frontiers | Frontiers in Communication

TYPE Original Research
PUBLISHED 21 June 2023
DOI 10.3389/fcomm.2023.1178413

OPEN ACCESS

EDITED BY
Pradeep Nair,
Central University of Himachal Pradesh, India

REVIEWED BY
Rafael Obregon,
UNICEF United Nations International Children's Emergency Fund, United States
Rizanna Rosemary,
Syiah Kuala University, Indonesia

*CORRESPONDENCE
Jing Xu
xujing@pku.edu.cn

RECEIVED 02 March 2023
ACCEPTED 25 May 2023
PUBLISHED 21 June 2023

CITATION
Liu S, Wu Q, Luo X, Chen Y and Xu J (2023) Egoistic and altruistic behaviors in tobacco control campaign: the role of social media exposure, interpersonal communication and attitudes. *Front. Commun.* 8:1178413. doi: 10.3389/fcomm.2023.1178413

Egoistic and altruistic behaviors in tobacco control campaign: the role of social media exposure, interpersonal communication and attitudes

Shiyu Liu[1], Qiaofei Wu[2], Xinyuan Luo[2], Yu Chen[1] and Jing Xu[1]*

[1]School of Journalism and Communication, Peking University, Beijing, China, [2]Department of Communications and New Media, National University of Singapore, Singapore, Singapore

Introduction: A growing body of research has examined the relationship between media exposure to health campaign information and health behaviors, yielding inconsistent findings. To address this inconsistency, it is crucial to investigate the underlying mediation and moderation mechanisms. Building upon the social diffusion model, this study explores the mediating role of interpersonal communication and the moderating role of attitudes in the relationships between health behavioral outcomes and exposure to campaign information.

Method: A tobacco control social media campaign were conducted and assessed via an online survey. Specifically, the survey was conducted from the day after the end of the campaign. Respondents were recruited via Sojump using convenience and snowball sampling. Eligible participants were non-smokers and quitters residing in China and had been exposed to the campaign information. Data were analyzed using the R software.

Results: A total of 326 eligible participants were included in the final analysis. The results suggest that social media exposure to campaign information is indirectly associated with both egoistic and altruistic behavioral intentions through interpersonal communication. However, attitudes toward tobacco control weaken the association between social media exposure to campaign information and interpersonal communication about tobacco risks. Furthermore, the indirect effect of social media exposure to campaign information on egoistic and altruistic behavioral intentions, mediated by interpersonal communication about tobacco risks, is contingent upon attitudes toward tobacco control.

Conclusion: This study tests and supports the proposition that interpersonal communication mediates the effects of campaign information exposure on health behaviors in the context of China, which contributes to the existing literature on the health effects of campaign information exposure and provides implications for the design of health campaigns to more effectively promote healthy behaviors.

KEYWORDS

social media exposure, interpersonal communication, egoistic, altruistic behavioral intention, attitudes, tobacco control campaign

Introduction

Despite declines in cigarette smoking prevalence during the past decades, tobacco use remains the most preventable cause of death and disease worldwide (GBD 2019 Tobacco Collaborators, 2021). For example, smoking is responsible for about 8 million premature deaths each year, in particular, 1.2 million are non-smokers who are dying due to exposure to second-hand smoke (World Health Organization, 2022). To address the health issues caused by tobacco, various approaches were conducted and the antismoking campaign was one of them that works well.

In early 1977, the antismoking campaign was started to be used as an approach to deal with health problems caused by tobacco (Doxiadis et al., 1985) and achieved positive results. For example, in 1985, international campaigns conducted in more than 20 countries greatly improved the knowledge, attitudes, and behaviors of the youth (Tessier et al., 1989, 1992a,b). Later in 1997, the National Tobacco Campaign (NTC) launched in Australia contributed columns of health outcomes, including 144,500 quitline calls within the first 12 months of its operation (Miller et al., 2003), 88% confirmed recall and making 49% smokers more likely to quit in 2000 (Donovan, 2000; Wakefield et al., 2003). The national campaign— Tips From Former Smokers (Tips) —was conducted in the United States in 2012 and resulted in a 12% relative increase in population-level quit attempts (Xu et al., 2015) and nationally, an estimated 1.64 million additional smokers made a quit attempt after the Tips (McAfee et al., 2013).

