

Factors associated with the intention of students at universitas muhammadiyah surakarta to quit smoking

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ABSTRACT

Smoking remains a major public health concern among university students and may lead to various adverse health consequences. Although previous studies have examined smoking cessation intention, limited evidence exists regarding the combined role of the Theory of Planned Behavior, smoking cessation knowledge, and peer support among Indonesian university students. Understanding factors associated with students' intention to quit smoking is essential for developing effective smoking cessation interventions. This study aimed to identify factors associated with the intention to quit smoking among students at Universitas Muhammadiyah Surakarta. A quantitative study with a cross-sectional design was conducted from January to March 2025 involving 166 active student smokers selected using a total sampling technique. Data were collected through a structured questionnaire based on the Theory of Planned Behavior and analyzed using descriptive statistics, Chi-Square and Fisher's Exact tests to examine associations between categorical variables, with a significance level of $p < 0.05$. The results showed that attitude ($p < 0.001$), knowledge regarding smoking cessation methods ($p = 0.001$), and peer support ($p < 0.001$) were significantly associated with smoking cessation intention. Students with positive attitudes, good knowledge, and higher peer support were more likely to intend to quit smoking. In contrast, subjective norms ($p = 0.284$) and perceived behavioral control ($p = 0.107$) were not significantly associated with the intention to quit smoking. These findings extend the application of the Theory of Planned Behavior and support universities in strengthening smoking cessation education, peer-based interventions, counseling services, and smoke-free campus policies.

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INTRODUCTION

Smoking remains one of the leading preventable causes of morbidity and premature mortality worldwide. According to the World Health Organization (WHO), tobacco use continues to contribute substantially to the global burden of non-communicable diseases, causing more than

eight million deaths each year, with the majority occurring in low- and middle-income countries (WHO, 2025). Indonesia remains one of the countries with a high prevalence of tobacco consumption, particularly among adolescents and young adults. Smoking initiation commonly occurs during adolescence and often continues into adulthood, increasing the risk of nicotine dependence and long-term health problems (Yanti et al., 2022). Although university students generally possess better access to health information than the general population, smoking remains prevalent within this group, indicating that knowledge alone may not be sufficient to encourage smoking cessation.

Smoking among university students is influenced not only by nicotine dependence but also by psychological, behavioral, and social factors. Besides increasing the risk of chronic diseases, smoking may negatively affect students' concentration, academic performance, productivity, and quality of life (Putra et al., 2025). The Theory of Planned Behavior (TPB) explains that an individual's intention to perform a behavior is determined by attitude, subjective norms, and perceived behavioral control (Budiarto et al., 2025). Within this framework, attitude reflects evaluations of quitting smoking, subjective norms represent perceived social expectations, and perceived behavioral control refers to confidence in the ability to quit. Smoking cessation intention may also be influenced by additional factors, such as cessation knowledge and peer support, which complement the TPB framework by strengthening motivation and confidence to quit.

Previous studies consistently support the usefulness of TPB in explaining smoking cessation intention; however, their findings are not entirely consistent. A meta-analysis by Alanazi et al., (2022) confirmed that attitude, subjective norms, and perceived behavioral control were significant predictors of smoking cessation intention. Similarly, Setchoduk et al., (2023) reported that the TPB constructs were associated with university students' intention to quit smoking during the COVID-19 pandemic. In contrast, Wang et al., (2023) found that psychological and social factors contributed to adolescents' intention to quit smoking, while Alahmadi & Al-Zalabani, (2025) emphasized the important role of subjective norms and peer support in strengthening smoking cessation intention. More recently, Nazzal et al., (2024) & Marzo et al., (2022) also highlighted that peer smoking behavior influenced adolescents' smoking intention through beliefs and attitudes toward smoking. Collectively, these findings indicate that TPB provides a strong theoretical foundation; however, cognitive and social contextual factors may further improve its ability to explain smoking cessation intention.

