	16.0

Table 4. Relationship between demographic characteristics and coping on drug adherence

Variable	Medication adherence	
	r	p-value
Age	-0.132	0.047
Gender	0.023	0.730
Family History	-0.131	0.050
Long suffered	-0.129	0.054
Active coping	0.212	0.001
Planning	0.215	0.001
Restraint	0.207	0.002
Suppression of competing activities	0.295	0.000
Seeking instrumental and informational social support	0.195	0.003
Positive reinterpretation	0.170	0.011
Return to religion	0.322	0.000
Seeking emotional social support	0.205	0.002

Table 5. Linear Regression Analysis of Factors Affecting Drug Interactions

Variable	B	SE	$\beta$	t	p*
Constant	1.363	0.247		5.526	0.000
Age	0.639	0.200	0.369	3.204	0.002
Gender	0.584	0.240	0.284	2.430	0.016
Suppression of competing activities	0.145	0.078	0.142	1.867	0.063
Return to religion	0.182	0.071	0.200	2.575	0.011

## DISCUSSION

Hypertension is a significant risk factor for cardiovascular and kidney disease. Although treatment for hypertension is available, only about 25% of people with hypertension have control of their blood pressure. Effective management in patients with hypertension is recommended to assess the asymptomatic target organ damage and the risk of secondary causes. Management of hypertension depends not only on the level of blood pressure but also on the risk of cardiovascular disorders (Bhagani, S., et al, 2018).

People with hypertension must be responsible for taking care of themselves every day. This treatment includes blood pressure monitoring, diet management, maintaining physical activity, maintaining weight, stress management and medication adherence. Appropriate treatment and lifestyle modification will be able to prevent and slow the occurrence of complications. Blood pressure that is not well controlled will contribute to heart and kidney disease. So that self-regulation to achieve the

desired blood pressure level is very important (Visutyothin, Y., 2018).

The results of this study indicate that age, sex, return to religion and suppression of competing activities affect medication adherence in patients with grade 2 and grade 3 hypertension. These results illustrate that demographic characteristics also play a substantial role in adherence to taking drugs. Besides, these results also indicate that the coping strategy in the emotion-focused coping category is the coping strategy that is most influential on sufferers.

Age is the most potent variable influencing medication adherence. The results show that the younger generation tends to have a better level of adherence compared to old age. This is possible because young sufferers feel a higher threat to their disease, so they try to take the drug regularly to avoid excessive blood pressure. Whereas in elderly patients, long-term treatment that must be done is likely to have an impact on the emergence of boredom to consume drugs regularly. So that patients will prefer not to take medicine.

Gender also has an effect on medication adherence. Patients with hypertension who are female have better adhesion compared to men. Women tend to be more proactive in getting treatment for their condition. However, the results of other studies show that women have lower levels of medication adherence compared to men (Granger, B. B., et al, 2009; Manteuffel, M., et al, 2017). This is possible because women experience more side effects that are felt due to the treatment received. So women decided to stop treatment (Manteuffel, M., et al, 2017).

This is also in line with other studies in which the suppression of competing activities affects the behaviour of sufferers who are under stress. Patients in stressful situations more often use coping strategies in the form of avoidance and rejection rather than finding positive aspects of the stressful event that they are experiencing (Orzechowska, A., 2013)

Return to religion reflects emotion-focused coping as a coping variable that influences medication adherence. This is supported by other studies that explain that emotion-focused coping is associated with the occurrence of dysmenorrhea (Nursalam, N., et al, 2018). Return to religion is an effort made to try and control the problems they are facing by multiplying prayers and getting closer to God. This strategy shows that the spiritual and religious dimensions of sufferers with chronic diseases become very important for their lives and affect the sufferer's representation of their health (Perricone, G., et al, 2013). Spirituality has a significant relationship with disease prevention behaviour (Rohman., et al, 2019).

Spiritual beliefs possessed by a patient suffering from a chronic illness has the potential to support or hinder a person's ability to care for himself (Drutchas, A., et al, 2014). Religious needs are strongly related to beliefs, beliefs and positive emotions towards God, where this is also related to an individual's



interpretation of his illness (Büssing, A., et al, 2015). In someone suffering from a chronic disease, religious needs are positively related to spiritual well-being and life satisfaction (Büssing, A., et al, 2013a). However, this is different from other research results where religious needs are not associated with high or low life satisfaction. However, this need refers more to the resources that are vital to them and relied on by them. This happens because of several underlying factors, namely their religious attitude, such as the attitude towards the strength of faith needed to survive in the difficult times they are going through. It is also based on their search for factors to find access to spiritual sources or sources of religiosity that may be useful to overcome the illness they experience which ultimately interprets their illness into something of value (Büssing, A., et al, 2015).

In light of these conditions, the health worker has a duty to provide care to chronic patients, it is therefore necessary to conduct an assessment of their spiritual and religious needs. This is because the requirements for spirituality and religiosity play an essential role in the quality of life for sufferers (Büssing, A., et al, 2010).

## CONCLUSION

Several factors influence adherence to taking the medication in patients with grade two and grade three hypertension. Demographic characteristics, namely age and gender, and emotion-focused coping, namely religion and suppression of competing activities, have a significant effect on medication adherence.

Suggestions for further research include a qualitative research design to explore coping strategies for patients with grade two and grade three hypertension, especially in return to religion variables and suppression of competing activities. Practice implications for this research is to increase drug adherence for patient hypertension grade two and grade three, strengthened coping strategies are very important.

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Original Research

## Family Support System as an Effort to Optimize Coping Mechanism of Preschool Children During Hospitalization

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### ABSTRACT

**Introduction:** The condition of the child during hospitalization can experience stress due to environmental changes. Child coping mechanism is very supportive of the adaptation process. The purpose of this study was to analyze the effect of family support system on coping mechanisms during hospitalisation.

**Methods:** It was quasi-experimental with pre-test post-test with control group design. The study population was preschool children who were treated in the Hospital of Bangkalan, East Java Province, Indonesia. Total sample was 60 respondents in treatment and control group and obtained consecutive sampling. The variables were family support system and coping mechanism. Data collection used Children's Coping Behavior questionnaire and tested by paired t-test.

**Results:** The treatment group showed the coping mechanism was mostly maladaptive (mean=34.07) and after the intervention most of them had adaptive coping (mean=46.87). Whereas in the control group before the intervention, the coping mechanism was mostly maladaptive (mean=36.22) and after the intervention most of the coping groups had maladaptive coping (mean=36.74).

**Conclusion:** Family support systems play an important role in improving the adaptive coping of preschool children during hospitalisation. Nurses should maximise family support as a strategy in interacting with children to enhance coping mechanisms to reduce the stress of hospitalisation.

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### INTRODUCTION

Hospital is a process for reasons of planning or emergency that requires children to stay in the hospital to undergo therapy and treatment (McMahon & Chang, 2020; Rückholdt, Tofler, Randall, & Buckley, 2019). Thus, being treated at the hospital remains a big problem and causes fear and anxiety (Chao & Chiang, 2003). Hospitality can also be interpreted as psychological changes that can be the cause of children being hospitalized (Priyoto, 2014). Disease and hospitalisation are often the first crisis children must be faced. Especially during the early years, children are very vulnerable to disease crises and hospitalisations due to stress due to changes from normal healthy and environmental

routines, and children have a limited amount of coping to deal with stress (Stratta et al., 2014). In general, preschoolers show maladaptive coping behaviours when adapting to the hospitalisation they experienced, namely behavioural reactions such as protest, hopelessness, and regression. This is because children feel afraid if their body parts will be injured by health care workers (Atkin & Ahmad, 2001; Sukoati & Astarani, 2012).

Rejection from nursing care and treatment has become a phenomenon in hospitals (Stratta et al., 2014). Based on research conducted by psychologists in the last 30 years, it is stated that 10-30% of children with hospitalisation have psychological disorders and as many as 90% of children feel disappointed and discouraged from

being hospitalized (Evi, Sri, & Junaidi, 2013). From the results of a survey of preliminary studies, four of five preschool children (3-6 years old) who are being treated show maladaptive coping behaviours manifested by crying, anger, withdrawal by not wanting to talk, always asking to go home, asking to be held, and do not want to eat. Preschoolers when they are hospitalised generally have a fear of both doctors and nurses, especially if the child has experienced such as immunized (Palka et al., 2016). In his shadow, a nurse or doctor would hurt him by injecting. In addition, children also feel disturbed relations with parents or siblings.

The environment at home is certainly different in an atmosphere with the tools in the treatment room (Foster, Mitchell, Young, Van, & Curtis, 2019; Foster, Young, Mitchell, Van, & Curtis, 2017). The first reaction of the child in addition to fear is the patient lacks an appetite and even cries, does not want to drink milk or eat the food provided (Joosten & Hulst, 2014; Stremmer, Haddad, Pullenayegum, & Parshuram, 2017; Whyte et al., 2011). The child's reaction is influenced by perceptions, age, previous experience of the process of illness and being treated and the support system available (Nursalam & Efendi, 2008). Effective coping produces a permanent adaptation which is a new habit and an improvement from the old situation, while ineffective coping ends in maladaptive i.e. behaviour deviating from normative desires and can harm oneself or others or the environment (Rasmun, 2014).

One of the best approaches is to encourage parents to stay with their children and participate in care if possible (Duzkaya, Uysal, & Akay, 2014; Moghaddam, Vashani, Reihani, & Zadegan, 2017; Olsson, Kenardy, De Young, & Spence, 2008). Parents can provide effective care during hospitalisation of their children (Konuk Şener & Karaca, 2017). It has been proven in several studies that children will feel safe when they are beside their parents, especially when facing invasive procedure (Supartini, 2004). Casey in (Supartini, 2004) suggested that the principle of nursing services to children must focus on children and families, to meet the needs of children and their families (Kudchadkar et al., 2019; Moghaddam et al., 2017). The purpose of this study is to analyze the effect of family support systems on coping mechanisms of preschool children.

## MATERIALS AND METHODS

The research design used quasi-experimental with pre-test post-test with control group design. Variables in this study were the family support system and coping mechanisms of preschool children. The population of this study was preschool children who were treated in the Hospital of Bangkalan, East Java Province, Indonesia. The sample size was 30 respondents in the treatment group and 30 respondents in the control group. Sampling technique using consecutive sampling.

Data collection used in the form of observation sheets of coping mechanisms for preschoolers using the Children's Coping Behavior checklist designed by (Hernandez, 2008).

The implementation of the family support system intervention in the treatment group is based on the standard procedure that has been made, and each nurse carries out nursing care to patients from the first day to the third day. The steps in implementing the family support system include the pre-action stage, the orientation phase, the work phase and the termination stage. The study was conducted for three months (August - October 2018). The intervention in the control group used standard therapy that was routinely carried out in the Hospital of Bangkalan, East Java Province, Indonesia. The results of the study to determine differences in coping mechanisms before and after the intervention in the treatment and control groups were tested by paired T-test. This research has been conducted ethics due diligence by KEPK STIKES Ngudia Husada Madura.

## RESULTS

The age of children in the treatment group was mostly three years old (10.3%). In the control group, most of the age of nine years was 30 people (30%). Based on the sex of the children in the treatment group, most of the male were 17 people (56.7%). In the control group, most of the male was 16 people (53.3%) (Table 1).

The coping mechanisms of respondents in the treatment group before the intervention were mostly maladaptive as many as 18 people (60%), after the intervention most of the coping mechanisms were quite adaptive as many as 20 people (66.7%). The coping mechanisms of respondents in the control group before the intervention were mostly maladaptive as many as 16 people (53.3%), after the intervention most of the coping mechanisms were maladaptive as many as 15 people (50%). In the treatment group, there was an increase in the mean coping mechanism before (34.07) and after (46.87) intervention family support system. Whereas in the control group, there were less significant mean differences in coping mechanisms between before (36.22) and after (36.74) administration of the intervention. Paired t-test results in the treatment group showed p-value

Table 1. Characteristic Respondents (n=60)

Characteristics	Treatment		Control	
	n	%	n	%
Age				
3 year	10	33.3	9	30
4 year	8	26.7	7	23.3
5 year	7	23.3	8	26.7
6 year	5	16.7	6	20
Gender				
Male	17	56.7	16	53.3
Female	13	43.3	14	46.7

(0.000) and in the control group p-value (0.065) with  $\alpha$  (0.05). This indicates that there is an influence of the family support system on the coping mechanism of preschool children (Table 2).

**DISCUSSION**

Sickness and hospitalisation are the main crises seen in children. If a child is hospitalized, the child will be prone to crisis because the child will experience stress due to changes in both his health status and the environment in daily habits, and the child has a number of limitations in coping mechanisms to deal with problems and events that are of nature (Almis, Bucak, Konca, & Turgut, 2017). push. Children's reaction in overcoming the crisis is influenced by the level of age development, previous experience of the process of illness and being treated, support systems available, and coping skills in dealing with stress (Christian, 2018).

Effective coping produces a permanent adaptation which is a new habit and an improvement from the old situation, while ineffective coping ends in maladaptive ie behaviour deviating from normative desires and can harm oneself or others or the environment (Rasmun, 2014). During early childhood, children understand that certain circumstances can arouse certain emotions, facial expressions indicate certain emotions, emotions affect behaviour, and emotions can be used to influence the emotions of others. At this stage of preschool age, stable concepts are formed, mental reasoning emerges, egocentrism begins to become strong and then weakens, as well as the formation of belief in the magical. Based on Piaget's theory, at this stage, the focus is on the limitations of children's thinking which refers to mental activities that allow children to think about the events or experiences they experience (Duzkaya et al., 2014; Hill et al., 2019).