On the other hand, in recent years, various antismoking campaigns have been realized in developing countries including China to address domestic tobacco-related issues as well. In China, the first national anti-smoking mass media campaign launched in 2008 confirmed that message exposure was positively related to subsequent quit attempts (Li et al., 2014). In 2010, another antismoking campaign -Giving Cigarettes is Giving Harm (GCGH) -was initiated, resulting in a drop in giving cigarettes as a present (Qin et al., 2014; Huang et al., 2015). As people move to the Internet and social media, an increasing number of health education and promotion activities started to be conducted online, including tobacco control campaigns. In May 2011, the China Tobacco Control Media Campaign was initiated on Sina Weibo showing that perceived risk and self-efficacy posts positively influenced online audience engagement (Jiang and Beaudoin, 2016).

To further explore the potential of social media campaigns for improving public awareness of tobacco hazards and stimulating health behavior, the Chinese government conducted another national social media anti-smoking campaign named Tobacco Control Debate Competition (TCDC, 控烟辩论大赛 in Chinese) in 2022. Supported by China CDC and the China Association for Tobacco Control, the TCDC campaign aimed at raising public awareness of tobacco hazards, reducing the prevalence of tobacco use, and promoting tobacco control policies, started on April 22 and ended on June 7, 2022. The materials for the campaign include 32 debate videos and 1 picture, broadcasted via the Internet and social media, including China.com, Weibo, and WeChat. To the end of the campaign, there were over accumulable 500,000 people involved and 20 million viewers.

Conceptual framework

The conceptual framework for this study generally draws from the social diffusion model. In the traditional individual exposure model, people's behavior or behavioral intentions are affected via campaign message exposure Directly. This approach, however, may not be the only way that the campaign influence behavior. Interpersonal communication can be another crucial factor influencing individuals' behaviors (Hornik, 2002; Hornik and Yanovitzky, 2003). Therefore, Hornik proposed the social diffusion model presenting interpersonal communication faction in health campaigns. According to the social diffusion model, person's behavior was affected by health campaigns not only because they were exposed to the campaign message but also because they talked about the campaign messages, implying that campaign exposure stimulates interpersonal communication, and in turn, interpersonal communication affects individual's behavioral (Hornik, 2002; Hornik and Yanovitzky, 2003).

Based on the social diffusion model, we linked the campaign exposure and behavioral intentions via interpersonal communication and consider attitudes as moderators in the process (see Figure 1). Highlighted in this framework is the notion that the effectiveness of antismoking campaigns depends on integrated work of campaign message exposure, interpersonal communication and attitudes. Modeling a pathway from the campaign exposure to behavioral intentions for improving the effectiveness of the antismoking campaign, this study makes attempts to (a) confirm a path linking information exposure and health behaviors, (b) discuss how interpersonal communication mediates the effects of a health campaign, (c) determine that this mediation will be moderated by attitudes toward tobacco control, and (d) provide empirical evidence for future antismoking campaign research and practice.

Literature review

Campaign message exposure, interpersonal communication and health behaviors

Traditionally, antismoking campaigns can affect people's behaviors if individuals are exposed to campaign messages, and this traditional notion has been supported by empirical studies (McAfee et al., 2013; Hamill et al., 2015; Kim et al., 2016; Lyu et al., 2022). However, the social diffusion model suggests that campaigns can stimulate people's behaviors by generating interpersonal communication within social networks (Hwang, 2012), given people may discuss the content of the campaign messages after being exposed. In this context, a pathway was established where health campaign exposure stimulates interpersonal communication, which in turn influences health outcomes, including behaviors (Hendriks et al., 2014). Previous research has confirmed the mediating role of interpersonal communication. For instance, Van den Putte et al. (2011) demonstrated that exposure to antismoking campaigns leads to discussions about the campaigns and smoking cessation, suggesting that interpersonal communication can be regarded as an independent predictor of subsequent quit attempts. Thrasher et al. (2016) found that conversations about pictorial health warnings on cigarette packages influenced smoking cessation attempts independently of other established predictors of smoking cessation, indicating that interpersonal communication can be considered as an independent predictor of subsequent quit attempts. Additionally, some studies have examined interpersonal communication as an indirect pathway for the effect of antismoking campaigns, showing that interpersonal health communication was a significant determinant of cessation attempts (Korhonen et al., 1998; Jeong et al., 2015; Parks and Kim, 2018).

