

# Awareness of College Students on Davao City's Anti-Smoking Ordinance (City Ordinance No. 0367-12 s. 2012) and their Smoking Behavior

Herzel Miles Abendan, Katrina Angela Madulin, Brian Dave Laude, and John Vianne Murcia

## ABSTRACT

Tobacco control ordinances reduce smoking prevalence only when target populations are aware of their provisions. Among college students—a critical period for health habit formation—the link between ordinance awareness and smoking-related cognitions remains understudied in the Philippine local governance context. This study examined awareness of Davao City's Anti-Smoking Ordinance (City Ordinance No. 0367-12 s. 2012) among 272 college students, described their smoking behavior across four belief dimensions, and determined correlations between ordinance awareness and smoking beliefs. Using a quantitative descriptive-correlational design with stratified random sampling, data were collected via adapted instruments. Descriptive statistics and Spearman's rank-order correlation were applied. Students demonstrated very high ordinance awareness ( $M = 4.45$ ,  $SD = 0.69$ ). Authority enforcement and penalty clarity received the highest ratings ( $\approx 4.50$ ), while community dissemination and monitoring were slightly lower ( $\approx 4.38$ ). Health-related consequences of smoking yielded the highest behavioral mean ( $M = 4.28$ , very high), negative behavioral beliefs were high ( $M = 4.08$ ), and positive behavioral beliefs were moderate ( $M = 2.71$ ). Spearman's correlations showed that ordinance awareness was positively associated with negative behavioral beliefs ( $\rho = .509$ ), health-related results ( $\rho = .285$ ), and complicating control beliefs ( $\rho = .222$ ; all  $p < .001$ ). No significant correlations emerged for positive behavioral beliefs, normative beliefs, or facilitating control beliefs. High ordinance awareness strengthens recognition of smoking's negative health consequences and perceived barriers to smoking, but does not appear to operate through social normative pathways. These findings support sustained health education and visible enforcement as tobacco control mechanisms in educational settings, while identifying social-norm interventions as an underserved complementary strategy.

**Keywords:** *anti-smoking ordinance; tobacco control; college students; smoking behavior; ordinance awareness; Davao City; Philippines.*

## I. INTRODUCTION

Tobacco use remains one of the most significant preventable causes of morbidity and mortality globally, responsible for more than eight million deaths annually and a disproportionate burden of non-communicable disease across both high-income and developing nations (Le Foll et al., 2022). The college years represent a critical developmental window during which smoking habits that persist across the lifespan are most commonly initiated or consolidated. Young adults in their late teens and early twenties are simultaneously negotiating independence, social identity, and academic stress — conditions that together create heightened susceptibility to tobacco initiation and normalization (Bin Abdulrahman et al., 2022). Understanding what

shapes smoking behavior during this period — and, crucially, what mitigates it — is therefore an urgent public health priority.

Anti-smoking ordinances are among the most widely deployed instruments for tobacco control at the local governance level. By establishing smoke-free environments, mandating visible signage and penalty notice, and authorizing enforcement by designated authorities, such ordinances aim to restrict the social and physical contexts in which smoking occurs, deter smoking through perceived legal consequences, and signal community norms against tobacco use. Their effectiveness, however, is contingent on a precondition that is frequently assumed rather than empirically verified: that the target population possesses adequate awareness of the ordinance's provisions, boundaries, and

H. M. Abendan, K. A. Madulin, B. D. Laude

College of Criminal Justice Education,  
Jose Maria College Foundation, Davao  
City, Philippines.

(e-mails: herzel.abendan@jmc.edu.ph,  
katrina.madulin@jmc.edu.ph,  
brian.laude@jmc.edu.ph)

J. V. B. Murcia\*

Research Development and Publication  
Office, Jose Maria College Foundation,  
Davao City, Philippines

(e-mail: john.murcia@jmc.edu.ph)

\*Corresponding Author

Submitted: March 26, 2025

Published: June 5, 2025

Turnitin: 8%

Grammarly: 96%

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enforcement mechanisms. Where that awareness is low or uneven, the ordinance's deterrent and normative functions are correspondingly impaired (Sabaulan et al., 2021).

