



Original Article

A Cross-sectional Study of Parental, Peer, and Cigarette Advertising Influences on Smoking Behavior Among Adolescent Boys

Taqwin^{1*}, Moh. Ricki H.R. Djuga², Jurana³, Amir⁴, Nurlailah⁵, Nasrul⁶, Anna Veronica Pont⁷, Azizah Saleh⁸, Selvi Alfrida Mangundap⁹, Baharuddin Condeng¹⁰, Rina Tampake¹¹

^{1-6,8}Applied Bachelor of Nursing Study Program, Poltekkes Kemenkes Palu, Palu, Indonesia

⁷Diploma III Midwifery Study Program, Palu, Poltekkes Kemenkes Palu, Palu, Indonesia

^{8,10,11}Diploma III Nursing Study Program, Palu, Poltekkes Kemenkes Palu, Palu, Indonesia

Author Correspondence* taqwin.sahe78@gmail.com



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ABSTRACT

The Government of the Republic of Indonesia has made various efforts to reduce the number of adolescent boys who smoke. However, the number of adolescent male smokers continues to be high. This study aimed to identify the relationship between parental smoking, peer pressure, and exposure to tobacco advertising and smoking behavior among adolescents. This study was designed as a cross-sectional study with a sample of 55 male SMKN 6 Palu students, selected using proportional random sampling. Data collection was conducted using questionnaires and data analysis through chi-square tests and prevalence ratio (PR). The results of this study showed that the prevalence of adolescent smoking was at the level of 83.6%, most respondents were not affected by parental smoking (94.5%), 56.4% were influenced by friends who smoked, and 60% were influenced by exposure to tobacco advertisements. The chi-square test showed no significant association between smoking parents and adolescent smoking behavior ($p=0.431$); peer influence ($p=0.957$), and cigarette ad exposure ($p=0.074$) PR 1.25 (95% CI: 0.95–1.65). These findings indicate that none of the examined factors were statistically associated with adolescent smoking behavior, suggesting that the study hypothesis was not supported. Although a high prevalence of smoking and considerable exposure to cigarette advertising were observed, the results should be interpreted with caution and do not provide sufficient evidence to justify causal claims or strong policy recommendations. Further studies with larger samples and stronger designs are needed to clarify these relationships.



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INTRODUCTION

Tobacco use among adolescents remains an urgent public health problem, particularly in low- and middle-income countries such as Indonesia, where regulations protecting young people from nicotine exposure and tobacco marketing are still limited in enforcement (Abidin et al., 2019; Agbaje, 2024; Nurhalimah et al., 2024). National data show that smoking among Indonesian adolescents aged 10–18 years increased from 7.2% in 2013 to 9.1% in 2018, while the 2019 Global Youth Tobacco Survey reported that 19.2% of students aged 13–15 years were current smokers, with the prevalence substantially higher among boys than girls (Dewi et al., 2023; Ihyauddin et al., 2023; Kemenkes R.I., 2018). Local studies in Central Sulawesi also indicate that adolescent smoking remains a concern, with reported prevalence of 24.6% in Banggai Islands Regency and 36.3% in Palu City (Malaha et al., 2022; Napirah et al., 2022).

Several factors have been associated with adolescent smoking behavior, including parental smoking, peer influence, and exposure to cigarette advertisements. Parents who smoke may normalize smoking behavior within the household, while peers can influence smoking initiation through social acceptance and group pressure (Fithria et al., 2021; Lin et al., 2023; Septiono et al., 2021). Previous studies also show that tobacco advertising, promotion, and sponsorship remain accessible to Indonesian adolescents through retail outlets, outdoor billboards, television, social media, and other digital platforms (Laili et al., 2022; Septiono et al., 2022; Vital Strategies, 2021). These channels may increase adolescents' familiarity with cigarette brands and shape positive perceptions of smoking.

Although parental and peer influences have been widely examined, evidence regarding the role of cigarette advertising exposure among Indonesian adolescents remains important to update, particularly because tobacco companies continue to use digital platforms, sponsorships, and outdoor advertising despite existing restrictions (Astutik et al., 2024; Rosilawati et al., 2024; Septiono et al., 2022). Therefore, further empirical research is needed to examine whether exposure to cigarette advertisements, together with parental smoking and peer influence, is related to smoking behavior among adolescent boys.