Changes in coping patterns in children can be caused by environmental changes that are entirely meaningful for children. Usually, children are at home with family or friends in a pleasant atmosphere. However, when a child is sick and has to undergo treatment in a hospital, the child must adapt to the environment and atmosphere that is foreign to him. Besides that, the child's activity must also be limited unlike at home, it will make the child feel lost his strength. This situation tends to make children act aggressively with anger and rebellion (Stremler

et al., 2017). Apart from environmental changes experienced by children, the absence of children who have adaptive coping mechanisms can also be caused by child development based on the child's age and physical condition of the child who is sick. Preschoolers have not been able to reason, they are only able to perceive anything that makes them uncomfortable and make the pain in themselves as something that can threaten them at any time while the condition of illness experienced by children will worsen their perceptions about things that are considered threatening so that children become unable to cope well (Christian, 2018).

In helping coping mechanisms to be more adaptive in children during hospitalisation, the role of the family as a support provider is needed in the care of children while undergoing hospitalisation. The presence of a family for a child being treated in the hospital helps the child deal with the changes it receives, the child will adapt and try to learn and change their perceptions about things they feel are uncomfortable and afraid (Smith, 2018).

The coping mechanism of children is greatly influenced by good social support from families for sick children. The family plays an important supporting role during the child's recovery period. If this support is not available, the success of recovery decreases significantly (Friedman & Jones, 2010). One of the best approaches is to encourage parents to stay with their children and participate in care if possible (Smith, 2018). Family support system (family support system) is a support system provided by the family to family members in order to maintain the social identity of family members, provide emotional support, material assistance, provide information and services, or facilitate family members in making new social contacts with the environment. Family support is obtained from people who have social relationships with individuals. The primary source of social support is the closest people such as parents, family and close friends. The foundation of children's social relations is the relationship between parents and children, where parents have an important role in the family as adults who provide a sense of security, love, protection and education. The social support that can be shown by the family includes giving more attention to children, but that does not mean spoiling and obeying all the wishes of the child.

Attention can be done by accompanying children

Table 2. Distribution of Coping Mechanism of Preschool Children (n=60)

Coping mechanism	Treatment				Control			
	Before		After		Before		After	
	n	%	n	%	n	%	n	%
Adaptive	0	0	8	26.7	0	0	1	3.3
Enough	12	40	20	66.7	14	46.7	14	46.7
Maladaptive	18	60	2	6.6	16	53.3	15	50
Paired t test	Mean = 34.07		Mean = 46.87 p-value = 0.000		Mean = 36.22		Mean = 36.74 p-value = 0.065	

Significant: p-value < 0.05; insignificant: p-value > 0.05

during treatment, inviting children to joke and play, providing understanding in language that children understand about the care and treatment provided during hospitalisation is a way to help the child recover quickly. Family participation is significant for healing children because the family is the closest support system for children. Support from the family is also verbal or non-verbal information, both in real/behavioural assistance provided by people who are familiar with children in their social environment or in the form of attendance and things that can provide emotional benefits. If the child gets good social support from the family or the people closest to him, the child will feel safe and comfortable and indirectly influence the use of children's coping during the treatment process (Garro, Thurman, Kerwin, & Ducette, 2005; Hasegawa et al., 2015).

The coping mechanism that children learn is very important in their ability to cope with disorders experienced by children. The positive effect of family social support is on adjusting for events in a stressful life (Bordone, Arpino, & Aassve, 2017). Support from the family can improve ways of dealing with problems or solve problems focused on reducing stress reactions through the attention, information and feedback needed (Alcântara et al., 2016).

The influence of family support on the use of coping mechanisms for preschoolers in principle, family support system intervention is one way that can be used to make children feel safe and comfortable and help children adapt during the treatment process in the hospital (Helton & House, 2019; Iio, Hamaguchi, Nagata, & Yoshida, 2018). Families usually know what makes their children feel comfortable, such as being held, stroked, or talked. Children will be free to express their feelings when near the people closest to them. Another case with children who do not get more attention from their families, children will seek a lot of attention with fuss and tend to act aggressively (Weber & Harrison, 2019).

Based on the results of existing research and theories, it can be done to help children adapt adaptively during hospitalisation by doing a family support system. In providing this intervention, the role of parents in assisting children is significant as supporting children, nurses and hospitals only act as facilitators so that if there are procedures for nursing care offered by nurses, parents must be actively involved and assist children and provide motivation to children (Iio et al., 2018; Tsitsi, Charalambous, Papastavrou, & Raftopoulos, 2017).

## CONCLUSION

Preschoolers (3-6 years old) who are treated have a good coping mechanism after an intervention using a family support system approach. The family especially the presence of parents, means to be able to improve coping mechanisms in children undergoing hospitalisation to help children reduce stress and the adverse effects of stress due to

hospitalisation. Nurses are expected to be able to involve the role of the family in providing nursing care to children especially preschool age to improve coping mechanisms and reduce the stress of hospitalisation.

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Original Research

## Correlation Between Emotional Peer Support and Cyberbullying Behaviour in Senior High School Students

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### ABSTRACT

**Introduction:** The biggest users of the internet and social media are teenagers. This has an impact on the tendency for harassment behavior known as cyberbullying. This harassment is quite serious because it is massive; it can happen at any time and anywhere. This harassment generally comes from the victim's peers. This research aimed to analyze the correlation between peer emotional support and the cyber-bullying behavior among the students in senior high school.

**Methods:** This research used a cross-sectional study design. The sample size of this study was 246 students in senior high school from the academic year 2018-2019 collected through purposive sampling. The instrument of this research was emotional support from their peers and cyberbullying behavior. The bivariate analysis used was the Spearman test ( $\alpha < 0.05$ ; CI=95%).

**Results:** There is a significant correlation between emotional peer support and cyberbullying behavior among the students in senior high school.

**Conclusion:** Community health nurses should improve the emotional peer support among the students in order to promote the prevention of cyberbullying behavior.

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### INTRODUCTION

One of the characteristics of the development of high school-aged adolescents is that they need friends, that they are eager to try everything that is not yet known to them and they have a desire to explore their natural surroundings (Putro, 2017). This has an impact on their use of the internet and social media, which is high in the adolescent age group. Data from the Indonesian Internet Service Providers Association (2018) shows that the number of internet users in Indonesia has now reached 88.1 million. Most users are teenagers, especially those in high school, reaching 64.7%. Teenagers use social media to interact with their friendship groups. The results related to conventional harassment behavior tends to shift towards cyberbullying. A survey was conducted with 259 participants as the sample (202 female), with all of the respondents aged 19-25 years of. In this survey, 58,1% had experienced some

form of cyberviolence (Ham & Livazovic, 2019). Cyberbullying perpetration indicates the "repeated violation, harassment and ridicule of others online, or using mobilephones or even other electronic devices" (Patchin and Hinduja, 2012). Cyberbullying is a mischievous behavior that is usually done by individuals or groups intentionally and repetitively on purpose to harm others using computers, phones, and other electronic devices. Additionally, this behavior has so far been considered safe because adults do not recognize when the behavior occurs. This is as it is not easy to monitor activity related to the internet (Sari, 2016). Using technology, people can do things that may bring either good or harm to both themselves and others (Utami, 2014). The user of the internet is not limited because all circles can access it quickly and they are free to do anything (Bauman, Toomey, & Walker, 2013).

In Indonesia, there are no age restrictions for smartphone users. There is a vulnerability associated with the negative impact of smartphone use in adolescents, both emotionally and socially. Based on the results of the study, it shows that 21% report regular cyber-victimization with a distinct emotional disturbance (31,3%), anger (20,8%), helplessness (13,1%) and sorrow (20,5%) (Ham & Livazovic, 2019). The victims also feel insecure in any situation and they often experience despair due to the oppression in cyberspace (Vaillancourt, Faris, & Mishna, 2017). The victims feel afraid and uncomfortable with and in their environment, and the victims furthermore feel insecure and threatened in terms of their safety (Hidajat, Adam, Danaparamita, & Suhendrik, 2015). Cyberbullying behavior that occurs over a long period of time can have an impact on the victim's psychology, such as a loss of self-confidence, increased anxiety and decreased performance (Rifauddin, 2016).

Cyberbullying behavior uses more forms of verbal communication through writing such as what is experienced on the internet and through social media (Maya, 2015). Willard (2007) indicated a taxonomy of the different types of cyberbullying: 1) flaming (i.e. an online fight), 2) harassment (i.e. repetitive, offensive messages), 3) outing and trickery (i.e. soliciting personal information from someone and then electronically sharing that information without the individual's consent), 4) exclusion (i.e., blocking an individual), 5) impersonation (i.e. posing as the victim), 6) cyberstalking (i.e. sending repetitive threats) and 7) sexting (i.e. distributing pictures of another individual without that person's consent). Cyberbullying behavior is usually done freely on the internet. Moreover, bullies can sometimes be falsely known; their hidden identity allows them to do anything without fear (Narpaduhita & Suminar, 2014).

Cyberbullying perpetrators among teenagers generally comes from among their friends. Teenagers will behave in order to be accepted by their group of friends even if this behaviour is not in accordance with their wishes. Social support, especially peer emotional support, plays a vital role in preventing cyberbullying behavior. Peer emotional support will build empathy when dealing with the adverse behavioral problems that occur in adolescents (Steffgen, König, Pfetsch, & Melzer, 2011). Teens receive more emotional support from their peers than from their parents. This may come from the interdependence between them and their peers in terms of giving and receiving support and motivation, which they usually like to do as part of an exchange (Lakon, Wang, Butts, Jose, & Hipp, 2017; Keliat, 2016). Our study aims to analyze the relationship between peer emotional support and cyberbullying behavior in high school-aged adolescents.

Table 1. Distribution of the Respondents by sex, class, the occupation of their parents, the parents' education, height, and student weight referring to the Senior High School Students, Jember (n = 246)

Characteristics of the respondents	n	%
Gender		
Men	62	25,2
Women	184	74,8
Class		
X	125	50,8
XI	121	49,2
Parents' job		
Not working	6	2,4
Government employees	52	21,1
Private employees	73	29,7
Entrepreneurship	63	25,7
Etc (farmer, laborer)	52	21,1
Parents' education		
Elementary school	4	1,6
Junior High School	15	6,1
Senior High School	159	64,6
College	68	27,6
Height		
140-150 cm	37	15,0
151-160 cm	117	47,6
161-170 cm	67	27,2
171-180 cm	25	10,2
Body Mass Index (BMI)		
Less weight	90	36,6
Normal weight	112	45,5
Overweight	41	16,7
Obesity	3	1,2

## MATERIALS AND METHODS

This research used an analytical observation design with a cross-sectional approach. This research was conducted in a senior high school in the district of Jember. The population included students from the 10th and 11th grades, totaling 635 students in the 2018-2019 academic year. Based on the Slovin Formula ( $d=5\%$ ), the sample size of this study was 246 students via a proportionate stratified random sampling technique. The data was collected between February and March 2019. The instrument of this research was peer emotional support (12 item questions about empathy, caring, concern, positive regard, and encouragement focused towards the person;  $\alpha$ -Cronbach score=0,849) and cyberbullying behavior (10 item questions about the identification of the perpetrator, victims, both, or none of them regarding cyberbullying;  $\alpha$ -Cronbach score=0,849). The data collection was conducted after getting a permit from the school. The students were gathered after informed consent was given and through the students filling in the provided questionnaires. After all of the data was collected, bivariate analysis was performed using the Spearman test ( $\alpha<0.05$ ; CI=95%). This study was approved by the Health Research Ethics Commission of the Faculty of Dentistry, University of Jember No.334/UN25.8/KEPK/DL/2019..