Regulatory frameworks for tobacco control operate through multiple pathways — restricting smoking spaces, imposing financial penalties, and leveraging visible enforcement to signal social disapproval of tobacco use. Their effectiveness depends critically on public awareness: an ordinance that is inadequately communicated or unenforced produces neither deterrence nor normative shift. Sabaulan et al. (2021) examined awareness of a local anti-smoking ordinance in Santiago City, Philippines, and found that while smokers demonstrated moderate awareness of prohibited areas, awareness was most consistently conveyed through slogans and posted notices rather than through formal dissemination programs. Importantly, ordinance awareness was positively associated with intention to quit, suggesting a direct pathway from regulatory knowledge to cessation motivation that this study sought to replicate at the student level.

At the national level in the Philippines, the Republic Act No. 9211 (Tobacco Regulation Act) and the Sin Tax Reform Law have collectively produced measurable reductions in tobacco use prevalence, operating through pricing mechanisms, advertising restrictions, graphic health warnings, and smoke-free zone designations (Arrazola et al., 2020; Cordero, 2024). Arrazola et al.'s (2020) analysis of Global Youth Tobacco Survey data from 2000 to 2015 confirmed that the implementation of RA 9211 was associated with a statistically significant reduction in smoking prevalence among Filipino school youth aged 13–15, providing evidence that national legislative tobacco control can produce measurable population-level behavior change when consistently implemented. The question of how this national framework is reinforced — or undermined — by local ordinance awareness among college students is one that the present study addresses.

In Davao City, Philippines, the Anti-Smoking Ordinance No. 0367-12, s. 2012 (City Government of Davao, 2012), establishes a comprehensive regulatory framework for tobacco use in public spaces, with specific provisions for educational institutions enforced by the Tobacco

Dispute Resolution Office (TDRO), the Department of Social Services (DSS), and the Philippine National Police (PNP). Despite this framework, the relationship between students' awareness of this specific ordinance and the smoking-related cognitions and behaviors that tobacco control seeks to influence has not been systematically studied. National data indicate a decline in overall tobacco use prevalence in the Philippines — from 29.7% in 2009 to 19.5% in 2021 — attributable in part to national legislation (Cordero, 2024), but the micro-level dynamics of how local ordinance awareness translates into student-level smoking behavior remain insufficiently documented.

The transition to college is a well-documented risk period for smoking initiation and habit consolidation. Bin Abdulrahman et al. (2022) found that among university students at IMSIU in Saudi Arabia, the majority who smoke initiated during their university years, with stress and social influence from smoking family members identified as primary triggers. This temporal pattern — initiation during higher education rather than in adolescence — is consistent with Alves et al.'s (2022) Portuguese study showing that social influences, particularly from smoking peers and exposure to secondhand smoke, were the dominant environmental predictors of current smoking status among university students. These studies collectively confirm that the college environment is not simply a venue in which pre-existing habits persist but an active site of habit formation.

This study addresses this gap by examining the level of ordinance awareness and smoking behavior among college students at a private higher education institution in Davao City, and by testing the correlation between these two constructs across multiple dimensions of smoking-related beliefs. The study is theoretically grounded in Rogers' (1975) Protection Motivation Theory (PMT) and Ajzen's (1985) Theory of Planned Behavior (TPB), which together provide explanatory frameworks for how threat appraisal and coping efficacy (PMT) and for how attitudes, subjective norms, and perceived behavioral control (TPB) shape tobacco-related decisions. Three specific objectives guide the study: (1) to assess the level of awareness of the Anti-Smoking Ordinance among college students; (2) to describe

the smoking behavior profile of respondents across four belief dimensions; and (3) to examine the correlational relationship between ordinance awareness and smoking behavior dimensions.