In summary, campaign exposure stimulates interpersonal communication, which subsequently influences individuals' behavioral intentions, indicating that interpersonal

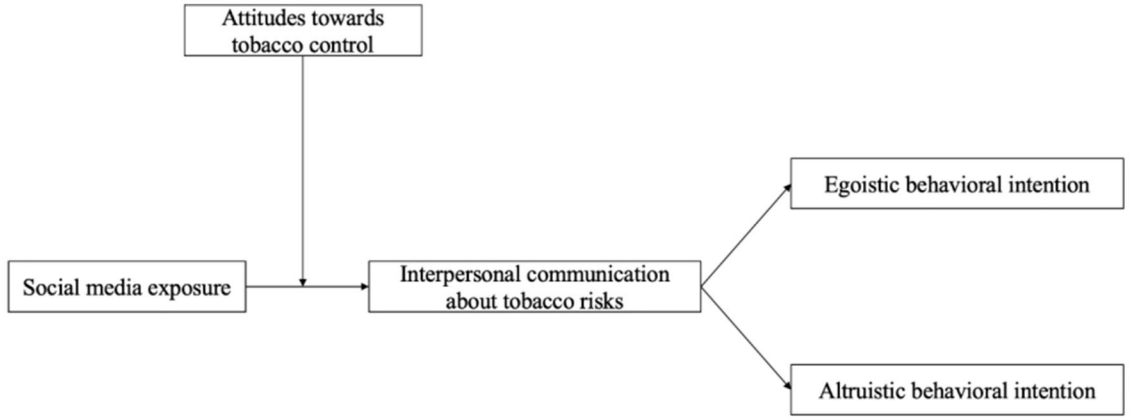

FIGURE 1
Conceptual framework.

communication acts as a mediator of tobacco control campaign effects. Since the TCDC campaign specifically aimed to promote conversations about tobacco risks among family members and friends, interpersonal communication should be recognized as a critical effect and outcome of the campaign. For the purpose of this article, our focus was on exploring the potential mediating role of interpersonal communication in relation to tobacco-related behavioral intentions. Consequently, we formulated the following hypotheses:

H1: Social media exposure positively relates to (a) egoistic and (b) altruistic behavioral intentions via increased interpersonal communication about tobacco risks.

The moderating role of attitudes toward tobacco control

However, it is important to note that social media exposure to tobacco control campaigns does not always directly result in a higher level of interpersonal communication about tobacco risks. One significant contributing factor could be individuals' pre-existing attitudes toward tobacco control, which are formed prior to their exposure to campaign messages.

People are inclined to form attitudes toward certain objects, people, ideas, and values they encounter in their daily lives through social interactions, observations, and learnings. In other words, "attitudes may be viewed as units of social knowledge that are based on experience, convictions and feelings caused by the object of this attitude" (Zanna and Rempel, 1988; p. 7). Thus, people may develop different attitudes depending on their distinctive life experiences. Once formed, attitude is quite resistant to changes and variations. In the current context, since attitudes are difficult to change, how people with different attitudes toward tobacco control may lead to different selections of media content due to *selective exposure* (Lazarsfeld and Berelson, 1948), or attitude strength may lead to different reactions to counter-arguments still remain unclear.

A large body of research suggests that attitude may strengthen the relationship between social media exposure and sharing behavior (Vraga et al., 2015; Weeks et al., 2017). Interestingly, Weeks et al. (2017) have found that when people perceive the information in social media they encounter as congruent with their pre-existing attitude, they are more likely to share pro-attitudinal information or express their opinions within their networks. This is because people's exposure to pro-attitudinal messages may influence their perceived supportiveness of opinion climates. As a result, according to the spiral of silence theory (Noelle-Neumann, 1974), people shall feel less fear of isolation in a supportive opinion climate and thus more confidently express their opinions and spread congruent information to their social networks (Weeks et al., 2017). In particular, people with positive attitudes toward tobacco control might find the social media campaign about tobacco risk congruent with their attitudes, perceive the opinion climate as supportive, and become more likely to communicate tobacco risks with their social networks.

