

Biopsychosocial Determinants of Dental and Oral Health Behavior in Elementary School Children in Ponorogo, Indonesia: Application of Health Belief Model

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ABSTRACT

Background: Based on Basic Health Research in 2018, the proper brushing teeth behavior in children in Indonesia was 2.8%. The Elementary School period is an important stage for developing the behavior of maintaining dental and oral health in children (students). This study aimed to analyze the bio psychosocial determinants of the behavior of maintaining dental and oral health in elementary school children in Ponorogo by implementing the theory of Health Belief Model.

Subjects and Method: This was a cross-sectional study conducted in Ponorogo, East Java, Indonesia, from January to February 2020. A sample of 200 students from 25 elementary schools was selected by simple random sampling. The dependent variable was dental and oral health behavior. The independent variables were knowledge, teacher's role, attitude, perceived susceptibility, perceived seriousness, perceived benefit, perceived barrier, cues to action, self-efficacy, and school. The data were collected by questionnaire. The data were analyzed by a multilevel multiple logistic regression run on Stata 13.

Results: Dental and oral health behavior in elementary school students increased with good knowledge (OR= 8.73; 95% CI= 2.18 to 34.95; p= 0.002), strong teacher's role (OR= 3.99; 95% CI= 1.17 to 13.65; p= 0.027), positive attitude (OR= 6.45; 95% CI= 1.73 to 24.04; p= 0.005), strong

perceived susceptibility (OR= 7.81; 95% CI= 2.12 to 28.78; p= 0.011), high perceived seriousness (OR= 6.62; 95% CI= 1.93 to 22.69; p= 0.003), weak perceived barrier (OR= 0.18; 95% CI= 0.05 to 0.72; p = 0.015), big perceived benefit (OR= 7.78; 95% CI= 1.80 to 33.56; p= 0.006), strong cues to action (OR= 3.95; 95% CI= 1.12 to 13.91; p= 0.032), and strong self-efficacy (OR= 4.99; 95% CI= 1.38 to 18.05; p=0.014). Elementary schools had contextual effect on the dental and oral health behavior with ICC= 14.14%.

Conclusion: The behavior of maintaining dental and oral health in elementary school students is affected by good knowledge, strong teacher's role, high perceived susceptibility, high perceived seriousness, weak perceived barrier, big perceived benefit, high cues to action, and strong self-efficacy. The school has a contextual effect on the behaviour of maintaining dental and oral health in students.

Keywords: the behaviour of maintaining dental health, health belief model.

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BACKGROUND

The behavior of maintaining dental and oral health is an effort to maintain dental and oral

health. School-age children are susceptible to various dental and oral health problems. Therefore, the school period is an important

stage in developing children's habits to maintain dental and oral health at an early age (Inglehart et al., 2017).

Based on data from the World Health Organization (WHO) in 2016, the incidence of caries in children around the world was 60-90%. Besides, the prevalence of the dental disease in children in Indonesia was 67.3% (Ministry of Health, 2018)

Based on the result of the Basic Health Research in 2018, the dental health condition of Indonesian people tended to be poor. The result of the survey showed that 57.6% of Indonesian people had dental and oral health problems. There were only 10.2% of them got medical dental care. Dental and oral health problem is closely related to the behavior of brushing teeth. There are only about 2.8% of Indonesian children who brush their teeth properly. Oral health is an important part of general health and well-being. A child with a poor oral cavity can affect their life in the future (Leary and Do, 2019).

Poor oral health can affect the ability to eat, talk, and socialize. Besides, attitude and habit from the behavior pattern that has been formed at an early age greatly determine how far an individual successfully adapted in his life (Hurlock, 2011).

Dental care is an effort that is important to do. It aims to keep the children's teeth healthy, thus functioning properly. As a result, children can process food well. Besides, children's teeth also affect the growth of the jaw and form the face. Teeth play an important role in helping children to talk and giving direction for permanent teeth (Priyoto, 2015).

Teeth and mouth are the entrance for food needed for children's health. However, they can also be an entrance for bacteria and viruses. Dental care, as early as possible, will prevent cavities. The gums will be healthy; therefore, the child does not have a toothache. Besides, dental care prevents deciduous

teeth to be extracted prematurely due to decay (gangrene). It also prevents undeveloped jaws of children that cause a lack of space for permanent teeth. Therefore, it does not affect the appearance and confidence of the children after adolescence (Sariningsih, 2012).