Table 2. Frequency distribution of the respondents' characteristics with the category of cyberbullying in Senior High School Students, Jember (n = 246)

Characteristics of the respondents	Cyberbullying Category				Total n (%)
	Perpretator n (%)	Victim n (%)	Both n (%)	Not doing n (%)	
Gender					
Men	9 (14,6)	5 (8,0)	5 (8,0)	43 (69,4)	62 (25,2)
Women	16 (8,7)	28 (15,2)	25 (13,6)	115 (62,5)	184 (74,8)
Class					
X	11 (8,8)	10 (8)	14 (11,2)	90 (72)	125 (50,8)
XI	14 (11,6)	23 (19)	16 (13,2)	68 (56,2)	121 (49,2)
Parents' job					
Not working	1 (16,7)	2 (33,3)	0 (0)	3 (50)	6 (2,4)
Government employees	7 (13,5)	8 (15,4)	6 (11,5)	31 (59,6)	52 (21,1)
Private employees	6 (8,2)	9 (12,3)	12 (16,5)	46 (63)	73 (29,7)
Entrepreneurship	4 (6,3)	7 (11,1)	8 (12,7)	44 (69,8)	63 (25,7)
Etc (farmer, laborer)	7 (13,5)	7 (13,5)	4 (7,7)	34 (65,4)	52 (21,1)
Parents education					
Elementary School	0 (0)	1 (25)	0 (0)	3 (75)	4 (1,6)
Junior High School	3 (20)	3 (20)	1 (6,7)	8 (53,3)	15 (6,1)
Senior High School	16 (10,1)	20 (12,6)	22 (13,8)	101 (63,5)	159 (64,6)
College	6 (8,8)	9 (13,2)	7 (10,3)	46 (67,6)	68 (27,7)
Height					
140-150 cm	5 (13,5)	6 (16,2)	2 (5,4)	24 (64,9)	37 (15)
151-160 cm	10 (8,5)	17 (14,5)	16 (13,7)	74 (63,2)	117 (47,6)
161-170 cm	7 (10,5)	7 (10,5)	8 (11,9)	45 (67,1)	67 (27,2)
171-180 cm	3 (12)	3 (12)	4 (16)	15(60)	25 (10,2)
Body Mass Index (BMI)					
Less weight	7 (7,8)	6 (6,7)	5 (5,5)	72 (80)	90 (36,6)
Normal weight	13 (11,6)	10 (8,9)	19 (17)	70 (62,5)	112 (45,5)
Overweight	5 (12,2)	16 (39)	5 (12,2)	15 (36,6)	41 (16,7)
Obecity	0 (0)	1 (33,3)	1 (33,3)	1 (33,4)	3 (1,2)

## RESULTS

Several respondent characteristics were used in the present study including gender, parental occupation, the parent's education and height. Based on Table 1, the frequency distribution of gender obtained from the 246 respondents yielded that the female respondents outnumbered the male respondents with a total of 184 (74.8%). The score for the most common parental occupation was that of a private worker, with a total of 73 students (29.7%). The second most common occupations were entrepreneurs, civil workers and others. The least common occupation was unemployment. Furthermore, the parental education indicator, which had the most common distribution, was that of senior high school. This is as shown in the response from 159 students (64.6%). Based on the distribution of height obtained from 246 respondents, most students (as many as 117 students) were 151 to 160 cm tall. The least common distribution was that from only 25 students at 171 to 180 cm tall (10.2%).

In Table 2, it can be observed that out of the 246 respondents, the male respondents were most often the bullies (as many as 9 students; 14.6%). The table also informs us that the most common parental occupation was that of a private worker; 6 (8.2%) were bullies, 9 (12.3%) were victims and 12 (16.5%) were bullies and victims referring back to this. It was also found that cyberbullying incidents occur very

little occur for the respondents whose parents did not go to school or who had graduated only from elementary education; none (0%) of these respondents were either bullies or victims and the victims of bullying. Only 1 (25%) respondent was identified as a victim.

Table 3, on the other hand, explains that the students who became the research respondents preferred receiving emotional support from their peers (195 students or 79.3%). High peer emotional support means that the students genuinely care about their peers in terms of empathy, caring, concern, positive regard and encouragement. Emotional support is usually characterized by the perception of trust in relation to others (Shensa, Sidani, Escobar-Viera, et al., 2020). Related to this, the indicator of peer emotional support, which was considered to be the most influential, was *encouragement toward the person*. This is because most of the respondents marked this indicator higher than the other indicators. It was known that from the 246 respondents, most of them (158 - 64.2%- respondents) did not become either bullies or victims. The rest of them (35.8%) were bullies, victims or both. Finally, the Spearman test resulted in the relationship between the variable of peer emotional support and the variable of cyberbullying behavior as being determined to have a *p-value* of 0.001. The correlation value was -0.228. In other words, the correlation of the two variables was classified as low. The negative correlation implies

that the more that cyberbullying behavior is done, the lower the emotional support from their peers. The less the cyberbullying behavior is done, the higher the emotional support given by their peers.

## DISCUSSION

As found in the present study focused on 246 respondents, the number of students who were both a bully and a victim of cyberbullying was quite considerable. Cyberbullying is commonly done because of the dislike of a person which cannot be directly expressed or uttered in real life. Therefore, social media and online platforms are preferred (Budiarti, 2016). Teenagers who are active users of social media are more prone to cyberbullying behavior as it opens up chances for them to become either bullies or victims of cyberbullying (Mesch, 2009).

A previous study conducted by Febrianti & Hartana (2014) obtained the result that females are more involved in cyberbullying than males. The findings of the study do not conform to the findings of the present study where more male students are involved in cyberbullying. Male students usually belong to a particular group who like to do bad things to other students outside of the group. *Cyberbullying* usually happens to people or victims who have a different appearance. For example, if they are smaller in body size or if they seem to weigh more (overweight) than others (Rahayu, 2012). Teenagers with a distinctly bigger or thinner body than their peers tend to be less accepted among their friends, compared to those with an (considered) average body size (Kustanti, 2015).

Emotional support is very crucial because the victims of cyberbullying need to feel comfortable and loved by others, especially their friends (Sundari, 2015). Several factors influence the high and low emotional support given by peers to the teens that are the receivers of the support and the support provider themselves. Emotional support can be in the form of expressions of empathy such as listening, being open, trusting, understanding, compassion, and attention being given. The receiver of the support can be influenced if the receiver of the support does not like to socialize, if they do not get along with others, if they are not motivated to help others and if they not want others to know that she or he needs help. The second factor can be influential because teenagers are not likely to support their friends emotionally if they seem to have nothing (no resource) to help others with, if they struggling with their own depression and if they are not sensitive to their surroundings, thus making them unaware of their friend's emotions (Pragwati, 2014). The ability of the students to get emotional support can help them to overcome the problems that are being faced so then the teens are not immersed in the sadness that is being experienced (Ristianti, 2008).

It is implied in the findings of the present study that there is a correlation between peer emotional

Table 3. Analysis of the Relationships Between Peer Emotional Support and Cyberbullying Behavior in Senior High School Students in Jember

Variable	n (%)	Correlation
Peer Emotional Support		
High Peer Emotional Support ( $x \geq 38$ )	44 (17,9)	
Medium Peer Emotional Support ( $22 \leq x < 38$ )	195 (79,3)	
Low Peer Emotional Support ( $x < 22$ )	7 (2,8)	
Cyberbullying Behavior Categories		$r = -0,228$ $p = 0,001$
Perpretator	25 (10,2)	
Victim	33(13,4)	
Both (perpretator and victim)	30 (12,2)	
Not doing (neither perpretator nor victim)	158 (64,2)	

support and the cyberbullying behavior of teenagers. It was known that the more that cyberbullying behavior is done, the less peer emotional support is being given. This is because the worse the interactions are among their peers, the more this can lead to cyberbullying behavior. Groups of teenagers have a relationship with the cyberbullying behavior of other teenagers. Worse interactions among their peers may trigger cyberbullying (Hinduja & Patchin, n.d.). Moreover, their peers can play a role in the media related to informing individuals of the social norms or agreements that are allowed to be done by teens. Therefore, teenagers are prone to being involved in cyberbullying because they believe that their negative behavior is confirmed and supported by their friends. In other words, their peers are an essential element in how teenagers behave (Budiarti, 2016). Researchers argue that cyberbullying behavior is a form of negative behavior that results from a lack of peer emotional support. Excellent emotional support will make someone avoid negative behaviors such as cyberbullying.

## CONCLUSION

According to the findings of the study and the discussion in the previous section, it can be concluded that there is a relationship between peer emotional support and cyberbullying behavior. The results imply that the more cyberbullying there is, the lesser peer emotional support has been given.

Prospective studies can focus more on cyberbullying by taking into account other factors in addition to peer emotional support such as the parent's role and the attitude of the groups of their peers towards cyberbullying. Both teachers and parents are expected to play an active role in overseeing the student's activities when they are interacting via the internet. They should also provide good parenting for the students.

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Original Research

## The Relationship between Partner Support and Interdialytic Weight Gain (IDWG) Hemodialysis Patient

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### ABSTRACT

**Introduction:** Patients undergoing hemodialysis experience an influence in terms of the biological, psychological, social and spiritual problems that they encounter. In particular, there are biological aspects that affect weight gain between dialysis sessions. In terms of the psychological aspect, there is an influence on emotional vulnerability, such as anxiety, fear and despair. They need family support, especially as part of a couple. This study aimed to determine the relationship between partner support and IDWG in hemodialysis patients.

**Methods:** This study used a descriptive cross-sectional design. The population consisted of 60 hemodialyzed people. The sample was recruited using purposive sampling, resulting in 42 respondents who met the inclusion criteria. The study was conducted in a Private Hospital in Surabaya. The independent variable was partner support and the dependent variable was the IDWG in the hemodialysis patient. The data was collected through a questionnaire and it was analyzed using the Spearman test.

**Results:** The results show that there was a relationship between partner support and IDWG hemodialysis patients with  $p = 0.025$  ( $\alpha \leq 0.05$ ).

**Conclusion:** Good partner support reduces the low IDWG in hemodialysis patients. Therefore, determining the level of family support especially that given by a partner of a IDWG hemodialysis patients will positively support better IDWG hemodialysis patients, thus preventing them from the potential side effects of IDWG such as hypotension, muscle cramps, shortness of breath and cardiovascular problems.

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### INTRODUCTION

One of the problems experienced by hemodialysis patients is weight gain between the two sessions of dialysis, which is called uncontrolled inter-dialysis weight gain (IDWG). Weight gain between the dialysis sessions is a manifestation of the amount of fluid intake between dialysis sessions. IDWG additions that are too high can have negative effects on the body such as hypotension, muscle cramps, difficulty breathing, and cardiovascular problems. IDWG > 4% increases the frequency of hospitalization and IDWG exceeding 5.7% increases the mortality of patients (Wong et al., 2017). In the NKF KDOQI Guidelines (2002), it is mentioned that the weight gain inter-dialysis should not exceed 4.8% of dry weight. This is because excessive ultrafiltration can give rise to

problems in terms of hemodynamics and cardiovascular disorders (Kurniawati, 2012).

The research conducted by Istanti (2011) showed that social and family support as well as self-efficacy were related to two through to five factors that contributed to IDGW incidents. One of strategies that have been suggested to limit IDGW is behavioral interventions. This strategy was developed to improve the adherence of fluid restriction, the improvement of xerostomia and the use of lower dialysate sodium concentration (Bossola, Pepe, & Vulpio, 2018). Excessive salt consumption will increase ECF osmolality, which stimulates thirst. Behavioral interventions are applied to increase the compliance with the fluid restrictions. This behavioral intervention uses an approach to increase motivation, knowledge and understanding in order to

improve the level of obedient behavior towards fluid restrictions.

The phenomenon of reduced salivary flow or xerostomia in hemodialysis patients is caused by the atrophy and fibrosis of the salivary glands. Therefore, finding strategies to stimulate the salivary glands is a solution to improve xerostomia. The high concentration of sodium dialysate stimulates thirst in hemodialysis patients. This is because the sodium dialysate concentration reduces sodium loss. The feeling of thirst will make the patient drink excess water. In this situation, the role of the family is very important to succeed in the implementation of a behavioral intervention. The source of family support that was the most instrumental was that of a couple (husband, wife). This is because the interaction of the individual first and foremost is the nearest person, which is often a partner. The purpose of this study was to determine the relationship between the supports from the partners with the IDWG of the patients undergoing hemodialysis.

## MATERIALS AND METHODS

The study was a descriptive correlation with a cross-sectional approach. The population was all of the patients with Chronic Kidney Disease (CKD) undergoing routine hemodialysis in a private hospital in Surabaya in January 2018, which is as many as 60 people. The sampling technique was total sampling. The inclusion criteria were patients who had undergone hemodialysis > 3 months, who were undergoing regular hemodialysis 2 times a week, who had a life partner, who had a stable hemodynamic condition and who were willing to participate as respondents. The exclusion criteria were patients who passed through the hemodialysis schedule, and the patients who could not measure their own weight. The patients who passed through the hemodialysis schedule were excluded. It is because in this study, IDWG is defined as patient weight gain between two sessions of dialysis due to excess fluid / food volume. If the respondents came to the hemodialysis therapy more than two weeks after the previous schedule, then the data from the respondents might be effect the research results. We assume that the weight gain of the respondents who underwent hemodialysis every two weeks was different from that of the respondents who received hemodialysis that was more than two weeks apart. The respondents who were unable to stand on their own to measure their weight found the data collection process difficult. The samples obtained from this study totaled 42 respondents. The independent variable was support from the spouse and the dependent variable was IDWG.

This study used questionnaires to obtain the demographic and spousal support data. The Support Spouse Questionnaire was developed by Pratita (2012). This questionnaire consists of 17 questions which measure the 4 spousal support dimensions. The four dimensions of support provided by the

spouse are the emotional dimension, valuation dimension, instrumental dimension, and informational dimension. The score of the spousal support questionnaire was calculated by calculating the cumulative number of the respondents' answer scores divided by the number of question items. The test results on the reliability and validity were obtained. In the end, the spouse-focused questionnaire concluded that there was good support (>3-4), enough support (2-3), and poor support (<2). Weight scales and a self-developed observational checklist were used to measure IDWG. The researchers collected the data by themselves. The data collection procedures carried out during the two periods of hemodialysis. The first period of the data collection was done with the questionnaire respondents focused on their demographics and the spousal support data. Then their weight was measured after the completion of hemodialysis and the results were documented on the observational checklist. In the second period (scheduled with the hemodialysis respondents) of the data collection, the respondents' weight was collected before the respondents underwent hemodialysis. Because the data had a normal distribution, we used the median score to create the level of IDGW. The IDWG level was mild, moderate and heavy. SPSS 25 statistical analysis was used to determine the characteristics of the demographic data of the respondents. Since, both of the data scales were continuous and the data had a normal distribution, the Pearson Product Moment test was selected in order to determine the relationship between the independent variables and the dependent variable.

