

Theory of Planned Behavior and Health Belief Model on Factors Associated with Breast Self Examination among University Students

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ABSTRACT

Background: The new cases of breast cancer worldwide are estimated at 1,384,155 with almost 459,000 related deaths. A common problem for breast cancer treatment is patients who often come to a health care provider when they are in the final stages of cancer. Early detection of breast cancer can be conducted by using the method of Breast Self Examination (BSE). This study aimed to analyze the determinant of Breast Self Examination (BSE) in female university students.

Subjects and Method: This study used a cross sectional design. This study was conducted at Universitas Sebelas Maret, Surakarta, Central Java, from August-September 2019. A sample of 200 female university students was selected by simple random sampling. The dependent variable was Breast Self Examination. The independent variables were age, perceived barrier, self-efficacy, subjective norm, and attitude. The data were collected by using questionnaires. The data were analyzed by a multiple logistic regression run on Stata 13.

Results: Breast Self Examination (BSE) increased with age ≥ 20 years (OR=5.01; 95%CI=1.79 to 14.00; $p=0.002$), positive perceived barrier (OR=0.018; 95%CI=0.03 to 0.27; $p<0.001$), strong self-efficacy (OR=6.40; CI 95%=2.53 to 16.23; $p<0.001$), strong subjective norm (OR=4.13; 95%CI=1.55 to 10.99; $p=0.004$), and positive attitude (OR=7.55; 95%CI= 2.57 to 22.22; $p=0.022$).

Conclusion: Breast Self Examination (BSE) increased with age, perceived barrier, self-efficacy, subjective norm, and attitude.

Keywords: breast cancer, breast self examination, theory of planned behavior, screening

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BACKGROUND

Nowadays, breast cancer is a major women's health problem globally. Meanwhile, primary prevention for breast cancer is still not available (Lusiatun et al., 2017; Nuryati et al., 2018). New cases of breast cancer worldwide are estimated at 1,384,155 with almost 459,000 related deaths. According to the American Cancer Society, 1 out of 8 United States women experience breast cancer in their lifetime. ACS has predicted the incidence of breast cancer in women around the world reaching around 3,200,000 new cases per year in 2050. This rate reflects the high number of

breast cancer incidence and its effects on people throughout the world as well as the urgency for prevention and treatment (Tao et al., 2015).

The incidence of breast cancer in developed countries is higher, while the relative mortality is the greatest in least developed countries. Therefore, women's education is recommended in all countries both developed and developing countries for early detection and treatment. A plan for controlling and preventing breast cancer must be a high priority for health policy makers. In addition, increasing awareness of factors and early detection in developing

countries needs to be conducted (Ghoncheh et al., 2016). Nationally, the highest estimated number of cancer patients is in Central Java and East Java Provinces, which is around 68,638 and 61,230 people (Ministry of Health RI, 2015).

Women who suffer from breast cancer will experience a lot of social and psychological pressure and physical problems. In addition, long-term treatment can also change lifestyle and quality of life. The incidence of breast cancer can be reduced through prevention, early detection, and treatment, thus reducing mortality rate from breast cancer. Preventive action and early detection is important to do especially in developing countries and rural areas, where medical resources are limited. The method of BSE is important to implement, but many women miss the opportunity to practice BSE due to lack of information, knowledge, awareness, and minimum programs of BSE (Kim et al., 2019).

Breast Self Examination (BSE) is a non-invasive adjunctive examination technique for early detection of breast cancer. It is a useful screening when mammography is not available in rural and poor urban areas. There is evidence that women who practice BSE every month may be able to detect lumps at an early stage of development. In addition, early diagnosis has been reported to produce a good prognosis. Breast self-examination refers to a woman who is aware of the normal appearance and shape of her breasts and looks for changes in breast size or shape, the lumps, skin tightness, discharge, and unusual pain conditions. For younger women, BSE is the only method available to detect abnormal changes at an early stage due to the inaccuracy and ineffectiveness of other screening and breast tissue which has a greater mass. BSE is an economical method, convenient method, a method that can be carried out

independently, and a simple method which does not require special equipment (Sani and Naab, 2014).