## II. METHOD

### A. Study Setting and Participants

The study was conducted at a private higher education institution in Davao City, Philippines. The institution was selected on the basis of its diverse multi-program student population, accessible research collaboration infrastructure, and geographic location within the jurisdiction of the Davao City Anti-Smoking Ordinance. Participants were college students enrolled in five academic programs: the College of Business and Economics (COBE), the College of Criminal Justice Education (CCJE), the Bachelor of Science in Information Technology (BSIT), the College of Arts and Sciences (CAS), and the College of Teacher Education (CTE).

Using Yamane's formula with a 0.05 margin of error applied to a total enrolment population of 851 students, a required sample size of 272 was determined. Stratified random sampling was applied, with each program constituting a stratum. The allocation across strata was: COBE (n = 84), CCJE (n = 78), BSIT (n = 45), CAS (n = 37), and CTE (n = 28), reflecting the relative program enrolment sizes. Inclusion criteria required active enrolment at the time of data collection. Participants who declined to complete the informed consent form were excluded.

### B. Research Design

This study employed a quantitative, descriptive-correlational research design. The descriptive component characterized the level of ordinance awareness and the smoking behavior profile of the college student sample. The correlational component examined the strength and significance of associations between ordinance awareness and each of the four smoking behavior dimensions, without inferring causality. A correlational design was appropriate for addressing the study's third objective given that experimental manipulation of ordinance awareness was neither feasible nor ethically indicated in this context.

### C. Instrument

Ordinance awareness was assessed using a 10-

item instrument adapted from Mojares et al. (2014), with items addressing the clarity, dissemination, enforcement, penalties, boundaries, monitoring, personnel adequacy, and signage of the Anti-Smoking Ordinance. All items were rated on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). The scale interpretation followed the range: 4.20–5.00 = Very High; 3.40–4.19 = High; 2.60–3.39 = Moderate; 1.80–2.59 = Low; 1.00–1.79 = Very Low.

Smoking behavior was assessed using a multi-dimensional instrument adapted from Glover et al. (2005) and Acarlı and Yaman (2014), covering four dimensions: (1) behavioral beliefs — positive and negative beliefs about the effects of smoking; (2) health-related results — awareness of smoking's health consequences; (3) normative beliefs — perceived social support for and against smoking; and (4) control beliefs — perceived facilitating and complicating factors for smoking. All items were rated on a five-point scale, interpreted using the same range as the awareness instrument but with corresponding behavior-specific descriptors.

### D. Data Collection and Analysis

Following institutional ethics clearance and Dean's approval, researchers obtained the official student enrolment list from the registrar. Questionnaires were distributed in person to campus-based respondents with verbal and written explanation of the study's purpose, rights of participants, and voluntary nature of participation. All participants signed informed consent forms before completing the surveys. Students residing outside Davao City boundaries received their questionnaires through a secure digital platform. Completed questionnaires were screened for missing responses and data integrity before analysis.

Descriptive statistics — means (M) and standard deviations (SD) — were computed for all ordinance awareness items and all smoking behavior dimensions. Spearman's rank-order correlation coefficient ( $\rho$ ) was used to test the associations between ordinance awareness and each smoking behavior sub-dimension, given the ordinal nature of the Likert-scale data and to avoid assumptions of interval normality. Significance was evaluated at  $\alpha = .05$ . All analyses were conducted using JAMOVI software.

### III. RESULTS AND DISCUSSION

#### A. Awareness of the Anti-Smoking Ordinance

Table I presents the descriptive statistics for ordinance awareness. The overall awareness level was very high (M = 4.454, SD = 0.693), indicating that the study population is comprehensively informed about the Anti-Smoking Ordinance and its enforcement mechanisms.

All ten items fell within the very high awareness range, with item means clustered narrowly between 4.38 and 4.50. The highest awareness was registered for authority enforcement by the TDRO, DSS, and PNP (M = 4.498) and for penalty clarity (M = 4.495) — the two aspects of the ordinance that are most directly visible and consequential to students navigating campus environments. The clarity and boundary definition of the ordinance (M = 4.491 and 4.484, respectively) and the use of physical signage (M = 4.487) also received high ratings, consistent with

current findings compare favorably to the lower ordinance coverage and monitoring awareness reported by Mojares et al. (2014), which may reflect improvements in enforcement communication in Davao City's educational settings over the intervening decade.