Despite these findings, several research gaps remain. Most previous studies have focused primarily on the three core TPB constructs or examined knowledge and peer support as separate predictors. Consequently, limited evidence is available regarding the combined influence of TPB constructs, smoking cessation knowledge, and peer support within a single conceptual framework. Furthermore, previous findings have shown variations in the relative contribution of TPB constructs, suggesting that the original TPB model may not fully explain smoking cessation intention across different populations and sociocultural contexts. Evidence from Indonesian university students, particularly those enrolled in private universities, also remains scarce. Therefore, a more comprehensive model that integrates cognitive, behavioral, and social factors is needed to better explain smoking cessation intention among university students.

Therefore, this study aimed to examine the factors associated with smoking cessation intention among students at Universitas Muhammadiyah Surakarta by integrating the Theory of Planned Behavior constructs with smoking cessation knowledge and peer support. Unlike previous studies that primarily examined these variables separately, this study incorporates them into a single conceptual model to provide a more comprehensive explanation of smoking cessation intention. This study extends the application of TPB by demonstrating that smoking cessation intention is shaped not only by attitude, subjective norms, and perceived behavioral control but also by contextual factors, including knowledge and peer support. The findings are expected to contribute to the theoretical development of TPB in smoking cessation research and provide

evidence for designing more effective, evidence-based, and context-specific smoking cessation interventions and smoke-free campus policies in higher education institutions.

RESEARCH METHOD

This study employed a quantitative cross-sectional design to examine factors associated with smoking cessation intention among students at Universitas Muhammadiyah Surakarta (Albasheer et al., 2023). The study was conducted from January to March 2025 and involved 166 active student smokers selected using a total sampling technique. A total sampling technique was employed because the number of eligible active student smokers was relatively limited, allowing all respondents who met the inclusion criteria to be included in the study and minimizing selection bias. Eligible participants were active students aged 18–25 years who had smoked for at least six months and provided written informed consent. Students who were inactive, submitted incomplete questionnaires, or withdrew during the study were excluded.

Data were collected using a structured questionnaire adapted and modified from previously developed Theory of Planned Behavior (TPB)-based smoking cessation instruments and relevant literature to suit the characteristics of Indonesian university students. The TPB framework was used because it explains that behavioral intention is influenced by attitude, subjective norms, and perceived behavioral control (Kusumawati et al., 2018). In this study, smoking cessation intention was measured as the dependent variable, while attitude, subjective norms, perceived behavioral control, smoking cessation knowledge, peer support, smoking duration, and cigarette type were measured as independent variables.

The questionnaire measured respondents' perceptions, knowledge, and smoking characteristics. TPB variables and peer support were assessed using a Likert scale, while smoking duration and cigarette type used categorical questions. The instrument was reviewed by experts and tested among 30 similar respondents. Validity was assessed using Pearson Product-Moment correlation, and reliability was evaluated using Cronbach's Alpha, with a value of ≥ 0.70 considered acceptable (Dewanto et al., 2022).

Table 1. Operational definition of variables

Variable	Operational Definition	Instrument	Scale	Categories
Intention to Quit Smoking	Students' intention to stop smoking.	Questionnaire	Ordinal	Intention; No intention
Attitude	Students' evaluation of smoking cessation.	Questionnaire	Ordinal	Positive (≥ 20); Negative (< 20)
Subjective Norm	Perceived social support for smoking cessation.	Questionnaire	Ordinal	Positive (≥ 20); Negative (< 20)
Perceived Behavioral Control	Perceived ability to quit smoking.	Questionnaire	Ordinal	High (≥ 16.5); Low (< 16.5)
Duration of Smoking	Length of smoking history.	Questionnaire	Ratio	< 2 years; 2–5 years; > 5 years
Type of Cigarette	Type of cigarette usually smoked.	Questionnaire	Nominal	Non-filter; Filter; Electronic cigarette (vape)
Knowledge of Smoking Cessation	Knowledge of smoking cessation methods.	Questionnaire	Ordinal	Good (≥ 20); Poor (< 20)
Peer Support	Support from friends to quit smoking.	Questionnaire	Ordinal	High (≥ 19); Low (< 19)

