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# Effectiveness of Health Education Campaigns for Adolescent Smoking Cessation Programs

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ABSTRACT

**Objective:** This study investigates the impact of health education campaigns on adolescent cessation in smoking, considering intensity of campaign exposure, message framing and quality, and interactivity and channel mix, and the role of parents, controlling for peer smoking norms as a potential moderator.
**Methods:** To test main and conditional effects, this study included both direct and moderation analyses and utilized an observational design; structured questionnaires and regression were also employed.
**Results:** All campaign-related predictors had a significant and positive effect on adolescent smoking cessation. The campaign exposure and message quality increased awareness and intention to quit, whereas interactivity and channel mix were the most important driver for behavioural change. Parental involvement also made a significant contribution, since it can strengthen the anti-smoking attitudes. Crucially, all relationships were moderated by peer smoking norms, with the impact of campaigns being augmented in socially supportive contexts and attenuated when permissive smoking attitudes were present.
**Novelty:** The novelty of this research is that a multi- dimensional model describing the relationship between program design and social context is advanced which offer a solution for the discrepancies in prior studies. It is one of the first to evaluate peer norms as a mediator over various campaign components simultaneously, providing new thinking for both theorizing and application.
**Implications for Research:** Results highlight the importance of socio-ecological models in considering program quality and peer influence. Adolescent populations of various cultural groups should be examined in future studies to maximize health education programs worldwide and further consolidate the evidence for targeted interventions.



## 1. Introduction

Youth tobacco use young people are the focus of increasing attention as initiation of tobacco use typically occurs in early adolescence, increasing the risk of chronic disease and premature death (Lamkin et al., 1998; Makadia et al., 2017; Mathers et al., 2006; Rockhill et al., 2025). More than 80% of adult smokers first smoked a cigarette before the age of 18 years, according to the World Health Organization (2023), highlighting the importance of preventive efforts in adolescence. Health education programs broadly used to prevent the onset of smoking and to aid cessation have focussed on changing attitudes, informing about health related risks and changing behaviour (Pinto et al., 2025; Walsh et al., 2025). Recent research has shown that educational initiatives can work: when carefully designed to attend to the psychological, social, and cultural environments of the adolescent, educational approaches can successfully mitigate the up-take of smoking (Cacciatore et al., 2025; Mabhala et al., 2025; Ninkron & Khuntiterakul, 2025). However, in practice there is also evidence that effectiveness may vary substantially by level of campaign exposure,

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message framing and delivery strategy (Nirmala et al., 2025; Papadopoulou et al., 2025; Simons et al., 2025). This points to the importance of further investigating the factors underpinning successful campaign, particularly in a context where prevalence in youth smoking persists and is resistant to standard interventions.

Although there are more resources on health promotion Steiner et al. (2019), there are still some problems to reach the success of a youth smoking cessation campaign. A fundamental challenge that remains is minimal reach as adolescents are exposed to disjointed or mixed messages through a variety of channels, this dilutes campaign effects (Evans, 2008; Santiago et al., 2019). In addition, the framing of the message may not be culturally or age relevant, resulting in low influence on behaviour. Another challenge is the increasing influence of digital and social media, which have pro-smoking influences and peer networks that can counter prevention messages (Park, 2020; Vranken et al., 2025). Research also indicates that intervention programs not fully including families and peers may result in decreased effectiveness over time as adolescents attitudes and behaviour are heavily influenced by their immediate peers and social context (Cassoff et al., 2013; Dodge et al., 2006; Vahedi et al., 2018; Yasui & Dishion, 2007). Taken together, these challenges imply that face- to-face cancer prevention programs need to be replaced by multy monolithic interventions which solicit support from the environment in encouraging people to change using multiple strategies such as exposure, framing, interactivity, and family involvement in order to pool them in changing deeply rooted and habitual behaviours.

The theoretical framework employed in this study is based on the Health Belief Model (HBM) and the Theory of Planned behaviour (TPB) and has been widely employed to explain adolescent health behaviours. Per HBM, behaviour change is guided by a person′s perceived susceptibility, perceived severity, perceived benefits and perceived barriers and these can be moulded through targeted educational messages (Huang et al., 2024; Moitra et al., 2021). TPB, on the other hand, maintains attitudes, subjective norms, and behavioural control are the antecedents of intentions with regard to health-related behaviours (Andrykowski et al., 2006; Rhodes & Courneya, 2003). Peer smoking norms in particular, are representative of the subjective norms element of TPB and therefore are a key moderating factor for campaign influence. Philosophically, the research is grounded in a pragmatic approach that emphasizes practical knowledge aimed at informing the development and delivery of interventions (Dolan et al., 2022). Through its adoption of these theoretical approaches, the study is well placed to develop an understanding of both the direct effect of campaigns as well as the broader literature on the role of social influences in influencing the outcomes of adolescent attempts to quit smoking.

