Public Health of Indonesia
E-ISSN: 2477-1570 | P-ISSN: 2528-1542

Original Research

Relationship between Health Belief Model constructs and smoking behavior among school-age adolescents in Indonesia: A cross-sectional study

Gisely Vionalita[1]*, Devi Angeliana Kusumaningtiar[1], and Dudung Angkasa [2]

[1] Department of Public Health, Faculty of Health Sciences, Universitas Esa Unggul, Jakarta, Indonesia
[2] Department of Nutrition, Faculty of Health Sciences, Universitas Esa Unggul, Jakarta, Indonesia

DOI: https://doi.org/10.36685/phi.v9i4.717
Received: 5 August 2023 | Revised: 21 September 2023 | Accepted: 7 November 2023

Corresponding author:
Gisely Vionalita
Department of Public Health, Faculty of Health Sciences, Universitas Esa Unggul, Jakarta, Indonesia
Email: gisely@esaunggul.ac.id

Abstract

Background: Programs aimed at altering health risk behavior in adolescents have frequently been a priority for the health department in Indonesia. However, these efforts have not yielded optimal results thus far. The Health Belief Model (HBM) is considered a dependable indicator for predicting health-risk behavior.

Objective: This study sought to establish the relationship between the constructs of the Health Belief Model (HBM) – namely, perceived susceptibility to health-related issues due to smoking, perceived barriers to non-smoking, perceived benefits of non-smoking, perceived self-efficacy to non-smoking, and cues to action for non-smoking – and smoking behavior among adolescents of school age.

Methods: The study employed a cross-sectional design, examining smoking behavior in 171 school-age adolescents in Indonesia. This was done using an online Indonesian Smoking Behavior Questionnaire and a validated Indonesia Health Belief Model Questionnaire that measures the five domains of HBM. The Chi-square test was utilized to explore associations among different variables.

Results: Adolescents with an average age of 16.04 years (ranging from 12 to 17 years) reported a 5.8% incidence of smoking in the past 30 days. Significantly, there was a relationship between perceived susceptibility ($p = 0.002$), barriers to quitting smoking ($p < 0.001$), cues to action ($p = 0.019$), and smoking behavior in adolescents.

Conclusion: The study provides valuable insights into how the Health Belief Model is linked to the involvement of adolescents in health risk behavior, particularly smoking. This information is crucial for the development of health education tailored to adolescents of school age.

Keywords: Health risk behavior; adolescent; school age; smoking; Health Belief Model; Indonesia

Background

Adolescents play a crucial role in determining population growth due to their substantial proportion in the population. According to the World Health Organization (World Health Organization, 2016), adolescence is the age range of 10-19 years, while the United Nations categorizes adolescents as young people aged 15-24 years, including the age range of 10-24 years when referring to youth. As of 2015, the global youth population reached 1.2 billion individuals. In Indonesia, the prevalence of smoking among junior high school students has shown an increasing trend, rising from 19% in 2016 to 27% (Kementerian Kesehatan Republik Indonesia, 2018). Data from Riskesdas in 2007 and 2010 revealed that the prevalence of initiating smoking among individuals aged 15-19 years was higher, increasing from 32.4%

in 2007 to 43.3% in 2010. Research indicates that smoking at a young age leads to a higher dependence on tobacco and is associated with various illnesses and disease symptoms. These include heart attacks, high blood pressure, acute respiratory infections (ARI), diabetes, and other health symptoms (Balakumar et al., 2016). Moreover, studies have found that COVID-19 patients who were smokers had a significantly higher risk of death compared to those who did not have underlying smoking-related (Wang et al., 2021).