The biomedical model studies the biological cause of a disease in an individual. However, biological cause is not enough to explain the process of the occurrence of a disease in the body. Two other aspects are needed; they are psychological and social aspects. A bio psychosocial model shows the mental condition which is a reason for a person to contribute to the health and the manifestation of the person's illness (Murdi, 2016)

One of the theories for studying behavior is the theory of Health Belief Models (HBM). The theory of Health Belief Models (HBM) has six basic components that form behavior, including perceived susceptibility, perceived seriousness, perceived benefit, perceived barrier, cues to action, and self-efficacy (Murdi, 2018).

Based on the result of the preliminary study obtained from Ponorogo Health Office data, the number of Elementary School/Madrasah Ibtidaiyah students in 2016 who needed to get dental and oral health care was 38.4%. In 2018, the number of students increased to 40.3%. It showed that the health care needs of the Elementary School/Madrasah Ibtidaiyah students in Ponorogo increased. Therefore, further intervention needs to be conducted.

Based on the description above, the implementation of the theory of the Health Belief Model approach and the bio psychological aspect was expected to improve student's behavior of maintaining dental and oral health. Therefore, the researcher was interested in conducting a study entitled, "Bio psychosocial Determinants of Dental and Oral Health Behavior in Elementary School

Children in Ponorogo: Application of Health Belief Model".

SUBJECTS AND METHOD

1. Study Design

This study was an analytical observational study with a cross-sectional study design. This study used multilevel analysis technique. The individual level of the study was the Elementary School Students. The community level of the study was school. This study was conducted from January to February 2020.

2. Population and Sample

The study population was all of the Elementary Students in Ponorogo. A sample of 200 students from 25 elementary schools was selected by simple random sampling. Schools were selected by stratified random sampling.

3. Study Variables

The dependent variable was dental and oral health behavior. The independent variables were knowledge, teacher's role, attitude, perceived susceptibility, perceived seriousness, perceived benefit, perceived barrier, cues to action, self-efficacy, and school.

4. Operational Definition of Variables

Dental and oral health behavior was the actions taken by the students to maintain dental and oral health, including maintaining dental hygiene, maintaining food, going to dental health care as well as setting the time, frequency, and brushing teeth. This study was collected by questionnaire. The measurement scale was continuous, but it was transformed into dichotomous, coded 0= poor and 1= good.

Knowledge was the result of students' knowledge of how to maintain dental and oral health, including how to brush teeth, the frequency and time to brush teeth, and food that affected dental health. This study was collected by questionnaire. The measurement scale was continuous, but it was transformed into dichotomous, coded 0= poor and 1= good.

Teacher's Role was the role of the educators who were responsible for teaching students to maintain dental and oral health at school. This study was collected by questionnaire. The measurement scale was continuous, but it was transformed into dichotomous, coded 0= weak and 1=strong.

Attitude was a response in the form of a positive or negative assessment of students towards the behavior of maintaining dental and oral health, including attitude in maintaining dental health and maintaining food that was good or not good for dental health. This study was collected by questionnaire. The measurement scale was continuous, but it was transformed into dichotomous, coded 0= negative and 1=positive.

Perceived Susceptibility was a subjective perception of students regarding risk level followed by the effect if they did not maintain dental and oral health. This study was collected by questionnaire. The measurement scale was continuous, but it was transformed into dichotomous, coded 0= weak and 1=strong.

Perceived Seriousness was the level of seriousness of the students regarding risk level followed by the effect if they did not maintain dental and oral health. This study was collected by questionnaire. The measurement scale was continuous, but it was transformed into dichotomous, coded 0= weak and 1= strong.

Perceived Benefit was the positive effect obtained by the students in maintaining dental and oral health. This study was collected by questionnaire. The measurement scale was continuous, but it was transformed into dichotomous, coded 0= weak and 1= strong.

Perceived Barrier was the barrier experienced by the students in maintaining dental and oral health. This study used questionnaires as the instrument of the study. This study used a continuous data scale. The data

was converted into a dichotomy to facilitate analysis. Code 0=weak and 1=strong.