This study passed the institutional review board of Muhammadiyah University of Surabaya. The research permit was issued by the Department of Education and Research of the hospital as the chosen research setting. The whole process of submission took one and half months.

## RESULTS

The majority of the respondents in terms of gender were male (64.3%) and a small percentage were female (35.7%). The average age of the respondents was 50.74 years old with a standard deviation of 10.883. The youngest age was 27 years old and the oldest was 74 years old. Most of the respondents had a high school education (40.5%) and a small percentage was un-educated (4.8%). Most of the respondents were un-employed (45.2%) and a small percentage were private officers (4.8%) (Table 1).

Based on Table 2, The spousal support level was good for the majority (57.1%) and only 11.9% experienced less support. The majority of the respondents who underwent hemodialysis had done so for more than 12 months (90.5%) and a small portion had been undergoing hemodialysis for  $\leq$ 12 months (9.5%). The mean IDGW value was 2.89 (95% CI = 2.74-3.04) while the mean value of spousal support was 2.45 (95% CI = 2.21-2.64). The mean

Table 1. The Respondent Characteristic Distribution by Demographic Data (n=42)

Demographic Characteristics	n	%
Gender		
Male	27	64.3
Female	15	35.7
Age		
27-34 years old	3	7.1
35-42 years old	6	14.3
43-50 years old	12	28.6
51-58 years old	10	23.8
59-66 years old	9	21.4
67-75 years old	2	4.8
Education background		
Un-educated	2	4.8
Elementary School	6	14.3
Junior High School	9	21.4
Senior High School	17	40.5
Bachelor	8	19.0
Occupational		
Un-employed	19	45.2
Public Service Officer	3	7.1
Private Officer	2	4.8
Entrepreneur	13	31.0
Retired	5	11.9

value of the length of hemodialysis was 47.61 (95% CI = 43.72 - 57.09). This is based on the statistical Spearman test result with a significant p-value of 0.025 ( $\alpha \leq 0.05$ ). Thus, p is smaller than  $\alpha$  [0.025 < 0.05] so therefore there is a relationship between the support of the spouses with the Interdialytic Weight Gain (IDWG) experienced by hemodialysis patients in Hospital Al-Irsyad Surabaya.

## DISCUSSION

### Identification of the spousal support in the patients undergoing hemodialysis therapy

The results showed that 57.1% of respondents have good life partner support and only 11.9% had less. It can be said that the majority of respondents in this study are supported in an optimal way. In the patients undergoing hemodialysis, indispensable support from their spouses is evidenced because the actions of hemodialysis are done for life. These actions can cause stress and boredom for the patients otherwise. Support from their spouse can increase a patient's life in relation to adherence. Juárez-Ramírez et al (2015) also stated that a greater level of social support mainly comes from partner-related compliance. It serves to reduce the adverse effects of stress and to help in the management of the disease.

The level of support provided by the spouses of the respondents in these studies can be influenced by religious factors, as the majority of the respondents' were Muslim (95.2%). Islam teaches that in marriage (husband / wife), there must be mutual affectionate support and mutual help. There is a sense of responsibility as part of a pair where there is mutual support against any state experienced, including

accepting the condition or disease suffered by the partner, and giving in to God. This is in accordance with the hadith of the Prophet Muhammad who said that the best man is the one who is the most kind to his family.

Supportive spouses will make for a more harmonious relationship and it can also increase the happiness felt because they will give their help voluntarily and on the basis of love to cure their ailing spouse. This was also supported by Pratita (2013) who explained that in a marriage, two people as one have a mutual sense of desire, unity, interdependence, mutual service, mutual encouragement and support. Prasetyawati et al (2012) identified that spousal support may come in one of four forms: emotional, appraisal, informational, and instrumental. Emotional support given to the couples in this study is in the form of encouragement in terms of the treatment, giving them the motivation to comply with the rules of eating / drinking and giving attention to their partner. Thus the hemodialysis patients feel less alone because of the people watching them.

According to Friedemann, Newman, Buckwalter, & Montgomery (2014), support can be provided through the assessment of the positive expressions of couples, approval of the idea of support and the feeling that your partner can help with troubleshooting. Support ratings were given through the expression of praise when no medical progress was made, when overseeing the implementation of the rules of eating / drinking, and when they were either happy or angry if the respondent violated the rules related to eating / drinking as set by the doctor. Thus the respondents sought to maintain an



Table 2. IDWG Relationship with Spousal Support and the Length of Hemodialysis (n=42)

Variables	n	%	Mean	SD	Min-Max	95% CI	P
IDWG			2.89	1.472	0-6.5	2.74-3.04	
Mild	17	40.5%					
Moderate	22	52.4%					
Heavy	3	7.1%					0.025
Spouse Support			2.45	0.705	1-4	2.21-2.64	
Poor	5	11.9					
Moderate	13	31.0					
Good	24	57.1					
Length of Hemodialysis			47.61	32.70	4-126	43.72 -57.09	
≤ 12 months	4	9.5					
>12 months	38	90.5					

appropriate fluid intake because the doctor who recommended it was the one watching. Informational support refers to the guidance, advice or explanation related to how couples behave and how they try to find a way out of the problem. In this case, this is the regulation of body weight over time while on dialysis. Support is given in the form of advice given to the couples to encourage them to abide by the rules about drinking, including telling them about the consequences of excessive drinking, and informing them about all of the information passed on from the doctor or nurse to the respondent. This is so then the respondents understand the consequences if they break the rules of eating / drinking that are set.

Instrumental support is given in the form of practical and concrete help as needed. The support of this instrument is in the form of a couple who prepare their food / beverages together according to the rules set both in the home and at hospital. During the study, it can be observed that the respondents who underwent hemodialysis were facilitated in this by their life partner, such as by delivering the respondents to the hospital and even bringing in food and drinks according to the rules set by the doctor. Thus the results of the respondents support that the most couples are a form of instrumental support.

### Identification of IDWG in Hemodialysis Patients

The results showed that the lowest IDWG respondents had a result of 0%. The highest IDWG found was 33.3%. This is contrary to other research which states that weight gain between the dialysis sessions of zero ml would not be possible (Yosi Suryarini, 2010). IDWG is an increase in the volume of fluid that is manifested by an increase in body weight as the basis used to determine the amount of fluid intake during the inter-dialytic period. The patients were routinely measured in terms of weight before and after hemodialysis in order to determine the condition of the fluid in the patient's body. IDWG was calculated based on their dry weight after hemodialysis (Istanti, 2013). Weight gain due to too much fluid has become one of the prognoses of kidney failure, which affects survival time.

The greater the weight gain, the lower the level of patient safety (Kurniawati, 2012). Most of the respondents know the result of excess IDWG due to the information received from their doctors and

nurses during hemodialysis. The respondents' knowledge about the consequences of excessive IDWG can be influenced by the respondents' education, which for 17 respondents (40.5%) was that of high school level. According to Arnold (2008) and Suryarini (2010), they said that the higher the level of education of a person, the better they tend to behave. This is because education is obtained in order to lay the foundations of understanding (comprehension) and behavior in a person. During the course of HD, patients with CKD are always given good insights by the doctors or nurses to encourage them to reduce their fluid intake. This is because this will have an impact on the patient's IDWG.

When at home, the respondents receive support from their spouse in the form of emotional support, appraisal, information and instrumental assistance so then the patients can better adhere to the drinking rules that must be followed. This encourages there to be no heavy IDWG. This is in line with the research conducted by Pratita (2012) who found that married couples can persuade or seduce their partners to encourage them to comply with some of the things that have been recommended by doctors including the eating and drinking rules. The results of these studies showed that the average HD duration experienced by the respondents ranged from 43.72 months to 57.09 months. The longer the patients underwent hemodialysis therapy for, the more knowledge they acquired. This allowed them to be more positive concerning their compliance with the liquid diet that can affect their IDWG. This is in line with the results of the study by Mustikasari (2017) which states that the duration of hemodialysis (> 1 year) has an influence on knowledge, attitude and the patient's compliance with the restrictions concerning fluid intake. Each patient requires a different time period within which to improve their knowledge and attitude.

### The relationship between the support of their spouses with IDWG in hemodialysis patients in Hospital Al-Irsyad Surabaya

The relationship between IDWG and spousal support in the Hemodialysis Unit produced a p-value of significance of 0.025 with  $\alpha \leq 0.05$ . The obtained p is smaller than  $\alpha$  [0.025 < 0.05], thus supporting the hypothesis maintained by the researchers that there is a relationship between the support of the spouses

and IDWG in hemodialysis patients in Hospital Al-Irsyad Surabaya. The longest period of time in terms of the respondents undergoing hemodialysis was 126 months while the shortest was 4 months. According to the investigators, the longer that the patients undergo hemodialysis for and the more that the patients are obedient in terms of undergoing hemodialysis, the more that they increasingly recognize their own bodies when it feels uncomfortable. Istanti (2011) states that one of the causes of weight gain is fluid intake. The respondents initially did not know about the causes of IDWG and this condition might have an impact due to their lack of knowledge.

The lack of knowledge of the respondent was caused by only a small proportion of respondents having a college-level education (8 respondents; 19%). The remaining respondents' education level was below that. This is in line with the research results by Suryarinilsih (2010) which state that the higher a person's education level, the better their level of knowledge when it comes to seeking treatment and care.

The analysis in this study showed that most of the respondents were aged 43-50 years old, totaling 12 respondents (28.6%). The age of the respondents is among those who are still very eager to seek treatment to improve their health. Age could also affect the compliance of the respondents when conducting hemodialysis and refer to keeping the weight gain between dialysis sessions at a level that is not too heavy. Based on these results, the majority of the respondents have the support of a life partner (24 respondents; 57.1%). Delianty (2015) states that support from their life partner is the effort made by the married couple mentally, physically, and socially.

According to researchers, the spouse as well as those closest to the respondents serve as a support system for their partner. They noticed that the people who are supportive are always ready to provide assistance if needed, either in the form of thoughts when making the decision to undergo hemodialysis or providing the motivation to want to comply with the drinking rules that must be followed for the convenience of their partner. This is in line with the research conducted by Pratita (2012) showing that spousal support can improve patient compliance in terms of the therapy offered for chronic diseases, which in this case is hemodialysis and problems. Spousal support during the hemodialysis process is essential in order to maintain and improve the quality of life of the patient partner as well as to reduce the risk of health problems such as hypotension, muscle cramps, shortness of breath, and cardiovascular problems.

## CONCLUSION

There is a significant relationship between the support given by the spouse and IDWG in hemodialysis patients. Good partner support reduces the IDWG in hemodialysis patients. Therefore,

determining the level of family support, especially that given by the partner of the IDWG hemodialysis patients, will positively support a better level of IDWG. This prevents them from experiencing the potential negative side effects of IDWG such as hypotension, muscle cramps, shortness of breath, and cardiovascular problems. For further research to be referenced and developed in relation to conducting further research, it should be focused on the factors that affect the support of the spouses given to the patients on hemodialysis.

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Original Research

## Analysis of the Sociodemographic and Psychological Factors of the Family Caregivers' Self-Management Capabilities for Type 2 Diabetes Mellitus

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### ABSTRACT

**Introduction:** The successful management of Type 2 diabetes mellitus is determined by the role of the family in self-management as a family caregiver. Many factors influence the capability of the family caregivers to carry out diabetes self-management. The purpose of this study was to analyze the factors that influence the family caregiver capability of performing diabetes self-management in people with Type 2 diabetes mellitus.

**Methods:** The study design was an analytical observation using a cross-sectional approach. The sample was 220 family caregivers of people with Type 2 diabetes mellitus in Jember Regency, East Java Province, Indonesia. The multistage random sampling technique was used as the sampling technique. The research instrument was a questionnaire. The questionnaires used in this study were the Diabetes Management Self Efficacy Scale, the Spoken Knowledge in Low Literacy Patients with Diabetes Questionnaire, the Motives for Caregiving Scale, the Spirituality Index of Well-Being, the Sense of Coherence Scale, the Coping Scale, the Hensarling Diabetes Family Support Scale, and the Family Caregiver's Perception of the Role of the Nurse Questionnaire. The data analysis was performed using the Pearson correlation test, the Spearman rank test, and the multiple linear regression test.

**Results:** The results of the Pearson correlation test and Spearman rank test showed that the sociodemographic factors associated with diabetes self management were age ( $p=0.000$ ), gender ( $p=0.016$ ), education ( $p=0.000$ ), income ( $p=0.000$ ), and kinship ( $p=0.000$ ). The psychosocial factors associated with diabetes self management were diabetes knowledge ( $p=0.000$ ), motivation ( $p=0.000$ ), coping skills ( $p=0.000$ ), spirituality ( $p=0.000$ ), family coherence ( $p=0.000$ ), family support ( $p=0.000$ ) and the role of the nurses ( $p=0.000$ ). The multiple linear regression test showed that the factors associated with diabetes self management were diabetes knowledge ( $\beta=0.047$ ), motivation ( $\beta=0.094$ ), coping ( $\beta=0.188$ ), spirituality ( $\beta=-0.082$ ), family coherence ( $\beta=-0.043$ ), family support ( $\beta=0.296$ ) and the role of the nurses ( $\beta=0.512$ ).