Although infectious diseases still account for the majority of disease burden in underdeveloped nations, non-communicable diseases are increasingly being acknowledged as serious public health issues (Murray & Lopez, 1997; Siswati et al., 2023). By 2020, it is anticipated that roughly 10% of all deaths will be linked to tobacco (Reisi et al., 2014). Programs for changing health risk behavior have actually often been on the agenda of the health department in Indonesia, but these efforts have not yet given maximum results. Hence, this research aims to elucidate health-risk behaviors through the application of the Health Belief Model (HBM). It is noteworthy that this model has been relatively underutilized in the examination of the determinants of health-risk behaviors, particularly within the context of Indonesian adolescents. Health Belief Model (HBM) is a model used to predict the cause of health seeking actions based on the person's beliefs, for this study (Jones et al., 2015; Tarkang & Zotor, 2015). This model will be applied to adolescent health-risk behavior by describing self-efficacy, perceived benefits, perceived barriers, and perceived susceptibility & perceived severity. The HBM application will later describe a map of the causes of adolescents' decisions to risk health behaviors apart from modifiable factors such as parental education, parental roles, and parental knowledge.

One of the most popular models for analyzing health behavior is the HBM, which has been extensively used to group theoretical predictors of acts that promote health internationally. According to Li and Kay (2009), the HBM is a technique used to assess and clarify individual differences in preventative health behavior (Janz & Becker, 1984) has proven to be a reliable indicator of smoking behavior. Despite the high and increasing prevalence of cigarette smoking in Indonesia, little attention has been paid to examination of the influential factors of cigarette smoking among adolescents' students and using HBM for the predictors. Based on the explanation above, the purpose of this research is to know the application of the Health Belief Model on the health behavior of school adolescents at risk and the development of an intervention model to reduce the health behavior at risk of school adolescents.

Methods

Study Design

This study employed a cross-sectional research design.

Samples/Participants

The research consisted of all adolescents of school age attending Junior and Senior High Schools on Java Island, Indonesia. A total of 171 adolescents participated in the study, selected through accidental sampling by means of approaching headmasters and teachers. The sample size was determined using the Lemeshow formula (Levy & Lemeshow, 2013). Inclusion criteria required participants to reside in the study area, express willingness to take part, possess internet access, and be capable of providing essential data via an online survey.

Instrument

The questionnaire consisted of the informant information regarding the level of father and mother education that divided into two categories: Low (Junior High School or <9 years) and High (Senior High School & University or >9 Years), Family income was categorized as either Low (≤ Regional Minimum Wage, IDR 4.230.000) or High (> Regional Minimum Wage, IDR 4.230.000) ang Smoking behavior, categorized into Yes (smoking in the last 30 days) No (not smoking in the last 30 days). Respondents also require to fill out the HBM questionnaire. A socio-psychological theoretical framework called the Health Belief Model (HBM) was developed in the 1950s with the aim of explaining and predicting health-related actions. It has been used to direct actions for health promotion in real-world settings (Champion & Skinner, 2008). The instrument was developed by the researchers based on the Health Belief Model consisted of perceived susceptibility to health-related problems due to smoking (I am at risk of developing diseases caused by smoking, such as lung cancer, if I smoke), Severity (Smoking-related diseases are numerous and can exacerbate each other, such as

hypertension and heart disease), perceived barriers to non-smoking (when I gather with friends, I tend to smoke together and when I don't smoke, I feel less enthusiastic about doing tasks), perceived benefits of non-smoking (illness from smoking can be avoided by exercise), and cues to action of non-smoking (my parents smoking in front of me). Those questions were categorized into Yes (agree) and No (not agree). The pilot study was obtained for validity test using a sample of 30 adolescents in school age adolescents and have the Cronbach's alpha values 0.885.

Data Analysis

The data were analyzed using IBM SPSS Statistics 20 software, with a significance level set at 0.05. Demographic data were examined using frequency and percentage distribution tables. To conduct bivariate analysis, the Chi-square test was employed to explore associations among different variables. This test was used to determine whether there is a statistically significant correlation between the variables. Odds ratios (OR) and 95% confidence intervals (CI) were calculated to assess the strength of relationships between variables and the Behavior of open defecation. The odds ratio indicates the likelihood of open defecation based on the presence or absence of certain factors, while the confidence interval provides a range of values within which the true population odds ratio is likely to fall. Moreover, the odds ratio is also utilized to establish the likelihood of smoking Behavior in adolescents, as determined by the HBM.

Ethical Considerations

The study was approved by ethical committee Universitas Esa Unggul, Indonesia.