Cues to Action were the action or education from parents or teachers that could be the reason for students to change their behavior of maintaining dental and oral health. This study was collected by questionnaire. The measurement scale was continuous, but it was transformed into dichotomous, coded 0= low and 1= high.

Self-Efficacy was a belief in students' abilities in maintaining dental and oral health. This study was collected by questionnaire. The measurement scale was continuous, but it was transformed into dichotomous, coded 0= weak and 1=strong.

School Level was the level of school eligibility assessment based on the criteria established by the Education Office. This study used questionnaires as the instrument of the study. This study used a categorical data scale. Code 1=C accreditation and 2=B accreditation and 3=A accreditation.

5. Data Analysis

a. Univariate Analysis

The continuous-scale variable was described in Mean, SD, minimum, and maximum. Besides, the categorical-scale variable was described in n and percentage (%).

b. Bivariate Analysis

The correlation among two categorical-scale variables or the difference of the percentage

among two or more groups was tested statistically with Chi-square. Its correlation was measured by using Odds Ratio (OR). The statistical significance was presented in the form of the p value.

c. Multivariate Analysis

The correlation among variables was analyzed using multilevel multiple logistics.

6. Research Ethic

This study was conducted based on the study ethics which consisted of an informed consent form, anonymity, confidentiality, and ethical clearance. The ethical clearance in this study was obtained from the Health Research Ethics Committee of Dr. Moewardi Hospital, Surakarta, Indonesia, No: 115/I/HREC/2020.

RESULTS

1. Sample Characteristics

The characteristics of the sample are shown in Table 1 and 2. Table 1 shows the measurement of 200 students as the subjects of the study. The mean value of the characteristic of students' age was 10.26 and the SD was 1.26; the youngest student was 8 years old and the oldest student was 12 years old. The mean value of the characteristic of sex was 1.64 and the SD was 0.48. The mean value of the characteristic of the grade was 4.64 and the SD was 1.17. The lowest grade was 2nd grade and the highest grade was 6th grade.

Table 1. Sample characteristics (continuous data)

Characteristic	N	Mean	SD	Min.	Max.
Age (years)	200	10.26	1.26	8	12
Sex	200	1.64	0.48	1	2
Grade	200	4.64	1.17	2	6
Dental and oral health behavior	200	10.68	4.37	4	19
Knowledge	200	2.95	1.15	1	5
Teacher's role	200	5.70	2.35	2	10
Attitude	200	5.6	2.27	2	10
Perceived susceptibility	200	2.98	1.22	1	5
Perceived seriousness	200	2.56	0.94	1	4
Perceived benefit	200	1.62	0.76	1	3
Perceived barrier	200	2.67	0.91	1	4
Cues to action	200	2.79	1.10	1	5
Self-efficacy	200	2.65	0.92	1	4

Table 2. Sample characteristics (dichotomous data)

Characteristic	N	%
Sex		
Male	73	36.50
Female	127	63.50
Age		
8-9 years	64	32.00
10-12 years	136	68.00
Grade		
Low	42	21.00
High	158	79.00
Dental and oral health behavior		
Poor	109	54.50
Good	91	45.50
Knowledge		
Poor	87	43.50
Good	113	56.50
Teacher's role		
Weak	97	48.50
Strong	103	51.50
Attitude		
Negative	102	51.00
Positive	98	49.00
Perceived susceptibility		
Low	94	47.00
High	106	53.00
Perceived seriousness		
Low	92	46.00
High	108	54.00
Perceived benefit		
Small	110	55.00
Big	90	45.00
Perceived barrier		
Weak	102	51.00
Strong	98	49.00
Cues to action		
Low	92	46.00
High	108	52.00
Self-efficacy		
Weak	92	46.00
Strong	108	52.00

Table 2 shows that the majority of the subjects of the study were female. There were 127 female students (63.50%) and 73 male students (36.50%). Most of the students were 11-12 years old (68.0%). There were 158 students (79%) who came from high grade (5th and 6th grade).