**Conclusion:** Efforts to increase the family caregiver's capabilities in terms of diabetes self-management should pay attention to the socio-demographic and psychosocial factors to prevent complications and to improve the health status, and quality of life of people with Type 2 diabetes mellitus.

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### INTRODUCTION

Type 2 diabetes mellitus is a chronic disease that cannot be cured. It requires proper medical

management, ongoing self-management, and collaboration between the diabetic individual, their family and any associated health workers. This is because the family plays an essential role in the

successful management of Type 2 diabetes mellitus (World Health Organization [WHO], 2016). The successful management of Type 2 diabetes mellitus is determined by the role of the family in self-management as a family caregiver can help the person with diabetes to manage the disease (Pierce & Lutz, 2012). This is by helping them to carry out a series of diabetes self-management actions (Powers et al., 2015). However, not all families can play a role as a family caregiver. As a result, this can lead to failure in diabetes self-management (World Health Organization [WHO], 2016). The majority of families (53.33%) were unable to carry out their role as family caregivers related to caring for the Type 2 diabetes mellitus patients (Putri, Yeni, & Handayani, 2013). Other studies showed that the family caregivers who care for people with diabetes have health problems themselves or physical and psychological disorders. This has the impact of them having a decreased ability to carry out the health task of caring for people with diabetes (Badriah, Wiarsih, & Permatasari, 2017). Furthermore, the failure of a family caregiver in terms of diabetes self management has an impact on their health status. It also increases the complications of people with diabetes (International Diabetes Federation [IDF], 2017). The problem also can increase the care needed in the health care institutions which has an impact in terms of increasing the health cost (World Health Organization [WHO], 2016), decreasing quality of life, reducing life expectancy and increasing the mortality rate (International Diabetes Federation [IDF], 2017).

Diabetes is an incurable disease. It requires continuous care in the long term that can deplete the family's economic resources and disrupt the roles, functions, and regulations in the family. Diabetes also has a negative impact on the other family members in the form of physical and psychological disorders, social disruption and disturbances in the economic stability of the family. These all impact on their capability to carrying out caring actions related to the disease (Pierce & Lutz, 2012). Families can participate in diabetes self-management to prevent the negative effects of the disease (World Health Organization [WHO], 2018). They can also provide emotional support to the people with diabetes, help them to develop healthy behaviors and promote diabetes self management. This can improve their blood sugar control, reduce the complications of the disease and improve the quality of life of diabetics (Hu et al., 2014; Matrook et al., 2018). Therefore, it is essential for the health care provider to understand the critical role of the family in managing the disease and to seek to improve the family's capability of managing the disease independently.

Several studies have shown that many factors can affect the capability of the family caregivers in terms of self-management. Sociodemographic factors including age, sex, marital status, socioeconomic status, ethnicity, and kinship can influence how a person conducts independent management of the disease (Friedman, Bowden, & Jones, 2010; Pierce &

Lutz, 2012). In addition, several studies show that a person's psychosocial condition such as their knowledge, motivation, coping, family coherence, and aspects of religiosity can also affect how a person should behave in relation to managing the disease of their family members (Antonovsky & Sourani, 1988; Friedman, Bowden & Jones, 2010; Pierce & Lutz, 2012; Rabinowitz et al., 2009; Sakanashi & Fujita, 2017).

The family caregiver perception factors related to the resources that can be used in efforts to care and support the health services will also determine the ability of the family caregiver to carry out the caregiving role (Friedman, Bowden, & Jones, 2010; Grant & Ferrell, 2012; Pierce & Lutz, 2012). Understanding the interaction between the sociodemographic factors and psychosocial factors with the ability of the family caregivers to manage Type 2 diabetes mellitus can provide insights to improve diabetes management comprehensively. This step was taken to be able to provide positive results in the management of diabetes, namely increased glycemic control and reduced disease complications, and to improve the quality of life of people with Type 2 diabetes mellitus.

## MATERIALS AND METHODS

The study design was an analytical observation with a cross-sectional approach conducted from October 28th until November 28th 2019 in 10 Public Health Centers in Jember Regency, East Java Province, Indonesia. The sample size was 220 family caregivers of Type 2 diabetic patients. This study used multistage random sampling with the following inclusion criteria: (1) spouse or adult children who have a parent with Type 2 diabetes mellitus, (2) living together with people with Type 2 diabetes mellitus, (3) the families of people with Type 2 diabetes mellitus who have been diagnosed with Type 2 diabetes mellitus within a minimum of 1 year and (4) the family has health insurance.

The variables in this study are the family caregiver's diabetes self-management capabilities as the dependent variable and the sociodemographic and psychosocial factors as the independent variables. The sociodemographic factors included age, gender, education level, income level, marital status, kinship with diabetes, diabetes duration and the complications of diabetes. The psychosocial factors included diabetes knowledge, motivation, coping skills, spirituality, family coherence, family support, and the perception of the role of the nurses. The instruments used in this study were questionnaires. All of the questionnaires were tested for validity and reliability, and all of the research variable question items have been declared to be valid and reliable.

The family caregiver diabetes self-management capabilities were measured by the Diabetes Management Self Efficacy Scale by van der Bijl et al.

(2001). This questionnaire consists of 20 items with a Likert scale of 1-5 which contains beliefs about the ability to regulate Type 2 DM type 2 diets, the regulation of physical activity of patients with Type 2 DM, the use of medication, blood sugar monitoring, and foot care. The sociodemographic factors were measured using questionnaires consisting of questions focused on age, gender, education level, income level, marital status, kinship with diabetics, and also diabetes duration and the complications experienced by people with diabetes.

The Spoken Knowledge in Low Literacy Patients with Diabetes Questionnaire by Rothman et al. (2005) was used to measure the diabetes knowledge variables. This questionnaire contains questions on the knowledge of the signs, symptoms, and management of diabetes. This questionnaire consisted of 20 question items; a correct answer was given a score of 1 while a wrong answer was given a score of 0. The range of scores was 0-20. The Motives for Caregiving Scale by Kolmer et al. (2008) was used to measure the motivation of the family caregiver when caring for patients with diabetes. This questionnaire contains the aspects of responsibilities and obligations, feeling happy, being the right person and hope. This questionnaire consists of 12 question items with a score of yes (1) and no (0). The score range was 0-12.

The Spirituality Index of Well Being by Daaleman & Frey (2004) was used to measure the aspects of family caregiver spirituality, which consists of their self-confidence in life and life schemes. This questionnaire consisted of 12 items with a Likert scale of 1-5. The score range is 12-60. The Sense of Coherence Scale by Holmefur et al. (2014) was used to measure the family caregiver perception of family coherence. The questionnaire consisted of 13 items with a Likert scale of 1-7 so the score range was 13-91. The Coping Scale by Hamby, Grych, & Banyard (2015) was used to measure the family caregiver coping skills that contained an assessment of their abilities to overcome problems. The questionnaire consisted of 13 items with a Likert scale of 1-4 so the value range was 13-52.

The Hensarling Diabetes Family Support Scale by Hensarling (2009) was used to measure the family caregiver perceptions of family support received in the form of information, an assessment and emotional and instrumental support. The questionnaire consisted of 29 items on a scale of 1-4, so the score range was 29 – 116. The perception of the family care groups of the health services was measured using a questionnaire compiled based on the concept of the role of the nurses of empowering the family (Imanigoghary et al., 2017). This questionnaire consisted of 25 question items that measured the family perceptions on the role of nurses in helping people with diabetes and their families, in the form of enabling (9 items), reinforcing (8 items), and supporting (7 items) with a Likert scale of 1-4, so the range of scores was 24-96.

The data collection in the study was carried out with the help of research assistants. Before the data collection, the researcher got informed consent for the study from each respondent. The researcher explained the purpose and benefits of the research, the procedure of conducting the research, and the risk of participating in the research. After it was explained, the researcher sought approval from each of the prospective respondents in order for them to become research respondents by signing an informed consent sheet.

The data was analyzed using both a univariate and multivariate analysis test. The baseline sociodemographic characteristics of age, diabetes duration, the complications of diabetes, and other numerical research variables were described using both mean and standard deviation (SD). The categorical data of gender, education level, income level, marital status and kinship of the diabetes patients were described using frequency and constituent ratios. The correlation tests, namely the Pearson correlation test and the Spearman rank test, were used to determine the relationship between the characteristics of the respondents with diabetes self-management. The multiple linear regression test was used to analyze the factors that influence the family caregiver's diabetes self-management capability. A 2-sided  $P < 0.05$  was considered to be statistically significant. This study passed the ethical review of the Health Research Ethics Commission of the Faculty of Nursing Universitas Airlangga and it received approval of the research protocol number 1795-KEPK.

## RESULTS

The demographic characteristics of the respondents have been presented in Table 1. The average age of the respondents in this study was 49.49 years old. The majority of the respondents were female (67.2%), married (91.4%), and had an education level of junior high school (33.8%) with a level of income under the regional minimum wage (69.8%). The average diabetes duration of illness was 48.08 months and they did not have any complications (83.6%).

The respondent characteristics based on the psychosocial factors have been presented in Table 2. The majority of respondents (63.18%) had a good knowledge of diabetes and they were highly motivated to care for their family members with diabetes (79.09%). The coping skills of the respondents were, for the majority, in the high category (61.36%) as were the aspects of spirituality (67.27%). The majority of respondents had family coherence that was in the good category (79.09%) and they received high family support from the rest of the family (74.09%). However, the respondents' perceptions of the role of the nurses in providing services was in the middle category for the majority (65.55%) and the majority of the respondents'

Table 1. Respondents' Sociodemographic Characteristics (n=220)

Variable	Mean ±SD or n (%)
<b>Age (years)</b>	49.49 ± 9.516
<b>Gender</b>	
Female	156 67.2
Male	64 27.6
<b>Level of Education</b>	
Elementary School	56 24.1
Junior High School	78 33.6
Senior High School	70 30.2
College	16 6.9
<b>Income</b>	
Under Minimum Wage	162 69.8
Above Minimum Wage	58 25.0
<b>Marital Status</b>	
Unmarried	2 0.9
Married	212 91.4
Widow/Widower	6 2.6
<b>Kinship</b>	
Children	36 15.5
Husband	53 22.8
Wife	131 56.5
<b>Diabetes Complications</b>	
No	194 83.6
Present	26 11.2
<b>Diabetes Duration (month)</b>	48.0818 ±23.6336

Table 2. Respondent Characteristics Based on the Psychosocial Factors (n = 220)

Variable	n	%	Mean ± SD (Min-Max)	Mean difference		p value
				Female	Male	
<b>Diabetes Knowledge</b>			11.6364± 2.80322 (5.00- 17.00)	11.0769 ±2.77207	13.0000± 2.39709	0.000
Poor	81	36.82				
Good	139	63.18				
<b>Motivation</b>			9.3636± 1.87377 (5.00 - 12.00)	9.0833± 1.95088	10.0469± 1.47390	0.000
Low	0	0				
Middle	46	20.91				
High	174	79.09				
<b>Coping Skills</b>			39.318± 7.02207(22.00- 50.00)	38.1731± 7.21125	42.1562± 5.66027	0.000
Low	13	5.91				
Middle	72	32.3				
High	135	61.36				
<b>Spirituality</b>			47.1500± 7.23893 (28.00-59.00)	46.0769± 7.46825	49.7656± 5.92745	0.000
Low	0					
Middle	72	32.73				
High	148	67.27				
<b>Family Coherence</b>			72.8500± 8.23348 (46.00-88.00)	71.8654± 8.66367	75.2500± 6.53683	0.002
Poor	0	0				
Fair	46	20.91				
Good	174	79.09				
<b>Family Support</b>			95.0818± 13.87526 (56.00-116.00)	93.0385± 14.73766	1.0006E2± 9.96641	0.000
Low	0	0				
Medium	57	25.91				
High	163	74.09				
<b>Role of Nurses</b>			69.4682± 8.91840 (50.00-88.00)	68.4295± 9.01906	72.0000± 8.19601	0.007
Poor	0	0				
Fair	142	65.55				
Good	78	35.45				
<b>Diabetes Self-management</b>			71.0818± 10.55460 (43.00- 90.00)	69.3782± 10.98817	75.2344± 8.09221	0.000
Poor	11	5				
Fair	106	48.18				
Good	103	46.82				

abilities in terms of managing diabetes was in the middle category (48.18%). Table 2 also shows that

there are significant differences based on gender, where the average male respondent had diabetes

Table 3. Relationship Between the Sociodemographic and Psychosocial Factors on Diabetes Self Management Capability (n=220)

Variable	Diabetes Self-Management Capability	
	r	p value
<b>Sociodemographic Factors</b>		
Age	-0.212**	0.000
Gender	0.262**	0.000
Education Level	0.453**	0.000
Income	0.207**	0.002
Marital Status	0.057	0.397
Kinship	-0.311**	0.000
Diabetes Complications	-0.024	0.724
Diabetes Duration	0.022	0.745
<b>Psychosocial Factors</b>		
Diabetes Knowledge	0.774**	0.000
Motivation	0.808**	0.000
Coping Skills	0.808**	0.000
Spirituality	0.759**	0.000
Family Coherence	0.648**	0.000
Family Support	0.817**	0.000
Role of Nurses	0.865**	0.000

\*\* Correlation is significant at the 0.01 level (2-tailed).