Results

Analysis of the 171 participants' survey responses as shown in **Table 1**, revealed that the mean age of the students was 16.04 (min = 12 years and max = 17 years), Father's education more than 9 years (80.70%), Mother's education more than 9 years (76.02%), parents were smokers in the family of (50.9%) of the subjects, Income more than regional minimum standard (43.27%). 5.8%% of the subjects were smokers at the time of study.

Table 1 Descriptive analysis HBM and smoking behavior

Variable	Frequency	Percentage
	171	**100%**
Perceived Susceptibility (Disease as risk of smoking):		
Yes	160	93.6
No	11	6.4
Perceived Severity (opinion health consequences of smoking):		
Yes	164	95.9
No	7	4.1
Perceived Benefit (illness from smoking can be avoided):		
Yes	164	95.9
No	7	4.1
Perceived Barriers (smoking can help in social life):		
Yes	160	93.6
No	11	6.4
Cues to action (Parents smoker):		
Yes	87	50.9
No	84	49.1
Father's education (>junior high school):		
Yes	138	80.7
No	33	19.3
Mother's education (>junior high school):		
Yes	130	76.02
No	41	23.8
Income (>Regional Minimal standard):		
Yes	74	43.3
No	97	56.7
Smoking (past 30 days):		
Yes	10	5.8
No	161	94.2

Table 2 shows that there were significant association between perceived susceptibility and smoking behavior (p = 0.002) (PR= 1.616 with 95% CI (0.225 – 11.631)), Barriers to stop smoking and smoking behavior (p = 0.000) PR= 0.046 with 95% CI (0.015 – 0.139) and Cue to action regarding parents' smoking behavior (p = 0.019) PR= 9.321 with 95% CI (1.207 – 71.983).

Table 2 Association HBM model and smoking behavior

Variable	Smoking				Total		*p-value*	PR (95% CI)
	Yes		No					
	n	%	n	%	n	%		
Susceptibility								
No	1	9.1	10	90.9	11	100	0.002	1.616
Yes	9	5.6	151	94.4	160	100		(0.225 – 11.631)
Severity								
No	1	14.3	6	85.7	7	100	0.881	2.603
Yes	9	5.5	155	94.5	164	100		(0.381 – 17.801)
Benefit								
No	1	14.3	6	85.7	7	100	0.881	2.603
Yes	9	5.5	155	94.5	164	100		(0.381 – 17.801)
Barriers								
No	4	2.5	156	97.5	7	100	0.000	0.046
Yes	6	54.5	5	45.5	11	100		(0.015 – 0.139)
Parents smoker								
No	9	10.7	75	89.3	84	100	0.019	9.321
Yes	1	1.1	86	98.9	87	100		(1.207 – 71.983)

Discussion

According to the HBM, healthy behavior is determined by personal beliefs or perceptions about the disease and strategies to reduce the risk of contracting the disease (Glanz et al., 2015; Poss, 2001). HBM includes several psychological factors that influence health behavior. Among several factors, HBM focuses on threat perception and evaluation of health behavior which is said to be the primary aspect in understanding the representation of healthy behavior (Anuar et al., 2020; Orji et al., 2012). Perception of threat consists of two main beliefs, namely perceived susceptibility, and perceived severity. Perceived susceptibility is an individual's perception of the possibility of getting a disease, while perceived severity is an individual's perception of the severity of the disease.

Evaluation of health behavior also consists of two main beliefs, namely perceived benefits, and perceived barriers (Kamimura et al., 2016). Perceived benefits refer to an individual's perception of the advantages or positive outcomes they expect to experience through the treatment or smoking process, which may influence their decision-making regarding risk-taking behaviors like smoking (Carter-Harris et al., 2017; Slovic et al., 2005). On the contrary, perceived barriers includes an individual's perception of potential negative consequences or challenges they may encounter while undergoing rehabilitation to address adolescent smoking habits. These barriers can be psychological, social, or practical in nature and might discourage individuals from actively engaging in efforts to quit or reduce smoking. Another significant factor in behavior change is the concept of threat, which serves as a stimulus or trigger for an individual to initiate changes in their behavior. For instance, experiencing health-related threats or negative consequences associated with smoking may motivate individuals to consider quitting or adopting healthier behaviors (Leventhal et al., 2012; Ronis et al., 2014). In addition to perceived benefits, perceived barriers, and threat, an individual's personality and personal beliefs also play pivotal roles in the adoption of new behaviors.

