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Caregiver behavior in teaching toothbrushing to early childhood in Surabaya City based on the Theory of Planned Behavior

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Abstract

Background: Early childhood dental caries remains a major public health problem in Indonesia. Children under five years of age depend heavily on adults for oral health practices, including toothbrushing. Due to increasing parental employment, caregiving responsibilities are often delegated to caregivers, whose behavior plays a critical role in shaping children's oral hygiene habits. The Theory of Planned Behavior (TPB) provides a framework for understanding factors that influence caregiver behavior.

Objective: This study aimed to analyze caregiver behavior in teaching toothbrushing to early childhood children in Surabaya City based on the Theory of Planned Behavior.

Methods: This cross-sectional study was conducted among caregivers of early childhood children in Surabaya City. A total of 70 respondents were selected using cluster random sampling. Data were collected through structured questionnaire-based interviews. Statistical analysis was performed using the Spearman correlation test with a significance level of $p < 0.05$.

Results: Among the TPB variables, attitude and perceived behavioral control (PBC) showed a significant influence on caregivers' intention to teach toothbrushing ($p < 0.05$). These factors were strongly associated with caregiver behavior in promoting toothbrushing practices in early childhood.

Conclusion: Attitude and perceived behavioral control are key determinants in strengthening caregivers' intentions and behaviors in teaching toothbrushing to young children. Interventions aimed at improving these factors may enhance oral hygiene practices in early childhood.

Keywords: Caries; Caregivers; Behavior; Early Childhood; Theory of Planned Behavior

1. Introduction

Oral health problems, particularly dental caries, remain a major global concern in early childhood. The Global Burden of Disease study reported a high prevalence of caries in both primary and permanent teeth among children, despite the World Health Organization's target of achieving a DMF-T index of zero by 2030. 1 Early childhood is associated with poor oral hygiene practices and frequent consumption of sweet, cariogenic foods, increasing the risk of dental caries.2

In Indonesia, dental caries prevalence among children under five years of age remains extremely high. Riskesdas 2018 reported a caries prevalence of 90.2% in this age group. A study in Surabaya found that 68.5% of kindergarten children

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experienced caries, with no evidence of restorative treatment, indicating insufficient preventive and curative oral health care.3

Primary teeth play an essential role in children's growth and development; however, they are often neglected due to the misconception that they are temporary and do not require proper care. Parents and caregivers are expected to guide children in maintaining oral hygiene, particularly toothbrushing, which is a key preventive behavior against caries.3 Dental caries development is influenced by behavioral, environmental, and demographic factors, including oral hygiene practices and socioeconomic conditions.4

Urbanization and social changes, especially in Surabaya, have increased the number of dual-income families, resulting in greater reliance on caregivers and daycare services.5 Caregivers play a vital role in shaping children's daily health behaviors, including oral hygiene. Children under five years of age depend entirely on adults for health-related decisions, which can influence long-term behavior patterns.6

The Theory of Planned Behavior (TPB) is a well-established model for understanding health behaviors. TPB proposes that behavior is influenced by intention, which is determined by attitude, subjective norms, and perceived behavioral control.7 Applying this framework can help identify key factors influencing caregiver behavior in teaching toothbrushing to early childhood children. Therefore, this study aims to analyze caregiver behavior in teaching toothbrushing to early childhood children in Surabaya City based on the Theory of Planned Behavior.

2. Materials and Methods

This study employed an observational analytic design with a cross-sectional approach. All variables were measured and observed simultaneously at a single point in time. Each research subject was observed only once, and measurements were conducted to assess the characteristics and variables of interest at the time of data collection. The study population consisted of caregivers of children aged approximately 2–4 years who were enrolled in daycare centers in Surabaya City. This age group was selected because the prevalence of dental caries in early childhood tends to be high. Samples were selected using a cluster random sampling technique, in which sampling was based on groups or clusters rather than individual subjects. The minimum required sample size for this study was 19 caregivers.

The dependent variable in this study was caregiver behavior in teaching toothbrushing to children, while the independent variables included attitude toward behavior, subjective norms, perceived behavioral control, and intention. Data were collected using a structured questionnaire designed to assess caregiver behavior in teaching toothbrushing to preschool children in Surabaya based on the Theory of Planned Behavior. The questionnaire was developed to describe oral health behavior through a TPB approach and was adapted from a combination of the Hiroshima University–Dental Behavioral Inventory (HU-DBI) from Japan and the appendix questionnaire used in a study by Ling Zhu et al. in China. These instruments were synthesized and adjusted in accordance with the guidelines for Constructing a Theory of Planned Behavior Questionnaire (Ajzen, 2006).