Data processing involved checking, coding, and data entry to ensure data accuracy and completeness. Variables with scores were categorized using median cut-off values due to non-normal data distribution, including attitude, subjective norms, perceived behavioral control, smoking cessation knowledge, and peer support, while smoking duration was classified as new, intermediate, and long-term smokers. Data were analyzed using univariate analysis for frequency distributions and bivariate analysis using the Chi-square test, with Fisher's Exact Test applied when Chi-square assumptions were not met. Statistical significance was set at $p < 0.05$. Ethical

approval was obtained from the Health Research Ethics Committee of Universitas Muhammadiyah Surakarta (No. 2025/KEPK-FIK/II/2026), and all participants provided informed consent.

RESULTS AND DISCUSSIONS

Overview of the Research Site

The research was carried out at Universitas Muhammadiyah Surakarta (UMS), a private university located in Surakarta, Indonesia. UMS is one of the largest private universities in the region, with students from diverse academic and socio-economic backgrounds. This setting was considered appropriate because university students represent a population vulnerable to smoking behavior due to social interaction, peer influence, and lifestyle changes during young adulthood. During the preliminary survey, 166 active student smokers who met the inclusion criteria were identified and included using a total sampling technique. Therefore, UMS was considered a relevant setting for examining factors associated with students' intention to quit smoking.

Respondent Characteristics

Univariate analysis was conducted to describe respondents' characteristics. The results are presented in Table 2.

Table 2. Respondent characteristics

Characteristics	Frequency (n)	Percentage (%)
Age		
19-21 Years	103	62.0
22-24 Years	63	38.0
Gender		
Male	129	77.7
Female	37	22.3
Type of Cigarette		
Filter Cigarettes	93	56.0
Electronic Cigarettes (Vape)	56	33.7
Clove Cigarettes	17	10.3
Smoking Duration		
Long-term	10	6.0
Moderate	54	32.5
New Smoker	102	61.5

As shown in Table 2, most respondents were aged 19-21 years (62.0%), male (77.7%), smoked filter cigarettes (56.0%), and had been smoking for less than two years (61.5%). These findings indicate that smoking behavior was predominantly observed among young adult male students who were relatively new smokers.

Validity and Reliability

The validity and reliability test results of the research instrument are presented in Table 3.

Table 3. Validity and reliability test results

Variable	Number of Items	r-count Range	r-table	Cronbach's Alpha	Interpretation
Knowledge	20	0.447-0.913	0.361	0.948	Valid and Reliable
Attitude	20	0.372-0.849	0.361	0.884	Valid and Reliable
Subjective Norms	20	0.377-0.699	0.361	0.871	Valid and Reliable
Perceived Behavioral Control	20	0.384-0.577	0.361	0.819	Valid and Reliable
Peer Support	24	0.365-0.836	0.361	0.909	Valid and Reliable
Smoking Cessation Intention	4	0.647-0.852	0.361	0.730	Valid and Reliable

According to the results presented in Table 3, all questionnaire items met the validity criteria, with Pearson Product-Moment correlation coefficients exceeding the critical value (r -table = 0.361). Furthermore, all variables demonstrated good internal consistency reliability, as indicated

by Cronbach's Alpha coefficients ranging from 0.730 to 0.948, exceeding the recommended minimum value of 0.70 (Cheung, 2023). Therefore, the questionnaire was considered valid and reliable for data collection.

Univariate Analysis

The univariate analysis was conducted to describe the distribution of each research variable. The results are presented in Table 4.