Based on the description above, awareness is important for all individuals, especially women. Therefore, they have desire and sincerity to do healthy behavior. Changes in health behavior can be analyzed by using the theory of Health Belief Model and Theory of Planned Behavior. The theory of Health Belief Model (HBM) is an ideal theory in the field of health education and health promotion. It specifically explains about health behavior, predicts changes in health behavior, provides strong predictive power, has a construction that is easy to build, can be used both for short-term and long-term health behavior changes, can be applied both in the individual, group, community, and the entire culture level (Sharma, 2015).

The theory of Health Belief Model is one of several theories for predicting changes in health behavior which has been developed by Stretcher and Rosenstock (Nugrahani et al., 2017). Besides, the Theory of Planned Behavior provides more detailed substance information about the determinants of behavior contained in the behavior, normative, and control of one's belief. This theory does not determine where beliefs are from, but also shows the possibility of other factors that affect a person's belief such as personality and values of life including demographic variables (education, age, sex, and income), as well as exposure factors to media, and other sources. These factors are expected to affect intention and behavior indirectly (Ajzen, 20-11).

This study aimed to analyze the determinant of Breast Self Examination (BSE) behavior in female college students associated with the Health Belief Model

(HBM) and Theory of Planned Behavior (TPB).

SUBJECTS AND METHOD

1. Study Design

This was an analytic observational study using case control design. This study was conducted at Department of Obstetrics and Gynecology and Faculty of Social and Political Sciences, Universitas Sebelas Maret, Surakarta, from August-September 2019.

2. Population and Sample

There were 200 female college students as the sample of the study. The sample was collected by using simple random sampling. The ration was 1:3 between female college students in Department of Obstetrics and Gynecology and Faculty of Social and Political Sciences, Universitas Sebelas Maret, Surakarta.

3. Study Variables

The dependent variable was Breast Self Examination (BSE). The independent variables were age, perceived barrier, self-efficacy, subjective norm, and attitude.

4. Operational Definition of Variables

Age was a unit of time in years that measured the existence of the respondents when they were born until the study was conducted. This study used questionnaires as the measurement instrument. This study used continuous data scale. The data was converted into a dichotomy to facilitate analysis. Coded 0 for <20 years and 1 for ≥ 20 years.

Perceived barrier was a belief on negative aspect of certain health actions that were considered as barriers that could be barriers in performing recommended behavior. The consideration was the cost and the benefit of an action, so that it became a barrier for individual to take action. This study used questionnaires as the measurement instrument. This study used continuous data scale. The data was converted

into a dichotomy to facilitate analysis. Code 0=negative (< 9), 1=positive (≥ 9).

Self-efficacy was an individual's belief for not taking certain health actions, or an individual's belief about something so she did not do Breast Self Examination (BSE). This study used questionnaires as the measurement instrument. This study used continuous data scale. The data was converted into a dichotomy to facilitate analysis. Code 0=weak (<19), 1= strong (≥ 19).

Subjective norm was perceived social and normative effect to do or should not do Breast Self Examination (BSE). This study used questionnaires as the measurement instrument. This study used continuous data scale. The data was converted into a dichotomy to facilitate analysis. Code 0= weak (<15), 1 = strong (≥ 15).

Attitude was an individual's level in evaluating how beneficial a Breast Self Examination (BSE) behavior was. This study used questionnaires as the measurement instrument. This study used continuous data scale. The data was converted into a dichotomy to facilitate analysis. Code 0= negative (<18), 1=positive (≥ 18).

5. Data Analysis

Univariate analysis was used to describe each dependent and independent variable. The data were classified according to the data types. They were put in the table of frequency distribution.

Bivariate analysis was used to determine the association between age, perceived barrier, self-efficacy, attitude, and subjective norms and Breast Self Examination (BSE). They were measured by using the Chi-square test.

Multivariate analysis explained the effect of age, perceived barrier, self-efficacy, attitude, and subjective norm on Breast Self Examination (BSE). They were analyzed by a multiple logistic regression. The univa-

riate, bivariate, and multivariate analysis used the Stata 13 program.

