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Determinant of Smoking Behavior among Elementary Student in Indonesia: A Structure Equation Model

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Abstract

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BACKGROUND: Initial smoking exposure may occur during early adolescence (aged 10–12 years old) and it increases over time. Although several factors for smoking behaviors exist among adolescents, there is few studies address determinant of smoking behavior by adding others variables in theory of plan behavior (TPB) such as smoking refusal skills, self-regulation, parenting, family function, environment, and culture.

AIM: The aim of this study was therefore to evaluate the determinant of smoking behavior among elementary student in Indonesia using a structural equation model.

METHODS: A cross-sectional survey was carried out from June to October 2019 in West Java, Indonesia. For each school, students were selected using a systematic random sampling technique. The study included girls and boys ages 10–12. The consent was obtained by the parent or guardian. Structural equation modeling was used for analysis.

RESULTS: The mean age was 10.56 years (SD = 0.37). About 28.6% of them were currently smoking with aged of first use was 10.02 (SD = 0.19). More than half (56%) of their family were currently smoking too and friend smoking was 41.7%. The final model accounted for 27% and 39% of the variance of intention and smoking behavior, respectively, has both direct and indirect effect through empowerment on self-care behaviors toward pregnancy-related complication.

CONCLUSION: The present study was intended to expand the TPB by including additional variables in its model: smoking refusal skills, self-regulation, parenting, family function, environment, and culture. This study also provides a significant contribute for clinical a practice and policy maker as a basic data to establish future intervention to promote no tobacco use among elementary student to achieve optimal well-being to prevent a fatal disease.

Introduction

Smoking is a leading cause of preventable death worldwide, responsible for 1 in 10 deaths worldwide [1]. Around 1.3 billion people worldwide smoke and 7 million people die from tobacco consumption every year [1]. Despite efforts to reduce smoking rates among adults, smoking rates among young people continue to increase. Indonesia is the third largest smoking country in the world (46.16%) [2]. Tobacco smoking prevalence among students aged 10–14 years old was estimated to be 87.5% [2].

Adolescents are more prone to smoking if they were in a peer group that smokes [3]. The influence of the family on adolescent smoking is mainly due to the direct effects of family poverty, smoking parents, and family processes [4], [5]. Strong parental influence is demonstrated by the influence of parents, teachers, and siblings, while perceived social influence is shown by

peers, parents, and siblings [3]. The stronger the family relationship, the more likely adolescent smoking is to be stopped and avoided [6]. Adolescents are less likely to engage in risky behavior, such as alcohol consumption, drug use, juvenile delinquency, and smoking, if they have parents who set a good example for their activities inside and outside the family [7]. In some societies, there are several customs about smoking. For example, in Aceh culture (Indonesia), smoking is a cultural custom of enjoyment [8].

The social determinants of smoking behavior were carried out using a number of theoretical frameworks [2], [9], [10], [11], [12]. The theory of planned behavior (TPB) has been used to test if smoking is a learned behavior, as well as develop interventions to reduce cigarette consumption [13]. TPB assumes that the best predictor of behavior is behavioral intention; intention, in turn, has three determinants including subjective norm, perceive benefit, and perceive behavior control [14]. Despite several factors impacting adolescent

smoking behaviors, this study adds others variables to the TPB including smoking refusal skills, self-regulation, parenting, family function, environment, and culture. The objective of this study was to identify the most important factors associated with smoking behavior among elementary school students in Indonesia.

Methods

Research design

A cross-sectional survey was carried out from June to October 2019 in West Java, Indonesia. The study was able to determine the prevalence of all factors under investigation at one point in time. The study was carried out in the two largest districts of the city of Bogor, West Java, Indonesia. The list of schools was provided by the Ministry of Education. The schools were further stratified by form (private or public). The sample size was based on the assessment of the root-mean-square error of approximation (RMSEA). For each school, students were selected using a systematic random sampling technique.

