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# Predicting E-Cigarette Adoption Among University Students: A Theory of Planned Behavior Approach in a Collectivist Context

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## Abstract

E-cigarette use has become an increasingly prevalent trend among university students, accompanied by ongoing debates regarding its long-term health effects. This trend is linked to the perception that e-cigarettes contain lower levels of nicotine and other harmful substances compared to conventional tobacco cigarettes. This study aimed to examine the factors influencing students' adoption of e-cigarettes by applying the Theory of Planned Behavior (TPB). The research was conducted among students at UIN Sunan Kalijaga Yogyakarta. Data were collected via an online survey distributed through the university's academic system, with respondents recruited through accidental and snowball sampling. A total of 105 students completed the questionnaire and were included in the analysis. The results showed that the TPB model explained only 12.1% of the variance in students' intention to adopt e-cigarettes, a notably low value indicating the influence of factors beyond the standard TPB constructs. Attitude toward behavior ($\beta = 0.251$) and perceived behavioral control ($\beta = 0.169$) were positively associated with intention, whereas subjective norm was negatively associated. This finding indicates that social referents tended to discourage rather than promote the adoption of e-cigarettes. The attitude toward behavior construct was primarily driven by items reflecting social acceptance rather than health-risk perceptions. These findings suggest that students' adoption of e-cigarettes as an alternative to conventional tobacco cigarettes is influenced more by social factors than by perceptions of reduced health risks.

## Keywords

TPB, E-cigarette, Student, University, Subjective norms

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## 1. BACKGROUND

Rising adolescent mortality attributable to smoking (Knaappila et al., 2019) prompted the World Health Organization (WHO) to establish the Framework Convention of Tobacco Control (FCTC) (WHO, 2005). As part of this framework, nicotine replacement therapy delivered through electronic

nicotine delivery systems (ENDS) was introduced, contributing to the increasing number of e-cigarette users in Indonesia (Sala & Gotti, 2023; Smith et al., 2022). The Global Adult Tobacco Survey (GATS) released a 2021 report that found a 3% increase in e-cigarette users in Indonesia over 10 years (GATS, 2021). This substantial increase has positioned Indonesia among the countries with the highest prevalence of e-cigarette use worldwide (Annur, 2023). Within Indonesia, the Special Region of Yogyakarta has one of the highest prevalences of e-cigarette use among adolescents, reaching 7.4%(TCSC-IAKMI, 2020). The increase in e-cigarette use has an impact on changes in nicotine consumption that were previously enjoyed in the form of tobacco, which is in line with the WHO policy.

The WHO's support for ENDS aims to shift consumption from tobacco to e-cigarettes based on safety considerations related to nicotine exposure. The electrically powered heating mechanism that converts nicotine into vapor is regarded as a means of reducing the harms associated with tobacco smoking (Trtchounian et al., 2010). Additionally, the ENDS approach has been framed as a therapeutic effort to alleviate tobacco dependence (Farsalinos et al., 2014). However, this perspective conflicts with the Food and Drug Administration (FDA) report, which states that tobacco-specific nitrosamines (TSNAs) and diethylene glycol (DEG) produced during the heating of e-liquid are toxic and carcinogenic substances posing significant risks to human health (Food and Drug Administration, 2019). The disregard for these harmful substances suggests that the transition to e-cigarettes is driven not only by health-related considerations but also by external factors.

The social and cultural momentum, stemming from the reframing of nicotine consumption through e-cigarettes, is reflected in shifts in intentions that align with adolescent lifestyle. Martinez et al. (2021) identified this pattern through the normalization of e-cigarette use in public spaces as part of a new lifestyle. The shift from medical rationale to lifestyle formation is further reinforced by the use of social media to disseminate information about e-cigarette consumption behaviors (Alpert et al., 2020). Adolescents' emerging behaviors are, in turn, exploited by manufacturers to expand the marketing of their products. Escobedo et al. (2021) demonstrated this by showing that advertising featuring public figures increases e-cigarette use. The shift in users' motives from medical needs toward

fulfillment thus produces a new, unhealthy lifestyle driven by social and cultural factors.