In this study, several variables were found that were stated to be related to smoking behavior in adolescents in Indonesia, such as susceptibility, barriers, and parental behavior (cues to action). Susceptibility here is a condition of human vulnerability that assesses how likely it is to be exposed to something (Conner & Norman, 2015). Research has demonstrated that a significant portion of adolescent's have hesitance towards engaging in smoking behaviors due to their heightened awareness of the detrimental health consequences linked to this habit. This awareness underscores the potential for effective governmental intervention

through the enhancement of health and social initiatives aimed at mitigating the adverse impacts of smoking. This intervention could be strategically implemented across multiple domains, including homes, schools, and social media platforms. By proactively addressing the potential harms of smoking in these varied contexts, policymakers can contribute to a healthier and more informed adolescent population, thereby reducing the prevalence of smoking and its associated risks.

Another variable that is considered to be related to smoking behavior in Indonesia adolescents is a barrier, which is considered an inhibiting variable that makes it difficult for humans to leave smoking habits, for example peer norms. When adolescents assemble with their peers, they frequently smoke together, and the idea that a nonsmoker is not a "genuine guy" is still associated with adolescents (Irwin Jr et al., 2002). Additionally, the perception of the masculinity related with smoking behavior is also consider as barrier (Fithria et al., 2021). Therefore, this can make things worse. Perceived barriers include an individual's viewpoint regarding potential unfavorable outcomes or challenges they might confront while attempting to modify their risky health behavior. These barriers can manifest as personal, societal, or environmental factors that impede their capacity to embrace healthier behaviors. For instance, a teenager might view quitting smoking as difficult due to withdrawal symptoms, peer influence, or insufficient support from family and friends (Orji et al., 2012). It is imperative for educational institutions, parents, and public spaces to intervene in this pattern. Moreover, certain survey responses indicate that adolescents perceive smoking as a stress-reliever, which contradicts the well-known detrimental effects associated with smoking.

In this study, it was also found that adolescent smoking behavior was highly influenced by parents' smoking habits. This is consistent with the assumption that the family level is the primary level of health promotion (Ennett et al., 2001). Whereas families need to be able to offer a solid basis for modelling risk-free health habits (Michaelson et al., 2021). Especially if it involves children engaging in their parents' risky actions, as this will definitely set a negative example for adolescents. The likelihood of offspring smoking initiation increased with the number of smoking parents and the duration of exposure to parental smoking (Gilman et al., 2009). This underscores the importance of parental influence in shaping adolescent health behaviors, highlighting the need for targeted interventions to discourage smoking initiation in this vulnerable demographic.

These findings underscore the complexity of smoking behavior among adolescents. It's not solely a matter of individual choices but also involves perceptions of susceptibility and barriers, as well as environmental influences such as parental smoking habits. Such insights are invaluable for designing targeted interventions to reduce smoking initiation among adolescents. Efforts could focus on altering perceptions of susceptibility and barriers, as well as on providing support and education for parents to discourage smoking in the household. These findings suggest the importance of addressing these perceptions and beliefs in designing effective interventions and health promotion programs for adolescents to promote healthier behaviors and reduce health risk-taking tendencies.

Conclusion

This study sheds light on the relationship between the Health Belief Model and health risk engagement among adolescents in the school-age group. Specifically, the variables of perceived susceptibility, perceived barriers, and parental smoking behavior emerged as significant predictive factors for smoking behavior, providing valuable insights into this complex behavior. The findings from this study have the potential to inform the development of more effective health education and promotion programs targeted at school-age children. However, it is important to note that this study has some limitations for the small number of the participants and it did not capture other potentially important determinants of health risk behavior in adolescents, which could have further enriched the understanding of the phenomenon. Therefore, future research should add more participants and explore additional factors that may influence health risk behavior in this population. Overall, the current study contributes to our understanding of the Health Belief Model's applicability in the context of adolescent health risk behavior. By identifying significant predictors of smoking behavior, this research can aid in the design of interventions and strategies aimed at promoting healthier behaviors among school-age children and adolescents.