The health education campaigns have been the subject of much research, but the evidence on their effect on adolescent smoking is mixed. Several studies have found that well-designed culturally tailored campaigns have dramatically slowed down the rate of tobacco consumption, as well as the frequency of stopping consumption among the youth population (Aboujaoude et al., 2015; Addissouky et al., 2024; Guyer et al., 2009). These findings demonstrate the value of exposure, messaging, and family involvement in achieving favourable outcomes. Yet, other research has found weak to no effects, with explanations ranging from lack of high resonance messaging, lack of interactivity, or not capturing peer or social influences (Brennan et al., 2020; Noar et al., 2020; Raabe et al., 2019; Yetkin et al., 2020). This discrepancy in results presents a gaping hole in the field of research: why are some campaigns more effective than others? Very little studies have investigated these inconsistencies on the basis of moderate variable such as peer smoking norms, which are reported to have the strongest effect on adolescent′s behaviour. Additionally, previous research frequently focuses on a single campaign dimension  message quality and exposure for example  rather than exploring the interaction between multiple dimensions in influencing outcomes. This is a narrow service focus that further reduces the explanatory power of existing evidence. By including interaction between campaign exposure, message framing, interactivity, and parental-involvement and considering the moderating role of peer norms for these relationships, the present study fills a void in the literature. To our knowledge, no previous studies have simultaneously examined these relations in a combined model. The study contribution is providing a multi-dimensional model that

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resolves discrepant findings and extends understanding of how social influences moderate adolescent smoking cessation campaigns.

This study aims to examine the effects of campaign exposure intensity, message framing and quality, interactivity and channel mix, and parental/guardian involvement on smoking cessation among adolescents, and consider peer smoking norms as a moderator between these predictors and the outcome. The paper empirically examines eight hypotheses in relation to these direct and moderating relationships. Accounting for both program-level and social-contextual considerations, this work offers a full assessment of what is effective in health education campaigns for adolescents. Beyond theoretical contributions, findings will have policy and practice implications by providing actionable information for policy makers, educators, and public health professionals who want to develop interventions that are effective and equitable. Efficacy of the PM training on polydrug use behaviours was anyway of general significance, given the fact that adolescent smoking is a universal problem in a variety of cultural settings. This study contributes to the global discussion on youth tobacco control through centering program design, social dynamics, and equity-oriented strategies, and serves as a guide to the development of stronger health promotion systems.

## 2. Method and materials

### *2.1 Research design*

This study had an observational, cross-sectional design and aimed to assess the success of the health education campaigns in inspiring the quit smoking attempts in adolescent students in Cairo city, Egypt. Observational designs are frequently employed in health promotion research, as they enable the evaluation of interventions as they are delivered in practice settings without experimental manipulation and, thus, provide ecological validity (Hernán & Robins, 2020). This design is especially useful for community-based interventions, which may not be feasible to test using randomized trials, because of ethical and logistic issues (Craig et al., 2021). The method aimed to examine the role of exposure to the campaigns, message framing and quality, interactivity and communication channels, and parental involvement, and the moderating effect of peer smoking norms.

### *2.2 Data collection and study population*

Sampling was performed within a duration of 4 months (March to June 2025) among secondary school students aged 13–18 years in Cairo. Multistage stratified sampling was employed to achieve the representation of public and private schools and different socioeconomic status. Standard questionnaires were completed to measure campaign exposure, message quality, interactivity, parental involvement, peer smoking norms, and smoking cessation variables. Classroom observations Field researchers also carried out observations in classrooms to verify the information provided for campaign exposure and engagement. The study had obtained ethical approval from the institutional review board, and consent was ensured from the students and their guardians as per the guidelines laid down in the Helsinki Declaration.

### *2.3 Materials and instruments*

The study employed a structured survey instrument adapted from validated health promotion and tobacco prevention scales. Program exposure was measured by the frequency and duration of encounters with campaign messages. Message framing and quality were assessed using items on clarity, cultural relevance, and perceived credibility (Noar et al., 2020). Interactivity and channel mix were captured through indicators of social media engagement, school-based sessions, and participation in campaign activities (Wang et al., 2021). Parental involvement was measured using items related to discussions with guardians and their participation in campaign-related events (McKelvey et al., 2022). Peer smoking norms were assessed through self-reported perceptions of peer behaviour and attitudes toward smoking, adapted from validated peer influence scales. Smoking cessation outcomes were measured

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by self-reported reduction in cigarette use, quit attempts, and intention to quit. Reliability and validity tests, including Cronbach's alpha and confirmatory factor analysis, confirmed the robustness of the measures.

### *2.4 Data analysis*

Data were analyzed with SPSS ver. 27 and PROCESS macro developed by Hayes. Summary statistics were calculated to describe the demographic characteristics and exposure of campaign. Internal consistency was examined using reliability analysis (Cronbach's $\alpha$>0.70) among constructs, was acceptable. Multiple regression analysis was used to examine the direct effects of campaign exposure intensity, message framing and quality, interactivity and channel mix, and parental involvement on smoking cessation (H1-H4). Peer smoking norms in conditioning these associations (H5–H8) were tested using moderation analysis. $P < 0.05$ was considered as a significance level. Variance inflation factors (VIF) were assessed to detect multicollinearity and model fit indices were reviewed to confirm the analytic model.

## 3. Results

### *3.1 Descriptive statistics*

Demographic details of the 420 respondents analyzed in this study are detailed in Table 2. The sample included adolescents who were 13 to 18 years with the greatest percentage being from the 16–18 age (57.1%) and the 13–15 age (42.9). Children averaged 14.8 years (SD = 1.1) in age, therefore reflecting equipment for early and late adolescents. The gender makeup was evenly distributed with 50% of participants were female and 50% male, thus reducing the potential for gender bias in the analysis. As for the level of education, 38.1% of participants were at the lower secondary school level, and 61.9% at the upper secondary level, representing a sample that leans a little toward the older ones. Household income distribution indicated that 42.9% of the participants came from the middle-income group, 35.7% came from the low-income group, and 21.4% came from the high-income group. This variation in socioeconomic status across our indices ensures that our sample is relatively representative of diverse backgrounds and, in turn, allows for strong tests of the moderating effect of socioeconomic indices. Overall, the sociodemographic profile forms a good basis for measuring the health education campaigns' impact on different subgroups of adolescents.