The study was conducted in daycare centers in Surabaya City, with data collection carried out from October to November 2019. Data analysis was performed using correlation analysis to examine the relationship between dependent and independent variables. The Spearman correlation test was used to determine the association between variables.

3. Results

This study was conducted in six randomly selected daycare centers in Surabaya City, with a total of 70 caregiver respondents who cared for children aged 2–4 years. Data collection was carried out between September and October. The collected data were tabulated to describe respondent characteristics and caregiver behavior in teaching toothbrushing to children aged 2–4 years in Surabaya based on the Theory of Planned Behavior framework.

Respondent age was categorized according to the classification issued by the Indonesian Ministry of Health (2009), which included late adolescence (17–25 years), early adulthood (26–35 years), late adulthood (36–45 years), and early elderly (46–55 years). Most respondents were in the late adolescence category, accounting for 27 individuals (38.6%). Respondents in early adulthood comprised 22 individuals (31.4%), followed by late adulthood with 12 individuals (17.1%) and early elderly with 9 individuals (12.9%). These findings indicate that the majority of caregivers involved in this study were relatively young.

Regarding educational background, 33 respondents (47.1%) had an education level of elementary, junior high, or senior high school, while 37 respondents (52.9%) had completed education beyond senior high school. This distribution suggests that more than half of the caregivers had attained a relatively higher level of education.

Analysis of the relationship between attitude and intention showed that high intention was more frequently observed among respondents with a good attitude, with 21 respondents (61.8%) reporting high intention, compared to those with a poor attitude. In terms of subjective norms, respondents who frequently experienced social pressure demonstrated higher intention, with 22 respondents (61.1%) reporting high intention, while those who did not experience such norms were more likely to report lower intention. For perceived behavioral control, respondents who perceived toothbrushing instruction as easy to perform showed a higher proportion of high intention, with 21 respondents (58.3%), compared to those who perceived it as difficult.

The relationship between intention and behavior indicated that caregivers who reported high intention were more likely to perform toothbrushing instruction behavior, with 33 respondents (51.6%) reporting that they practiced teaching toothbrushing. In contrast, respondents with low intention showed a lower proportion of performing the behavior.

Differences in sociodemographic factors, including age and education, were analyzed in relation to the components of the Theory of Planned Behavior using the Kruskal–Walli's test (Table 1). The results demonstrated that age was not significantly associated with attitude toward behavior, subjective norms, perceived behavioral control, intention, or behavior ($p > 0.05$). Similarly, educational level showed no significant differences across attitude, subjective norms, perceived behavioral control, intention, and behavior ($p > 0.05$), indicating that these sociodemographic factors did not significantly influence the TPB components in this study.

Table 1 Differences in sociodemographic factors and TPB components

Sociodemographic factors	**Attitude toward behaviour Mean ± SD (p value)**	**Subjective norms Mean ± SD (p value)**	**Perceived behavioural control Mean ± SD (p value)**	**Intention Mean ± SD (p value)**	**Behaviour Mean ± SD (p value)**
Age	20.31 ± 3.09 (0.147)	19.51 ± 13.91 (0.187)	19.69 ± 3.23 (0.167)	21.51 ± 2.32 (0.930)	23.49 ± 1.69 (0.124)
Education	– (0.258)	– (0.804)	– (0.224)	– (0.280)	– (0.320)

Significant at $p < 0.05$

Spearman correlation analysis revealed a significant positive correlation between attitude and intention ($p < 0.05$; $r = 0.486$), indicating a moderate relationship (Table 2). Subjective norms did not show a significant correlation with intention ($p = 0.434$; $r = 0.095$). Perceived behavioral control demonstrated a significant but weak positive correlation with intention ($p < 0.05$; $r = 0.282$). Furthermore, intention was significantly correlated with behavior ($p < 0.05$; $r = 0.389$), indicating a weak positive relationship between caregivers' intention and their actual behavior in teaching toothbrushing to children.