The mean of dental and oral health behavior was 10.68 (Mean= 10.68; SD=

4.37). The mean of the knowledge was 2.95 (Mean= 2.95; SD= 1.15). The mean of the teacher's role was 5.70 (Mean= 5.70; SD= 2.35). The mean of the students' attitude was 5.6 (Mean= 5.6; SD= 2.27). The mean of perceived susceptibility was 2.98 (Mean= 2.98; SD= 1.22). The mean of perceived seriousness was 2.56 (Mean= 2.56; SD= 0.94). The mean of perceived benefit was 1.62 (Mean=

1.62; SD= 0.76). The mean of perceived barrier was 2.6 (Mean= 2.6; SD= 0.91). The mean of cues to action was 2.79 (Mean= 2.79; SD= 1.10). The mean of self-efficacy was 2.65 (Mean= 2.65; SD= 0.92).

Table 4 shows that the majority of the Elementary School children in Ponorogo or 109 children (54.50%) had poor behavior of maintaining dental and oral health. There were 113 children (56.50%) who had good knowledge. There were 103 children (51.50%) who had a strong teacher's role in maintaining dental and oral health. There were

102 children (51%) who had a negative attitude. There were 106 children (53%) who had high perceived susceptibility. There were 108 children (54%) who had high perceived seriousness. There were 102 children (51%) who had a weak perceived barrier. There were 110 children (55%) who had high perceived benefits. There were 108 children (54%) who had high cues to action. There were 108 children (54%) who had strong self-efficacy.

Table 3. Bivariate analysis on the determinants of dental and oral health behavior

Independent Variable	Dental and Oral Health Behavior				OR	95% CI		p
	Poor		Good			Lower Limit	Upper Limit	
	n	%	n	%				
Knowledge								
Poor	69	79.3	18	20.7	6.99	3.51	14.15	<0.001
Good	40	35.4	73	64.6				
Teacher's role								
Weak	72	74.2	25	25.8	5.13	2.68	9.89	<0.001
Strong	37	35.9	66	64.1				
Attitude								
Negative	80	78.4	22	21.6	8.65	4.35	17.32	<0.001
Positive	29	29.6	69	70.4				
Perceived susceptibility								
Low	77	81.9	17	18.1	10.47	5.12	21.75	<0.001
High	32	30.2	74	69.9				
Perceived seriousness								
Low	79	85.9	13	14.1	15.80	7.30	35.15	<0.001
High	30	27.8	78	72.2				
Perceived benefit								
Small	67	60.9	43	39.1	1.78	0.97	3.25	0.044
Big	42	46.7	48	53.3				
Perceived barrier								
Weak	32	31.4	70	68.6	0.12	0.06	0.24	<0.001
Strong	77	78.6	21	21.4				
Cues to Action								
Low	78	84.8	14	15.2	13.83	6.51	30.09	<0.001
High	31	28.7	77	71.3				
Self-efficacy								
Weak	74	80.4	18	19.6	8.57	4.26	17.49	<0.001
Strong	35	32.4	73	67.6				

2. Bivariate Analysis

Table 3 shows the result of the Chi-Square. Table 3 showed that dental and oral health behavior among elementary school students

increased with high knowledge (OR= 6.99; 95% CI= 3.51 to 14.15; p<0.001), strong teacher's role (OR= 5.13; 95% CI= 2.68 to 9.89; p<0.001), positive attitude (OR= 8.65;

95%CI=4.35 to 17.32; $p<0.001$), high perceived susceptibility (OR= 10.47; 95% CI= 5.12 to 21.75; $p<0.001$), high perceived seriousness (OR= 15.8; 95% CI= 7.30 to 35.15; $p<0.001$), high perceived benefit (OR=1.78; 95% CI= 0.97 to 3.25; $p= 0.044$), strong cues to action (OR= 13.8; 95% CI=

6.51 to 30.09; $p<0.001$), and strong self-efficacy (OR= 8.57; 95% CI= 4.26 to 17.49; $p<0.001$).

Dental and oral health behavior among elementary school students increased with weak perceived barrier (OR= 0.12; 95% CI= 0.06 to 0.24; $p<0.001$).