6. Study Ethics

This study was consisted of informed consent form, anonymity, confidentiality, and ethical clearance. The ethical clearance in this study came from the Health Research Ethics Committee of Dr. Moewardi Hos-

Table 1. The characteristic of the study subject

No.	Sample Characteristics	N	%
1.	Age		
	<20 years	47	23.50
	≥20 years	153	76.50
2.	Access to information		
	Yes	132	66.00
	No	68	34.00
3.	Department		
	Faculty of Social and Political Science	150	75.00
	Obstetrics	50	25.00

Table 1 shows the characteristics of the subjects of the study. Most of the female college students aged ≥20 years that were 153 people (76.50%), most of the female college students who had accessed information related to Breast Self Examination (BSE) was 132 people (66.00%), and most of the female college students took Faculty

Table 2. Univariate analysis (continuous data)

No.	Variable	n	Mean	SD	Min.	Max.
1.	Age	200	19.69	1.87	16	29
2.	Perceived barrier	200	10.93	5.21	1	21
3.	Self-efficacy	200	19.20	5.28	7	30
4.	Subjective norm	200	15.51	5.87	5	24
5.	Attitude	200	16.15	5.83	6	24

Table 2 shows the measurement of variable of age had mean and SD values by 19.69 ± 1.87 with the lowest age by 16 years and the highest age by 29 years. The variable of perceived barrier had mean and SD values by 10.93 ± 5.21 with the lowest perceived barrier score by 1 and the highest score by 21. The variable of self-efficacy had mean and SD values by 19.2 ± 5.28 with the

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RESULTS

1. The Characteristic of the Sample

The characteristic of the sample can be seen in Table 1.

of Social and Political Sciences, that were 150 people (75%).

2. Univariate Analysis

The result of the descriptive statistical test of continuous data was in the form of age, perceived barrier, self-efficacy, attitude, and subjective norm variables.

lowest self efficacy score by 7 and the highest score by 30. The variable of subjective norm had mean and SD values by 15.51 ± 5.87 with the lowest subjective norm score by 5 and the highest score by 24. The variable of attitude had mean and SD values by 16.15 ± 5.83 with the lowest attitude score by 6 and the highest score by 24.

Table 3. Univariate Analysis (dichotomous data)

Independent Variable	Criteria	Frequency (n)	Percentage (%)
Age (years)	<20 years	47	23.50
	≥20 years	153	76.50
Perceived barrier	Negative	87	43.50
	Positive	113	56.50
Self-efficacy	Weak	89	44.50
	Strong	111	55.50
Subjective norm	Weak	97	48.50
	Strong	103	51.50
Attitude	Negative	98	49.00
	Positive	102	51.00

Table 3 shows the data of univariate analysis data (dichotomous data) from 200 study subjects. Based on the data, most respondents aged >20 years that were 153 people (76.50%) and 47 people (23.50%) aged <20 years. Most respondents had positive perceived barrier that were 113 people (56.50%) and negative perceived barrier by 87 people (43.50%). Most respondents had strong self-efficacy that were 111 people (55.50%) and weak self-efficacy by 89 people (44.50%). Most respondents had strong subjective norm that were 103 people (51.50%) and weak subjective norm by 97 people (48.50%). Most respondents had positive attitude that were 102 people (51.00%) and negative attitude by 98 people (49.00%).

3. Bivariate Analysis

The bivariate analysis in this study aimed to explain the association between the independent variables (age, perceived barrier, self-efficacy, attitude, and subjective norm) and the dependent variable (Breast Self Examination). Bivariate analysis used the chi square test with a 95% confidence level ($p < 0.05$). The result of the bivariate analysis can be seen in Table 4.

Table 4 shows that there was an association between age and Breast Self Examination (BSE) behavior. The female college students aged ≥20 years (77.8%) did Breast Self Examination (BSE) more often

than the female college students aged <20 years (48.9%). The female college students aged ≥20 years had 3.65 times possibility to do Breast Self Examination (BSE) compared to the female college students aged <20 years.

Table 4 shows that there was an association between perceived barrier and Breast Self Examination (BSE) behavior. The female college students who had negative perceived barrier (93.1%) did Breast Self Examination (BSE) more often than female college students who had positive perceived barrier. The female college students with negative perceived barrier had 0.09 times possibility to do Breast Self Examination (BSE) compared to the female college students with positive perceived barrier.

Table 4 shows that there was an association between self-efficacy and Breast Self Examination (BSE) behavior. The female college students with strong self-efficacy (86.5%) did Breast Self Examination (BSE) more often than the female college students with weak self-efficacy. The female college students with strong self-efficacy had 5.98 times possibility to do Breast Self Examination (BSE) compared to the female college students with weak self-efficacy.