From a Protection Motivation Theory perspective, this very high awareness profile is particularly significant for the threat appraisal component: students who are well-informed about the ordinance's scope, penalties, and enforcement are likely to perceive a higher probability of personal consequence from smoking on campus — a perception that elevates their threat appraisal and, per PMT, strengthens their motivation to engage in the protective behavior of non-smoking. The consistency of high awareness across all items with relatively small standard deviations (range = 0.781–0.903) further suggests that this awareness is broadly shared across the student population rather than concentrated in specific demographic or program subgroups.

TABLE I: LEVEL OF AWARENESS OF COLLEGE STUDENTS REGARDING ANTI-SMOKING ORDINANCE NO. 0367-12 (N = 272)

Item	M	SD	Descriptive Level
1. The ordinance is clearly stated.	4.491	0.795	very high
2. The ordinance is properly disseminated to the community.	4.380	0.873	very high
3. There is strict implementation of the ordinance.	4.470	0.817	very high
4. The ordinance is stated within specific boundaries and scope.	4.484	0.799	very high
5. The ordinance is regularly monitored.	4.380	0.835	very high
6. The penalty is clearly stated and known to the public.	4.495	0.781	very high
7. Authorities (TDRO, DSS, PNP) are prohibiting smoking within school boundaries.	4.498	0.781	very high
8. Signage (tarpaulins, sign boards, leaflets) prohibiting smoking in designated places is used.	4.487	0.822	very high
9. A system is followed in implementation.	4.437	0.903	very high
10. Sufficient personnel are implementing the ordinance.	4.419	0.873	very high
Overall	4.454	0.693	very high

an enforcement regime that relies substantially on visible deterrence mechanisms.

The relatively lower means for community dissemination (M = 4.380) and routine monitoring (M = 4.380) — while still technically very high — suggest a marginal gap in how well the ongoing procedural infrastructure of ordinance implementation reaches students. This is consistent with Sabaulan et al.'s (2021) finding in Santiago City that awareness was more robustly established through physical notices and slogans than through structured dissemination programs, and with the broader Philippine tobacco control literature suggesting that enforcement visibility outpaces formal community education efforts. The

#### B. Smoking Behavior Profile of College Students

Table 2 presents the descriptive statistics for smoking behavior across four dimensions and eight sub-categories.

The smoking behavior profile that emerges from these data exhibits a consistent asymmetric structure across all four dimensions: the sub-categories indexing resistance to or concern about smoking uniformly score higher than those indexing acceptance or facilitation of smoking. Health-related results — awareness of smoking's physical health consequences — register as the highest dimension overall (M = 4.28, very high),

TABLE II: LEVEL OF SMOKING BEHAVIOR OF COLLEGE STUDENTS ACROSS FOUR DIMENSIONS (N = 272)

Dimension	Sub-Category	M	SD	Descriptive Level
Behavioral Beliefs	Positive	2.705	1.161	Moderate
	Negative	4.077	0.916	High
Health-Related Results	Health-related	4.280	0.822	Very High
Normative Beliefs	Supporting	3.060	1.124	Moderate
	Not Supporting	3.582	1.367	High
Control Beliefs	Facilitating	3.087	1.066	Moderate
	Complicating	3.742	1.065	High

confirming that health consequence awareness constitutes the most robust anti-smoking cognition in this sample. This finding is consistent with the TPB's attitude component and aligns with Acarlı and Yaman's (2014) original instrument validation, which similarly identified health-related beliefs as the most strongly held smoking deterrent among student populations.

Negative behavioral beliefs about smoking (M = 4.08, high) complement the health-related results finding, together forming a strong cognitive foundation of smoking disapproval. By contrast, positive behavioral beliefs — capturing endorsement of smoking's perceived benefits such as stress relief, increased alertness, or social facilitation — rated only at moderate levels (M = 2.71). This divergence is theoretically significant: it indicates that while students may intellectually recognize smoking's harms, a non-trivial proportion retains moderate positive evaluations of smoking's instrumental benefits. This residual positive belief endorsement creates the ambivalence that tobacco control research consistently identifies as a barrier to cessation and a facilitator of sustained smoking behavior even among individuals who express awareness of health risks (Alves et al., 2022).