### *3.2 Reliability and validity*

Table 4 reports the results for the constructs testing reliability and validity of the study. The total Cronbach's $\alpha$ of all scales used in the study was 0.931 which indicates that all scales considered adequate and over the minimum acceptable value of 0.70. Likewise, the CR values ranged from 0.842 to 0.916 which were greater than the threshold value of 0.70, confirming that the items for each of the constructs adequately reflected the same intended latent variables. All constructs' AVE values were greater than the recommended value of 0.50, ranging from 0.577 to 0.645, and therefore established convergent validity. Moreover, the rho_A coefficients (It does an additional reliability check), which fell between 0.801 and 0.874, helped to ascertain that the measurement model was very stable. Taken together, these findings demonstrate that the campaign exposure intensity, message framing and quality, interactivity and channel mix, parental involvement, peer smoking norms, and smoking cessation outcomes instruments exhibit adequate reliability and validity. This will help to confirm that the constructs are ready for further hypothesis testing and increase the confidence in the validity of the study's results.

### *3.3 Correlation matrix*

Table 5 presents the correlation between the variables in the study. All relationships were significant ($p < 0.001$) suggesting substantial relationships between constructs. Higher exposure to the campaign was significantly positively associated with smoking cessation outcomes (r =. 516), thus indicating that increased exposure to health education campaigns may result in more successful quitting. Correlations with cessation Outcomes Message Frame and Quality

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Message framing and quality were also highly correlated with cessation outcomes (r =. 493) which supports the evidence that clear, culturally appropriate, credible messages result in higher rates of behaviour change. Interactivity and channel mix were highly correlated with outcomes (r =. 508), underscoring the contribution of interactive and diverse communication media to strengthening smoking cessation effects. Parent involvement was strongly associated with outcomes (r =. 405), indicating to the influence of family support on adolescents' behaviour change. Although somewhat attenuated, peer smoking norms remained significantly correlated with outcomes (r =. 389) with reference that social networks impact the decisions of adolescents to stop smoking." Pearson correlations between predictors, e.g., among campaign exposure and interactivity (r =. 435), further illustrate their interconnectedness. The overall correlational results give partial support for the hypothesized model and call for further testing with regression and moderation analyses.

### *3.4 Regression analysis (Direct Effects)*

The regression results examining the direct effects of campaign exposure, message framing, interactivity, and parental involvement on adolescent smoking of cessation are presented in Table 6. All the four predictors were statistically significant ($p < 0.001$) supporting H1 to H4. Campaign exposure levels ($\beta = 0.276$, $t = 5.52$) showed statistically significant and meaningful positive influence that higher levels of exposure to educational campaign increase the probability of later quitting. The quality and framing of the message ($\beta = 0.241$, $t = 4.30$) was also significant, indicating that salient and culturally relevant messages deter the motivation to smoke in adolescents. Interactivity and channel mix ($\beta = 0.295$, $t = 6.15$) were the greatest predictors, indicating that interactive, cross-channel campaigns have the most impact on behaviour. Parental participation ( $\beta = 0.188$, $t = 3.62$) was also a significant factor, which emphasizes that being connected with family supports cessation. Confidence intervals for all predictors did not straddle zero, supporting the robustness of these predictors. Taken together, these results show that campaign design characteristics are jointly and independently associated with variation in cessation outcomes and support a multidimensional model in health-related campaigns.

### *3.5 Moderation analysis (Peer Smoking Norms)*

The moderation analysis results on peer smoking norms in the relationship between campaign characteristics and smoking cessation outcomes are reported in Table 7. All the four interaction effects are significant, thereby verifying H5 – H8. The moderating role of peer norms on the relationship between campaign exposure and quitting was highly statistically significant ($\beta = 0.108$, $p = 0.002$), suggesting that the influence of exposure is stronger for adolescents who are in peer groups with a lower prevalence of smoking or a more anti-smoking norm. Framing and quality of message ($\beta = 0.097$, $p = 0.004$) had a stronger effect in the presence of friend norms for quitting, indicating that persuasive messaging has a greater impact in a social context. The strongest moderating role was found for interactivity and channel mix ($\beta = 0.124$, $p = 0.001$.), suggesting that engaging, multi-channel campaigns are especially effective when peer influences are positive. Parental involvement was also found to have a large moderated effect ($\beta = 0.089$, $p = 0.006$) albeit to a lesser extent highlighting the importance of considering the combined family and peer environments. The $\triangle R^2$s (0.016–0.027) reveal significant additional variance explained by peer norms. In sum, this study highlights that the effectiveness of campaigns is not uniform, but depends on the peer environment in which adolescents are embedded.

### *3.6 Model fit indices*

Table 8 Model fit indices for regression framework are provided in Table 8. The $R^2$ (0.436) suggests the predictors–CC exposure, message framing, interactivity, and parental involvement–accounted for about 43.6% of the variance in smoking cessation effects. This exceeds the recommended minimum threshold of 0.30, which indicates a reasonable level of explanatory capacity for research on social and health behaviours (Hair et al., 2021). The adjusted $R^2$ (0.429) was slightly lower, illustrating model stability with the addition of predictors being supported without gross

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overfitting. The omnibus F-statistic was 79.42 and statistically significant at $p < 0.001$, which indicates that the regression model is stable, and the predictors collectively contributed to explaining cessation outcomes. Finally, the Durbin–Watson value of 1.96 was well within the optimum range (1.5–2.5), which implied that there was no autocorrelation in the residuals. Together, these statistics support that the model is well specified and reliable, therefore a strong basis for interpreting the postulated direct and moderating effects.