Table 4. Effect of the Psychosocial Factors on Diabetes Self Management Capability

Variable	Coefficient					Model reliability test	
	Non-standardized Coefficients		Standardized Coefficients	t	p	F test	
	B	SE	$\beta$			F	p
Constant	-0.912	3.774		-2.242	.809	184.360	0.000
Diabetes Knowledge	0.176	0.203	0.047	0.868	0.386		
Motivation	0.529	0.682	0.094	0.775	0.439		
Coping Skills	0.283	0.092	0.188	3.059	0.003		
Spirituality	-0.120	0.119	-0.082	-1.003	0.317		
Family Coherence	-0.055	0.056	-0.043	-0.972	0.332		
Family Support	0.225	0.079	0.296	2.846	0.005		
Role of Nurses	0.606	0.045	0.512	13.336	0.000		
Model	R	R Square	Adjusted R Square	SE of the Estimate			
I	0.927 <sup>a</sup>	0.859	0.854	4.02952			

a. Predictors: (Constant), Role of Nurses, Family Coherence, Diabetes Knowledge, Spirituality, Coping Skills, Family Support, Motivation

knowledge, motivation, coping skills, spirituality, family coherence and family support that was better than that of the female respondents.

Table 3 shows that there are three factors, namely marital status, diabetes complications and diabetes duration, that are not related to their diabetes self-management capability. All of the psychosocial factors were associated with diabetes self-management capability.

According to Table 4, it can be seen that only the coping variables, family support, and the perception of the role of the nurses partially influenced the ability of the family caregivers in terms of the diabetes self-management capability (p-value <0.05). The F test of the model had an F value = 184,360, p = 0,000 <  $\alpha$  = 0.05. This explains that the variables of knowledge, motivation, coping, spirituality, family support, and the family caregiver perceptions of the nurses jointly influenced the family caregiver's diabetes self-management capability. It can be concluded that the estimated linear regression model is feasible to use to explain the impact of the variables on the

independent management of Type 2 diabetes mellitus by the family caregivers.

## DISCUSSION

The results show that the majority of family caregivers have an ability of diabetes self-management that is in the middle category (48.18%). However, there are a small proportion of family caregivers who have diabetes self-management capabilities in the poor category (5%). This is important and it should be a concern of the health care providers. This is because the inability of the families to carry out diabetes self-management can have an impact on the behavior of diabetics, their health status and the emergence of disease complications that can trigger a decrease in quality of life and an early death (International Diabetes Federation [IDF], 2017).

The family-focused approach is likely to maximize the effectiveness of the intervention. Interventions that involve families can provide a new structure for

the family by adjusting their roles and expectations as needed to ensure optimal patient self-care (Matrook et al., 2018; Pierce & Lutz, 2012). The empowerment of the family caregivers as an effort to improve the ability of the independent management of diabetes needs to be developed as a preventive promotion effort when managing diabetes (Hu et al., 2014; International Diabetes Federation [IDF], 2017; Matrook et al., 2018).

### **The Influence of Sociodemographic Factors on Diabetes Self-management Capability**

#### **Age**

The age of the family caregivers can affect diabetes self-management capability. The results of the study, as listed in Table 1, show that the average age of the family caregivers was 49.9 years old. The role of a person as a family caregiver in the long-term care of a disease shows different levels and types of responsibility according to the age of the family caregiver (Pierce & Lutz, 2012). Age is related to the experience and skills possessed in terms of self-care. In general, an increase in age will increase the experience and skills possessed. This is one of the strong contributors to the development of skills in self-care. However, the results of the study, as shown in Table 3, also show that age has a negative relationship with diabetes self-management capability where the older a person is, the more that it will reduce their diabetes self-management capability. This is likely related to their functional and cognitive capacity where at an older age, there is a decrease in the cognitive function. This can affect their ability to perform self-care (Riegel, Jaarsma, & Strömberg, 2012).

#### **Gender**

The results of the study, as listed in Table 1, show that the majority of family caregivers were women (67.2%). This is consistent with the previous study which states that women are more likely to carry out their role as a family caregiver (Pierce & Lutz, 2012). The results of the study, as shown in Table 2, show that gender differences influence diabetes self-management capability. The average family caregiver needs to have knowledge, motivation, coping skills, spirituality, the perception of family coherence, and family support as well as the perception of the role of the nurses. In this respect, the male caregivers have higher values than the female family caregivers. There needs to be attention paid by the health care providers in terms of their health promotion efforts because, as is well known, the majority of family caregivers are women.

#### **Marital status**

The results of the study, as listed in Table 1, show that the majority of the family caregivers are married with a life partner (91.4%). The results showed that marital status did not correlate with diabetes self-management skills (Table 3). This is likely due to the fact that some of the family caregivers do not have a life partner but they still get adequate support from

their other family members. This is shown in Table 2 where the majority of the respondents (74.09%) get support from their families in the high category, meaning that they can still develop their diabetes self-management skills. However, it must still be a concern that someone who has a spouse will find it easier to get help from their family in the form of information, assessments, instruments and emotional support (Hensarling, 2009). A healthy spouse will automatically assume themselves to be the caregivers of their partner (Pierce & Lutz, 2012).

#### **Socioeconomic status**

The results of the study in Table 1 show that the majority of respondents had a junior high school education level (33.8%), with an income level below the regional minimum wage (69.8%). Health promotion efforts in the prevention of diabetes complications need to be developed on a massive scale because the inability to manage diabetes independently will have an impact on disease complications. This can cause increased health care costs (World Health Organization [WHO], 2016). Variations in socioeconomic status affect the role of the family caregiver, especially in reference to long-term care. Families from the higher socioeconomic groups show better care than those from the low socioeconomic groups (Pierce & Lutz, 2012).

#### **Kinship**

The results in Table 1 show that the majority of family caregivers who treat people with diabetes are their life partners (79.30%), especially wives (56.5%). This is consistent with the previous opinion that for patients who are adults, a spouse or adult child is their primary caregiver (Pierce & Lutz, 2012). Adult children have a filial obligation to take care of their parents (Jones, Winslow, Lee, Burns, & Zhang, 2011). However, kinship as a life partner shows a stronger relationship in care compared to other kinship relationships (Friedman, Bowden, and Jones, 2010). Kinship as a life partner involves a stronger emotional relationship than an adult children-parent relationship. Adult children who care for their parents have a double obligation, namely the filial obligation to care for their parents and the responsibilities related to taking care of their own families (wife/ husband and children). The results in Table 3 show that there is a significant relationship between kinship and diabetes self-management capability. The kinship relationship determines the caregiving process. The kinship relationship will determine the family caregiver's motivation when caring for people with Type 2 diabetes mellitus (Pierce & Lutz, 2012).

### **The Influence of Psychosocial Factors on Diabetes Self-management Capability**

The results of the study show that psychosocial factors influence the ability of the family caregivers in relation to diabetes self-management. The correlation test results in Table 3 show that diabetes knowledge, motivation, coping skills, spirituality, family



coherence, family support, and the perception of the role of the nurses have a significant effect on diabetes self-management capability. Based on the results of modeling through multiple linear regression as listed in Table 4, it can be seen that the psychosocial variables of knowledge, motivation, coping skills, spiritual aspects, family support, and the family caregiver perception of the nurses jointly affects diabetes self-management capability. Based on Table 4, it also can be seen that the R-value of 0.927 shows that there are multiple correlations (knowledge, motivation, coping, spirituality, family support, and family caregiver perceptions of nurses) with the ability to independently manage diabetes by the family caregiver.

The adjusted R Square value of 0.854 shows that the magnitude of the role or the contribution of the variables of knowledge, motivation, coping, spirituality, family support, and the family caregiver perceptions of the nurses is able to explain the variable ability of independent management in reference to Type 2 diabetics by 85.4%. The results of this study are consistent with the previous research which states that the factors of social status, psychological conditions, and social support can affect the ability of self-care and in turn, quality of life (Walker et al., 2014).

### **Diabetes Knowledge**

The results in Table 3 show that knowledge of diabetes has a significant positive relationship with diabetes self-management capability ( $r = 0.77$ ;  $p = 0.000$ ). Providing the right education needs to be done in order to improve the ability of the family caregivers in terms of their diabetes self-management capability. The results of the study in Table 2 further show that there are still family caregivers who have poor diabetes knowledge (36.8%). Some of the families show helplessness when helping the sufferers to manage and master adaptive tasks related to their health problems. This is due to the lack of information held by the family and a lack of understanding and even incorrect information given to the family about the health problems that they face. Ignorance related to the treatment process will cause excessive stress for the family caregivers, thereby reducing their motivation, influencing coping and affecting their ability to treat diabetes (Sakanashi & Fujita, 2017).

### **Motivation**

The results show that the majority of family caregivers (79.09%) have high motivation when treating their diabetic family members. The motivation owned by someone will encourage them to achieve their goals. The results of the study in Table 3 show that motivation has a significant positive relationship with diabetes self-management capability ( $r = 0.808$ ;  $p = 0.000$ ). The higher the motivation, the more that their diabetes self-management capability will increase in quality. This is due to the abilities of the family caregiver being influenced by their motivation when caring for their

sick family member. The high motivation that comes from the expectations related to the results of the care process will increase their commitment to caring for their ill family members (Friedman, Bowden & Jones, 2010).

### **Coping Skills**

The results in Table 2 show that the majority of the family caregivers have high coping skills (61.36%). The results of the study, as listed in Table 3, show that coping skills have a positive and significant relationship with diabetes self-management capability ( $r = 0.808$ ;  $p = 0.000$ ) where the better the coping skills, the better the independent management of diabetes by the family caregiver. Ineffective coping is marked by destructive behavior that can appear in the family caregiver. There is also the inability of the caregivers to manage the stressors that arise due to the limitations in their social activities and free time, violations of privacy, the disruption of the household and work routines, the demand for dual roles, a lack of social support and assistance from other family members, disruptions in their family relationships and the lack of aid from humanitarian service agencies and health professionals (Friedman, Bowden & Jones, 2010).

### **Spirituality**

The results in Table 2 show that the majority of family caregivers have a high spiritual aspect (67.27%). Table 3 shows that the spirituality aspect has a positive and significant relationship with diabetes self-management capability ( $r = 0.759$ ;  $p = 0.000$ ), where the higher the spirituality aspect, the better the independent management of diabetes by the family caregiver. The results of this study correspond to those of the previous studies which state that the spirituality aspects of the caregiver affects the general health and well-being of the caregiver overall (Rabinowitz et al., 2009). Spirituality affects the coping mechanisms used by encouraging the caregiver to be more constructive (Chang, Noonan, & Tennstedt, 1998). It also increases the commitment of the family caregivers when caring for their family members (Sakanashi & Fujita, 2017).

### **Family Coherence**

The results of the study in Table 2 show that the majority of the family caregivers have a good perception of family coherence (79.09%). There is a positive and significant relationship between family coherence and diabetes self-management capability ( $r = 0.648$ ;  $p = 0.000$ ), where the better the perception of family coherence, the better the independent management of diabetes by the family caregivers (Table 3). The results of this study are consistent with those of the previous studies which state that family coherence can help to support the positive assessment of family caregivers related to the demands of care, thus facilitating effective coping and the management of care (Jones et al., 2011). Family coherence is related to the ability of the family

members to adapt when dealing with stressful life events (Antonovsky & Sourani, 1988).

### Family Support

The results of the study, as listed in Tables 2 and 3, show that the majority of family caregivers have family support that is in the good category (74.09%). There is a positive and significant relationship between family coherence and diabetes self-management capability ( $r = 0.817$ ;  $p = 0.000$ ) where the higher the family support received, the better the independent management of diabetes by the family caregiver. The results of this study are consistent with the previous study, which states that family support will increase the empowerment of the family caregivers (Sakanashi & Fujita, 2017). Social support from other family members will reduce the negative impact and improve the positive aspects of caregiving (Jones, Winslow, et al., 2011). A lack of social support and assistance from other family members will reduce the resources of the family caregiver in turn (Friedman, Bowden, & Jones, 2010).

### Role of Nurses

The results of the study, as listed in Table 3, show that the majority of family caregivers have a strong perception related to the role of the nurses (65.55%). This is not something extraordinary. It should be a common concern to ensure that the family caregiver's perception of the role that has been performed by the nurses in helping to treat people with diabetes is in the quite good category. More serious efforts are needed to increase the role of the practitioners in managing diabetes. There is a positive and significant relationship between family coherence and diabetes self-management capability ( $r = 0.648$ ;  $p = 0.000$ ) as listed in Table 3. The better the perception of the role of the nurses, the better the independent management of diabetes by the family caregiver. Support from health professionals has been proven to prevent the depression symptoms that appear in the family caregivers. The social support of the caregivers has a positive effect in the form of feelings of satisfaction, love, and pride (Imanigoghary et al., 2017). The majority of respondents in this study believe that caregiving makes them stronger, more patient, more appreciative of the time spent with their family and less judgmental of others. The results showed that the role of the nurses in providing support to the caregivers was through providing advocacy education. Advocacy is needed to improve the service support of the family caregivers through family education and through the preparation of the skills required by the caregivers (Grant & Ferrell, 2012).