Yet, in other cases, situations may be differentpositive attitudes may weaken the relationship between social media exposure and interpersonal communication. Interestingly, individuals with favorable attitudes toward an issue such as quitting smoking may show less reactance to fear-arousing appeals conveyed in advertisements. This is because according to the theory of reactance (Brehm, 1966), for a defensive reaction to occur, an individual's freedom of choice should be constrained and threatened—the desire to regain autonomy triggers resistance (Clee and Wicklund, 1980). In the current context, participants with positive attitudes toward tobacco risk expose to congruent messages, they may feel less threatened and less motivated to have behavioral intentions to disseminate congruent messages to their peers. In contrast, people with negative attitudes toward tobacco control may perceive incongruent information about tobacco risks of social media campaigns as a threat to their freedom of choice (i.e. exposure to health messages link to smoke and cancer), they are more inclined to react to regain their autonomy (Jäger and Eisend, 2013). Therefore, compared to people who encounter pro-attitudinal messages and consider their behavioral changes as intrinsically motivated, people who are exposed to incongruent information may become more externally induced to invoke resistance and actions. There is a reason to believe that the moderating role of attitudes toward tobacco control may hinge on the interplay between social media exposure, interpersonal

communication about tobacco risks, and possible egoistic and altruistic behavior intentions.

> **RQ2:** To what extent do attitudes toward tobacco control moderate the association between social media exposure and interpersonal communication about tobacco risks?

Assuming people's attitudes toward tobacco control moderate the association between social media exposure and interpersonal communication, it is also likely that people's attitudes might conditionally influence the strength of the indirect relationship between social media exposure and health outcomes, thereby demonstrating a pattern of moderated mediation between the study variables.

> **RQ3a:** To what extent do attitudes toward tobacco control moderate the indirect effect of social media exposure on egoistic behavioral intention, via the mediator of interpersonal communication about tobacco risks?
> **RQ3b:** To what extent do attitudes toward tobacco control moderate the indirect effect of social media exposure on altruistic behavioral intention, via the mediator of interpersonal communication about tobacco risks?

Methods

Sample

We used data that was collected via an online survey to evaluate the effectiveness of the TCDC campaign. The survey was conducted from June 8, 2021, the day after the end of the TCDC campaign, to June 14, 2021. Respondents were recruited via Sojump (https://www.wjx.cn) using convenience and snowball sampling. We then posted recruitment announcements on media websites (i.e., China.com), Sina Weibo, and WeChat through researchers' accounts. A total of 326 eligible participants were included in the final analysis. Those participants were non-smokers or quitters who reside in China and have been exposed to campaign information. Participants were offered a 2 CNY (about 0.28 USD) compensation for their time and effort.

Measurement

Social media exposure

We measured social media exposure to campaign information by asking respondents to identify whether they were exposed to campaign information, such as videos, posters, and news through the following channels: (1) Weibo; (2) WeChat; (3) short video platforms such as TikTok or Kuaishou. Responses were dichotomous (1 = yes; 0 = no) and were summed to compose an index of social media exposure (M = 1.63, SD = 0.81).

Egoistic and altruistic behavioral intentions

Two types of behavioral intentions were measured using the scale adapted from Van den Putte et al. (2011), where responses were recorded on a 5- point scale ranging from 1 (very unlikely) to 5 (very likely). Of the two types of behavioral intentions, egoistic behavioral intention (i.e., intention to not initiate smoking) was measured by one statement "I plan to not initiate smoking in the next 6 months" (M = 4.34, SD = 0.99). The second type of intention, the altruistic behavioral intention was measured by asking respondents to indicate how likely they plan to do the following behaviors that would benefit their families, friends, or classmates who are in need: (1) talk about quitting smoking; (2) provide aids in quitting; (3) recommend smoking cessation hotlines; (4) recommend smoking cessation clinics. Responses were averaged to generate a composite scale of altruistic behavioral intention, with a higher score indicating a higher intention to perform altruistic behaviors (Cronbach's α =.91; M = 4.24, SD = 0.87).