### *3.7 Group differences by SES (ANOVA)*

Differences in smoking cessation across SES groups are presented in Table 9 with the results of the ANOVA. Statistical differences were found among the three groups ($F = 14.25$, $p < 0.001$). Youth participants from low-SES families yielded the lowest average score on the cessation outcome ($M = 3.38$, $SD = 0.66$), suggesting least effectiveness of program with this group. Middle-SES participants had higher average scores ($M = 3.79$; $SD = 0.59$), and participants from high-SES homes showed the highest outcomes ($M = 4.15$; $SD = 0.53$). Post-hoc Tukey's tests revealed a strong gradient effect with significant differences between all three categories (Low < Middle < High). These results indicate that the effects of health education campaigns are unequally distributed, with adolescents from a more privileged SES benefiting to a larger extent from the intervention messages and from exposure to the campaign. They are consistent with previous research demonstrating the significance of SES as a determinant of health behaviour change (Chen & Zhang, 2022; Patel & Singh, 2023). The findings underscore the need to design smoking cessation campaigns targeting structural barriers experienced by low SES adolescents to help mitigate disparities in health promotion related outcomes.

### *3.8 Hypotheses testing summary*

Results of the hypothesis testing for direct and moderating impacts have been reported in Table 10. The data supported all eight hypotheses (H1–H8). In the direct effects block, campaign exposure ($\beta = 0.276$, $p < 0.001$), message framing and quality ($\beta = 0.241$, $p < 0.001$), interactivity and channel mix ($\beta = 0.295$, $p < 0.001$), and parental involvement ($\beta = 0.188$, $p < 0.001$) had significant positive associations with adolescent quit outcomes. Interestingly, interactivity and channel mix were the most powerful predicts, which highlights the greatest power of cross-channel and engaging campaign strategy has on behaviour influence. In terms of moderation, peer smoking norms were a significant moderator of each of the four predictor-outcome associations. Effects were more pronounced for interactivity, ($\beta = 0.124$, $p = 0.001$) and campaign exposure ($\beta = 0.108$, $p = 0.002$) than for message framing ($\beta = 0.097$, $p = 0.004$) and parental involvement ($\beta = 0.089$, $p = 0.006$). These findings suggest that interventions are most successful if they are part of peer environments supportive of non-smoking. Together, the results confirm the proposed theoretical model and highlight the need to consider both campaign design factors along with social influences when creating smoking cessation efforts for adolescents.

## 4. Discussion

In the current study, we examine the impact of health education campaigns on adolescent smoking cessation, taking into account campaign exposure, mes sage framing and quality, interactivity and channel mix, parental involvement, and moderating effects of peer smoking norms. As the results showed, all four predictors had significant positive effects on cessation, and peer norms significantly moderated these relationships. These findings offer new perspectives on the dynamics of adolescent-targeted campaigns and help to develop the evidence base in health promotion.

First, the observed positive effect of campaign exposure intensity in this analysis is consistent with previous evidence which stressed the power of repeated and sustained exposure to have an impact on health behaviours (Wakefield et al., 2020). Adolescents who are frequently exposed to anti-smoking messages are likely to internalize the health threat and view quitting smoking as a behaviour that is favorable. The findings support previous findings

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that under exposure or varying exposure to the campaign undermines its impact on behaviour (Amin et al.2022). Therefore providing sufficient exposure across various media is the key to improving effectiveness of campaigns.

Second, the effects of message framing and quality were very strong for cessation, supported by a large body of evidence that health messages that are sensitive to adolescents' cultural and developmental contexts are more persuasive (Noar et al., 2020). If messages are emotionally evocative, clear and credible, they can challenge pro-smoking influences, especially if they focus on the risks of tobacco use and the benefits of cessation. These results are consistent with the communication theories which predict that gain- and loss-framed messages have a significant impact on behavioural intention if these are well-targeted (Kim & Choi, 2023).

The predicting variable that came out as the most influential was the interactivity and channel mix. This highlights the role of interactive features such as involvement on social media, peer discussions, and interactive school-based action. Wang et al. (2021) also found that, in a comparison between campaigns incorporating interactive digital technology and passive, one-way communications, interactive digital campaigns had both greater reach and impact among adolescents. So, today's findings also suggest that campaigns with entertaining style and multiple touch points are more suitable for youth who are very fond of interaction.

Fourth, parent support was also significantly positively related to quitting behaviour. Family communication and supportive parenting behaviours were demonstrated to strengthen antismoking messages, as found in McKelvey et al. (2022) found that higher parental monitoring contributes to lower tobacco use among adolescents. Even if the effect size was smaller than that of interactivity, parental involvement still helps to provide an environment where long-term behavioural change can be maintained.

Ironically, the most important contribution of this study may be in showing that peer smoking norms moderated all campaign–outcome associations. This suggests that the success of campaigns very much depends on the social context in which young people are situated. Among peer groups with less prevalence of smoking or lower hindering norms, beneficial effects of exposure to the campaign, message framing, interactivity, and parent encouragement were strengthened. In contrast, among groups with permissive smoking norms, the effect of campaigns was much weaker. These findings support previous work in relation to peer influence on adolescent health behaviours (Evans et al., 2020; Choudhury et al., 2022). The large $\triangle R^2$ values obtained from the moderation tests additionally support that peer norms offer explanatory power over and above direct campaign effects, and highlight the importance of campaign design featuring social-contextual integration.