Table 4. The result of the analysis of multilevel multiple logistic regression

Independent Variable	OR	95%CI		P
		Lower limit	Upper limit	
Fixed effect				
Knowledge (good)	8.73	2.18	34.95	0.002
Teacher’s role (strong)	3.99	1.17	13.65	0.027
Attitude (positive)	6.45	1.73	24.04	0.005
Perceived susceptibility (high)	7.81	2.12	28.78	0.002
Perceived seriousness (high)	6.62	1.93	22.69	0.003
Perceived barrier (strong)	0.18	0.05	0.72	0.015
Perceived benefit (big)	7.78	1.80	33.56	0.006
Cues to action (high)	3.95	1.12	13.91	0.032
Self-efficacy (strong)	4.99	1.38	18.05	0.014
Constant	<0.01	<0.01	0.01	<0.001
Random effect				
School Var(constant)= 0.54		0.02	16.65	
N observation= 200				
N group= 25				
Log likelihood= -46.24				
LR test vs logistic regression, $p= 0.231$				
ICC= 14.14%				

3. Multivariate Analysis

Table 4 shows the multivariate analysis of the result of the multilevel multiple logistic regression. The students with good knowledge were 8.73 times more likely to have good behavior of maintaining dental and oral health compared to the students with poor knowledge (OR=8.73; 95%CI=2.18 to 34.95; $p=0.002$). The students with a strong teacher’s role were 3.99 times more likely to have good behavior of maintaining dental and oral health compared to the students with a weak teacher’s role (OR=3.99; 95%CI=1.17 to 13.65; $p=0.027$).

The students with positive attitudes were 6.45 times more likely to have good behavior of maintaining dental and oral health compared to the students with negative attitudes (OR=6.45; 95%CI= 1.73 to 24.04; $p=0.005$).

The students with high perceived susceptibility were 7.81 times more likely to have good behavior of maintaining dental and oral health compared to the students with low perceived susceptibility (OR=7.81; 95%CI= 2.12 to 28.78; $p=0.002$).

The students with high perceived seriousness were 6.62 times more likely to have good behavior of maintaining dental and oral health compared to the students with low perceived seriousness (OR=6.62; 95%CI= 1.93 to 22.69; $p=0.003$).

The students with strong perceived barriers were 0.18 times more likely to have poor behavior of maintaining dental and oral health compared to the students with a weak perceived barrier (OR=0.18; 95%CI= 0.05 to 0.72; $p=0.015$).

The students with big perceived benefit were 7.78 times more likely to have good behavior of maintaining dental and oral health compared to the students with small perceived benefit (OR=7.78; 95%CI= 1.80 to 33.56; p=0.006).

The students with high cues to action were 3.95 times more likely to have good behavior of maintaining dental and oral health compared to the students with low cues to action (OR=3.95; 95%CI= 1.12 to 13.91; p=0.032).

The students with strong self-efficacy were 4.99 times more likely to have good behavior of maintaining dental and oral health compared to the students with weak self-efficacy (OR=4.99; 95%CI= 1.38 to 18.05; p=0.014).

School had a contextual effect on the dental and oral health behavior with ICC= 14.14%. This means that around 14.14% of the behavior of maintaining dental and oral health in students was affected by the school. The result of the ICC was bigger than the standard size (Rule of Thumb=8-10%). Therefore, the effect of the school contextual in this study was important to be observed.

DISCUSSION

1. The effect of knowledge on dental and oral health behavior

There was a positive effect of knowledge on the behavior of maintaining dental and oral health in students. The students with good knowledge were 8.73 times more likely to have good behavior of maintaining dental and oral health compared to the students with poor knowledge.

This is in line with a study conducted by Al-Qahtani et al. (2020), that knowledge of dental and oral health affected dental and oral health behavior in students at Albha School, Saudi Arabia. Knowledge of dental and oral health in children could motivate them to maintain dental and oral health.

Based on a study conducted by Vahid et al., 2019, knowledge of dental and oral health in students through oral health education could improve the ability of an individual to explain from 60.3% to 96.6%.

2. The effect of the teacher's role on dental and oral health behavior

There was a positive effect of the teacher's role on the behavior of maintaining dental and oral health in students. The students with a strong teacher's role were 3.99 times more likely to have good behavior of maintaining dental and oral health compared to the students with a weak teacher's role.

Based on a study conducted by Eden et al. (2018), students who got a more active teacher's role regarding brushing techniques correctly had a significant result. The significant decrease in plaque accumulation has been evaluated at a 1-month examination. Besides, the frequency of brushing teeth in students increased significantly after 1 to 6 months.

