

The Correlation between a Mother's Behavior Regarding Her Child's Dietary Habits and Early Childhood Caries (Based on the Theory of Planned Behavior)

Iwany Amalliah Badruddin^{1*}, Almas Riska Zhafarina², Anton Rahardjo¹,
Ciptasari Prabawanti³, Melissa Adiatman¹

1. Department of Dental Public Health and Preventive Dentistry, Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia.
2. Undergraduate Program, Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia.
3. Family Health International 360 Jakarta, Menara Salemba Building 3rd Floor, Jalan Salemba Raya, Jakarta, Indonesia.

Abstract

Objective: To obtain information regarding the relationship of a mother's behaviour in relation to her child's dietary habits based on the theory of planned behavior (TPB) with Early Childhood Caries (ECC). **Methods:** This research comprised a cross-sectional study using a TPB questionnaire on 295 mothers and intra-oral examinations on 295 children in the District of Beji, Depok, Indonesia. The calibration of the TPB questionnaire was conducted prior to the research. The internal and external reliability of the children's dietary habits questionnaire was Cronbach's alpha = 0.863 and Intraclass Correlation (ICC) = 0.899. **Results:** The prevalence of ECC in the Beji District was 53.9%, with a DMFT score of 3.46 and plaque score of 7.66. The correlation between children's dietary habits and ECC was significant and constituted a negative correlation ($r = -0.293$ and $r = -0.197$). **Conclusion:** There was a significant correlation between a mother's behavior in relation to her child's dietary habits based on the TPB, with ECC. These findings have important implications for the prevention of ECC in children because they suggest that prevention programs need to also focus on mother's behavior towards oral health, since it affects their children's dietary habits.

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Introduction

Dental caries is one of the most prevalent diseases in children in the world.¹ Caries is defined as a chronic infection of a tooth caused by the *Streptococcus mutans* bacteria. Caries in the primary teeth of children under 6 years of age is referred to as *early childhood caries* (ECC).² ECC is a common problem in children 3–5 years of age. The prevalence of caries in children aged 3–5 years in Jakarta was 81.2%.³ According to the Ministry of Health of the Republic of Indonesia data of Basic Health Research (RISKESDAS), in 2007, the prevalence of dental and oral problems in Indonesia was 80%, of

which 90% concerned children under five years of age.⁴ With the high prevalence and higher potential of permanent teeth exposed to dental caries, ECC has become a serious problem in children.

To develop, caries requires a host (tooth in the oral cavity), food substrate, and aciduric bacteria as a direct etiology. Saliva is also found to be one of the host components.⁵ ECC also has an indirect etiology, i.e., the socioeconomic status of the family, maternal knowledge of dental and oral health, maternal education, and maternal breastfeeding status. Children with ECC tend to have parents with low socioeconomic status. Indeed, socioeconomic status will affect the environment, the ability to provide food, access to healthcare services, and education of children.⁶ Parental knowledge of dental and oral health is also one of the factors that influences parents' behavior concerning oral health care for them and their children. Williams et al.'s study showed that the incidence of caries in three-year-

*Corresponding author:

Iwany Amalliah Badruddin
Department of Dental Public Health and Preventive
Dentistry, Faculty of Dentistry, Universitas
Indonesia, Jakarta, Indonesia
E-mail: iwanybadruddin@gmail.com

old children was associated with a low level of maternal knowledge of dental and oral health.⁷

Kerrod B. Hallett and Peter K. O'Rourke's study showed that maternal education has a profound relation with the severity of ECC.⁸ Mothers with higher education have better knowledge of dental and oral hygiene practices and the importance of deciduous teeth. In Blum's model, health was affected by four determinants, including: healthcare services, genetics, environment, and behavior. Hickman stated that behavior, including lifestyle choices, had a greater impact on health than any other determinants.¹⁰ Therefore, behavior is very important in maintaining dental and oral health. The role of a mother in a family is needed in developing habits and the oral health status of children, particularly children under 6 years old.