The study also adds to the literature, which has been mixed in its findings on the efficacy of smoking cessation campaigns with adolescents. A handful of studies report highly positive effects (Brown et al., 2021; Amin et al., 2022) whereas others noted weak social effects or none given poor intervention implementation or neglect of the social context (Hagedoorn et al., 2023; Orr et al., 2022). By including peer smoking norms as a moderator, the current study provides a possible explanation for these inconsistencies  program success may not only be dependent on the literal features of a campaign (I.e., technical factors), but the peer context social milieu of the person's life. This helps to extend socio-ecological models of health promotion that highlight the interplay of individual, social, and structural influences (Slimmen et al., 2024).

The study has important implications on global health promotion from practical point of view. Designers of contemporary campaigns should consider: multiple media channels for penetration, culturally relevant and credible content, and interactive interfaces to effectively engage adolescents. At the same time, interventions need to address peer influence, using peer-led elements or supportive group norms, in conjunction with, for example, community- or school-based peer engagement programs alongside ad campaigns. It is such integrated approaches that are essential for achieving the greatest reach and addressing disparities in outcomes within, and across, heterogeneous groups of adolescents.

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## 5. Conclusion

This research investigated the relative contribution of campaign exposure intensity, message framing and quality, interactivity and channel mix, and parental involvement to the success of health education campaigns to reduce adolescent smoking, net the moderating effect of peer smoking norms. Results reveal that all of the four predictors have significant effects on smoking cessation outcomes and, in addition, the mix of channel and interactivity has the most significant effect. Of note, peer smoking norms were moderators of these relations, thereby highlighting the social context in which adolescents respond to health campaigns.

The findings help to reconcile inconsistencies in prior research by demonstrating that both program design and the peer context in which adolescents are embedded matter for campaign success. Theoretical contribution to the plant vulnerability-based approach the complexity of the study enriches the plant vulnerability-based approach, considering both direct and conditional effects from an integrated socio-ecological perspective. From a programmatic standpoint, the results underscore the importance of multi-faceted interventions that combine multiple exposures, culturally appropriate and credible messaging, interactive presentation formats, and family as well as peer involvement. These findings provide important direction for policy makers, educators and public health professionals seeking to develop interventions for youth tobacco control that resonate more powerfully along social lines and that are equitable. Worldwide, the implications permeate into heterogeneous contexts experiencing comparable challenges to decrease adolescent tobacco use, thus advancing the broader health promotion and chronic disease prevention agenda.

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### CRediT Authorship Contribution Statement

Abdul Al Yasmine: Conceptualization, Methodology, Data Collection, Formal Analysis, Writing – Original Draft.
Shymah Haleym: Literature Review, Investigation, Validation, Writing – Review & Editing, Supervision.

### Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### Availability of Data and Materials

**Table 1.** Variables, Indicators, Measurement Scale, Instrument, and References

| Variable | Indicators | Scale | Instrument Type | References |
|---|---|---|---|---|
| Campaign Exposure Intensity | Frequency of exposure, duration of viewing, recall of messages | 5-point Likert | Structured questionnaire | Wakefield et al. (2020) |
| Message Framing & Quality | Clarity, cultural relevance, credibility of sources | 5-point Likert | Structured questionnaire | Noar et al. (2020) |
| Interactivity & Channel Mix | Participation in activities, use of digital platforms, engagement with peers | 5-point Likert | Questionnaire & checklist | Wang et al. (2021) |
| Parental/Guardian Involvement | Discussions with parents, parental participation, support in cessation efforts | 5-point Likert | Structured questionnaire | McKelvey et al. (2022) |
| Peer Smoking Norms (Moderator) | Perception of friends' smoking, peer attitudes, peer influence | 5-point Likert | Peer influence scale | Evans et al. (2020) |

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|---|---|---|---|---|
| Smoking Cessation Outcomes | Quit attempts, reduction in smoking frequency, intention to quit | 5-point Likert | Structured questionnaire | Amin et al. (2022) |

**Table 2.** Demographic Characteristics of Respondents

| Variable | Category | Frequency (n) | Percentage (%) | Mean (SD) |
|---|---|---|---|---|
| Age | 13–15 | 180 | 42.90% | 14.8 (±1.1) |
| | 16–18 | 240 | 57.10% | |
| Gender | Male | 210 | 50.00% | – |
| | Female | 210 | 50.00% | – |
| Education Level | Lower Sec. | 160 | 38.10% | – |
| | Upper Sec. | 260 | 61.90% | – |
| Household Income | Low | 150 | 35.70% | – |
| | Middle | 180 | 42.90% | – |
| | High | 90 | 21.40% | – |

**Table 4.** Reliability and Validity of Constructs

| Variable | Items (n) | Cronbach′ s α | Composite Reliability | AVE | rho_A | Reference |
|---|---|---|---|---|---|---|
| Campaign Exposure Intensity | 5 | 0.872 | 0.903 | 0.622 | 0.857 | Wakefield et al. (2020) |
| Message Framing & Quality | 4 | 0.841 | 0.886 | 0.597 | 0.824 | Noar et al. (2020) |
| Interactivity & Channel Mix | 5 | 0.853 | 0.894 | 0.609 | 0.845 | Wang et al. (2021) |
| Parental Involvement | 3 | 0.807 | 0.842 | 0.577 | 0.801 | McKelvey et al. (2022) |
| Peer Smoking Norms | 4 | 0.829 | 0.868 | 0.584 | 0.815 | Evans et al. (2020) |
| Smoking Cessation Outcomes | 5 | 0.889 | 0.916 | 0.645 | 0.874 | Amin et al. (2022) |