Inclusive and exclusive criteria

The study included girls and boys ages 10–12. Their consent was obtained by the parent or guardian. Children who were not in school during the data collection period were not included in the study. People who were mentally challenged and children whose parents or guardians declined to provide assent or could not give consent did not take part in the study.

Instruments

The research instrument was the self-administered questionnaire which consisted of personal information, age, gender, family members' smoking status, friends' smoking status, age of the first use, and current smoking status. Students' current smoking was defined if smoking for ≥ 1 day during the past 30 days.

The student's intentions were measured using seven items to assess their smoking intentions. It asked "During the next 3 months, do you think you will smoke a cigarette?" "If your best friend offered you a cigarette, would you smoke it?" "How likely do you think your answers are to the following?" (Very unlikely). The researcher built the questionnaires based on the elicitation results and used them to estimate the content validity. Content validity ratio was 0.78 and content validity index (CVI) was 0.82. The internal consistency reliability coefficients was 0.69.

Attitude toward smoking were measured using four items from the Global Youth Tobacco Survey

(GYTS) such as "It makes you confident," "Cigarettes are enjoyable," "Positive attitudes toward non-smokers" such as "There are cool people who do not smoke" and "I think someone my age who does not smoke cigarettes looks well kept." Content validity was reviewed and approved by 5 experts with CVI range from 0.80 to 0.84. The internal consistency reliability coefficient was 0.72.

Subjective norm was assessed using three GYTS-derived items to test the effect of adolescent referents (parents, guardians and friends) on their smoking activity. Participants with mothers/female guardians or caregivers who smoke, and students who perceive norms conformity with smoking were asked to answer the questions. These were scored on a 5-point Likert differential scale, with scores ranging from 1 (strongly agree) to 5 (strongly disagree). Content validity was reviewed and approved by 5 experts with CVI range from 0.80 to 0.84. The internal consistency reliability coefficients was 0.72.

Perceived behavioral control was assessed by the single item extracted from GYTS, the feeling or belief that they should reject a cigarette if a friend offers. A 5-point Likert differential scale from 1 (very difficult) to 5 (very easy for me) were used to score the perceived behavior control. Content validity was reviewed and approved by 5 experts with CVI range from 0.80 to 0.84. The internal consistency reliability coefficients was 0.72.

Parenting is divided into authoritarian, democratic, and permissive. These were scored on a 5-point Likert differential scale, with scores ranging from 1 (strongly agree) to 5 (strongly disagree). Content validity was reviewed and approved by 5 experts with CVI range from 0.75 to 0.78. The internal consistency reliability coefficients was 0.70.

The environment is defined in the areas of family modeling, socialization with peers, and the accessibility of smoking facilities. These were scored on a 5-point Likert differential scale, with scores ranging from 1 (strongly agree) to 5 (strongly disagree). Content validity was reviewed and approved by 5 experts with CVI range from 0.81 to 0.83. The internal consistency reliability coefficients was 0.76.

Culture is included in individualism, collectivism, and social system symbols as measured by the differential semantic scale. Content validity was reviewed and approved by 5 experts with CVI range from 0.75 to 0.80. The internal consistency reliability coefficients was 0.70.

Self-efficacy consists of three things, namely: Magnitude, generality, and strength. Magnitude refers to assessing a person's level of difficulty in performing a specific task (e.g., how difficult is my job?). Power is the sum of the confidence of a person in good performance at a varying degree of difficulty or ability to perform a specific task (e.g., how sure am I that I can succeed at the job?). Generality refers to the degree to which

there are universal standards across circumstances (e.g., how to ensure that my new assignments apply to what I have learned?). For the self-efficacy component, the response varies from: (1) (Never able to do it), (2) (sometimes unable to do it), (3) (neutral), (4) (quite capable of doing it), (5) (quite capable of doing it), and (6) (always capable). Content validity was reviewed and approved by 5 experts with CVI range from 0.73 to 0.79. The internal consistency reliability coefficient was 0.73.