Interpersonal communication about tobacco risks

Two items were employed to measure interpersonal communication about tobacco risks. Respondents were asked to indicate their likelihood of engaging in the following behaviors with their families, friends, or classmates: (1) sharing tobacco risks, and (2) talking about tobacco risks. Responses were recorded on a 5-point scale ranging from 1 (very unlikely) to 5 (very likely). The average score of two items was obtained to represent a composite index of interpersonal communication about s ($r = 0.72$, $p < 0.001$; M = 4.28, SD = 0.93).

Attitudes toward tobacco control

Six items adapted from Henriksen et al. (2002) were used to measure the extent to which respondents agreed with the following statements: (1) There should be smoke-free legislation in China; (2) The sale of tobacco to adolescents should be banned; (3) Smoking should be completely banned in schools; (4) The number of tobacco retailers should be reduced; (5) Films and teleplays should not include too many smoking scenes; (6) Illegal smokers should be reported. Responses were scored on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). We averaged responses to create a composite scale (Cronbach's α = 0.95; M = 4.05, SD = 1.07). A higher score represented more positive attitudes toward tobacco control.

Control variables

Demographics, smoking status, and social environment were included in the analyses to eliminate potentially confounding influences. Demographic characteristics included age (1= 14 years old or below to 5 = 65 years old or above), gender (1 = male, 0 = female), education level (1 = senior high school or below to 3 = graduate or above), monthly household income (1 = CNY $2999 or below to 5 = CNY $7,000 or above). Smoking status was categorized as a quitter (currently not smoking but had smoked previously) and non-smoker (had never smoked). Since prior works suggest that social environment relates to smoking behaviors (Miller et al., 2006; Okoli et al., 2008), we measured social environment by asking respondents to indicate the presence of a smoker family member (1 = yes, 0 = no) and the number of smoker friends (1 = none of them to 5 = all of them).

Statistical analysis

Data were analyzed using the R software (version 3.6.3). To test our hypotheses and answer research questions, we performed a series of simple mediation models and moderated mediation models using Hayes (2018) PROCESS macro for R. The 95% confidence intervals of the indirect and conditional indirect effects were estimated based on a 5, 000 bootstrapped resampling procedure.

Results

Descriptive analyses

Table 1 provides an overview of descriptive statistics regarding participant characteristics. Bivariate correlations of the key study variables were displayed in Table 2. Social media exposure was positively related to interpersonal communication about tobacco risks, egoistic behavioral intention, and altruistic behavioral intention. Interpersonal communication about tobacco risks was positively related to egoistic behavioral intention and altruistic behavioral intention. In addition, attitudes toward tobacco control were positively related to interpersonal communication about tobacco risks, egoistic behavioral intention, and altruistic behavioral intention.

TABLE 1 Demographics, smoking status and social environment of study sample ($N = 326$).

	Mean (SD)	*n* (%)
Age	2.70 (0.65)	
14 years old and below		8 (2.45)
15–24 years old		113 (34.66)
25–44 years old		179 (54.91)
45–64 years old		22 (6.75)
65 years old and above		4 (1.23)
Gender		
Male		204 (62.58)
Female		122 (37.42)
Education level		
High school or below		73 (22.39)
Undergraduate (including junior college) or above		253 (77.61%)
Monthly household income		
Below CNY $5,000		95 (29.14)
CNY $5,000 or above		231 (70.86)
Smoking status		
Non-smoker		190 (58.28)
Quitter		136 (41.72)
Family smoker		
Yes		221 (67.79)
No		105 (32.21)
Number of smoker friends	2.99 (1.10)	
Exposed media channels		
Weibo		312 (95.71)
WeChat		288 (88.34)
Tiktok/Kuaishou		112 (34.36)

Analyses of direct and indirect effects

To examine indirect relationships between social media exposure and egoistic and altruistic behavioral intention via interpersonal communication about tobacco risks (H1a and H1b), two mediation models were run using model 4 of Hayes (2018) PROCESS macro for R. Results were presented in Table 3.