Previous studies on e-cigarette use have primarily focused on identifying the key variables driving consumption, often overlooking the socio-cultural factors influencing the transition from tobacco cigarettes. Two main research trends can be distinguished. The first involves identifying dominant factors in e-cigarette use. Kurdi et al. (2021), Wamamili et al. (2020), and Natto (2020) reported that misconceptions regarding electronic cigarettes contribute to their use among students. These misconceptions are often linked to insufficient access to accurate information (Almutham et al., 2019; Merianos et al., 2022). Other factors contributing to the transition include the variety of available flavors (Habib et al., 2020), social status (Roberts et al., 2022), and use as a means of stress relief (Grant et al., 2019). The second trend concerns restrictions on e-cigarettes. Wipfli et al. (2020) and Hiler et al. (2020) have proposed explicit bans through regulations and intensive health promotion at the university level. Although these studies clarify individual and regulatory determinants, the application of the Theory of Planned Behavior (TPB) to the transition from tobacco cigarettes to e-cigarettes, particularly the role of subjective norms in a collectivist and religiously diverse student population, remains underexplored. Therefore, examining the motivations underlying e-cigarette use from social and cultural perspectives is essential for developing strategic policies to reduce the number of users and promote a healthy environment.

## 2. METHODS

### Study Design and Setting

This study examined the determinants of e-cigarette adoption among university students using the Theory of Planned Behavior (TPB). It analyzed the relationships among TPB constructs to identify the factors influencing students' decisions to use e-cigarettes. A literature review was conducted to identify the Theory of Planned Behavior as an appropriate framework for analyzing students' behavior in adopting e-cigarettes.

The study was conducted at UIN Sunan Kalijaga Yogyakarta. This university was chosen because several of its faculties have promoted smoking restrictions and actively disseminated information about the health risks of smoking. Although a comprehensive smoke-free campus policy has not yet been implemented, smoking remains a common social practice among

students, reflecting the influence of social interactions and campus culture. These conditions provided the rationale for the study.

**Participants and Sampling**

The study population consisted of all students enrolled at UIN Sunan Kalijaga Yogyakarta. Participants were recruited using a combination of accidental and snowball sampling techniques. Accidental sampling, based on respondents' willingness to participate, was conducted by distributing an online questionnaire via Google Forms through the university's academic system. Subsequently, snowball sampling was used, with respondents asked to refer other students who met the predetermined inclusion criteria.

A total of 105 students voluntarily completed the questionnaire, and their responses were included in the final analysis. Following Hair et al. (2019), PLS-SEM is particularly suitable for predictive research involving relatively small samples. Therefore, the sample of 105 respondents meets the minimum requirements for PLS-SEM, considering the complexity of the proposed model and the recommended level of statistical power.

**Instrument**

The research instrument was adapted from Alber et al. (2021), consisting of 10 items for the attitude construct, 12 items for the subjective norm, 5 items for perceived behavioral control, 3 items for intention, and 3 items for smoking behavior. Following validity testing, items with factor loadings below 0.60 were removed, leaving seven attitude items, six subjective norm items, four perceived behavioral control items, and two intention items for subsequent analysis.

The second section gathered respondents' background characteristics, including age, smoking history, and religious and educational background. Prior to the main survey, the questionnaire was pilot-tested on 25 students from the study area. Construct validity was assessed using SmartPLS version 4, starting with convergent validity. Following Chin (1998), reflective indicators were considered valid when factor loadings were ≥ 0.60. The results demonstrated satisfactory construct validity and item performance (Table 1). Reliability was evaluated using Cronbach's alpha, with all constructs exceeding 0.60.

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**Table 1.** Questionnaire Items

| Construct | Item Code | Item | Outer Loading |
|---|---|---|---|
| Attitude | Att2 | E-cigarettes are beneficial | 0.609 |
| | Att3 | Safety of e-cigarettes | 0.759 |
| | Att4 | Do not contain harmful substances | 0.718 |
| | Att5 | Therapy for quitting smoking | 0.680 |
| | Att7 | More socially accepted | 0.774 |
| | Att8 | Variety of flavors | 0.660 |
| | Att9 | Prefer e-cigarettes | 0.743 |
| Subjective Norm | SN6 | Approval from close friends | 0.771 |
| | SN7 | Approval from family | 0.638 |
| | SN8 | Approval from the community | 0.919 |
| | SN9 | Friends' desire | 0.658 |
| | SN10 | Encouragement from friends | 0.794 |
| | SN11 | Encouragement from family | 0.711 |
| Perceived Control | PC1 | Easier to carry | 0.860 |
| | PC2 | Easier to obtain | 0.866 |
| | PC3 | Indifferent to others' opinions | 0.634 |
| | PC4 | Have full control over e-cigarette use | 0.766 |
| Intention | Int1 | Desire to quit | 0.763 |
| | Int2 | Duration of quitting therapy | 0.784 |

Construct validity was further assessed using a confirmatory factor model to evaluate model fit, validity, and reliability (Table 2), which indicated an adequate model fit.