This study aimed to determine the prevalence of smoking behavior among adolescent boys at SMKN 6 Palu and to examine its association with parental smoking, peer influence, and exposure to cigarette advertisements. By focusing on these three factors, this study is expected to provide preliminary evidence for school-based and community-based smoking prevention efforts in the Indonesian context.

RESEARCH METHOD

Study Design

This study used a cross-sectional design to examine factors related to smoking behavior in adolescent boys at SMKN 6 Palu. Data were collected in March 2025.

Population and Sample

The study population consisted of 122 male students from classes X and XI. The sample size was determined using the Slovin formula, with a 10% margin of error, resulting in a minimum of 55 respondents.

However, the use of a 10% margin of error may reduce the precision and statistical power of the study, particularly given the high prevalence of smoking behavior observed among adolescents. This study did not perform a formal power calculation; therefore, the findings should be interpreted with caution, as the sample size may not be sufficient to detect small to moderate associations. Future studies are recommended to use larger sample sizes and more rigorous sample size estimation methods based on statistical power analysis.

Proportional random sampling was used to ensure adequate representation of each grade level: 30 students from class X and 25 from class XI.

Operational Definition

1. Smoking Behavior: the act of inhaling cigarette smoke and exhaling it, measured using a structured questionnaire (2 items).
2. Parental smoking: students' exposure to smoking behavior by parents, measured by questionnaires (4 items).
3. Peer Influence: Assessed using a 9-item Guttman scale questionnaire adapted from Sidauruk (2020), which measures peer pressure or influence on smoking.
4. Tobacco Advertising Exposure: Measured by a 6-item questionnaire that assesses students' exposure to cigarette advertising.

All questionnaires had previously been tested for reliability, yielding a Cronbach's alpha coefficient of 0.970. While this value indicates high internal consistency, it may also suggest potential redundancy among items. Therefore, item-level analyses, such as inter-item and item-total correlations, are necessary to ensure that each item measures a distinct aspect of the construct rather than duplicating similar content. Future refinements to the instrument are recommended to improve construct validity and reduce potential overlap among items.

Data Collection

Data were collected using a closed-ended questionnaire administered by the researchers themselves. Responses to favorable and unfavorable items are assessed dichotomously (1 = Yes, 0 = No for positive statements; 0 = Yes, 1 = No for negative statements).

Data Analysis

Descriptive statistics was used for univariate analysis to present frequency distributions. Bivariate analysis was performed using the Chi-square test to assess the relationship between independent variables (parental smoking, peer influence, and advertising exposure) and smoking behavior, with a significance level set at $p < 0.05$.

Ethical Considerations

This research received an ethical permit from the Health Research Ethics Committee of the Palu Ministry of Health (Approval No.: 000653/KEPK Poltekes of the Ministry of Health Palu/2025).

RESULTS

1. Respondent Characteristics

Table 1: Frequency Distribution of Respondent Characteristics

Age	Frequency (f)	Percentage (%)
16 Years	30	54.5
17 Years	25	45.5
Classes		
X	30	54.5
XI	25	45.5

Source: Primary Data (2025)

Table 1 shows that the majority of respondents in this study were 16 years old (30, 54.5%), while 25 respondents (45.5%) were 17 years old. Based on class distribution, 30 respondents (54.5%) were from class X and 25 respondents (45.5%) from class XI.

2. Smoking Behavior

Table 2. Frequency Distribution of Smoking Behavior

Research Variables	Frequency (f) n=55	Percentage (%)
Smoking Behavior		
Smoking	46	83.6
No Non-smoking	9	16.4
Parental Smoking		
Affected	3	5.5
No	52	94.5
Peers		
Affected	31	56.4
No	24	43.6
Cigarette Advertising Display		
Affected	33	60
No	22	40

Source: Primary Data (2025)

Table 2 shows that out of 55 respondents, the majority had smoking behavior. A total of 46 respondents (83.6%) reported smoking, while 9 respondents (16.4%) did not smoke. Based on parental influence, only 3 respondents (5.5%) reported being affected by parental smoking, while 52 respondents (94.5%) reported no such influence.

For peer influence, 31 respondents (56.4%) reported being influenced by peers, while 24 respondents (43.6%) reported no influence. Regarding cigarette advertising exposure, 33 respondents (60%) reported exposure, while 22 respondents (40%) did not.