Table 2 Spearman correlation analysis among TPB components

Variables	**p value**	**Correlation coefficient (r)**
Attitude – Intention	0.000	0.486**
Subjective norms – Intention	0.434	0.095
Perceived behavioural control – Intention	0.018	0.282*
Intention – Behaviour	0.001	0.383**

* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

4. Discussion

This study was an observational analytic study with a cross-sectional design conducted among caregivers of children aged 2–4 years attending daycare centers in Surabaya City. Cluster random sampling was used to select caregivers from randomly chosen daycare centers in order to examine the relationships between attitude, subjective norms, perceived behavioral control, intention, and caregiver behavior in teaching toothbrushing to young children based on the Theory of Planned Behavior (TPB).

Children in early childhood have limited knowledge and understanding of oral and dental hygiene practices and remain highly dependent on adults for maintaining their oral health. Noviani (2010) reported that toddlers are unable to independently manage oral hygiene due to insufficient knowledge and cognitive development, making adult guidance essential.8 Similarly, Cahyaningrum (2017) emphasized that early childhood health development, including oral health, is strongly influenced by adult attention, knowledge, attitudes, and behaviors. Therefore, caregivers play a crucial role in shaping toothbrushing habits in young children.9

Age and educational level are often assumed to influence health-related decision-making. Suryabudhi (2003) suggested that increasing age is associated with greater experience, knowledge, and improved decision-making abilities. Likewise, Azwar (2007) stated that higher educational attainment enhances rational thinking and facilitates the absorption and processing of health-related information. However, in the present study, sociodemographic factors such as age and education were not significantly associated with any TPB components, including attitude, subjective norms, perceived behavioral control, intention, or behavior. These findings indicate that caregiver behavior in teaching toothbrushing may not be strongly determined by sociodemographic characteristics alone, but rather by psychological and cognitive factors as proposed in TPB.10

The Theory of Planned Behavior provides a well-established framework for predicting and explaining human behavior based on beliefs and attitudes. According to TPB, intention is the most immediate determinant of behavior, and intention itself is influenced by attitude toward the behavior, subjective norms, and perceived behavioral control. 7 In this study, attitude and perceived behavioral control were identified as the strongest predictors of intention, while subjective norms did not show a significant relationship with intention.

The significant positive correlation between attitude and intention indicates that caregivers who held more favorable attitudes toward teaching toothbrushing were more likely to intend to perform the behavior. This finding is consistent with TPB, which posits that individuals who perceive a behavior as beneficial and valuable are more motivated to engage in that behavior. The moderate strength of the correlation suggests that attitude plays a substantial role in shaping caregivers' intentions. 7

Perceived behavioral control was also significantly associated with intention, although the strength of the relationship was relatively weak. This finding suggests that caregivers who perceived teaching toothbrushing as easy and manageable were more likely to intend to perform the behavior. According to Ajzen, perceived behavioral control reflects an individual's confidence in their ability to perform a behavior and may influence both intention and behavior directly. In the context of this study, caregivers who felt capable of teaching toothbrushing were more likely to form intentions to do so.11

In contrast, subjective norms did not significantly influence intention. Subjective norms represent perceived social pressure from important others to perform or not perform a behavior.7 The lack of a significant relationship in this study may be explained by the specific context of caregiving in daycare settings, where decisions related to daily child care practices may rely more on personal beliefs and perceived competence rather than external social expectations. This finding supports previous studies suggesting that when individuals possess strong internal motivation and confidence, external social influence may play a limited role.12

Furthermore, intention was found to be significantly associated with actual behavior, indicating that caregivers with higher intention were more likely to practice teaching toothbrushing to children. This result aligns with TPB assumptions and previous research showing that intention is a strong predictor of behavior when individuals have sufficient control over the behavior.11 Intention reflects a conscious plan or readiness to act, which is subsequently translated into observable behavior.

Overall, the findings of this study suggest that caregiver behavior in teaching toothbrushing to young children is predominantly influenced by internal factors, particularly attitude and perceived behavioral control, rather than

external social pressure. Even in the absence of supportive subjective norms, caregivers with positive attitudes and adequate perceived control are still likely to teach toothbrushing to children.

5. Conclusion

This study concludes that caregiver behavior in teaching toothbrushing to early childhood children in Surabaya City, based on the Theory of Planned Behavior, is significantly associated with attitude and perceived behavioral control. Subjective norms were not significantly related to caregiver behavior. These findings indicate that even without social support from the surrounding environment, caregivers with positive attitudes and a strong sense of control are capable of teaching toothbrushing to children effectively. Future studies are recommended to include additional factors that may influence caregiver behavior, such as knowledge, motivation, and other psychosocial variables, in order to obtain a more comprehensive understanding of determinants of oral health behavior in early childhood.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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