Table 4. Univariate analysis of smoking behavior factors among students of Universitas Muhammadiyah Surakarta

Variables	Frequency (n)	Percentage (%)
Attitude		
Positive	133	80
Negative	33	20
Subjective Norms		
High	105	63
Low	61	37
Perceived Behavioral Control		
Positive	83	50
Negative	83	50
Smoking Duration		
Long-term	10	6
Moderate	54	33
New Smoker	102	61
Type of Cigarette		
Filter Cigarettes	93	56
Electronic Cigarettes (Vape)	56	34
Clove Cigarettes	17	10
Knowledge about Smoking Cessation		
Good	135	81
Poor	31	19
Peer Support		
High	88	53
Low	78	47

Table 4 shows that most respondents had positive attitudes (80%), high subjective norms (63%), good knowledge of smoking cessation methods (81%), and high peer support (53%). Perceived behavioral control was evenly distributed (50%), while most respondents were new smokers (61%) and used filter cigarettes (56%).

Bivariate Analysis

Bivariate analysis was performed to examine the association between independent variables and smoking cessation intention, as presented in Table 5.

Table 5. Bivariate analysis

Variables	Category	Intention to Quit n (%)	No Intention n (%)	p-value
Attitude	Positive	104 (92.0)	9 (7.9)	<0.001
	Negative	32 (60.4)	21 (39.6)	
Subjective Norms	High	90 (97.8)	2 (2.2)	0.284
	Low	46 (92.0)	4 (8.0)	
Perceived Behavioral Control	Positive	72 (86.8)	11 (13.2)	0.107
	Negative	64 (77.1)	19 (22.9)	
Knowledge about Smoking Cessation	Good	117 (86.7)	18 (13.3)	0.001
	Poor	19 (61.3)	12 (38.7)	
Peer Support	High	83 (94.3)	5 (5.7)	<0.001
	Low	53 (67.9)	25 (32.1)	

Bivariate analysis showed that attitude ($p < 0.001$), knowledge regarding smoking cessation methods ($p = 0.001$), and peer support ($p < 0.001$) were significantly associated with smoking cessation intention. In contrast, subjective norms ($p = 0.284$) and perceived behavioral control ($p = 0.107$) were not significantly associated. These findings indicate that personal attitudes, cessation knowledge, and peer support may play a greater role in shaping students' intention to quit smoking.

Discussion

Association between Attitude and Smoking Cessation Intention

The present study found that attitude was significantly associated with smoking cessation intention among students at Universitas Muhammadiyah Surakarta ($p < 0.001$). This finding indicates that students' personal evaluation regarding the benefits and consequences of quitting smoking plays an important role in shaping their willingness to change smoking behavior. According to the Theory of Planned Behavior (TPB), attitude represents an individual's positive or negative evaluation toward a behavior, which influences behavioral intention through the formation of beliefs about expected outcomes (Taha et al., 2025). When students believe that quitting smoking can improve health, increase confidence, reduce disease risk, and decrease financial burden, they are more likely to develop stronger motivation to stop smoking (Yücel, 2025).

Most respondents perceived smoking cessation as beneficial, suggesting that cognitive awareness regarding the advantages of quitting may have strengthened their intention to change. Among the variables examined in this study, attitude demonstrated the strongest behavioral relevance because smoking cessation requires internal motivation rather than only external encouragement. Although students may receive information or social pressure to quit, actual behavioral intention is more likely to emerge when individuals personally recognize quitting as valuable and meaningful.

These findings are consistent with previous studies demonstrating that positive attitudes are important determinants of smoking cessation intention among adolescents and university students. Xavier, (2024) reported that attitude significantly influenced smoking cessation intention among university students in Indonesia, while Kim et al., (2022) found similar results among adolescent smokers. The consistency of these findings may be explained by the characteristics of young adults, who generally have greater autonomy in making health-related decisions. In the Indonesian context, where smoking behavior remains socially accepted in some male communities, changing personal beliefs about smoking risks becomes a critical step in initiating cessation behavior (Gades et al., 2022).

From a public health perspective, these findings emphasize that smoking cessation interventions should not only provide information about health risks but also actively modify students' perceptions regarding the advantages of quitting. Health promotion programs using motivational communication approaches may strengthen positive attitudes and increase readiness to quit smoking.