### CONCLUSION

The results showed that the demographic and psychosocial factors together influence diabetes self-management capability. Sociodemographic factors such as age, gender, socioeconomic status, and kinship relations have a positive relationship with the

ability of the family caregivers in the independent management of Type 2 diabetes mellitus. There are also psychosocial factors such as knowledge, motivation, coping skills, spirituality, family support, and the perceptions of the family caregivers of the nurses. These together affect diabetes self-management capability. This study indicates that health care providers, in the promotion and prevention of Type 2 diabetes mellitus, should understand the interaction between the demographic factors, knowledge, the environment, and other diabetes-related factors. Paying attention to the sociodemographic and psychosocial factors can provide insights to improve glycemic control and health status, to prevent complications and premature death, and also to improve the quality of life of people with Type 2 diabetes mellitus. Further research is needed with a qualitative research design in order to explore the family caregivers when they are carrying out the independent management of diabetes. Further research in the form of experimental research by way of empowerment interventions evaluating the psychosocial factors should be done to prove the effectiveness of the involved factors concerning the ability of independent management of Type 2 diabetes mellitus.

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Original Research

## Comparison between the QRMA Measurement with the Anamnesis and the Capillary Blood Glucose Test

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### ABSTRACT

**Introduction:** The examination of patients with diabetes mellitus (DM) can be done by reviewing their complaints and through a capillary blood glucose level test to determine the value of their Random Blood Glucose Level. QRMA (Quantum Resonance Magnetic Analyzer) is claimed to be able to check the patient's bodily condition (including blood glucose) with an accuracy of 85%. The purpose of this study was to verify the validity of the QRMA tool and its accuracy by comparing the results of the anamnesis and the examination conducted using the capillary blood glucose test method.

**Methods:** The research method used was a cross-sectional design. The total sample consisted of 44 respondents in the working area of the Community Health Centers in Yogyakarta with the risk factor being blood sugar level instability. The sampling technique used was purposive sampling. The main variable in this study was the value of the blood sugar level measured based on the coefficient value of the QRMA tool and the value of Random Blood Glucose obtained through the capillary blood glucose test.

**Results:** The blood glucose value was not correlated significantly with the coefficient value of QRMA. The value of blood glucose when examined alongside the result of the respondent's anamnesis showed there to be a significant difference. The value of the QRMA coefficient when examined against the results from the history of the respondents showed no significant difference. Linear regression showed that the variables of height, body weight, and IMT had a correlation with the QRMA coefficient value.

**Conclusion:** The QRMA tool was not able to provide a picture of the actual condition of the blood glucose level of the respondents when compared with the results of the anamnesis and the blood glucose value from the capillary blood glucose test. Non-invasive health measurement devices such as QRMA are not used by nurses as a standard for determining the health status of DM patients.

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### INTRODUCTION

One of the diseases that pose a global health threat is diabetes mellitus (DM). Diabetes mellitus is a metabolic disease due to pancreatic beta-cell damage or a glucose uptake in the peripheral tissue due to insulin ineffectiveness (Type-2 DM) or a lack of absolute insulin (Type-1 DM) (Tjokroprawiro, 2007). The diagnosis of diabetes mellitus is determined according to the tools used, which currently varies. One of the non-invasive diagnostic tools available is QRMA which can display the coefficient value of the

blood sugar level taken. This has not been scientifically tested.

The number of DM patients in the world has increased from 346 million in 2004. It is estimated to have increased by 4.4% in 2030 (My & Obese, 2004). Data from the Central Bureau of Statistics (Badan Pusat Statistik/BPS in Indonesia) stated that DM patients in Indonesia in 2003 totaled 13.7 million and that this figure is estimated to reach 20.1 million people in 2030 (Rantung, Yetti, & Herawati, 2015). Risesdas data (2018) states that 2% of Indonesia's population suffers from diabetes mellitus based on

the doctor's diagnosis at an age >15 years in the period 2013 – 2018 (Kemenkes RI, 2018).

Blood glucose monitoring is important in order to control and prevent complications ("WHO guidelines on drawing blood: best practices in phlebotomy," n.d.). Early detection can be done through screening by checking the blood glucose level using a capillary blood glucose test (Handelsman et al., 2015).

The Random Blood Glucose test is often performed on DM patients through an invasive capillary blood glucose test method focused on the fingertips. Based on the tool manual, it is written that the non-invasive QRMA inspection tool can display the results of the glucose coefficient in the blood. It is believed to have an accuracy level of 85%. The results of the measurement done with the QRMA tool cannot be trusted because there is no scientific basis for it. Up until now, no scientific studies have been published stating that this tool is equivalent to the capillary blood glucose test method.

Therefore, the validity of the measurement of the blood glucose level using the QRMA tool should be confirmed by comparing it with the capillary blood glucose test. The comparison of these measurements is expected to provide scientific evidence related to the accuracy of the QRMA tool. Based on the above description, the purpose of this study is to determine the validity of the results produced by the QRMA tool when compared with the results of the anamnesis (when the patient has been diagnosed with DM by a doctor before) and the resulting blood glucose.

**MATERIALS AND METHODS**

This research study used a cross-sectional design. This study used both correlational and comparative tests in order to determine the validity of the QRMA tool. The Spearman Rank correlation test was used in order see if there were any changes in the coefficient value of the QRMA test when compared with the blood glucose value. The Mann-Whitney comparative test was used to compare the mean coefficient values of the QRMA tool and blood glucose with the results of the anamnesis. The testing of the normality of the numerical data was done using the Shapiro Wilk test (Table 2).

This research study was carried out in the working area of the Community Health Centers in Yogyakarta in September 2017. The sample in this study consisted of the residents in the working area of the Community Health Centers in Ngemplak II, Depok, Sleman, Yogyakarta. They all had risk factors associated with blood sugar level instability. The sampling technique used was purposive sampling (Figure 1). The main variable of this study was the coefficient of the blood glucose measured using the QRMA tool and the blood glucose value from the capillary blood glucose test method (mg/dl). The confounding variables in this study were gender, age, height, weight, and Body Mass Index (BMI).

QRMA (Figure 2) is a non-invasive medical examination tool that functions to analyze the health

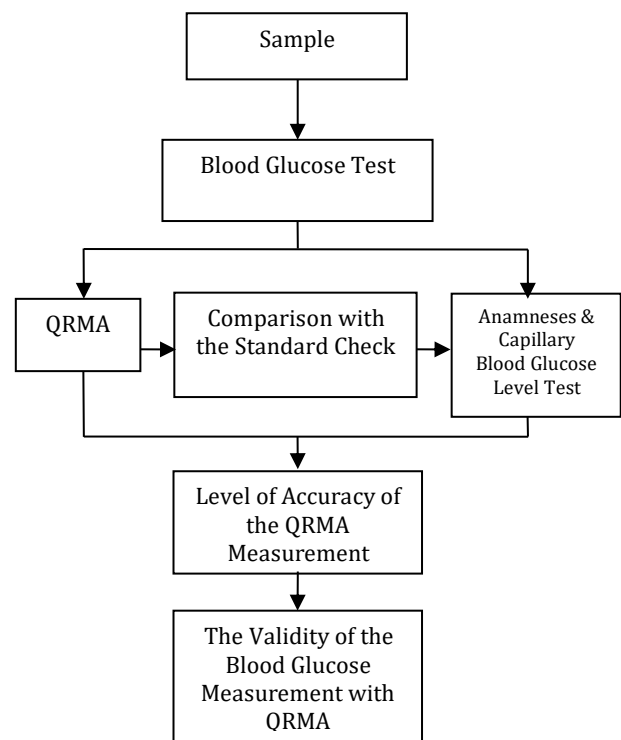


Figure 1. Research Framework

of the internal organs by collecting the body's energy frequency using a magnetic field sensor through a hand grip and electrode sensor. The QRMA tool used in this research was DM-916-C with application version 4.6.0. The use of QRMA began by entering the data for birth time, age, height and weight. The data obtained from the sensor was compared to the health information in the database. This tool takes 1 minute to use with a claimed accuracy of 85%. QRMA will show the blood glucose level and other conditions of the body as well as general advice as a precautionary measure (Figure 3).

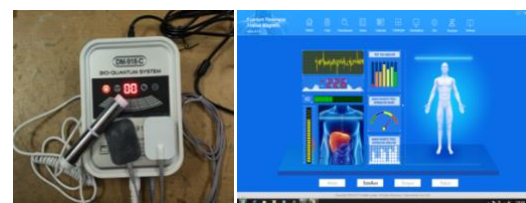


Figure 2. Display tools and screens from QRMA



Figure 3. Display of the QRMA analysis results related to blood sugar level

Table 1. Distribution of Sex and the Results of the Respondent's Anamnesis, 2017 (n = 44)

Characteristics	f	%
Sex		
Female	33	75.0
Male	11	25.0
Anamnesis		
No	40	90.9
Yes	4	9.1

Table 2. Distribution of the Age, Height, Weight, BMI, Blood Glucose and QRMA Coefficients, 2017 (n =44)

Variables	Min	Max	Mean	SD	CI 95%		S-W Normality Test
					Lower	Upper	
Age	18	76	45.34	13.54	41.22	49.46	0.285
Height	145	171	155.09	6.38	153.15	157.03	0.001
Weight	40	90	56.80	10.70	53.54	60.05	0.000
BMI	17.30	35.56	23.59	4.09	22.36	24.85	0.000
Blood Glucose	53	390	127.82	57.29	110.40	145.24	0.000
QRMA Coefficient	2.16	7.17	4.91	1.79	4.36	5.45	0.002

Description: Height in Centimeters; Weight in Kilograms; BMI: Body Mass Index; Random Blood Glucose Level in mg /dl; QRMA Coefficient: Quantum Resonance Magnetic Analyzer Coefficient

Table 3. Correlation between Age, Height, Weight and BMI with Blood Glucose and the QRMA Coefficient, 2017 (n = 44)

Variables	Blood Glucose Level	QRMA Coefficient
Age	0.194 (0.200)	0.645 (0.071)
Height	0.478 (-0.110)	0.875 (-0.024)
Weight	0.803 (-0.039)	0.838 (-0.032)
BMI	0.989 (-0.002)	0.803 (-0.039)
Blood Glucose	-	0.316 (-0.155)

Description: P-Value & (r Value) from Spearman Rank Test; Random Blood Glucose Level in mg /dl

Table 4. Test of the Differences in the Blood Glucose and Coefficient QRMA values with the Results of the Anamnesis, 2017 (n = 44)

Variables	Mean	SD	Mean Difference	SE Mean	CI 95%		P-value*
					Lower	Upper	
Blood Glucose							
Yes	264.25	85.877	150.075	42.939	110.323	189.827	0.000
No	114.18	30.857		4.879			
QRMA Coefficient							
Yes	4.531	1.067	0.413	0.534	2.334	1.508	0.768
No	4.944	1.861		0.294			

Description : \*) Mann-Whitney Test

The capillary blood glucose test was chosen because this measurement is a reference for DM patients in the community. Capillary blood glucose testing methods include invasive devices consisting of strips, batteries and a monitor as the main tools used to show the results of the measurements (Niwinski, 2009). The capillary blood test can be performed on the little finger, ring finger or middle finger (Muktabhant et al., 2012). The tool used in this research was an easy touch GCU. Immediate capillary blood glucose measurements were performed after the examination with QRMA. To avoid bias related to the limitations of the tool, the researchers ensured that the tool was a new product and that it worked well. The coefficient value of the blood sugar level from both the QRMA tool and the capillary glucose test were listed on the researcher's note sheet.

## RESULTS

Table 1 shows that the most common sex for the respondents was female (75.0%). A small proportion were confirmed to have diabetes mellitus (9.1%).

Table 2 shows that the mean age of the respondents was 13.54 ± 13.54 years old (range 18-76 years old). The mean value for respondent height was 155.09 ± 6.38 centimeters (range 145-171 centimeters). The average value of the respondent's weight was 56.80 ± 10.70 kilograms (range 40-90 kilograms). The mean value for the respondent's BMI was 23.59 ± 4.09 (range 17.0-35.56). The mean blood glucose value for the respondents was 127.82 ± 57.29 mg/dl (range 53-390 mg/dl). The mean value of the QRMA coefficient of the respondents was 4.91 ± 1.79 (range 2.15 ± 7.17). The normality test results showed that only age was normally

distributed (p value  $0.285 > 0.05$ ). The other variables were abnormal (range p value  $0.000-0.002 < 0.05$ ).

Table 3 shows that age (p-value 0.645), height (p-value 0.875), body weight (p-value 0.838), BMI (p-value 0.803), and blood glucose (p-value 0.316) does not have a significant correlation ( $>0.05$ ) with the QRMA coefficient value. Similarly, the variables of age (p-value 0.194), body height (p-value 0.803), and BMI (p-value 0.989) showed no significant correlation with blood glucose.

Table 4 shows that there was a significant difference between the blood glucose values compared with the respondents' anamnesis (p-value  $0.000 < 0.05$ ). In contrast to the value of the QRMA coefficient, there was no significant difference when it was compared with the results of the respondent's anamnesis (p-value  $0.768 > 0.05$ ). The mean value of blood glucose in the respondents who had a blood glucose problem was  $264.25 \pm 85,877$ . This is higher than in the respondents who had no blood glucose problem ( $114.18 \pm 30,857$ ). The mean value of the QRMA coefficient in the respondents who had a blood glucose problem was  $4,531 \pm 1,067$ , which is lower than that of those who did not have a blood glucose problem at  $4,944 \pm 1.861$ .