Declaration Conflicting Interest

The authors have no conflicts of interest to declare.

Funding

This research was fully supported by Internal Research Institutions of Universitas Esa Unggul.

Acknowledgment

The authors extend their heartfelt appreciation to all the participants whose valuable contributions greatly contributed to the successful of this research.

Author Contribution

Conceptualization, methodology, and validation: GV; data collection, data analyzed and writing manuscript: GV, DAK, DA. All authors have read and agreed to the published version of the manuscript.

Author Biography

Gisely Vionalita is a Lecturer in Department of Public Health, Faculty of Health Sciences. Universitas Esa Unggul, Jakarta, Indonesia.

Devi Angeliana Kusumaningtiar is a Lecturer in Department of Public Health, Faculty of Health Sciences. Universitas Esa Unggul, Jakarta, Indonesia.

Dudung Angkasa is a Lecturer in Department of Nutrition, Faculty of Health Sciences. Universitas Esa Unggul, Jakarta, Indonesia.

References

Anuar, H., Shah, S., Gafor, H., Mahmood, M., & Ghazi, H. F. (2020). Usage of Health Belief Model (HBM) in health behavior: A systematic review. *Malaysian Journal of Medicine and Health Sciences*, *16*(11), 2636-9346.

Balakumar, P., Maung-U, K., & Jagadeesh, G. (2016). Prevalence and prevention of cardiovascular disease and diabetes mellitus. *Pharmacological Research*, *113*, 600-609. https://doi.org/10.1016/j.phrs.2016.09.040

Carter-Harris, L., Ceppa, D. P., Hanna, N., & Rawl, S. M. (2017). Lung cancer screening: what do long-term smokers know and believe? *Health Expectations*, *20*(1), 59-68. https://doi.org/10.1111/hex.12433

Champion, V. L., & Skinner, C. S. (2008). The health belief model. *Health behavior and health education: Theory, research, and practice*, *4*, 45-65.

Conner, M., & Norman, P. (2015). *EBOOK: predicting and changing health behavior: research and practice with social cognition models*. McGraw-hill education (UK).

Ennett, S. T., Bauman, K. E., Foshee, V. A., Pemberton, M., & Hicks, K. A. (2001). Parent-child communication about adolescent tobacco and alcohol use: what do parents say and does it affect youth behavior? *Journal of Marriage and Family*, *63*(1), 48-62. https://doi.org/10.1111/j.1741-3737.2001.00048.x

Fithria, F., Adlim, M., Jannah, S. R., & Tahlil, T. (2021). Indonesian adolescents' perspectives on smoking habits: a qualitative study. *BMC Public Health*, *21*(1), 1-8. https://doi.org/10.1186/s12889-020-10090-z

Gilman, S. E., Rende, R., Boergers, J., Abrams, D. B., Buka, S. L., Clark, M. A., Colby, S. M., Hitsman, B., Kazura, A. N., & Lipsitt, L. P. (2009). Parental smoking and adolescent smoking initiation: an intergenerational perspective on tobacco control. *Pediatrics*, *123*(2), e274-e281. https://doi.org/10.1542/peds.2008-2251

Glanz, K., Rimer, B. K., & Viswanath, K. (2015). *Health behavior: Theory, research, and practice*. John Wiley & Sons.

Irwin Jr, C. E., Burg, S. J., & Cart, C. U. (2002). America's adolescents: where have we been, where are we going? *Journal of Adolescent Health*, *31*(6), 91-121. https://doi.org/10.1016/S1054-139X(02)00489-5

Janz, N. K., & Becker, M. H. (1984). The health belief model: A decade later. *Health Education Quarterly*, *11*(1), 1-47. https://doi.org/10.1177/109019818401100101

Jones, C. L., Jensen, J. D., Scherr, C. L., Brown, N. R., Christy, K., & Weaver, J. (2015). The health belief model as an explanatory framework in communication research: Exploring parallel, serial, and moderated mediation. *Health Communication*, *30*(6), 566-576. https://doi.org/10.1080/10410236.2013.873363

Kamimura, A., Nourian, M. M., Jess, A., Chernenko, A., Assasnik, N., & Ashby, J. (2016). Perceived benefits and barriers and self-efficacy affecting the attendance of health education programs among uninsured primary care patients. *Evaluation and Program Planning*, *59*, 55-61. https://doi.org/10.1016/j.evalprogplan.2016.08.006

Kementerian Kesehatan Republik Indonesia. (2018). Laporan hasil riset kesehatan dasar (Riskesdas) Indonesia tahun 2018. *Riset Kesehatan Dasar*, *2018*, 182-183.