According to Suresh et al., a mother's level of knowledge and habits concerning dental and oral hygiene, such as tooth brushing, diet, and food selections will affect the dental and oral health of children.⁹ Considering the close relationship between mothers and children during such a period, the mother's behavior in oral health care needs to be observed, as children under the age of 6 will rely on their mother in cleaning their teeth and mouths. In the health context, health behavior is influenced by individual perceptions about a given health problem, by internal and external modifying factors, and by the relative weight of perceived benefits and barriers.¹¹

Among many behavioral theorists, Ajzen expanded the theory of reasoned action (TRA), which emphasizes the importance of attitude and intention in behavior change, with perceived behavioral change (PBC) in 1991. He showed that the most important determinant in behavior is intention, which is formed by attitude (ATT) and the subjective norm (SN).¹² Ajzen then added perceived behavioral change (PBC) to make the theory of planned behavior (TPB).¹³

Motivation is also important in oral health care, other than dental and oral knowledge. One of the most widely used theories of motivation in dental and oral health intervention is the TPB.¹⁴ The TPB includes three psychological factors as independent determinants of intention behavior, i.e., attitude (ATT), subjective norm (SN), and perceived behavior control (PBC).¹⁵ ATT is an overall assessment of behavior, and SN represents the pressure of certain people such

as parents and peers, the influence of belief and culture, and public opinions about the occurrence of a behavior. PBC describes the possibility a behavior may occur based on desire but limited by the difficulty of its execution.¹⁴ These three determinants can generate behavior intention, which then will influence whether a behavior occurs.^{14,15} In general, the stronger the intention to engage in a behavior, the more likely one is to perform a behavior.¹⁶

The above data have shown the high prevalence of caries in children, and it is known that children under the age of 6 years spend their time mostly with their mother and rely on their mothers in terms of oral health care. Generally, the better ATT and SN involved in a behavior, with the support of high PBC, the greater the possibility a person will perform such behavior.¹⁷ Hence, this study will observe the correlation between the oral health behaviors of mothers seen from the TPB regarding ECC.

Methods

A cross-sectional approach with observational analytics was applied in this study, which was carried out in 5 integrated health service posts (*Posyandu*) in the Beji District. The subjects were mothers and pairs of children under 6 years old with primary teeth. The number of registered pairs was 335, but only 295 had complete secondary data. The data collection in the study consisted of an intra-oral examination on the children using the DMFT index and plaque score, as well as an interview of the mothers with the TPB questionnaire. The TPB questionnaire was constructed under the supervision of an expert from the Psychology Department who calibrated its validity and reliability prior to the study. The internal reliability result using Cronbach's alpha showed a good consistency score (0.863). External reliability using test-retest (ICC) also showed an excellent agreement score (0.899). An ethical proposal was submitted to the Commission of Ethics of Dentistry Research (KEPKG). The mothers were asked to complete the questionnaire interview and informed consent forms to get approval for intra-oral examinations on children. Data analysis was performed using SPSS version 20 for descriptive and inferential analysis. The Spearman correlation test was used to examine the relation between variables.

Results

The total number of subjects of the study was 335 pairs of mothers and children, with a data completeness of 295. The subjects who were children consisted of 150 boys and 145 girls at an average age of 31.70 months. The average maternal age was 31.09 years. The highest percentage of mothers' education level was in the medium category, i.e., senior high school/equivalent/D3, at 61.1%, whereas 32.5% of mothers have an education level of primary school/junior high school, and 6.4% of mothers have an education level of undergraduate (S1) or higher. Maternal employment status indicated more mothers who do not work, i.e., 88.8%, whereas working mothers comprised 11.2% of the subjects. Family economic status was assessed using the UMR (regional minimum wages) of Depok City, with the results 65.1% below the UMR and 34.9% above the UMR. With a DMFT score at 3.46, 53.9% of the children had ECC, and the plaque score was at 7.66 (Table 1).