**Table 2.** A summary of goodness of fit indices

| Fit Index | SRMR | d ULS | d_G | NFI |
|---|---|---|---|---|
| Recommended Value | ‹ 0.1 | ‹ 0.95 | ‹ 0.95 | › 0.90 |
| Estimated model | 0.085 | 0.318 | 0.217 | 0.936 |

Discriminant validity was examined using the Average Variance Extracted (AVE), with AVE values ranging from 0.708 to 0.787, exceeding the corresponding inter-construct correlations (0.294–0.578), thereby confirming adequate discriminant validity.

**Table 3.** Discriminant validity

| Constructs | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Attitude | 0.708 | | | |
| Intention | 0.316 | 0.773 | | |
| Perceived control | 0.561 | 0.294 | 0.787 | |
| Subjective Norm | 0.578 | 0.146 | 0.307 | 0.754 |

**Data Analysis**

The collected data were analyzed using SPSS version 22 and SmartPLS version 4. Structural Equation Modeling (SEM) with the Partial Least Squares (PLS) approach was employed to examine the relationships among the study variables. SEM was chosen because it

allows for the assessment of relationships among multiple variables within a theoretical model, supports hypothesis testing while accounting for measurement error, and facilitates the analysis of complex relationships between latent and observed variables (Dash & Paul, 2021; Afthanorhan et al., 2020; Dijkstra & Henseler, 2015).

## 3. RESULTS

### Respondent Demographic Data

Respondents were predominantly aged 15–24 years (85.7%), with the remainder aged 25–34 years. Males accounted for 93.5% respondents, whether they completed the questionnaire voluntarily or were approached directly, while females comprised the remainder. This pronounced skew suggests the active use of e-cigarettes among university students in this setting is overwhelmingly concentrated among males, a pattern whose implications for generalizability are discussed in the limitations section.

Respondents were drawn from all faculties and the postgraduate school at UIN Sunan Kalijaga Yogyakarta. The largest proportions came from the Faculty of Science and Technology (27.3%), the Faculty of Ushuluddin and Islamic Thought (22.1%), and the Faculty of Sharia and Law (13.0%). At the same time, the remainder was distributed among the other faculties and the postgraduate school. Regarding smoking history, 39% of respondents reported first smoking actively in high school, 32.5% during university, 18.2% in middle school, and 10.4% in elementary school.

In terms of religious education background, 41.6% of respondents had attended a pesantren (Islamic boarding school), 33.8% had attended non-religious high schools, and 23.4% had attended Madrasah Aliyah (Islamic senior secondary schools). All respondents were university students who had used e-cigarettes in some capacity. Of these, 63.6% were classified as new users (less than two years), while the remainder were long-term users (two years or more).

### Measurement Model

Confirmatory Factor Analysis (CFA) yielded standardized factor loadings (λ) for all retained items, with significant t-values (t-table = 1.992, $p < 0.05$). The Average Variance Extracted (AVE), Composite Reliability (CR), and Cronbach's alpha (α), compared against recommended thresholds of 0.50, 0.60, and 0.70, respectively. All latent variables demonstrated acceptable convergent validity and reliability (Table 4).

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**Tabel 4.** The fit indicator of the model