Based on another study, the teacher's role was considered an important and needed school-based education strategy. The teacher could provide a lecture-based education. Besides, the teacher is skilled educated personnel who can help students increase their knowledge about dental and oral health (Lopez-Nunez et al., 2019).

3. The effect of attitude on dental and oral health behavior

There was a positive effect of the attitude of the students on the behavior of maintaining dental and oral health. The students with positive attitudes were 6.45 times more likely to have good behavior of maintaining dental and oral health compared to the students with negative attitudes.

Based on a study conducted by Wahengbam et al. (2016), a positive attitude also affected student's behavior in dental and oral health (r=0.353; p=0.010). This correlation shows that better knowledge could lead to a

positive attitude, thus affecting student's behavior. This could be implemented by adding information about oral health status in students, providing additional information about what was taught or what was learned at school, parents, and the environment regarding dental and oral health.

Student's attitude towards oral health was also affected by the experience, culture, family, belief, religion, and other life situations that could reflect oral health behavior in students. Based on a study conducted by Al-Subait et al. (2015), students who received information about oral health from their parents had better oral health compared to those who did not get it.

4. The effect of perceived susceptibility on dental and oral health behavior

There was a positive effect of perceived susceptibility on the behavior of maintaining dental and oral health in students. The students with high perceived susceptibility were 7.81 times more likely to have good behavior of maintaining dental and oral health compared to the students with low perceived susceptibility.

Based on a study conducted by Peyman and Porhaji (2015), there was a difference between pretest and posttest scores of perceived susceptibility towards the students in the experimental group. However, it was different from the control group. This study also showed that perceived susceptibility was considered an important factor affecting students' behavior in brushing their teeth.

5. The effect of perceived seriousness on dental and oral health behavior

There was a positive effect of perceived seriousness on the behavior of maintaining dental and oral health in students. The students with high perceived seriousness were 6.62 times more likely to have good behavior of maintaining dental and oral health compared to the students with low perceived se-

riousness (OR=6.62; 95%CI= 1.93 to 22.69; p=0.003).

Based on a study conducted by Lee et al. (2017), there was an effect of perceived seriousness on dental and oral health behavior in students ($t=-4.138$ and $p<0.001$). The perceived seriousness in this study was the perceived severity experienced by the students when having a toothache, including the perception of students when filling a tooth, checking up, having bad breath due to cavities, taking time to come for treatment, and the willingness to pay for medical expenses of dental check-up.

Based on a qualitative study conducted by Ghaffari et al. (2018), the majority of perceived susceptibility experienced by the students regarding toothache could affect communication. Besides, the cavity and dark color on teeth could also affect social relations.

6. The effect of perceived barrier on dental and oral health behavior

There was a negative effect of perceived barriers on the behavior of maintaining dental and oral health. The students with strong perceived barriers were 0.18 times more likely to have poor behavior of maintaining dental and oral health compared to the students with a weak perceived barrier.

Based on a study conducted by Peyman and Porhaji (2015), there was a significant effect between the perceived barrier and dental and oral health behavior in students. This study showed that there was a difference between pretest and posttest scores of perceived barriers towards the students in the experimental group. However, it was different from the control group.

Another study stated that there was an effect of the perceived barriers on dental and oral health behavior in students. The perceived barriers were fear of checking up to the dentist, fear of dental check-up due to need-

les, and the high cost of dental check up (Rahmati-Najarkolaei., 2016).

7. The effect of perceived benefit on dental and oral health behavior

There was a positive effect of perceived barriers on the behavior of maintaining dental and oral health. The students with high perceived benefit were 7.78 times more likely to have good behavior of maintaining dental and oral health compared to the students with low perceived benefits.

Based on a study conducted by Lee et al. (2017), there was an effect of perceived benefit on dental and oral health behavior in students ($t=3.253$ and $p=0.001$). In this study, the perceived benefit aimed to measure the perceived benefit of the students in maintaining dental and oral health to reduce dental caries.

Another study stated that there was an effect of perceived benefit on dental and oral health behavior ($r=0.14$ and $p=0.040$). This study showed that students who knew the perceived benefit in maintaining dental and oral health could maintain their dental and oral health (Goodarzi et al., 2017)

8. The effect of cues to action on dental and oral health behavior

There was a positive effect of cues to action on the behavior of maintaining dental and oral health. The students with high cues to action were 3.95 times more likely to have good behavior of maintaining dental and oral health compared to the students with low cues to action.