These descriptive findings indicate a high prevalence of smoking behavior and considerable exposure to peers and cigarette advertising; however, these proportions alone do not imply statistical association or causality.

3. Bivariate Analysis

Table 3. Bivariate Analysis of Smoking Behavior by Parental Smoking, Peer Influence, and Cigarette Advertising Exposure

Research Variables	Smoking Behavior		Quantity	p-value	RP (CI=95%)
	Smoking	Non-smoking			
Parental Smoking					
Affected	3 (100%)	0 (0%)	3	0.431	-
No	43 (82.7%)	9 (17.3%)	52		
Peers					
Affected	26 (83.9%)	5 (16.1%)	31	0.957	1.01 (0.80–1.28)
No	20 (83.3%)	4 (16.7%)	24		
Cigarette Advertising Display					
Affected	30 (90.9%)	3 (9.1%)	33	0.074	1.25 (0.95–1.65)
No	16 (72.7%)	6 (27.3%)	22		

Source: Primary Data (2025)

For parental smoking, all three respondents who reported being affected were smokers (100%), while among those not affected, 43 (82.7%) smoked, and 9 (17.3%) did not smoke. The statistical test showed $p = 0.431$, indicating no statistically significant association between parental smoking and adolescent smoking behavior.

The analysis of peer influence showed that among the 31 respondents who reported peer influence, 26 (83.9%) smoked, and 5 (16.1%) did not. Among the 24 respondents whose peers did not influence, 20 (83.3%) smoked, and 4 (16.7%) did not. The statistical test resulted in $p = 0.957$, indicating no statistically significant relationship between peer influence and smoking behavior. The prevalence ratio (PR = 1.01; 95% CI: 0.80–1.28) suggests no meaningful difference between groups.

Regarding cigarette advertising exposure, among 33 respondents who reported exposure, 30 (90.9%) smoked, and 3 (9.1%) did not. Among the 22 respondents who were not exposed, 16 (72.7%) smoked, and 6 (27.3%) did not. The statistical test yielded $p = 0.074$ with PR = 1.25 (95% CI: 0.95–1.65), indicating that although there is a higher proportion of smokers among exposed respondents, the association is not statistically significant.

Overall, none of the independent variables (parental smoking, peer influence, and cigarette advertising exposure) showed statistically significant associations with adolescent smoking behavior. Therefore, the results should not be interpreted as evidence of causal or meaningful relationships between these variables. Any observed differences in proportions may be due to chance, particularly given the small sample size.

DISCUSSION

This study aimed to examine the relationship between parental smoking, peer influence, and exposure to cigarette advertisements with smoking behavior in adolescent boys at SMKN 6 Palu. The findings indicate that none of the three independent variables showed a statistically significant association with smoking behavior.

These results differ from a number of previous studies that have reported significant associations between parental smoking, peer influence, and tobacco advertising exposure with adolescent smoking behavior. However, the absence of statistically significant findings in this study suggests that the observed relationships may be weak, context-specific, or influenced by methodological limitations. Therefore, the findings should be interpreted cautiously and not generalized beyond the study setting.

Previous research has shown that parental smoking can influence adolescent smoking behavior by normalizing tobacco use within the household environment (Hidayati, 2024; Utami, 2020). Similarly, peer influence has often been identified as an important social factor in smoking initiation among adolescents (Fithria et al., 2021; Gong et al., 2026; Lin et al., 2023). Exposure to cigarette advertising has also been linked to increased smoking intention and behavior in several studies (Dadras, 2024; Laili et al., 2022).

In contrast, the present study did not find statistically significant associations for these variables. This discrepancy may be explained by several factors, including the relatively small sample size ($n=55$), which limits statistical power and reduces the ability to detect meaningful differences between groups. In addition, the cross-sectional design prevents the establishment of temporal or causal relationships, and potential measurement limitations in the questionnaire may have affected the accuracy of exposure assessment.

It is also important to note that inconsistencies identified in the contingency table for parental smoking may have further affected the reliability of the bivariate analysis. This limitation highlights the need for careful data verification and suggests that the current findings should be interpreted as preliminary.

Given these limitations, the descriptive results showing high smoking prevalence and substantial exposure to peers and cigarette advertising should not be interpreted as evidence of causal relationships. Instead, they indicate areas that warrant further investigation using more robust study designs.