| Variable | Item Code | λ | t | Reliability and Validity |
|---|---|---|---|---|
| Attitude | Att2 | 0.647 | 4.267 | AVE: 0.502 |
| | Att3 | 0.773 | 5.714 | CR: 0.846 |
| | Att4 | 0.716 | 5.906 | α: 0.836 |
| | Att5 | 0.724 | 4.392 | |
| | Att7 | 0.754 | 7.269 | |
| | Att8 | 0.661 | 5.262 | |
| | Att9 | 0.689 | 7.332 | |
| Subjective Norm | SN6 | 0.817 | 3.101 | AVE: 0.569 |
| | SN7 | 0.749 | 2.263 | CR: 0.920 |
| | SN8 | 0.924 | 3 | α: 0.879 |
| | SN9 | 0.658 | 2.555 | |
| | SN10 | 0.730 | 2.662 | |
| | SN11 | 0.680 | 2.564 | |
| Perceived Behavioral Control | PC1 | 0.864 | 10.167 | AVE: 0.619 |
| | PC2 | 0.866 | 10.67 | CR: 0.849 |
| | PC3 | 0.628 | 3.786 | α: 0.797 |
| | PC4 | 0.764 | 6.253 | |
| Intention | Int1 | 0.764 | 12.365 | AVE: 0.598 |
| | Int2 | 0.783 | 14.365 | CR: 0.729; α: 0.729 |
| Beckground Factors | Bf3 | 1.000 | - | - |

All model fit indices meet the recommended thresholds (SRMR < 0.10, d_ULS and d_G below the HI95 bootstrap bound, NFI > 0.90, rms_theta < 0.12), indicating an acceptable level of model fit.

**Structural Model**

The structural model was evaluated in three steps. First, multicollinearity was assessed using the Inverse Variance Inflation Factor (VIF), with a recommended threshold of <5 (Hair Jr. et al., 2021).

**Tabel 5.** Inner VIF of the model

| | Intention | e-Cigarette Choice |
|---|---|---|
| Attitude (Att) | 1.988 | - |
| Subjective norm (SN) | 1.504 | - |
| Perceived Behavioral Control (PBC) | 1.461 | 1.094 |
| Intention (Int) | - | 1.094 |

All VIF values are under 5, indicating low multicollinearity and supporting the robustness of the parameter estimates in SEM-PLS.

Second, hypotheses were tested using t-statistics and p-values. A path was considered statistically significant when the t-statistic exceeded the critical value of 1.992 or if the p-value was less than 0.05.

Table 6. Hypothesis Testing Results

| Hypothesis | β | t-value | 95% interval | | f square | Result |
|---|---|---|---|---|---|---|
| | | | Lower | Upper | | |
| Att → Int | 0.251 | 3.764 | 0.120 | 0.382 | 0.036 | Accepted |
| SN → Int | -0.051 | 2.273 | -0.095 | -0.007 | 0.012 | Rejected |
| PBC → Int | 0.169 | 3.349 | 0.070 | 0.268 | 0.022 | Accepted |
| PBC → e-cigarette | 0.035 | 2.512 | 0.008 | 0.062 | 0.014 | Accepted |
| Int → e-cigarette | 0.834 | 23.649 | 0.765 | 0.903 | 2.217 | Accepted |

Hypothesis testing revealed a positive influence of students' attitudes and behavioral control on their intention to use e-cigarettes, with path coefficients of 0.251 (attitude) and 0.169 (perceived behavioral control), respectively. The corresponding t-statistics (3.764 and 3.349) both exceeded the critical t-value of 1.992, and the 95% confidence intervals for both paths (0.120-0.382 and 0.070-0.268) excluded zero, confirming statistical significance.

In terms of effect size, both attitude and perceived behavior control exerted only small structural effects on intention (f-square = 0.036 and 0.022, respectively). According to Hair et al. (2021), the f-square values of 0.02, 0.15, and 0.35 correspond to small, medium, and large effects.

Subjective norm, in contrast, had a significant negative effect on intention (β = -0.051; 95% CI: -0.095 to -0.007), with the confidence interval entirely below zero. Perceived behavioral control also exhibited a small but significant positive effect on the actual choice of e-cigarettes (β = 0.035; 95% CI: 0.008-0.062), while intention was by far the strongest predictor of e-cigarette use (β = 0.834; 95% CI: 0.765-0.903). These results suggest that reducing e-cigarette adoption among students may require awareness campaigns addressing perceptions of e-cigarettes, alongside regulatory measures restricting their availability.

## 4. DISCUSSION

Hypothesis testing revealed that attitude toward behavior and perceived behavioral control had significant positive effects on intention. These findings suggest that more favorable perceptions of e-cigarettes, including the belief that they can serve as a therapeutic aid for quitting conventional tobacco smoking, increase the intention to use them. The perceived ease of obtaining e-cigarettes also influenced both intention and actual choice to use e-cigarettes. In contrast, subjective norms exerted a significant negative effect on intention, indicating that social referents discouraged rather than encouraged adoption.