Results indicated that social media exposure to campaign information was positively associated with interpersonal communication about tobacco risks ($\beta = 0.22$, SE $= 0.06$, $p < 0.001$), which was further positively associated with both egoistic ($\beta = 0.63$, SE $= 0.05$, $p < 0.001$) and altruistic behavioral intention ($\beta = 0.74$, SE $= 0.03$, $p < 0.001$). Notably, the bootstrap confidence interval also confirmed two significant indirect relationships. Specifically, results showed an indirect positive association between social media exposure to campaign information and both egoistic ($\beta = 0.14$, BootSE $= 0.04$, 95% BootCI [0.063, 0.227]) and altruistic behavioral intention ($\beta = 0.17$, BootSE $= 0.05$, 95% BootCI [0.076, 0.257]) through interpersonal communication about tobacco risks. Thus, H1a and H1b were supported.

Analyses of moderated mediation effects

Next, to examine moderation and moderated mediation effects (RQ2, RQ3a and RQ3b), we ran two moderated mediation models using model 7 of Hayes (2018) PROCESS macro for R. Levels of moderators (low, moderate, and high) were determined using the mean (moderate level) and one standard deviation below/above the mean (low and high levels, respectively) (Hayes, 2015). Table 4 presents the results of these analyses.

Results showed a significant interaction between social media exposure to campaign information and attitudes toward tobacco control ($\beta = -0.24$, SE $= 0.05$, $p < 0.001$), suggesting that the positive association between social media exposure to campaign information and interpersonal communication about tobacco risks was weaker among people with more positive attitudes toward tobacco control. Moreover, the indirect effect of social media exposure to campaign information on egoistic (Index of moderated mediation $= -0.15$, BootSE $= 0.04$, 95% BootCI [-0.224, -0.066]) and altruistic behavioral intention (Index of moderated mediation $= -0.18$, BootSE $= 0.05$, 95% BootCI [-0.262, -0.078]) was contingent on attitudes toward tobacco control. Specifically, the indirect association between social media exposure to campaign information and egoistic behavioral intention via interpersonal communication about tobacco risks was significant for lower ($\beta = 0.23$, BootSE $= 0.06$, 95% BootCI [0.101, 0.357]) and moderate level

TABLE 2 Bivariate correlations among the key study variables.

	1.	2.	3.	4.
1. Social media exposure	-			
2. Interpersonal communication	0.26***	-		
3. Egoistic behavioral intention	0.22***	0.64***	-	
4. Altruistic behavioral intention	0.27***	0.82***	0.71***	-
5. Attitudes toward tobacco control	0.25***	0.61***	0.53***	0.64***

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

TABLE 3 Results of the simple mediation models.

	β	SE	t	p
Effect of social media exposure on interpersonal communication	0.22	0.06	3.57	<0.001
Effect of interpersonal communication on egoistic behavioral intention	0.63	0.05	13.04	<0.001
Effect of interpersonal communication on altruistic behavioral intention	0.74	0.03	23.37	<0.001
	b	BootSE	BootLLCI	BootULCI
Indirect effect of social media exposure on egoistic behavioral intention via interpersonal communication	0.14	0.04	0.063	0.227
Indirect effect of social media exposure on altruistic behavioral intention via interpersonal communication	0.17	0.05	0.076	0.257

Boot, Bootstrap results; LLCI, lower level of the 95% confidence intervals; ULCI, upper level of the 95% confidence intervals.

TABLE 4 Results of moderated mediation analyses.

Predictors	β	SE	t	p
	Interpersonal communication			
Social media exposure (SME)	0.12	0.05	2.27	< 0.05
Attitudes toward tobacco control (ATTC)	0.45	0.04	11.07	< 0.001
SME * ATTC	−0.24	0.05	−5.04	< 0.001
Conditional indirect effect	**β**	**BootSE**	**Boot-LLCI**	**Boot-ULCI**
	Egoistic behavioral intention			
Attitudes toward tobacco control				
Low	0.23	0.06	0.101	0.357
Moderate	0.07	0.03	0.010	0.141
High	−0.07	0.04	−0.146	0.009
	Altruistic behavioral intention			
Attitudes toward tobacco control				
Low	0.28	0.07	0.124	0.407
Moderate	0.09	0.04	0.011	0.158
High	−0.08	0.05	−0.177	0.010

Boot, Bootstrap results; LLCI, lower level of the 95% confidence intervals; ULCI, upper level of the 95% confidence intervals.