The normative belief profile follows a similar pattern: non-supporting normative influences (M = 3.58, high) — reflecting perceived social disapproval of smoking among significant others — outweigh supporting influences (M = 3.06, moderate). The moderate mean for supporting normative beliefs indicates that while students do not strongly perceive their social environment as encouraging smoking, some students do perceive a non-trivial degree of peer or family acceptance of tobacco use. In smoke-free ordinance contexts, this residual social support for smoking is

particularly consequential: Suarjana et al. (2022) found in a Bali smoke-free ordinance study that adherence was undermined precisely in communities where smoking remained socially acceptable and embedded in social rituals, regardless of formal regulatory prohibitions.

Control beliefs show the same asymmetric pattern, with complicating factors (M = 3.74, high) outweighing facilitating ones (M = 3.09, moderate). The relatively wide standard deviation for non-supporting normative beliefs (SD = 1.37) is the largest in the dataset and suggests substantial inter-individual variation in this dimension — some students perceive strong social pressure against smoking, while others experience comparatively weaker normative deterrence. This variability may reflect program-level or demographic subgroup differences in peer smoking prevalence that aggregate statistics mask.

### C. Correlation Between Ordinance Awareness and Smoking Behavior

Three of the seven smoking behavior sub-dimensions demonstrated statistically significant positive correlations with ordinance awareness. The strongest association was between awareness and negative behavioral beliefs about smoking ( $\rho = .509$ ,  $p < .001$ ), indicating that students with higher ordinance awareness are substantially more likely to hold strong negative beliefs about smoking's consequences. This is the most practically important finding in the correlation matrix: a Spearman's  $\rho$  of .509 constitutes a moderate-to-strong monotonic relationship that suggests ordinance awareness and negative smoking beliefs move together in a manner that is both statistically robust and substantively meaningful for behavior prediction.

The correlation between awareness and health-

TABLE III: SPEARMAN'S RANK-ORDER CORRELATIONS BETWEEN ANTI-SMOKING ORDINANCE AWARENESS AND SMOKING BEHAVIOR DIMENSIONS (N = 272)

Smoking Behavior Dimension	Spearman's $\rho$	p	Significance
<i>Behavioral Beliefs</i>			
Positive behavioral beliefs	-.107	.073	ns
Negative behavioral beliefs	.509	< .001	*
<i>Health-Related Results</i>			
Health-related results	.285	< .001	*
<i>Normative Beliefs</i>			
Supporting normative beliefs	.038	.523	ns
Non-supporting normative beliefs	.109	.068	ns
<i>Control Beliefs</i>			
Facilitating control beliefs	.065	.281	ns
Complicating control beliefs	.222	< .001	*

Note. ns = not significant ( $p > .05$ ); \* = significant at  $\alpha = .05$ .

related results ( $\rho = .285$ ,  $p < .001$ ) confirms that ordinance-aware students are more likely to endorse strong beliefs about smoking's physical health consequences — a finding consistent with PMT's threat appraisal pathway, in which exposure to legal and health risk information simultaneously elevates perceived severity of the smoking threat. The weaker but still significant correlation with complicating control beliefs ( $\rho = .222$ ,  $p < .001$ ) indicates that students more aware of the ordinance also perceive more barriers to smoking behavior — a theoretically coherent TPB pathway whereby enforcement visibility raises the perceived cost and difficulty of smoking in campus contexts.

The three non-significant correlations are analytically as important as the significant ones. No significant association was found between ordinance awareness and positive behavioral beliefs ( $\rho = -.107$ ,  $p = .073$ ), supporting normative beliefs ( $\rho = .038$ ,  $p = .523$ ), or facilitating control beliefs ( $\rho = .065$ ,  $p = .281$ ). The non-significant negative correlation between awareness and positive beliefs (approaching but not meeting the  $\alpha = .05$  threshold) warrants careful interpretation: it may reflect a genuine but weak tendency for more ordinance-aware students to have slightly lower endorsement of smoking's perceived benefits, but the statistical evidence is insufficient to support this interpretation confidently. More instructive are the flat correlations with normative beliefs, which suggest that the ordinance — at least at its current level of awareness — does not meaningfully alter students' perceptions of their social environment's attitudes toward smoking.