Together, attitude toward behavior, subjective norms, and perceived behavioral control accounted for only 12.1% of the variance in intention (R2 = 0.121). In contrast, intention explained 71.3% of the variance in the actual choice of e-cigarettes. The comparatively weak prediction of behavior in this sample partly reflects factor loadings below the standard threshold for some behavioral indicators.

The model's low explanatory power for intention warrants particular attention. In Theory of Planned Behavior (TPB) research, the three core constructs typically explain a substantial portion of the variance in intention. However, an R2 of 12.1% is markedly lower than values commonly reported in the literature. This suggests that nearly 88% of the variance in students' intention to adopt e-cigarettes is attributable to factors outside the standard TPB framework. Several external variables may account for this unexplained variance. Nicotine dependence is a plausible driver, as physiological addiction may influence intention independently of attitudes or social norms. Marketing and social media exposure, which have been shown elsewhere to correlate with e-cigarette uptake (Alpert et al., 2020; Escobedo et al., 2021), may also operate beyond the measured constructs. Additional factors include peer influence beyond injunctive subjective norms, flavor preferences (Habib et al., 2020), and stress or affect regulation (Grant et al., 2019). Incorporating these variables into an extended TPB model in future research may substantially enhance its explanatory power regarding e-cigarette adoption.

The strong effect of intention on behavior reinforces the core structure of the Theory of Planned Behavior (TPB), in which intention is the primary driver of behavior (Bosnjak et al., 2020; Conner, 2020). The negative effect of subjective norms on intention can be explained by La Barbera & Ajzen (2020), who demonstrated that subjective norms' influence is moderated by perceived behavioral control. This suggests that students' easy access to e-cigarettes may outweigh the influence of social referents, causing perceived disapproval from these referents to have a negative, rather than facilitating, effect on intention. Notably, perceived behavioral control was not the dominant predictor of intention in this sample.

The positive effect of perceived behavioral control was weaker than that of attitude toward behavior, which emerged as the strongest significant predictor of intention. This finding contrasts with studies in which perceived behavioral control exerts a stronger influence in

specific contexts (Ateş, 2020; Mohr & Kühl, 2021), as well as with Coşkun & Yetkin Özbük (2020), who reported a strong negative association between perceived behavioral control and food waste behavior. Such divergence underscores the context-dependent nature of TPB applications.

The prominence of attitude toward behavior as the strongest determinant of intention is related to the reflective nature of the indicators' relationship to their latent construct, particularly when they emphasize cognitive information. Items reflecting the effects of prior behavior showed lower loadings, suggesting that students' knowledge of e-cigarettes, including perceptions that they can serve as a therapeutic aid, plays a central role in their decision to use them. Ajzen (2005) supports this, noting that salient cognitive information can directly influence both intention and behavior without the need for additional variables. Ajzen and Fishbein (1980) further argue that attitude and subjective norm mediate the effects of external influences on intention and behavior through the underlying belief structure.

The perceived behavioral control items that met the loading criteria did not emphasize external or internal constraints, further reinforcing the dominance of attitude toward behavior in shaping intention. Constraints are an important factor moderating the effect of past behavior on attitude (Ajzen, 2005). Perceived ease of use of e-cigarettes indicates familiarity, suggesting that potential barriers were not a major concern. This is evidenced by the direct effect of perceived behavioral control on behavior, suggesting that e-cigarette use is not a novel experience for students, as behavioral control is more salient in familiar contexts (Ajzen & Madden, 1986). This pattern contrasts with the findings of Leone et al. (1999), who reported that attitude was a weaker predictor in comparable TPB models.

Although the attitude construct was primarily dominated by items reflecting cognitive evaluation, the affective and lifestyle dimensions of e-cigarette use warrant closer examination. The item related to social acceptance loaded highly (0.774), indicating that e-cigarette use is embedded in students' social self-presentation rather than being driven solely by health-related reasoning. Affective preference (0.743) showed a similar loading, whereas flavor preference contributed only modestly (0.660), and lifestyle-related items fell below the acceptable threshold. This finding suggests that within this cognitively oriented

construct, social and affective factors, such as using e-cigarettes to express social identity and strengthen a sense of belonging with peers, operate alongside deliberate evaluation rather than being subordinate to it. The lower loading of flavor and lifestyle items does not necessarily indicate their irrelevance; rather, in a collectivist and religiously diverse student population, social acceptance may encompass what elsewhere appears as lifestyle-driven motivation.