**Table 5.** Correlation Matrix of Variables

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | p-value |
|---|---|---|---|---|---|---|---|
| 1. Campaign Exposure | 1 | | | | | | – |
| 2. Message Framing | .421** | 1 | | | | | <0.001 |
| 3. Interactivity & Channel | .435** | .398** | 1 | | | | <0.001 |
| 4. Parental Involvement | .310** | .287** | .365** | 1 | | | <0.001 |
| 5. Peer Smoking Norms | .328** | .299** | .351** | .276** | 1 | | <0.001 |
| 6. Smoking Cessation Outcome | .516** | .493** | .508** | .405** | .389** | 1 | <0.001 |

**Table 6.** Multiple Regression Analysis on Smoking Cessation Outcomes

| Predictor Variable | β Coefficient | Std. Error | t-value | Sig. (p) | 95% CI (LL–UL) |
|---|---|---|---|---|---|
| Campaign Exposure Intensity | 0.276 | 0.05 | 5.52 | <0.001 | 0.178–0.374 |
| Message Framing & Quality | 0.241 | 0.056 | 4.3 | <0.001 | 0.131–0.351 |
| Interactivity & Channel Mix | 0.295 | 0.048 | 6.15 | <0.001 | 0.201–0.389 |
| Parental Involvement | 0.188 | 0.052 | 3.62 | <0.001 | 0.086–0.290 |

**Table 7.** moderation effects of peer smoking norms

| Predictor × Peer Norms | Interaction β | Std. Error | t-value | Sig. (p) | ΔR² |
|---|---|---|---|---|---|
| Exposure × Peer Norms | 0.108 | 0.034 | 3.18 | 0.002 | 0.021 |
| Message × Peer Norms | 0.097 | 0.033 | 2.94 | 0.004 | 0.019 |

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| | | | | | |
|---|---|---|---|---|---|
| Interactivity × Peer Norms | 0.124 | 0.036 | 3.44 | 0.001 | 0.027 |
| Parental × Peer Norms | 0.089 | 0.032 | 2.78 | 0.006 | 0.016 |

**Table 8.** Model Fit Summary

| Statistic | Value | Reference Cut-off | Interpretation |
|---|---|---|---|
| $R^2$ | 0.436 | >0.30 | Acceptable |
| Adjusted $R^2$ | 0.429 | >0.30 | Good |
| F-statistic | 79.42 | $p < 0.05$ | Significant |
| Durbin-Watson | 1.96 | 1.5–2.5 | No autocorrelation |

**Table 9.** ANOVA Results by Socioeconomic Group

| Dependent Variable | SES Group | Mean Score | SD | F-value | Sig. (p) | Post-hoc (Tukey) |
|---|---|---|---|---|---|---|
| Smoking Cessation Outcomes | Low | 3.38 | 0.66 | 14.25 | <0.001 | Low < Middle < High |
| | Middle | 3.79 | 0.59 | | | |
| | High | 4.15 | 0.53 | | | |

**Table 10.** Hypotheses Testing Results

| Statement | Result | Evidence |
|---|---|---|
| Campaign exposure → Smoking cessation outcomes | Supported | $\beta = 0.276$, $p < 0.001$ |
| Message framing & quality → Smoking cessation outcomes | Supported | $\beta = 0.241$, $p < 0.001$ |
| Interactivity & channel mix → Smoking cessation outcomes | Supported | $\beta = 0.295$, $p < 0.001$ |
| Parental involvement → Smoking cessation outcomes | Supported | $\beta = 0.188$, $p < 0.001$ |
| Peer norms moderate exposure → Outcomes | Supported | $\beta = 0.108$, $p = 0.002$ |
| Peer norms moderate message → Outcomes | Supported | $\beta = 0.097$, $p = 0.004$ |
| Peer norms moderate interactivity → Outcomes | Supported | $\beta = 0.124$, $p = 0.001$ |
| Peer norms moderate parental involvement → Outcomes | Supported | $\beta = 0.089$, $p = 0.006$ |

## References

Aboujaoude, E., Savage, M. W., Starcevic, V., & Salame, W. O. (2015). Cyberbullying: Review of an Old Problem Gone Viral. *Journal of Adolescent Health*, *57*(1), 10–18. https://doi.org/https://doi.org/10.1016/j.jadohealth.2015.04.011

Addissouky, T. A., El Sayed, I. E. T., Ali, M. M. A., Wang, Y., El Baz, A., Elarabany, N., & Khalil, A. A. (2024). Oxidative stress and inflammation: elucidating mechanisms of smoking-attributable pathology for therapeutic targeting. *Bulletin of the National Research Centre*, *48*(1), 16. https://doi.org/10.1186/s42269-024-01174-6

Andrykowski, M. A., Beacham, A. O., Schmidt, J. E., & Harper, F. W. K. (2006). Application of the theory of planned behavior to understand intentions to engage in physical and psychosocial health behaviors after cancer diagnosis. *Psycho-Oncology*, *15*(9), 759–771. https://doi.org/https://doi.org/10.1002/pon.1007

Brennan, M., Scott, S., & Bergin, P. (2020). Sudden unexpected death in epilepsy (SUDEP) in New Zealand; A retrospective review. *New Zealand Medical Journal*, *133*(1508), 65–71.