In the questionnaire, children's dietary habits consisted of the habit of giving a snack or sweet snack to children more than 3 times a day and the habit of giving bottle milk to children until they fell asleep. The answers to the questionnaire consisted of 7 scales; the greater the score, the better the behavior. In questions concerning ATT, the total score ranged from 5–35.

Questions about SN had a total score of 3–21, and questions of PBC, intention, and behavior each had a score ranging from 1–7. The distribution of answers regarding the habitual behavior of giving a snack/sweet snack to children more than 3 times a day indicates more mothers who answered ATT, SN, intention, and behavior in the good category, whereas concerning PBC, more answers from mothers were in the bad category. The answers in the neutral category (no answer) is the smallest percentage for all components.

On the habitual behavior of feeding bottle milk to children until the children fell asleep, the distribution of answers indicates more mothers who rated ATT, SN, PBC, intention, and behavior as good. Regarding this behavior, the answers in the neutral category (no answer) are also at the smallest percentage on all components.

Based on the result of Spearman's correlation test on the habitual behavior of giving a snack/sweet snack to children more than 3 times a day, ATT, SN, and PBC were significantly correlated with the intention to reduce such behavior, ($p < 0.001$) for ATT and SN, and ($p < 0.05$) for PBC. There was also a significant correlation between intention and the habitual behavior of giving a snack/sweet snack to children more than 3 times a day ($p < 0.05$).

The correlation score between ATT, SN, and PBC and intention and between intention and behavior itself suggested a positive correlation, which means an increase in ATT, SN, and PBC will increase intention, and an increase in intention will increase behavior. The result of a correlation test between behavior and ECC and plaque in children also indicated a significant correlation ($p < 0.001$), where the negative correlation score means an improvement in behavior will decrease ECC and plaque in children.

On the habitual behavior of giving bottle milk to children until they fell asleep, there was a significant correlation between ATT, SN, and PBC and the intention to reduce such behavior ($p < 0.001$). A correlation test between the intention and habitual behavior of giving bottle milk to children until they fell asleep also indicated a significant correlation ($p < 0.001$). The correlation score between ATT, SN, and PBC and intention and between intention and such behavior showed a positive correlation. This means that an increase in ATT, SN, and PBC will increase intention, and an increase in intention will improve behavior.

There was also a significant correlation between the habitual behavior of giving bottle milk to children until they fell asleep and ECC and plaque in children ($p < 0.05$), with a negative correlation score, which means an improvement in behavior will reduce ECC and plaque in children.

Table 1. ECC and Plaque Score in Child Subjects

Variable	Mean	SD	Min–Max
ECC	3.46	4.53	0–20
Plaque	7.66	6.65	0–18

Table 2. Distribution of Answers on the Habit of Giving Snack/Sweet Snack to Children More than 3 Times a Day

	n (%)	Mean
ATT: Feelings/thoughts about the habit of giving snack/sweet snack to children more than 3 times a day		28.03
Good (21–35)	239 (81)	
Bad (5–19)	49 (16.6)	
No Response (20)	7 (2.4)	
		16.41
SN: Opinion of people concerning the habit of giving snack/sweet snack to children more than 3 times a day		
Good (13–21)	228 (77.3)	
Bad (3–11)	50 (16.9)	
No Response (12)	17 (5.8)	
		3.98
PBC: Ability to limit the habit of giving snack/sweet snack to children more than 3 times a day		
Good (5–7)	113 (38.3)	
Bad (1–3)	131 (44.4)	
No Response (4)	51 (17.3)	
		5.3
Intention: Intention to reduce the habit of giving snack/sweet snack to children more than 3 times a day		
Good (5–7)	211 (71.5)	
Bad (1–3)	60 (20.3)	
No Response (4)	24 (8.1)	
		4.83
Behavior: Habit of giving snack/sweet snack to children more than 3 times a day		
Good (5–7)	217 (73.6)	
Bad (1–3)	50 (16.9)	
No Response (4)	28 (9.5)	