Leventhal, H., Brissette, I., & Leventhal, E. A. (2012). The common-sense model of self-regulation of health and illness. In *The self-regulation of health and illness behavior* (pp. 43-66). Routledge.

Levy, P. S., & Lemeshow, S. (2013). *Sampling of populations: methods and applications*. John Wiley & Sons.

Li, K., & Kay, N. S. (2009). Correlates of cigarette smoking among male chinese college students in China--A preliminary study. *International Electronic Journal of Health Education*, *12*, 59-71.

Michaelson, V., Pilato, K. A., & Davison, C. M. (2021). Family as a health promotion setting: A scoping review of conceptual models of the health-promoting family. *PLoS One*, *16*(4), e0249707. https://doi.org/10.1371/journal.pone.0249707

Murray, C. J., & Lopez, A. D. (1997). Alternative projections of mortality and disability by cause 1990–2020: Global Burden of Disease Study. *The Lancet*, *349*(9064), 1498-1504. https://doi.org/10.1016/S0140-6736(96)07492-2

Orji, R., Vassileva, J., & Mandryk, R. (2012). Towards an effective health interventions design: an extension of the health belief model. *Online Journal of Public Health Informatics*, *4*(3). https://doi.org/10.5210/ojphi.v4i3.4321

Poss, J. E. (2001). Developing a new model for cross-cultural research: synthesizing the health belief model and the theory of reasoned action. *Advances in Nursing Science*, *23*(4), 1-15.

Reisi, M., Javadzade, S. H., Shahnazi, H., Sharifirad, G., Charkazi, A., & Moodi, M. (2014). Factors affecting cigarette smoking based on health-belief model structures in pre-university students in Isfahan, Iran. *Journal of Education and Health Promotion*, *3*. https://doi.org/10.4103/2277-9531.127614

Ronis, D. L., Yates, J. F., & Kirscht, J. P. (2014). Attitudes, decisions, and habits as determinants of repeated behavior. In *Attitude structure and function* (pp. 213-239). Psychology Press.

Siswati, T., Olfah, Y., Setyowati, S., & Paramashanti, B. A. (2023). The impact of behavior change communication on healthy living movement-related knowledge and behavior among adolescents: A mixed-methods study. *Public Health of Indonesia*, *9*(1), 21-30. https://doi.org/10.36685/phi.v9i1.654

Slovic, P., Peters, E., Finucane, M. L., & MacGregor, D. G. (2005). Affect, risk, and decision making. *Health Psychology*, *24*(4S), S35. https://doi.org/10.1037/0278-6133.24.4.S35

Tarkang, E. E., & Zotor, F. B. (2015). Application of the health belief model (HBM) in HIV prevention: a literature review. *Central African Journal of Public Health*, *1*(1), 1-8.

Wang, Q. Q., Kaelber, D. C., Xu, R., & Volkow, N. D. (2021). COVID-19 risk and outcomes in patients with substance use disorders: analyses from electronic health records in the United States. *Molecular Psychiatry*, *26*(1), 30-39. https://doi.org/10.1038/s41380-020-00880-7

World Health Organization. (2016). *Department of maternal, newborn, child and adolescent health (MCA): progress report 2014–15*. Geneva: WHO.

Cite this article as: Vionalita, G., Kusumaningtiar, D. A., & Angkasa, D. (2023). Relationship between health belief model constructs and smoking behavior among school-age adolescents in Indonesia: A cross-sectional study. *Public Health of Indonesia, 9*(4), 140-146. https://doi.org/10.36685/phi.v9i4.717