Association between Subjective Norms and Smoking Cessation Intention

The present study found that subjective norms were not significantly associated with smoking cessation intention among students at Universitas Muhammadiyah Surakarta ($p = 0.284$). This finding suggests that perceived social expectations from family, friends, or significant others may not directly translate into personal decisions to quit smoking among university students. According to TPB, subjective norms influence intention through perceived social approval or pressure; however, this influence depends on how strongly individuals internalize those expectations (Difa et al., 2025).

Although most respondents reported receiving encouragement from others to quit smoking, these external influences were insufficient to determine cessation intention. One possible

explanation is related to the developmental characteristics of university students as emerging adults. At this stage, individuals generally experience increased independence and may prioritize personal beliefs and health evaluations over external expectations. Therefore, students may acknowledge that others want them to quit but still continue smoking if they do not personally perceive cessation as necessary.

The findings differ from previous studies reporting significant effects of subjective norms on smoking cessation intention. Wiyathama, (2023) identified subjective norms as an important predictor of cessation behavior, while Pertiwi & Kusumawati, (2025) found that family and peer expectations influenced adolescents' intention to quit smoking. The difference may be explained by variations in population characteristics. Adolescents may be more influenced by parental expectations, whereas university students tend to have greater decision-making autonomy and exposure to diverse social environments. In addition, smoking culture among Indonesian young adults may reduce the impact of social disapproval because smoking is still commonly encountered in peer groups and public spaces.

From a behavioral perspective, these findings indicate that interventions relying only on social pressure may have limited effectiveness. Public health programs should combine social support strategies with approaches that strengthen personal motivation and awareness of smoking consequences.

Association between Perceived Behavioral Control and Smoking Cessation Intention

The present study found that perceived behavioral control was not significantly associated with smoking cessation intention among students at Universitas Muhammadiyah Surakarta ($p = 0.107$). This finding indicates that students' confidence in their ability to quit smoking does not always result in stronger cessation intention. Within the TPB framework, perceived behavioral control reflects perceived capability and control over performing a behavior; however, its influence may depend on whether individuals can overcome actual barriers affecting behavioral change (Siti Azzahra et al., 2025).

Although respondents reported confidence in reducing cigarette consumption, refusing smoking invitations, and managing smoking urges, these perceptions may not fully represent their ability to overcome nicotine dependence and habitual smoking patterns. Smoking cessation is a complex behavior involving physiological addiction, psychological attachment, and environmental triggers. Therefore, perceived ability alone may be insufficient if students continue to experience stress, social exposure to smokers, or habitual smoking routines.

This finding differs from previous studies showing significant relationships between perceived behavioral control and smoking cessation intention among university students (Tinggasari, 2022). The inconsistency may occur because perceived behavioral control is influenced by contextual factors. In this study, most respondents were categorized as new smokers, suggesting that their smoking behavior may still be strongly shaped by social environments rather than individual control mechanisms.

From a public health perspective, increasing self-confidence should be accompanied by practical cessation support, including coping strategies, stress management, and access to counseling services. These approaches may help students transform perceived capability into actual cessation behavior.

Association between Knowledge of Smoking Cessation and Smoking Cessation Intention

The present study demonstrated a significant association between knowledge regarding smoking cessation and smoking cessation intention among students at Universitas Muhammadiyah Surakarta ($p = 0.001$). Knowledge may influence cessation intention because it provides individuals with cognitive resources to evaluate smoking risks and identify realistic strategies for behavior change. Students who understand cessation methods may perceive quitting as more achievable because they are aware of available solutions rather than viewing cessation as a difficult process.

Most respondents had good knowledge regarding smoking cessation methods, including avoiding smoking environments, managing stress, seeking support, and using cessation strategies. This suggests that health literacy functions as an important pathway in smoking cessation decision-making. Knowledge does not directly eliminate smoking behavior, but it can strengthen awareness, improve perceived benefits of quitting, and support the development of positive attitudes.