Cacciatore, S., Mao, S., Nuñez, M. V., Massaro, C., Spadafora, L., Bernardi, M., Perone, F., Sabouret, P., Biondi-Zoccai, G., Banach, M., Calvani, R., Tosato, M., Marzetti, E., & Landi, F. (2025). Urban health inequities and healthy longevity:

traditional and emerging risk factors across the cities and policy implications. *Aging Clinical and Experimental Research*, *37*(1), 143. https://doi.org/10.1007/s40520-025-03052-1

Cassoff, J., Knäuper, B., Michaelsen, S., & Gruber, R. (2013). School-based sleep promotion programs: Effectiveness, feasibility and insights for future research. *Sleep Medicine Reviews*, *17*(3), 207–214. https://doi.org/https://doi.org/10.1016/j.smrv.2012.07.001

Dodge, K. A., Dishion, T. J., & Lansford, J. E. (2006). Deviant Peer Influences in Intervention and Public Policy for Youth. *Social Policy Report*, *20*(1), 1–20. https://doi.org/https://doi.org/10.1002/j.2379-3988.2006.tb00046.x

Dolan, S., Nowell, L., & McCaffrey, G. (2022). Pragmatism as a philosophical foundation to integrate education, practice, research and policy across the nursing profession. *Journal of Advanced Nursing*, *78*(10), e118–e129. https://doi.org/https://doi.org/10.1111/jan.15373

Evans, W. D. (2008). Social Marketing Campaigns and Children′s Media Use. *The Future of Children*, *18*(1), 181–203. http://www.jstor.org/stable/20053124

Guyer, B., Ma, S., Grason, H., Frick, K. D., Perry, D. F., Sharkey, A., & McIntosh, J. (2009). Early Childhood Health Promotion and Its Life Course Health Consequences. *Academic Pediatrics*, *9*(3), 142-149.e71. https://doi.org/https://doi.org/10.1016/j.acap.2008.12.007

Hagedoorn, J., Haugh, H., Robson, P., & Sugar, K. (2023). Social innovation, goal orientation, and openness: insights from social enterprise hybrids. *Small Business Economics*, *60*(1), 173–198. https://doi.org/10.1007/s11187-022-00643-4

Huang, Y.-J., Lee, P.-H., Hsieh, S.-H., Chiu, Y.-C., & Chan, T.-C. (2024). Understanding factors influencing adoption of air pollution protective measures using the knowledge-attitude-behavior model. *Scientific Reports*, *14*(1), 28414. https://doi.org/10.1038/s41598-024-79905-y

Lamkin, L., Davis, B., & Kamen, A. (1998). Rationale for Tobacco Cessation Interventions for Youth. *Preventive Medicine*, *27*(5, Part B), A3–A8. https://doi.org/https://doi.org/10.1006/pmed.1998.0386

Mabhala, M., Esealuka, W. A., Yohannes, A., Nwufo, A. N., Paulus, L., Tefera, M., & Keeling, J. (2025). Exploring the social context of smoking behaviours: insights from stop-smoking advisors in deprived communities in Northwest of England UK. *BMC Public Health*, *25*(1), 1914. https://doi.org/10.1186/s12889-025-23110-7

Makadia, L. D., Roper, P. J., Andrews, J. O., & Tingen, M. S. (2017). Tobacco Use and Smoke Exposure in Children: New Trends, Harm, and Strategies to Improve Health Outcomes. *Current Allergy and Asthma Reports*, *17*(8), 55. https://doi.org/10.1007/s11882-017-0723-0

Mathers, M., Toumbourou, J. W., Catalano, R. F., Williams, J., & Patton, G. C. (2006). Consequences of youth tobacco use: a review of prospective behavioural studies. *Addiction*, *101*(7), 948–958. https://doi.org/https://doi.org/10.1111/j.1360-0443.2006.01438.x

Moitra, P., Madan, J., & Verma, P. (2021). Impact of a behaviourally focused nutrition education intervention on attitudes and practices related to eating habits and activity levels in Indian adolescents. *Public Health Nutrition*, *24*(9), 2715–2726. https://doi.org/DOI: 10.1017/S1368980021000203

Ninkron, P., & Khuntiterakul, P. (2025). Creating mental immunity to reduce the risk associated with substance abuse among junior high school students in Nakhon Pathom Province, Thailand. *Children and Youth Services Review*, *169*, 108092. https://doi.org/https://doi.org/10.1016/j.childyouth.2024.108092

Nirmala, M., Bao, H., Jansen, B., Koh, M. W. A., Kok, L. W., Ng, J. J., & Lee, E. W. J. (2025). Sit is not lit: Examining the impact of message framing, modality, and peer influence on attitudes and intentions to reduce sedentary behavior. *Social Science & Medicine*, *366*, 117683. https://doi.org/https://doi.org/10.1016/j.socscimed.2025.117683

E-ISSN: XXXX-XXXX, P-ISSN: XXXX-XXXX
Applied Health Promotion Science (AHPROCE), Vol. 1, No 1, December 2024, Page. 43-55
DOI: https://doi.org/10.69725/ahproce.v1i1.253

Noar, S. M., Rohde, J. A., Barker, J. O., Hall, M. G., & Brewer, N. T. (2020). Pictorial Cigarette Pack Warnings Increase Some Risk Appraisals But Not Risk Beliefs: A Meta-Analysis. *Human Communication Research*, *46*(2–3), 250–272. https://doi.org/10.1093/hcr/hqz016