In this study, self-regulation is as follows: (1). Setting up standards/objectives, (2). Management of the strategy, and (3). Self-controlling. For self-regulation variables, the answer ranges are: (1) (Never does it), (2) (sometimes do it), (3) (neutral), (4) (ever), and (5) (never) (always). Content validity was reviewed and approved by 5 experts with CVI range from 0.77 to 0.82. The internal consistency reliability coefficient was 0.77.

1 Smoking Refusal Skill

Participants were asked to decide what they should do in a scenario where someone offered them a cigarette, with five choices available: "I certainly declined," "I say: I'm not smoking now," "I'm leaving the spot," "I'm not going to smoke," and "I'm going to change the topic of the conversation." Five answers were scored on a 5-point scale, ranging from 1 (strongly agreed) to 5-point (strongly disagree). Content validity was reviewed and approved by 5 experts with CVI range from 0.78 to 0.82. Internal reliability of the data was checked at 0.75.

2 Procedure

Ethical approval was obtained from the ethics research committee of the study institution. Information and name list regarding studied participants were obtained from the head of the school. All guardian or parental consent was sought. The researcher distributed a set of self-administered anonymous questionnaires to those who agreed to participate during the class break. Time to complete all questioners were around 25 to 45 minutes.

3 Data analysis

Assumptions for normality and homoscedasticity were met as the data were not skewed. Descriptive statistics (frequencies, percentages, mean, and standard deviation) and Pearson correlation statistical test was used to determine associations between outcome and exposure variables. Path analysis is used to determine those factors that influence smokers' behaviors. The fit of the model was examined by the non-significant Chi-square value, the RMSEA, standardized root means

square residual (SRMR), non-normed fit index (NNFI), comparative fit index (CFI), and adjusted goodness-of-fit indices (AGFI). RMSEA and SRMR are below 0.08, indicating an appropriate fit. The AGFI, CFI, and NNFI values ranged between 0 and 1, with AGFI and 0.90 and CFI and NFI and 0.97, which indicate that they are well fitted to the data [15]. IBM SPSS version 25 (Chicago, IL) statistical software LISREL Version 8.8 (Scientific Software International, Inc., Skokie, IL, USA) was used for data entry and analysis, and the level of significance was set at $p < 0.05$.

Results

Demographic characteristics

Table 1 shows the demographic characteristics of adolescent age of 10–12 years old in this study. The mean age was 10.56 years (SD = 0.37). About 28.6% of them were currently smoking, and their aged of first smoking was 10.02 (SD=0.19). More than half (56%) of their family were currently smoking too and friend smoking was 41.7%.

Table 1: Demographic characteristics of studied participants (n=175)

Variables	n (%)
Age in year (mean ± SD)	10.56 ± 0.37
Gender	
Male	85 (48.6)
Female	90 (51.4)
Current smoking	
Yes	50 (28.6)
No	125 (71.4)
Age of first use	10.02 ± 0.19
Family smoking	
Yes	98 (56.0)
No	77 (44.0)
Friend smoking	
Yes	73 (41.7)
No	102 (58.3)

Table 2 shows bivariate analysis of determinant factors of smoking behavior among adolescent aged 10–12 years old. Environment, culture, family function, skill to refuse, subjective norm, self-efficacy, self-regulation, attitude toward smoking, parenting, and intention were significant associated with smoking behavior with r value ranged from 0.103 to 0.616.

Table 2: Bivariate analysis of determinant factors for smoking behaviors among adolescent

Variables	Mean (SD)	Range	r
Environment	21.7 ± 6.9	6.0–30.0	0.217**
Culture	18.3 ± 6.6	7.0–30.0	0.273*
Family function	119.7 ± 18.9	54.0–148.0	0.141*
Skill to refuse	17.5 ± 2.8	2.0–27.0	0.103*
Subjective norm	22.6 ± 4.2	10.0–30.0	0.345**
Self-efficacy	24.6 ± 5.9	6.0–30.0	0.191*
Self-regulation	24.7 ± 3.8	6.0–30.0	0.193*
Attitude toward smoking	25.2 ± 3.3	12.0–30.0	0.171*
Parenting	23.2 ± 5.6	6.0–30.0	0.285*
Intention	27.1 ± 4.5	6.0–30.0	0.616**
Smoking behavior	27.6 ± 4.9	6.0–30.0	