Table 3. Distribution of Answers on the Habit of Giving Bottle Milk to Children until the Children Fell Asleep

	n (%)	Mean
		27.34
ATT: Feeling/thought toward the habit of giving bottle milk to children until the children fell asleep		
Good (21–35)	226 (76.6)	
Bad (5–19)	58 (19.7)	
No Response (20)	11 (3.7)	
		16.89
SN: Opinion concerning the habit of giving bottle milk to children until the children fell asleep		
Good (13–21)	238 (80.7)	
Bad (3–11)	48 (16.3)	
No Response (12)	9 (3)	
		4.57
PBC: Ability to limit the habit of giving bottle milk to children until the children fell asleep		
Good (5–7)	156 (52.9)	
Bad (1–3)	110 (37.3)	
No Response (4)	29 (9.8)	
		5.35
Intention: Intention to reduce the habit of giving bottle milk to children until the children fell asleep		
Good (5–7)	205 (69.5)	
Bad (1–3)	62 (20.7)	
No Response (4)	29 (9.8)	
		4.82
Behavior: Habit of giving bottle milk to children until the children fell asleep		
Good (5–7)	182 (61.7)	
Bad (1–3)	94 (31.9)	
No Response (4)	19 (6.4)	

Table 4. Relation between ATT, SN, and PBC and Intention in Mother's Oral Health Behavior with Children

Habit	Number of subjects (n)	Correlation coefficient (r)	p Value
Giving snack/sweet snack to children more than 3 times a day			
ATT	295	0.224	0.001
SN	295	0.288	0.001
PBC	295	0.132	0.024
Giving bottle milk to children until they fell asleep			
ATT			
SN	295	0.269	0.001
PBC	295	0.254	0.001
	295	0.273	0.000

Table 5. Relation between Intention and Mother's Oral Health Behavior with Children

Intention to eliminate the habit	Number of subjects (n)	Correlation coefficient (r)	p Value
Giving snack/sweet snack to children more than 3 times a day	295	0.148	0.001
Giving bottle milk to children until they fell asleep	295	0.258	0.001

Table 6. Relation between Mother's Oral Health Behavior with Children and ECC and Plaque in Children

Habit	ECC (DMFT)			Plaque		
	Number of subjects (n)	Correlation coefficient (r)	p Value	Number of subjects (n)	Correlation coefficient (r)	p Value
Giving snack/sweet snack to children more than 3 times a day	295	-0.293	0.001	295	-0.276	0.001
Giving bottle milk to children until they fell asleep	295	-0.197	0.001	295	-0.190	0.001

Discussion

In this study, quite a high prevalence of ECC was found in children, i.e., at 53.9%, with a DMFT average of 3.46 and plaque score average of children at 7.66 of the total score of 18.

This was not in accordance with the Oral Health Global Goal 2010 of the World Health Organization (WHO), which expected caries-free children aged 5–6, whereas based on the result of this study, some caries were still found in children under 6 years old.¹⁸

Based on the analysis of results concerning the answer distribution of the TPB questionnaire, on the habitual behavior of giving a snack/sweet snack to children more than 3 times a day, the highest percentage answers of ATT were in the good category (81%), with an average total score of 28.02. The maximum score was 35, and highest percentage answers of SN were also in the good category (77.3%), with an average total score of answers being 16.41 of the maximum score of 21 in that category. The PBC concerning this behavior had the highest percentage of answers in the bad category (44.4%), with an average total score being 3.98 of the maximum score of 7. Intention and behavior showed the highest percentage answers in the good category, at 71.5% and 73.6%, with an average score of answers at 5.32 and 4.83 of the maximum score of 7.

On the habitual behavior of giving bottle milk to children until they fell asleep, all determinants of TPB, intention, and behavior showed results in the good category with the maximum score of each component equal to the habit of giving a snack/sweet snack to children more than 3 times a day. The percentage of ATT good category answers was 76.6%, with an average total score of 27.34. The good category of SN was at 80.7%, with answers' average total score at 16.89. The good category of PBC was 52.9%, with an average total score of answers at 4.57. Concerning intention and behavior, the most answers were in the good category, which was 69.5% and 61.7%, with an average score of answers being 5.35 and 4.82.