Table 5 shows the results of the multivariate test and the linear regression of sex, age, height, weight, blood glucose, BMI, and the result of the anamnesis with the QRMA coefficient value. The variables with a p value under the alpha value of 0.05 must be removed. In the first stage, the age variable (p-value 0.694) issued. In the second stage, the anamnesis variable (p-value 0.470) was issued. The third stage was where the blood glucose variable (p-value 0.440) was issued. The fourth stage had the gender variables (p-value 0.124) issued. In the fifth stage, the remaining variables of height (p-value 0.044), body weight (p-value 0.040), and BMI (p-value 0.039) had p-values  $< 0.05$ , so no more variables were issued.

## DISCUSSION

The blood glucose value of the respondents did not correlate significantly with the QRMA coefficient value. The change (increase or decrease) in the respondent's blood glucose value does not follow the same change as the QRMA coefficient value. In the manual, it was described that QRMA does not diagnose disease. It only analyzes the condition of the body based on electromagnetic waves. It is not in direct contact with the blood. The data from the QRMA tool is analyzed related to blood glucose and the results are shown in the form of three coefficient values, namely insulin secretion, blood glucose, and glucose in the urine (Figure 3).

In this study, the value used was the coefficient of blood glucose. The normal value range of the blood glucose coefficient via the QRMA device is 2,163-7,321. A coefficient value  $> 7321$  is considered to show an increase in blood glucose and vice versa, a coefficient  $< 2.163$  is considered to show a decrease

in blood glucose. There was no mention of the usage of frequency (Hz) and wavelength (Cm). In comparison, there are studies on recording electromagnetic wave radiation focused on objects ingested in the human digestive tract done by (Chirwa, Hammond, Member, Roy, & Cumming, 2003). The study describes the frequency of the wave used as being 150 MHz and 1.2 GHz. This is in contrast to the QRMA tool that came with no detailed explanation of the type and mechanism of how electromagnetic waves work in the QRMA tool either in the form of manuals or in published scientific references.

The coefficient value of the measurement of blood glucose level using electromagnetic waves through the QRMA tool has not been explained. There are various types of electromagnetic wave. They are often used to help establish medical diagnoses in the world of health in the form of X-rays (A. Radiasi, Bidang, Untuk, Masyarakat, & Nuklir-batan, 2008).

The use of electromagnetic waves is also in the form of CT-Scans and Linac therapy.

The use of electromagnetic waves in humans will result in radiation. The absorption rate depends on frequency, wavelength, the electromagnetic field polarization, body spacing compared to the wave source and the electrical properties of the body (P. Radiasi, Elektromagnetik, & Swamardika, 2009). Complaints resulting from the use of this technology include chronic fatigue, headache, and ringing ears (Kurniawan & Wahyuni, 2008). Damage to the human body due to electromagnetic waves is due to changes in the balance of free radicals in the biological system (Victorya, 2015).

### The Comparison of the QRMA Coefficient and Blood Glucose Values with The Results of The Anamnesis

The comparison between the QRMA coefficient value and the results of the respondent's anamnesis showed there to be no significant difference. This means that the blood glucose problem complained of by the respondents does not match the value of the coefficient from the QRMA. This can be seen from the average value of the lower QRMA coefficients in the respondents who made a high blood glucose complaint. The assessment of the DM patients can be done through interviews related to the trigger factors, signs and symptoms complained of by the respondents (American Diabetes Association, 2014).

The results of the comparison between the blood glucose value with the anamnesis of the respondents showed there to be a significant difference. This means that the changes in blood glucose value are in accordance with the complaints of the respondents related to their blood glucose problems. This can be seen from the average value of the blood glucose being higher in the respondents with blood glucose problems.

The examination of the blood glucose level was done through testing the capillary blood plasma per

mg / dl unit in accordance with the results of the anamnesis of the client (Rajaratnam & Pathmanathan, 2011; Hillet al., 2011). This indicates that the early detection of DM can be done through an examination of the blood glucose level via the capillary blood test method (Schifman et al., 2014; Handelsman et al., 2015). The results of the study by (Price, Leary, & Myburgh, 2005) focused on intensive care clients. The study found that there were statistical similarities between the capillary blood glucose measurements and those from venous blood.

The capillary blood test method is the act of checking or screening for the level of a certain substance in the blood. The accuracy of results is up to 97% (Kotwal & Pandit, 2012). Various factors can influence the results of the blood glucose measurements including operator technique, environmental exposure and client factors such as treatment, oxygen therapy, anemia, hypotension, and other disease states (Tonyushkina & Nichols, 2009). The capillary blood glucose measurement when performed by the client independently is likely to involve a faulty blood sampling procedure resulting in an incorrect data result (Mazze et al., 1994; Montagnana et al., 2009).

The results of the study by Muktabhant et al. (2012) found that the examination of blood glucose and fasting blood glucose through the capillary blood glucose test method still has low sensitivity. Blood glucose measurements using capillary blood samples have been studied by Boyd, Leigh, & Stuart (2005). They found that there was a small but significant difference between the measurement of capillary blood glucose level and that of venous blood. Similar results were found by Critchell et al. (2007) who stated that the capillary blood glucose level measured through the fingerstick method was not accurate when assessing clients in critical Intensive Care Units (ICUs). The results did not meet the Clinical and Laboratory Standards Institute (CLSI).

Blood glucose examination results from venous blood samples have thus become the most accurate reference available (Holmer, Ogden, Burda, & Norris, 2013). The measurement of the capillary blood glucose level can be attempted near to where the results of a venous blood sample examination were drawn by warming the hands of the clients before the examination (Hospital, 1992). This is possible because of the effect of arterial vasodilation on the hands of the client.

The examination of blood glucose levels performed in a non-invasive manner is still being developed. The results of a pilot study by Larin, Eledrisi, Motamedi, & Esenaliev, (2002) suggest that there is a significant correlation between changes in the non-invasive Optical Coherence Tomography (OCT) signals with the concentration of blood glucose during the trial.

### **Variables of Height, Weight and BMI are The Determinants of QRMA Coefficient**

The results of the multivariate linear regression test showed that the variables of height, weight, and BMI have a correlation with the QRMA coefficient value (Table 5). This means that the three variables are the determinants, while blood glucose level and the results of the anamnesis are not in accordance with the value of the coefficient for QRMA.

This proves that DM is a metabolic disease that is hereditary, characterized by hyperglycemia and glycosuria and accompanied by or where there is the absence of acute or chronic clinical symptoms (C. P. Guideline, n.d.). DM as a result of a lack of effective insulin in the body is a primary disorder that lies in the metabolism of carbohydrates that is usually accompanied by disorders related to fat and protein metabolism (H. C. Guideline, 2014). The fat and protein conditions were estimated from the ratio of height, weight, and BMI.

Blood glucose levels are found to be influenced by both endogenous and exogenous factors (Tirimacco et al., 2010). The endogenous factors refer to the hormonal factors such as insulin, glucagon, cortisol and the receptor system in the muscle and liver cells. The exogenous factors include the type and amount of food consumed and the level of physical activity performed.

### **CONCLUSION**

The limitation in this study was that it did not measure the last time that the respondents had a meal. This meal has an impact on the respondent's blood glucose level.

The QRMA tool does not provide an accurate picture of the blood glucose levels of the respondents compared with the results of anamnesis and the blood glucose values determined through the capillary blood glucose test. The change in the respondent's blood glucose value did not follow the same change in the QRMA coefficient value. The problem of blood glucose complained of by the respondents did not match the value of the QRMA coefficient. The variables of height, weight and BMI are the determinants of QRMA.

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## **EDITORIALS: IMPROVING RESILIENCE AND NURSE CARING BEHAVIOR**

Nurses encounter many risk factors in their work life and have to provide professional care for and relieve the patients under unpleasant conditions in any case in the same time. A number of adverse events or antecedents can pose a significant threat to the wellbeing of nursing staff, such as workplace violence, fatigue, lack of resources, intimidation at work, and lack of capacity that can affect service to patients (Cusack et al., 2016). These situation leads to abroad arrays of occupational stress which is happened in daily life. When stressors exceed nurse's coping skills, their functional capacity becomes impaired. A study in a teaching hospital in Surabaya in July 2017 found that nurses showed symptoms of stress characterized by frequent sleep disturbances (40%), loss of concentration and thinking small things were too detailed (40%), irritable and tension when interacting with other health workers (70%) (Dewi, Hargono, & Rusdi, 2019). Several methods were implemented to improve coping of nurses but not their resilience (ICN, 2016). Arguably, resilience skills are needed by nurses to provide a better care to patients and their family. Resilience is a term that we are hearing a lot lately. There is no single definition of resilience approved by experts. However, a common theme in various definition of resilience is strength, ability to overcoming challenging obstacles and bounce back from adversities (Çam, 2017). In this editorial, we discuss ways of engaging the nurses to resilience skill in order to improve their caring behaviour.

Resilience is the result of the accumulation of various factors and characteristics possessed by individuals, namely personality traits, protective factors, and experiences collected through life in the process and / or developing as a result. These internal and external factors can predispose to "protect" or put individuals "at risk" that cause resilience or maladaptation (Garcia-Dia, DiNapoli, Garcia-Ona, Jakubowski, & O'Flaherty, 2013).

Subsequently, there are 2 concepts in the organization that can emerge simultaneously in building nurse resilience, namely support and development. Support is defined as an intervention in the workplace that directs and provides opportunities for nurses to withstand the pressures at work. Development is defined as an intervention in the workplace that empowers nurses to enhance their professional, practice and personal potential. Furthermore, in each organizational concept there are three domains i.e personal, practice and professional. The personal domain covers the welfare of individual nurses. The practice domain consists of skills, abilities, and special competencies from the profession. The professional domain is about the service ideal which includes lifelong learning and adherence to ethical behavior patients (Cusack et al., 2016; Hsieh, Hung, Wang, Ma, & Chang, 2016).

In addition, three conditions that affect caring namely matters relating to patients, nurses themselves and the organization (hospital) (Tonges & Ray, 2011). The organizational factors highlighted are leadership, compensation and reward and professional relations. This component will build a healthy work environment that supports the ability and commitment of nurses displaying caring behavior.

As widely known that patients in the hospital need a care where nurse have to provide comprehensively in terms of bio-psycho-social-spiritual care. Furthermore, caring is not only a set of attitudes that can be identified such as sympathy or support, nor does it consist of all activities undertaken by nurses (Warelow & Edward, 2007). Professional nursing care is determined by the way a nurse can use knowledge and skills to value client uniqueness and be physically and emotionally and require resilience within the nurse (Warelow & Edward, 2007). Resilient nurses are able to display professional nursing care, in this case is caring behavior. Nurse resilience is a

nurse's ability to positively adapt to adversity, and can be applied to build personal strengths of nurses through several strategies namely building positive professional relationships, maintaining positivity, developing emotional insight, achieving life balance and spirituality, and becoming more reflective (Jackson, Firtko, & Edenborough, 2007). It can be concluded that resilient nurse will be able to help patients in any situation with nurse's professional manner.

Several studies have been carried out to develop nurse resilience potential, namely through Stress Control Workshops and Resilience Development Interventions (Pipe et al., 2012), A Work-Based Educational Intervention (McDonald, Jackson, Wilkes, & Vickers, 2012), Mindfulness-Based Stress Reduction Intervention (MBSRI) (Foureur, Besley, Burton, Yu, & Crisp, 2013), Multimodal Resilience Training Program (Mealer, Conrad, Evans, Jooste, Solyntjes, Rothbaum, et al., 2014), Mindful Self-Care and Resilience Intervention (MSCR) (Craigie et al., 2016), and Stress Management and Resiliency Training (SMART) (Chesak et al., 2015), A Pilot Integrative Coping and Resiliency Program (Tarantino, Earley, Audia, D'Adamo, & Berman, 2013), Aware Compassionate Communication: An Experiential Provider Training Series (ACCEPTS) (Gerhart et al., 2016). The latest model was developed by author using a Model of Resilience for Caring Enhancement (MORE CARE) and focused for ICU Nurses (Dewi, Nursalam, & Hargono, 2019). However the result is still inconsistent and influenced by various factors.

In general, strategies for building or developing resilience include a) building good relationships in teams; b) provide education and training to develop behaviors that help control or limit the intensity of stress, or help recovery; and c) help in processing emotions and learning from experience. Although individuals must be responsible for developing personal strategies to help coping and resilience, organizational support is an integral part of equipping individuals to face work related challenges (Adams, 2015). Resilient nurses have greater potential to be able to provide professional (caring) nursing services. In accordance with the resilience process (Lietz, Julien-Chinn, Geiger, & Hayes Piel, 2016) individuals reach the stage of resilience fully when able to provide assistance to others (helping others).

From the various explanations above, it can be highlighted that nurse resilience influences caring behavior in general. The concept of resilience is very important in the field of care because resilience plays an important role in nursing longevity and retention. Nursing leaders should be knowing how resilience can be applied to nurses and how to improve and maintain this concept in other fields (Turner, 2014). Therefore, it is very important to build and strengthen resilience of nurses in a stressful work environment in daily basis.

This editorial has touched briefly on the method of resilience capacity improvement and how this may mitigate the impact of work place stress on nurses by involving nurse as individual and organisation as where nurse have support.

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