** $p < 0.001$, * $p < 0.05$

Path analyses were used to determine the relationship between determinant factors and smoking behavior. The Chi-square was 95.02 and

degree of freedom (df) was 9, with a significant Chi-squared test result ($p = 0.09 > 0.05$). The goodness-of-fit indices for the hypothesized model were RMSEA = 0.04, AGFI = 0.94, CFI = 0.95, NFI = 0.92, and SRMR = 0.08, indicated that the final model fit to the data. The final model obtained is presented in Figure 1. The final model accounted for 27% and 39% of the variance of intention and smoking behavior, respectively. The both direct and indirect, and total effects of the selected factors of smoking behavior are shown in Table 3.

Table 3: Summary of standardized direct, indirect, and total effects of independent variables toward smoking behavior

Variables on the final path model	Smoking behavior		
	Direct effect	Indirect effect	Total effect
Environment	0.015*	0.03*	0.34**
Culture	-0.02*	0.02*	0.03*
Family function	-0.05*	0.21*	0.16*
Skill to refuse	0.30**	0.50**	0.36**
Subjective norm	-0.22*	0.47*	0.53**
Self-efficacy	0.08*	0.07*	0.15*
Self-regulation	0.07*	0.10*	0.18*
Attitude toward smoking	0.06*	0.04*	0.11*
Parenting	-0.04*	-0.03*	-0.07*
Intention	0.37**	0.44**	0.61**

**p<0.001, *p<0.05

Discussion

According to this study, 28.6% of the adolescent (aged 10 to 12 years olds) were current smokers and their aged of first smoking was 10.02 (SD=0.19). The majority of participants in the study were found to be less likely to smoke than previous research from Pakistan (82.66%) [16]. In a study involving the elementary school in Turkey (7), 43% of them reported having had smoking experience [17]. Smoking has become an

emblem of mode throughout the new age of advanced growth [16]. Increasing current trends in smoking have appeared alarmingly in the younger population of the city. Teenagers are the most vulnerable to smoking either because of their individual character or as part of education, boarding and community relations [18]. Smoking is also harmful and leads to a variety of lethal diseases [19]. The government and law enforcement agencies should enforce the laws on smoking in schools, public transport, offices, and workplaces so that children could not get access to cigarette smoke. Teachers should discipline children against smoking to minimize the social evil.

The present study was intended to expand the TPB by including additional variables in its model: Smoking refusal skills, self-regulation, parenting, family function, environment, and culture. Although smoking cessation skills improved the predictive validity of the original TPB in terms of statistical significance, the findings of this study showed that this extended model was successful in predicting the intention to smoke more effectively than the original TPB. However, the previous study in Iran failed to predict the intention to smoke, including the ability to refuse smoking [20]. This study also found that the rate of smoking behavior is related to self-regulation. Self-regulation is a personality trait consisting of three aspects: Attention control, activation control, and inhibitory control [21]. This is consistent with earlier research that says that self-regulation is the second key knowledge structure that affects behavior change [22].

Self-efficacy has influenced the intention and behavior of smoking. In prior meta-analysis, the strongest predictor of intention is self-efficacy [23]. Self-efficacy is a psychological mediator of health