The difference in predictive power between attitude toward behavior and perceived behavioral control may stem from item components that do not adequately capture barriers and prior behavioral experiences. These elements are essential within the Theory of Planned Behavior (TPB) and distinguish it from the Theory of Reasoned Action (TRA) and the Theory of Self-Regulation (TSR) (Leone et al., 1999). TPB considers behavioral constraints and prior experience as essential factors in regulating intentions and subsequent actions (Fishbein & Ajzen, 1975). Although perceived behavioral control alone may not fully determine behavior (Bagozzi & Kimmel, 1995), incorporating barriers and experience into item construction is critical when operationalizing the TPB framework.

Students' evaluations were most strongly associated with social acceptance (loading = 0.774) and affective preference (loading = 0.743). In contrast, the item assessing knowledge of e-cigarette hazards, as highlighted by Kurdi et al. (2021), Wamamili et al. (2020), and Natto (2020), had the lowest loading (0.609). These findings differ partly from those reported by Habib et al. (2020) and Roberts et al. (2022), who identified flavor and lifestyle as the main determinants of e-cigarette choice. In the present study, flavor preference contributed only a moderate amount (loading = 0.660), while the lifestyle items had loadings below the acceptable threshold of 0.60 and were therefore excluded from the analysis.

The prominence of attitude as a predictor of e-cigarette use suggests that interventions targeting students' attitudes could be effective at UIN Sunan Kalijaga Yogyakarta. Since the social environment influences attitudes, implementing smoke-free policies, reinforced by campus-wide restrictions on both conventional and electronic cigarettes, may help reduce use, consistent with recommendations by Wipfli et al. (2020) and Hiler et al. (2020). Overall, the findings indicate that e-cigarette adoption among these students is driven more by social factors than by health or tobacco prevention concerns.

These findings should be interpreted with caution because of several limitations, which may also explain the model's limited explanatory power. The sample was obtained from a single university using accidental and snowball sampling. Although this nonprobability sampling approach was appropriate for the study's exploratory objectives, it limits the generalizability of the findings to the wider student population. In addition, the sample consisted predominantly of male respondents (93.5%). This distribution likely reflects the higher prevalence of active e-cigarette use among male students; however, it limits the extent to which the findings can be generalized to both genders. Future studies should include a more balanced gender distribution to determine whether the observed relationships, particularly the negative effect of subjective norm, are also evident among female students.

The relatively low variance explained for intention (R2 = 12.1%) further indicates that the standard TPB constructs captured only part of the determinants of e-cigarette adoption. As noted above, variables such as nicotine dependence, marketing exposure, and peer influence may yield a more comprehensive model. Finally, the measurement of perceived behavioral control did not fully capture behavioral barriers and experience, which may have attenuated its predictive contribution. Future research employing larger, gender-balanced, and multi-site samples, together with an extended TPB model, would help address these limitations.

## 5. CONCLUSION

This study shows that the adoption of e-cigarettes among university students is more strongly influenced by attitudes, shaped by behavioral beliefs and previous experiences, than by perceived behavioral control. In contrast, subjective norm has a significant negative effect on intention. Theoretically, these results suggest that applying the Theory of Planned Behavior (TPB) to e-cigarette adoption would benefit from a refined conceptualization and measurement of perceived behavioral control, as well as from extending the model to capture determinants beyond its core constructs, given its limited explanatory power in this context. Practically, because students' decisions are influenced more by social and affective considerations than by perceptions of reduced health risk, campus tobacco-control policies should move beyond health-risk education to address the attitudes and social influences surrounding e-cigarette use, thereby more effectively preventing and reducing its adoption.

## AUTHOR CONTRIBUTIONS

SF was responsible for writing the original draft, collecting the students' data, and editing. SKD was responsible for quantitative data processing. SF and SKD developed the research framework and contributed to data collection and analysis. ANA and MYA contributed to data collection and to managing field assistants and research finance. All authors participated in the planning and reviewing of the article draft.

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## CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest in this research.

## DATA AVAILABILITY STATEMENT

The data the findings of this research are available from the corresponding author upon reasonable request.

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