Table 4 shows that there was an association between cues to action and Breast

Self Examination (BSE) behavior. The female college students with strong cues to action (85.3%) did Breast Self Examination (BSE) more often than female college students with weak cues to action. The female college students with strong cues to action had 4.98 times possibility to do Breast Self Examination (BSE) compared to the female college students with weak cues to action.

Table 4 shows that there was an association between subjective norm and

Breast Self Examination (BSE) behavior. The female college students with strong subjective norm (87.4%) did Breast Self Examination (BSE) more often than the female college students with weak subjective norm. The female college students with strong subjective norm had 5.99 times possibility to do Breast Self Examination (BSE) compared to the female college students with weak subjective norm.

Table 4. The bivariate analysis of the differences in the percentage of Breast Self Examination (BSE) according to a number of variables

Independent Variable	Breast Self Examination				Total		OR	p
	No		Yes		n	%		
	n	%	n	%				
Age (Years)								
<20 years	24	51.1	23	48.9	47	100	3.65	<0.001
≥20 years	34	22.2	119	77.8	153	100		
Perceived Barrier								
Negative	6	6.9	81	93.1	87	100	0.09	<0.001
Positive	52	46.0	61	54.0	113	100		
Self-efficacy								
Weak	43	48.3	46	51.7	89	100	5.98	<0.001
Strong	15	13.5	96	86.5	111	100		
Subjective Norm								
Weak	45	46.4	52	53.6	97	100	5.99	<0.001
Strong	13	12.6	90	87.4	103	100		
Attitude								
Negative	50	51.0	48	49.0	98	100	12.24	<0.001
Positive	8	7.8	94	92.2	102	100		

4. Multivariate Analysis

Table 5 shows that there was an association between age and Breast Self Examination (BSE) behavior. The female college students aged ≥20 years had 5.00 times highest possibility of doing Breast Self Examination (BSE) than those aged <20 years (OR=5.00; 95%CI=1.79 to 14.00; p=0.002).

There was an association between perceived barrier and Breast Self Examination (BSE) behavior. The female college students with negative perceived barrier had 0.08 times highest possibility of doing Breast Self Examination (BSE) than those with positive perceived barrier (OR= 0.08; 95% CI = 0.03 to 0.27; p<0.001).

There was an association between self-efficacy and Breast Self Examination (BSE) behavior. The female college students with strong self-efficacy had 6.40 times strongest possibility of doing Breast Self Examination (BSE) than those with weak self-efficacy (OR=6.40; 95% CI = 2.53 to 16.23; p<0.001).

There was an association between subjective norm and Breast Self Examination (BSE) behavior. The female college students with strong subjective norm had 4.13 times highest possibility of doing Breast Self Examination (BSE) than those with weak subjective norm (OR= 4.13; 95% CI = 1.55 to 10.99; p=0.004).

There was an association between attitude and Breast Self Examination (BSE) behavior. The female college students with positive attitude had 7.56 times highest

possibility of doing Breast Self Examination (BSE) than those with negative attitude (OR=7.56; 95%CI=2.57 to 22.22; p<0.001).

Tabel 5. The analysis of multiple logistic regression of the determinants of Breast Self Examination (BSE) behavior

Independent Variable	OR	95%CI		p
		Lower limit	Upper limit	
Age ≥20 years	5.00	1.79	14.00	0.002
Negative perceived barrier	0.08	0.03	0.27	<0.001
Strong self-efficacy	6.40	2.53	16.23	<0.001
Strong subjective norm	4.13	1.55	10.99	0.004
Positive attitude	7.56	2.57	22.22	<0.001
N Observation= 200				
Log Likelihood= -62.80				
p< 0.001				
R ² = 0.48				

DISCUSSION

1. The effect of age on breast self examination (BSE) behavior

The result of the analysis showed that there was an association between age and Breast Self Examination (BSE) behavior. The result was statistically significant with p= 0.002. The positive association between age and Breast Self Examination (BSE) behavior showed that ≥20 years of age increased Breast Self Examination (BSE) behavior 5.00 times higher than <20 years of age.