From the results of the correlation test, it was found that ATT, SN, and PBC

had a relationship with the intention to eliminate the habit of giving a snack/sweet snacks to children more than 3 times a day, with a positive correlation score, which means the higher the ATT, SN, and PBC, the higher the intention. This matter was consistent with Branden's research in 2014 that these three determinants can influence a mother's intention to limit the consumption of sweet snacks.¹⁹ In this study, a relationship was found between the intention and habitual behavior of giving a snack/sweet snack to children more than 3 times a day. The higher intention will result in better behavior. This is in accordance with Ajzen's theory that intention can predict behavior.¹⁶

Meanwhile, a correlation test assessing the behavior of giving snacks/sweet snacks to children more than 3 times a day and ECC showed that there was a relation between the two, but the obtained correlation score was negative. This means there was an inverse relation, i.e., if the habitual behavior of giving a snack/sweet snack to children more than 3 times a day improved, the ECC score of children would decrease. The same was found in the correlation test between behavior and plaque in children. This is consistent with Setiawati's study (2008), which found a relationship between a cariogenic snack habit and ECC.²⁰

On the habit of giving bottle milk to children until they fell asleep, a relationship was found between ATT, SN, and PBC and the intention to eliminate giving bottle milk to children until they fell asleep. This means that the higher the ATT, SN, and PBC, the higher the intention will be, consistent with Ajzen's theory (1991) that ATT, SN, and PBC can affect intention.¹⁶ The correlation test between intention and the habitual behavior of giving bottle milk to children until they fell asleep showed a relationship.

This is in accordance with the theory advanced by Fishbein and Ajzen (1975) that intention and behavior had a strong correlation. Ajzen (1985) also posited the theory that intention along with PBC would interact and predict behavior.¹⁷ The relationship between the habitual behavior of giving bottle milk to children until they fell asleep and children's DMFT showed a relationship with a negative correlation

score. The same was found concerning the relationship between the habitual behavior of giving bottle milk to children until they fell asleep with plaque in children. This finding was consistent with the research of Reisine dan Douglass (1998). The habit of feeding bottle milk to pre-school-aged children was a significant cause of the occurrence of caries.²¹

The correlation coefficient value between the three determinants of TPB, which are ATT, SN, PBC, and intention, tend to be weak. This can happen because the dimension relation of PBC and intention depends on the type of behavior and situation. Dumitrescu et al. showed that ATT has a strong predictor value, likely due to dividing it into two models, namely ATT affective and instrumental. A model like that would result in a significantly better relation compared to the combination model.²² For SN and the intention correlation coefficient value, Tramow and Finlay (1996) said that, for SN, it was due to only a small percentage of individuals whose behavior was strongly driven by perceived social pressure.²³

It was also rarely seen as directly affecting intention. This has led some researchers to suggest changing the concept of the TPB study.²⁴ PBC was the strongest predictor of intention, but there was a possibility that PBC has a weak correlation with intention.¹⁶ In the research of Beale and Manstead (1991) on maternal behavior limiting the consumption of sweets in children, PBC has a significant relationship with intention only concerning a mother's behavior with older children. This suggested that personal experience with a behavior plays a role in controlling the behavior, so that it can make PBC a strong predictor of intention.²

Conclusion

With the prevalence of ECC at 53.9% and a DMFT score at 3.46 in the children of Beji District, the TPB questionnaire was used to measure the relationship between the disease and whether it was due to mothers' behavior controlling their children's dietary habits. The correlation tests found the result of a significant relation between ATT, SN, and

PBC and intention, between intention and behavior, and between behavior, DMFT, and plaque in children on the habitual behavior of giving a snack/sweet snack to children more than 3 times a day. There is also a significant relation between ATT, SN, and PBC and intention, between intention and behavior, and between behavior, DMFT, and plaque in children on the habitual behavior of giving bottle milk to children until they fell asleep.

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