Rather than issuing strong public health recommendations, this study's findings emphasize the need for further research. Future studies should employ larger, more representative samples, conduct appropriate statistical power calculations, and consider longitudinal or cohort designs to better understand causal pathways among parental, peer, and media influences and adolescent smoking behavior. In addition, refinement of measurement instruments is recommended to ensure that each construct is assessed accurately and without redundancy.

While smoking prevention remains an important public health priority, the current study does not provide sufficient evidence to support specific intervention strategies targeting the examined variables. Therefore, any policy or programmatic recommendations should be based on a broader body of evidence rather than the findings of this study alone.

CONCLUSION

This study found that parental smoking, peer influence, and exposure to cigarette advertisements were not statistically associated with smoking behavior among adolescent boys at SMKN 6 Palu. Although a high smoking prevalence was observed in this study population, the absence of statistically significant associations indicates that the study hypothesis was not supported. Therefore, the observed differences in proportions between groups should not be interpreted as meaningful relationships, as they may be

attributable to chance, particularly given the small sample size. These findings highlight the need for caution in interpreting results and underscore the importance of conducting further research with larger samples and more robust study designs to understand better the factors influencing adolescent smoking behavior.

Author's Contribution Statement: Taqwin conceptualized the study and supervised overall research; Moh. Ricki H.R. Djuga collected data; Jurana conducted literature review, drafted the background, designed the questionnaire and coordinated data collection; Amir performed statistical analysis; Nurlailah managed data entry and cleaning; Nasrul interpreted findings related to parental influence; Anna Veronica Pont interpreted findings related to peer influence; Azizah Saleh interpreted findings related to cigarette advertising; Selvi Alfrida Mangundap drafted the discussion; Baharuddin Condeng drafted the conclusion and recommendations; Rina Tempake prepared the abstract and formatted references.

Conflict of Interest: This authors declare no conflict of interest related to this study.

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REFERENCES

- Abidin, L. S., Fitriyani, P., & Setiawan, A. (2019). Correlations between adolescents' perceptions of family health tasks and adolescents' smoking behaviors in Indonesia. *Enfermeria Clinica*, 29(S2), 367–372. <https://doi.org/https://www.elsevier.es/es-revista-enfermeria-clinica-35-articulo-correlations-between-adolescents-perceptions-family-S1130862119301469>
- Agbaje, A. (2024). Abstract 4147083: Incidental and progressive tobacco smoking from childhood through young adulthood with premature structural and functional cardiac damage in 1931 children: A 14-Year Longitudinal Study. *Circulation*, 150(Suppl_1), A4147083–A4147083. https://doi.org/10.1161/circ.150.suppl_1.4147083
- Astutik, E., Megatsari, H., Gandeswari, K., Sebayang, S. K., Nadhiroh, S. R., & Martini, S. (2024). Exposure to outdoor cigarette advertisements and cigarette retailers near Indonesian schools: Density, proximity, and students' self-report of exposure. *Tobacco Prevention & Cessation*, 10(November), 1–9. <https://doi.org/10.18332/tpc/194683>
- Dadras, O. (2024). Predictor of smoking cessation among school-going adolescents in Indonesia: a secondary analysis based on the transtheoretical model of behavioral change. *Frontiers in Psychiatry*, 15, 1374731. <https://doi.org/10.3389/fpsy.2024.1374731>
- Dewi, S. H., Yunita, J., Gustina, T., Ismainar, H., & Mitra, M. (2023). Persepsi Remaja Tentang Bahaya Merokok Ditinjau Dari Health Belief Model. *Jurnal Ilmu Kesehatan Masyarakat*, 12(03), 225–231. <https://doi.org/10.33221/jikm.v12i03.1759>
- Fithria, F., Adlim, M., Jannah, S. R., & Tahlil, T. (2021). Indonesian adolescents' perspectives on smoking habits: a qualitative study. *BMC Public Health*, 21(1), 82. <https://doi.org/10.1186/s12889-020-10090-z>