This study is in line with the study conducted by Sani and Naab (2014) that among the 52.7% people who did BSE regularly, 57.8% of them aged 18-30 years and only 13.3% aged >40 years. In addition, among respondents who did not conduct BSE regularly (47.3%), most of them (58.7%) aged 18-30 years and 5.0% aged >40 years. However, among 58.2% of respondents aged 18-30 years, 52.3% of them conducted BSE regularly and 47.7% did not conduct BSE regularly. Among respondents aged 31-40 years, most of them (53.0%) did not do BSE regularly and 47.0% did BSE regularly. Besides, among respondents aged

>40 years, most of them (75.0%) did BSE regularly and only 25.0% did not do BSE regularly. Based on the statistical test which was conducted by using chi-square, there was a significant association between the age group of respondents and the frequency of BSE practice. The further contingency coefficient indicates that there was a significant positive weak association between BSE practice and the age of the respondents (contingency coefficient of 0.252).

This study was not in line with a study conducted by Amasha (2013), that the average age of respondents was 29.5; (SD = 8.3) years and ranging between 18-55 years. This study showed that there was statistically non-significant association between the selected variables (age, education level, previous breast problem, knowledge of the risk factor of breast cancer and knowledge of BSE) and doing BSE (p=0.31; 0.17; 0.14, each of them was 0.17 and 0.29).

2. The effect of perceived barrier on breast self examination (BSE) behavior

Based on the result of the analysis, there was an association between perceived

barrier and Breast Self Examination (BSE). The result was statistically significant with $p < 0.001$. The positive association between negative perceived barrier and Breast Self Examination (BSE) behavior showed that negative perceived barrier increased Breast Self Examination (BSE) behavior 0.08 times higher than positive perceived barrier.

This study is in line with previous study that there was a significant association between BSE behavior in the future and perceived barrier ($b = -0.33$; $p < 0.001$) on the HBM subscale. If perceived barrier on BSE practice increased, the chance of BSE performance will decreased (Gonzales et al., 2018).

Another study also stated that BSE was affected by perceived barrier ($b = -0.80$, $p = 0.019$). Perceived barrier was defined as barriers or challenges for someone to do certain behaviors. People will consider that certain behaviors do not have any benefits. She chooses not to do it. This is in line with environmental factors in the social cognitive theory (SCT), that barriers are discomfort, prices, lack of information about certain events, unknown fear, and many other factors.

One of the possibilities that inhibit BSE behavior comes from the cultural beliefs. Different cultural background or social stigma makes some women refuse to receive knowledge about breast cancer. It is a taboo. There is a misconception which states that breast cancer occurs due to their residence location. Another possibility is because of fear of knowing the result, low perceived susceptibility, misunderstanding of the diagnosis process, and others. Based on this explanation, if women feel low perceived barrier, the likelihood of engaging in BSE behavior will increase and vice versa (Chin and Mansori, 2019).

Low perceived barrier allow women to do BSE. Therefore, identifying the perceived barrier to do breast cancer screening is significantly important in preventing disease progression, through more insightful activities undertaken by nurses and other health professionals (Akhtari-Zavare et al., 2013; Tabari et al., 2017).

3. The effect of self-efficacy on breast self examination (BSE) behavior

Based on the result of the analysis, there was an association between self-efficacy and Breast Self Examination (BSE). The result was statistically significant with $p < 0.001$. The positive association between strong self-efficacy and Breast Self Examination (BSE) behavior showed that strong self-efficacy increased Breast Self Examination (BSE) behavior 6.40 times stronger than weak self-efficacy.

This study is in line with a previous study that the high score on the self-efficacy scale indicates a positive and significant association with BSE behavior ($OR = 4.01$; $95\%CI = 2.39$ to 6.73) (Hajian-Tilaki and Auladi, 2014).

The result of this study is consistent with other studies which state that self-efficacy has the strongest and most consistent association with BSE behavior. Self-efficacy has a direct effect on BSE behavior. Self-efficacy can be improved by using several different techniques, namely verbal persuasion, emotional arousal, modeling, and performance achievement. Modification of attitudes about breast cancer needs to be carried out by medical personnel, especially for younger women with a family history of breast cancer (Noroozi et al., 2011).