Based on a study conducted by Ashoori et al. (2019), there was an effect of cues to action on dental and oral health behavior in Elementary School students ($r=0.26$; $p=0.010$). In this study, cues to action were the experience of toothache, the experience of toothache in the family, the education about dental and oral health, and observing the way parents brush their teeth. Another study explained that there was an effect of cues to

action on dental and oral health behavior ($r=0.10$ and $p=0.020$). This study explained that the cues to action towards students were largely determined by parents (Goodarzi et al., 2017).

9. The effect of self-efficacy on dental and oral health behavior

There was a positive effect of self-efficacy on the behavior of maintaining dental and oral health. The students with strong self-efficacy were 4.99 times more likely to have good behavior of maintaining dental and oral health compared to the students with weak self-efficacy ($OR=4.99$; $95\%CI= 1.38$ to 18.05 ; $p=0.014$).

Based on a study conducted by Goodarzi et al. (2019), self-efficacy affected dental and oral health behavior in students ($OR=1.34$; $95\%CI=1.06$ to 1.69 ; $p=0.012$). This study explained that students with high levels of self-efficacy would be better at brushing their teeth. Besides, the use of dental floss would make students were better at dental and oral health behavior.

Another study explained that there was a positive correlation between students' self-efficacy and dental and oral health behavior ($r=0.32$; $p<0.010$). To overcome the behavior, the students should think that they have the ability or believe in themselves (Ashoori et al., 2019).

10. Contextual effect of school on dental and oral health behavior

School had a contextual effect with the ICC of 14.14%. It showed that around 14.14% of the behaviors of maintaining dental and oral health in students were affected by schools. The result of the ICC was greater than the standard size (Rule of Thumb=8-10%). Therefore, in this study, it is important to pay attention to the contextual effect at schools.

Based on a study conducted by Inglehart et al. (2017), schools that provide dental and oral health education to students could improve their attitude, their knowledge, and

their intention to have positive behavior about oral health. It is expected to improve dental and oral health in Elementary School students in the United States. Besides, at the age of children, the school played an important role in teaching students, especially in oral health promotion.

Another study explained that the theory of Health Belief Model (HBM) could predict and change students' dental health behaviors (Goodarzi et al., 2017).

Based on a study conducted by Lopez-Nunez et al., 2019, school-based dental education could be widely accepted. It is not only important for students, but also teachers and parents. Therefore, school-based dental education in the future must be specifically designed to sustainably improve long-term health behaviors.

AUTHOR CONTRIBUTION

Fahma Widya Kusumawardhani was the main researcher who collected the data of the study, formulated the articles of the study, and processed the data. Harsono Salimo played a role in the procedures for writing a thesis and discussion of the study. Eti Poncorini Pamungkasari helped in formulating the theoretical framework and discussion.

CONFLICT OF INTEREST

This study did not have any conflict of interest.

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REFERENCE

- Al-Qahtani S, Razak P, Khan S (2020) Knowledge and practice of preventive measures for oral health care among male intermediate schoolchildren in abha, Saudi Arabia. *Int. J. Environ. Res. Public Health*. 17(3). doi: 10.3390/ijerph17-030703.
- Al-Subait A, Alousaimi M, Geeverghese A, Ali A, Metwally A (2015). Oral health knowledge, attitude and behavior among students of age 10-18 years old attending Jenadriyah festival Riyadh: a cross-sectional study. *Saudi J. Oral. Dent. Res.* 7(1): 45–50. doi: 10.1016/j.-sjdr.2015.05.001
- Ashoori F, Karimi M, Mokarami H dan Seif M (2019). Using health belief model to predict oral health behaviors in girl students: A structural equation modeling. *Pediatr. Dent. J.* doi: 10.1016/j.pdj.20-19.12.001
- Dinas Kesehatan Kabupaten Ponorogo (2017). *Profil Kesehatan Kabupaten Ponorogo tahun 2016*. Ponorogo: Dinkes Ponorogo.
- Dinas Kesehatan Kabupaten Ponorogo (2019). *Profil Kesehatan Kabupaten Ponorogo tahun 2018*. Ponorogo: Dinkes Ponorogo.
- Eden E, Akyildiz M, Sonmez I (2018). Comparison of two school-based oral health education programs in 9-year-old children. *Int Q Community Health Educ.* 39(3): 189–196. doi:10.1177/027-2684X18819980.
- Ghaffari M, Rakhshanderou S, Ramezankhani A, Noroozi M, Armoon B (2018). Exploration of brushing behavior among university students in Iran: A qualitative research. *Int J Adolesc Med Health.* doi: 10.1515/ijamh-2017-0115
- Goodarzi A, Heidarnia A, Tavafian S, Eslami M (2017). Measurement of health belief model constructs in relation with the