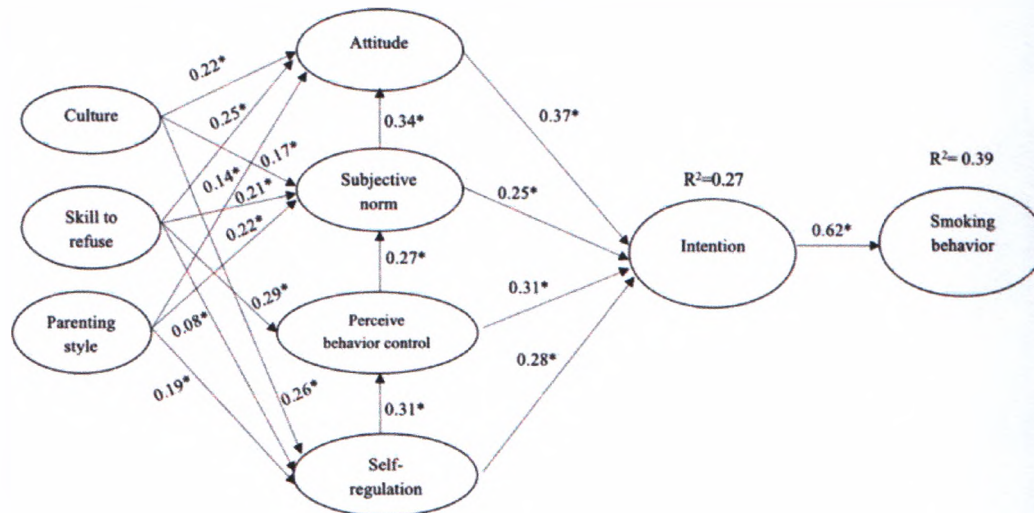


Figure 1: Path diagram of determinant smoking behavior among adolescent in Indonesia

because it will lead one to practice disease prevention activities [24]. A person's self-efficacy is determined by their actions and experiences with their parents, their friends, and their teachers. A relationship with peers is extremely important in the development of adolescents. Not only does it influence the adolescent's own self-perceptions but it also influences the adolescent's perceptions of other people in the community and the way in which others treat the adolescent. Peer environments provide many different opportunities for peer learning and peer modeling. That is, positive peer relationships of encouragement, sympathy, mutual support, and acceptance may positively mediate the development in social conflicts through encouraging sources of individual independence, suggesting that such effects may be mediated by representative experiences [25].

Our study found that there is significant association between all five constructs of a TPB and smoking behavior. These results have shown that TPB is a highly successful predictor of smoking behavior. Perception of behavior control contributed more significantly to this prediction than attitudes and subjective norms. This was expected because of the role perception plays in behavioral control of less-volitional behavior. The research findings are similar to previous studies [26], [27], [28]. Smoking literature shows that low perception of behavioral control is related to smoking initiation and smoking rate, as well as greater difficulty in stopping and/or higher rates of relapse among adolescents [20], [26]. In a similar study, Norman *et al.* also concluded that the TPB was predictive of intentions to quit smoking with perceived control as the most important predictor [20], [27]. Despite the fact that all the relationships were tested, the environmental impact is more significant than the personal one. This topic is interesting because there are environmental and personal constraints that may prevent real smoking cessation, such as an environmental barrier might be that everyone at school and a personal barrier might be nicotine dependence. It is worthwhile to explore the connection between determinants of smoking using different conceptualization and operationalization.

Conclusion

This finding provides an initial understanding of determinant of smoking using an extended of TPB among elementary students in Indonesia. This is one of the first studies to examine factors affecting smoking behavior, thus future research is needed to confirm our findings. This study also provides a significant contribute for clinical a practice and policy maker as a basic data to establish future intervention to promote

no tobacco use among elementary student to achieve optimal well-being to prevent a fatal disease.

Ethics Approval and Consent to Participate

The study was approved by the International Review Board of the affiliated university (045/ETIK/2019). As the information was also collected at the school, the Ministry of Health and Research and Development in West Java, Indonesia, also provided further clearance. Informed consent was obtained from the parent or the parent's legal guardian. Privacy and confidentiality were ensured throughout the study period by keeping all personal identifiers confidential.

Availability of Data and Materials

The data that support the findings of the current study are available from the corresponding author on request.

Authors' Contributions

ANH designed the study and recruited the participants. ANH, MN, and AK conducted data collection analyzed the data and wrote the manuscript. ANH, RM, HR, and AB contributed to the design of the study and manuscript writing. All authors contributed, read, and approved the final manuscript.

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