Based on a study conducted by Akhtari-Zavare et al. (2013), women who had high self-efficacy were more likely to do BSE ($OR = 1.08$; $95\%CI = 1.028$ to 1.126). Based on this study, the students who had

done BSE had higher self-efficacy towards BSE behavior compared to the students who had never done BSE previously. Women who are more confident in their ability to do BSE are likely to have BSE behavior.

4. The effect of subjective norm on breast self examination (BSE) behavior

Based on the result of the analysis, there was an association between subjective norm and Breast Self Examination (BSE). The result was statistically significant with $p=0.004$. The positive association between strong subjective norm and Breast Self Examination (BSE) behavior showed that strong subjective norm increased Breast Self Examination (BSE) behavior 4.13 times higher than weak subjective norm.

Based on a study conducted by Dewi and Zein (2017), 45.8% of the variance in BSE intentions in students was significantly correlated with subjective norms ($r=0.42$; $p<0.001$). This study showed that subjective norm represented a person's belief whether other people thought that she must be involved in a behavior or not. They are considered capable of assessing social pressure to do or should not do certain behaviors from significant references. Subjective norm is a function of normative belief where certain significant references think that a person must do or must not do behavior with one's motivation to meet expectations on a problem.

Based on a study conducted by Murphy et al. (2014), subjective norm affected mammographic behavior through several channels. Subjective norm has a small score, but it directly affects prevention behavior. In addition, subjective norm does not have a direct effect on intention, but it is mediated by perceived barrier. However, there are findings which showed a positive association between subjective norm and

intention when controlling attitudes (ie, benefit and barrier). It may occur due to different sizes of subjective norms. Recommendations or suggestions from doctors are often judged as subjective norm. Although this study assesses the normative effect of family and friends, these findings indicate that subjective norm is determinant of mammographic screening that can be targeted as intervention. The most effective approach to affecting women who have high score on perceived barrier is by giving advice from other women.

Subjective norm makes women tend to have higher intention for conducting BSE because there are important people around them that often encourage them to do BSE. They are obedient. In addition, subjective norm has a significant positive effect on intention to do breast cancer screening. These findings indicate that respondents' relatives and friends were encouraged to give positive role which would encourage women who were potentially susceptible to undergo breast cancer screening and increase their intention to do breast cancer screening (Wang et al., 2019)

5. The effect of attitude on breast self examination (BSE) behavior

Based on the result of the analysis, there was an association between attitude and Breast Self Examination (BSE). The result was statistically significant with $p<0.001$. The positive association between positive attitude and Breast Self Examination (BSE) behavior showed that positive attitude increased Breast Self Examination (BSE) behavior 7.56 times higher than negative attitude.

Determinant of behavior is a person's intention to do behavior that reflects their motivation (i.e. plan, decision or self-instruction) to conduct behavior (i.e. I intend to do BSE next month). Intention is determined by three factors. First, is a person's

attitude towards behavior that reflects all positive or negative evaluation of the behavior (i.e. doing BSE in the next month will be good). Second, subjective norm is people's perception of how far they want to behave (i.e. most people who are important for me want me to do BSE next month). Third, perceived behavioral control is people's perception of how far the internal and external factors can facilitate or inhibit behavior performance (i.e. I have full control whether I will do BSE in the next month or not) (Norman and Cooper, 2011).

Based on a study conducted by Norman and Cooper, 2011, all measures of Theory of Planned Behavior (except attitude), frequency of past behavior, context stability, and strength of habits, had significant positive association with intention to conduct BSE in the next month. Intention and on perceived behavioral control and all measures of past behavior had a significant positive association with BSE. In addition, the frequency of past behavior and context stability had significant positive association with habitual strength.

This study is also supported by Chung et al. (2014) which states that factor that affect the practical intention of BSE is attitude ($b=0.37$). The strength of the explanation of this model is 16.7%. The result of the study showed that the positive attitude of BSE affected the practical intention of BSE. Therefore, it is necessary to develop an educational program in order to get a positive attitude of BSE for high school students.

AUTHOR CONTRIBUTION

Asruria Sani Fajriah is the main researcher who played a role in coordinating study, conducting all stages of study, and completing study scripts. Supriyadi Hari Respati had a role in developing ideas, study design, and study hypotheses. Bhisma Murti had a role in developing theoretical

framework, processing data of the study, representing the results of the study analysis, and preparing the scripts of the study.

CONFLICT OF INTEREST

This study did not have any conflict of interest.

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