- oral health practice of female students in Tehran. *J Educ Health Promot.* 5(4): 25–37. Retrieved from <https://www.semanticscholar.org>
- Goodarzi A, Heidarnia A, Tavafian S, Eslami M (2019). Predicting oral health behaviors among Iranian students by using health belief model. *J Educ Health Promot.* 8(10). doi: 10.4103/jehp.jehp_10_18
- Hurlock (2011). Psikologi perkembangan :satu pendekatan sepanjang rentang kehidupan. Edisi ke-5. Edited by I. Soedjarwo &. Jakarta: Erlangga.
- Inglehart M, Zuzo G, Wilson J (2017). Kindergarten/Elementary School Teachers and Web-based Oral Health-Related Resources: An Exploration. *Oral Health Prev Dent.* 15(3): 229-236. doi: 10.3290/j.ohpd.a38159.
- Kementerian Kesehatan (2009). Undang-Undang No. 36 Tahun 2009. Jakarta: Indonesia.
- Kementerian Kesehatan (2018). Hasil utama laporan riskesmas 2018. Jakarta: Badan penelitian dan pengembangan kesehatan departemen kesehatan republik indonesia.
- Leary S, Do L (2019). Changes in oral health behaviours between childhood and adolescence: Findings from a UK cohort study. *Community Dent Oral Epidemiol.* 1–7. doi: 10.1111/cdoe.12475.
- Lee C, Ting C, Wu J, Lee K, Chen H dan Chang Y (2017). Dental visiting behaviours among primary schoolchildren: Application of the health belief model. *Int J Dent Hyg.* 16(2): 88–95. doi: 10.1111/idh.12319.
- López-Núñez B, Aleksejūnienė J, Villanueva-Vilchis M (2019). School-based dental education for improving oral self-care in mexican elementary school-aged children. *Health Promot Pract.* 20(5): 684–696. doi: 10.1177/1524839919840342.
- Murti B (2016). Riset epidemiologi. Surakarta: UNS Press.
- Murti B (2018). Teori promosi dan perilaku kesehatan. Surakarta: Pascasarjana Ilmu Kesehatan Masyarakat UNS.
- Peyman N, Porhaji F (2015). The effects of educational program based on the health belief model on the oral health behaviors of elementary school students. *Mod Care J.* 12(2):74-78.
- Priyoto (2015) Perubahan dalam perilaku kesehatan. Yogyakarta: Graha Ilmu.
- Rahmati-najarkolaei F, Rahnama P, Fesharaki M, Yahaghi H (2016). Determinants of dental health behaviors of iranian students based on the Health Belief Model (HBM). *Shiraz E Medical Journal.* 17: 7-8. doi: 10.17795/semj39-268.
- Sariningsih (2012). Merawat gigi anak sejak dini. Jakarta: PT.Gramedia.
- Vahid N, Hamid A, Mahbobeh S, Masoumeh S, Mahmood K (2019). The effect of oral health promotion program on early dental decay in students: A cluster randomized controlled trial. *J Caring Sci.* 8(2): 105–110. doi: 10.15171/jcs.2019.0-15.
- Wahengbam P, Kshetrimayum N, Wahengbam B, Nandkeoliar T, Lyngdoh D (2016). Assessment of oral health knowledge, attitude and self-care practice among adolescents - A state wide cross-sectional study in Manipur, North Eastern India. *J Clin Diagn Res.* 10(6): 65-70. doi: 10.7860/JCDR/2016/20693.8002
- WHO (2016). Kasus Karies pada Anak Balita. Retrieved from <https://health.kompas.com>