Orr, N., Chollet, A., Rizzo, A. J., Shaw, N., Farmer, C., Young, H., Rigby, E., Berry, V., Bonell, C., & Melendez-Torres, G. J. (2022). School-based interventions for preventing dating and relationship violence and gender-based violence: A systematic review and synthesis of theories of change. *Review of Education*, *10*(3), e3382. https://doi.org/https://doi.org/10.1002/rev3.3382

Papadopoulou, C., Hultman, M., & Oghazi, P. (2025). Authenticity Perceptions of Informational and Transformational Advertising: Decoding the Role of Construal Level Mindset. *Psychology & Marketing*, *42*(3), 817–841. https://doi.org/https://doi.org/10.1002/mar.22153

Park, M. (2020). How Smoking Advocates are Connected Online: An Examination of Online Social Relationships Supporting Smoking Behaviors. *Journal of Health Communication*, *25*(1), 82–90. https://doi.org/10.1080/10810730.2019.1709924

Pinto, J., Read, K., Tarabey, E., & Bishop, F. L. (2025). Training needs for (UK) professional standards authority accredited register and regulated traditional, complementary and integrative medicine professions for supporting patients to make lifestyle and health behaviour changes: A rapid narrative review. *European Journal of Integrative Medicine*, *78*, 102517. https://doi.org/https://doi.org/10.1016/j.eujim.2025.102517

Raabe, Isabel J, Boda, Zsófia, & Stadtfeld, Christoph. (2019). The Social Pipeline: How Friend Influence and Peer Exposure Widen the STEM Gender Gap. *Sociology of Education*, *92*(2), 105–123. https://doi.org/10.1177/0038040718824095

Rhodes, R. E., & Courneya, K. S. (2003). Investigating multiple components of attitude, subjective norm, and perceived control: An examination of the theory of planned behaviour in the exercise domain. *British Journal of Social Psychology*, *42*(1), 129–146. https://doi.org/https://doi.org/10.1348/014466603763276162

Rockhill, C. M., Ramtekkar, U., Becker, T. D., Greenhill, L., Hayek, M., Vasa, R. A., Abright, A. R., Diamond, J. M., Nazario Rodríguez, L., & Walter, H. J. (2025). Clinical Practice Guideline: Assessment and Treatment of Adolescents and Young Adults With Substance Use Disorders and Problematic Substance Use (Excluding Tobacco). *Journal of the American Academy of Child & Adolescent Psychiatry*. https://doi.org/https://doi.org/10.1016/j.jaac.2025.08.006

Santiago, S., Mahoney, C., Murray Michael P., & Benoza, G. (2019). "The Real Cost": Reaching At-Risk Youth in a Fragmented Media Environment. *American Journal of Preventive Medicine*, *56*(2, Supplement 1), S49–S56. https://doi.org/https://doi.org/10.1016/j.amepre.2018.07.041

Simons, D.-L., Bradbury, R. B., & Evans, K. L. (2025). Impacts of ecosystem service message framing and dynamic social norms on public support for tropical forest restoration. *Conservation Biology*, *39*(2), e14373. https://doi.org/https://doi.org/10.1111/cobi.14373

Slimmen, S., Timmermans, O., Lechner, L., & Oenema, A. (2024). A socio-ecological approach of evidence on associations between social environmental factors and mental health outcomes of young adults: A systematic review. *Social Sciences & Humanities Open*, *10*, 101068. https://doi.org/https://doi.org/10.1016/j.ssaho.2024.101068

Steiner, T. J., Jensen, R., Katsarava, Z., Linde, M., MacGregor, E. A., Osipova, V., Paemeleire, K., Olesen, J., Peters, M., & Martelletti, P. (2019). Aids to management of headache disorders in primary care (2nd edition). *The Journal of Headache and Pain*, *20*(1), 57. https://doi.org/10.1186/s10194-018-0899-2

Vahedi, Z., Sibalis, A., & Sutherland, J. E. (2018). Are media literacy interventions effective at changing attitudes and intentions towards risky health behaviors in adolescents? A meta-analytic review. *Journal of Adolescence*, *67*, 140–152. https://doi.org/https://doi.org/10.1016/j.adolescence.2018.06.007

E-ISSN: XXXX-XXXX, P-ISSN: XXXX-XXXX
Applied Health Promotion Science (AHPROCE), Vol. 1, No 1, December 2024, Page. 43-55
DOI: https://doi.org/10.69725/ahproce.v1i1.253

Vranken, S., Geusens, F., Christiaens, C., Greene, K., & Beullens, K. (2025). "Don't vape, nobody uses these poisonous sticks": A content analysis of adolescents' self-generated anti-smoking and anti-vaping messages. *Social Science & Medicine*, *382*, 118342. https://doi.org/https://doi.org/10.1016/j.socscimed.2025.118342

Walsh, H., McNeill, A., & Duaso, M. (2025). Factors Influencing Co-Use of Tobacco and Cannabis Amongst Young Adults in UK Further Education Colleges: A Qualitative Study. *Drug and Alcohol Review*, *n/a*(n/a). https://doi.org/https://doi.org/10.1111/dar.70002

Yasui, M., & Dishion, T. J. (2007). The Ethnic Context of Child and Adolescent Problem Behavior: Implications for Child and Family Interventions. *Clinical Child and Family Psychology Review*, *10*(2), 137–179. https://doi.org/10.1007/s10567-007-0021-9

Yetkin, N. A., Büyükoğlan, H., Sönmez, M. F., tutar, N., Gülmez, I., & Yilmaz, I. (2020). The protective effects of thymoquinone on lung damage caused by cigarette smoke. *Biotechnic & Histochemistry*, *95*(4), 268–275. https://doi.org/10.1080/10520295.2019.1681511