This pattern — significant correlations with cognitive and control pathways but not with social

normative pathways — is theoretically interpretable within both PMT and TPB. Ordinances operate primarily through their threat-appraisal effects (making consequences visible and credible) and through their enforcement-based control belief effects (raising the perceived difficulty of smoking). They do not, by design, directly alter the social norms that govern peer smoking behavior within student communities. Septiono et al.'s (2020) finding that smoke-free municipal ordinances reduced smoking intensity without significantly affecting social acceptance of smoking is directly consistent with this pattern. Suarjana et al. (2022) reached an analogous conclusion in their Bali study: ordinances are most effective where they are complemented by social norm change, not where they substitute for it.

The implication for tobacco control strategy is clear and specific: anti-smoking ordinances in educational settings are effective in reinforcing health belief awareness and strengthening the perceived barriers to smoking, but they leave social normative pathways substantially unaddressed. Comprehensive tobacco control for college students requires not only continued visible enforcement and penalty clarity — which this study's awareness data confirm are being effectively communicated — but deliberate social norm-change programming that directly targets peer and family attitudes toward smoking. Mentorship, peer-led cessation programs, and campus social media campaigns that denormalize smoking as a social activity are the indicated complementary interventions for the normative gap this study identifies.

#### IV. CONCLUSION

This study has demonstrated that college students possess very high awareness of Anti-Smoking Ordinance No. 0367-12, particularly its enforcement mechanisms, penalty structures, and visible signage — aspects of the ordinance that are most directly and consistently communicated in campus environments. Smoking behavior, assessed across four multi-dimensional constructs, reveals a consistently asymmetric profile in which anti-smoking cognitions (negative beliefs, health awareness, non-supporting norms, complicating controls) uniformly outweigh pro-smoking cognitions — a pattern consistent with the objectives of tobacco control policy and with the deterrent function of anti-smoking education.

The correlational analysis establishes that ordinance awareness is positively and significantly associated with negative behavioral beliefs about smoking ( $\rho = .509$ ), health-related belief awareness ( $\rho = .285$ ), and complicating control beliefs ( $\rho = .222$ ), but is unrelated to positive behavioral beliefs, normative beliefs, and facilitating control beliefs. This differential correlation pattern reveals the specific cognitive pathways through which the Anti-Smoking Ordinance exerts its behavioral influence: principally through threat appraisal and enforcement-based control belief mechanisms, without corresponding effects on the social normative dimensions of smoking behavior. The practical implication is that sustained investment in ordinance visibility and enforcement effectively addresses individual-level health cognitions but cannot substitute for social norm-change interventions that directly target the peer and family attitudes shaping students' smoking decisions.

The study has limitations that qualify its conclusions. The single-institution, single-city design limits the generalizability of findings to other higher education contexts in the Philippines or beyond. The cross-sectional design establishes association rather than causality, leaving open the question of whether ordinance awareness precedes and influences smoking beliefs or whether students who hold stronger anti-smoking beliefs are more attentive to ordinance information. The reliance on self-reported Likert-scale data for both constructs introduces response bias risks that

objective behavioral measures or biochemically validated smoking status assessments would reduce. Future research should employ longitudinal designs to establish temporal precedence, extend sampling to multiple institutions and cities for comparative analysis, and incorporate social network analysis to measure actual peer smoking norms — the dimension this study identifies as most under-addressed by current ordinance enforcement. Evaluations of specific social norm-change interventions in campus tobacco control programs are also warranted by these findings.

#### FUNDING

No funding was received by the authors in the conduct of this study.

#### CONFLICT OF INTEREST

Authors declare no conflict of interest in any form in the conduct of this study.

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