- Gong, L., Zhang, Z., & Wang, L. (2026). Study on adolescents' smoking intentions : the influence of peer smoking and the mediating roles of beliefs and attitudes toward smoking behavior. *Frontiers in Public Health*, March, 1–8. <https://doi.org/10.3389/fpubh.2026.1775438>
- Hidayati, N. (2024). Pengaruh Orang Tua, Keluarga, dan Lingkungan Sosial terhadap Perilaku Merokok Remaja. *Jurnal Ekonomi Kependudukan Dan Keluarga*, 1(2). <https://doi.org/10.7454/jekk.v1i2.01>
- Ihyauddin, Z., Putri, D. A. D., Tengkwawan, J., Ekawati, F. M., & Sitaresmi, M. N. (2023). Tobacco Use among School-Age Adolescents in Indonesia: Findings from the 2015 Indonesia Global School-Based Student Health Survey. *Korean Journal of Family Medicine*, 44(6), 327–334. <https://doi.org/10.4082/kjfm.23.0010>
- Kemendes R.I. (2018). *Hasil Utama Riskesdas 2018*. https://kesmas.kemkes.go.id/assets/upload/dir_519d41d8cd98f00/files/Hasil-riskesdas-2018_1274.pdf
- Laili, K., Ratih, S. P., Gayatri, R. W., & Adi, S. (2022). The impact of exposure to cigarette advertising and promotion on youth smoking behavior in Malang Regency (Indonesia) during the COVID-19 pandemic. *Journal of Public Health in Africa*, 13(s2). <https://doi.org/10.4081/jphia.2022.2409>
- Lin, M., Chu, M., Li, X., Ma, H., Fang, Z., Mao, L., Wang, P., Chen, T., & Chiang, Y.-C. (2023). Factors influencing adolescent experimental and current smoking behaviors based on social cognitive theory: A cross-sectional study in Xiamen. *Frontiers in Public Health*, 11. <https://doi.org/10.3389/fpubh.2023.1093264>
- Malaha, N., Rusdi, M., Syafri, M., Pannyiwi, R., Sima, Y., & Rahmat, R. A. (2022). Hubungan Tingkat Pengetahuan Dengan Perilaku Merokok di SMA N 1 Liang Kabupaten Banggai Kepulauan. *Barongko: Jurnal Ilmu Kesehatan*, 1(1), 11–16. <https://doi.org/10.59585/bajik.v1i1.17>
- Napirah, M. R., Vidyanto, V., & Hasanah, H. (2022). Preventing Smoking in Children: Implementation Non-Smoking Area in Palu City. *Diversity: Disease Preventive of Research Integrity*, 2(2), 84–97. <https://doi.org/10.24252/diversity.v2i2.25229>
- Nurhalimah, Putri, F. Y., Haryati, O., & Dinarti. (2024). Pengaruh Iklan Rokok Terhadap Perilaku Merokok Remaja. *JHCN Journal of Health and Cardiovascular Nursing*, 4(1). <https://ejournal.poltekkesjakarta1.ac.id/index.php/perawat/article/view/1505>
- Rosilawati, Y., Rafique, Z., & Sudiwijaya, E. (2024). Tobacco use among in-school young adolescents in Indonesia: Exploring availability, affordability, and accessibility. *PLoS ONE*, 19(3 March), 1–13. <https://doi.org/10.1371/journal.pone.0301291>
- Septiono, W., Kuipers, M. A. G., Ng, N., & Kunst, A. E. (2022). Self-reported exposure of Indonesian adolescents to online and offline tobacco advertising, promotion and sponsorship (TAPS). *Tobacco Control*, 31(1), 98–105. <https://doi.org/10.1136/tobaccocontrol-2020-056080>
- Septiono, W., Kuipers, M., Ng, N., & Kunst, A. (2021). The Mediating Role of Parental Factors in the Social Patterning of Smoking among Adolescents in Urban Indonesia. *Asian Pacific Journal of Cancer Prevention*, 22(10), 3127–3135. <https://doi.org/10.31557/APJCP.2021.22.10.3127>
- Utami, N. (2020). Pengaruh Kebiasaan Merokok Orang Tua terhadap Perilaku Merokok Remaja di Indonesia. *Media Kesehatan Masyarakat Indonesia*, 16(3), 327–335. <https://doi.org/10.30597/mkmi.v16i3.9801>
- Vital Strategies. (2021). *Adolescents' Exposure to Tobacco Marketing in Indonesia : Data*

Brief. 1–10. https://www.vitalstrategies.org/wp-content/uploads/Vital-Strategies_Exposure-to-Tobacco-Marketing-Among-Adolescents-in-Indonesia-Data-Brief_2021.pdf