The findings are consistent with previous studies showing that knowledge regarding smoking hazards and cessation strategies contributes to motivation to quit smoking. Arifin et al., (2021) reported that knowledge about smoking risks was associated with cessation motivation among university students, while Arnianti, (2023) demonstrated that smoking education improved adolescents' awareness regarding quitting behavior. The present study expands previous findings by suggesting that knowledge complements TPB constructs by providing additional cognitive support for behavioral intention formation.

From a public health perspective, universities should integrate smoking cessation education into student health promotion programs. Increasing health literacy may become an important preventive strategy, particularly among young adults before smoking behavior develops into long-term nicotine dependence.

Association between Peer Support and Smoking Cessation Intention

The present study found that peer support was significantly associated with smoking cessation intention among students at Universitas Muhammadiyah Surakarta ($p < 0.001$). This finding indicates that actual support received from peers may facilitate smoking cessation by providing encouragement, motivation, and assistance during behavioral change. Unlike subjective norms that reflect perceived expectations, peer support represents direct interpersonal interaction that can reduce psychological barriers and strengthen commitment to quit smoking.

Students who received greater peer support were more likely to express an intention to quit smoking. This relationship may occur because university students spend substantial time interacting with peers, making peer environments an important determinant of lifestyle decisions. Supportive peers may encourage healthier behaviors, provide accountability, and reduce exposure to smoking-related situations.

The findings are consistent with previous studies indicating that social support contributes to smoking cessation motivation. Saraswati et al., (2024) found that peer support influenced smoking cessation intention among adolescents, while File et al., (2023) reported that supportive peer environments encouraged healthier behavioral choices. The present findings highlight that social relationships influence cessation not merely through social pressure but through active assistance and emotional reinforcement.

Therefore, smoking cessation interventions in universities may benefit from peer-based approaches, such as peer educators, student support groups, and health ambassador programs. These strategies may create a supportive environment that encourages students to maintain smoking cessation efforts.

Overall Discussion, Scientific Contribution, Practical Implications, Strengths and Limitations

The present study demonstrates that smoking cessation intention among university students is influenced by cognitive and interpersonal factors. The findings contribute to the development of the TPB framework by demonstrating that additional factors beyond the original constructs, particularly smoking cessation knowledge and peer support, provide important explanations for smoking cessation intention among Indonesian university students.

Scientifically, this study highlights that smoking cessation intention is not determined solely by individual beliefs but also by the availability of information and supportive social environments. The insignificant findings for subjective norms and perceived behavioral control suggest that behavioral change among university students may require approaches beyond

increasing social pressure or self-confidence alone. Instead, interventions should strengthen internal motivation, improve health literacy, and provide practical social support.

However, several limitations should be considered. The cross-sectional design prevents causal interpretation, the use of self-reported questionnaires may introduce response bias, and the single-university setting limits generalizability. Future studies are recommended to apply longitudinal designs and multivariable analysis to explore smoking cessation behavior while considering additional factors such as nicotine dependence, psychological factors, family support, and campus tobacco control policies.

CONCLUSION

This study concludes that attitude, knowledge regarding smoking cessation methods, and peer support were significantly associated with smoking cessation intention among students at Universitas Muhammadiyah Surakarta, while subjective norms and perceived behavioral control were not significantly associated. This study contributes to smoking behavior research by extending the Theory of Planned Behavior (TPB) framework through the integration of smoking cessation knowledge and peer support as additional contextual factors in explaining students' intention to quit smoking. The novelty of this study lies in examining cognitive, behavioral, and interpersonal factors simultaneously among Indonesian university students, providing evidence that smoking cessation intention is influenced not only by individual beliefs but also by health literacy and supportive social environments. The findings imply that smoking cessation interventions should strengthen positive attitudes, improve cessation-related knowledge, and develop peer-based support programs. From a policy perspective, universities and public health stakeholders should implement structured tobacco control strategies, including health education, counseling services, and peer educator programs to support smoking cessation among young adults. Further studies using longitudinal designs and multivariable analyses are recommended to explore additional factors influencing successful smoking cessation behavior.

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