($\beta = 0.07$, BootSE = 0.03, 95% BootCI [0.010, 0.141]) of attitudes toward tobacco control, but not for higher level ($\beta = -0.07$, BootSE = 0.04, 95% BootCI−0.146, 0.009]). Moreover, interpersonal communication about tobacco risks mediated the relationship between social media exposure to campaign information and altruistic behavioral intention only when attitudes toward tobacco control was low ($\beta = 0.28$, BootSE = 0.07, 95% BootCI [0.124, 0.407]), and moderate ($\beta = 0.09$, BootSE = 0.04, 95% BootCI [0.011, 0.158]) but not when it was high ($\beta = -00.08$, BootSE = 0.05, 95% BootCI [−0.177, 0.010]).

Discussion

The social media tobacco control campaign has been used as an effective approach to address tobacco-related issues. In this study, we observed that social media exposure to the antismoking campaign has a direct or indirect effective impact on health behavior. These findings are significant given that social media campaigns for antismoking emerged as feasible and acceptable, which largely contribute to improved smoking-related outcomes and hold the potential to support worldwide smoking cessation efforts (Naslund et al., 2017). Therefore, exploring factors that influence health outcomes, how these factors influence health outcomes, and to what extent is necessary.

First, this study verified the relationship between several key variables (i.e., social media exposure, interpersonal communication, attitude, and behaviors including egoistic behavioral intention and altruistic behavioral intention) that influence the effectiveness of tobacco control campaigns. The study results show that (a) social media exposure was positively related to interpersonal communication and behaviors; (b) interpersonal communication was positively related to behavior; (c) attitudes were positively related to interpersonal communication and behaviors, implying that social media exposure, interpersonal communication, and attitudes may have a positive influence on behavioral intentions.

Then we examined the direct and indirect effects of social media exposure and interpersonal communication on behavioral intentions. The results indicate that social media exposure to antismoking campaign information stimulated conversations about tobacco risks, which further positively influenced the health behavioral intentions including egoistic (i.e., intention to not initiate smoking) and altruistic behavior (i.e., talking about quitting smoking; providing aids in quitting; recommending smoking cessation services of cessation hotlines and clinics). In addition, this study confirmed that interpersonal health communication could act as a mediator of campaign effects on non-smoker behavioral intentions. This indirect pathway for the effect of antismoking campaigns of interpersonal communication has been approved by research focusing on smokers (Jeong et al., 2015), adolescents (Hafstad and Aaro, 1997; Karletsos et al., 2021), the general public (Van den Putte et al., 2011; Hwang, 2012), and the low-income population (Parks and Kim, 2018).

These results imply that interpersonal communication appears to be an important catalyst for healthy behavioral intentions and supports the interplay between interpersonal communication and antismoking campaigns. Thus, the encouragement of interpersonal communication should be an important objective of such campaigns.

In addition, this study also discussed the moderating role of attitudes toward tobacco control campaigns. Specifically, we examined how attitudes moderated the association between social media exposure and interpersonal communication, as well as the indirect effect of social media exposure on behavioral intentions. We argue that attitudes about tobacco control may already exist prior to message exposure, guide conversations following exposure to campaign messages, and subsequently influence behavior. This implies that attitudes have an indirect pathway to influence the effects of health campaigns on health behaviors, a notion that has largely been overlooked in previous studies.The moderating function of attitudes has been extensively discussed in various domains such as information technology (IT) usage (Brannon et al., 2007; Bhattacherjee and Sanford, 2009), marketing (Alwitt and Berger, 1993; Defever et al., 2011; Czarnecka and Schivinski, 2019; Rahimnia and Arian, 2021), and health issues such as cancer, drug use, and nutrition (Maio and Olson, 1995; Knyazev, 2004; Hansen et al., 2011). However, research specifically focusing on the moderating role of attitudes in tobacco control has been lacking. In fact, most previous studies have treated attitudes as one of the health outcomes of tobacco control campaigns (Tessier et al., 1989, 1992a,b; Cowell et al., 2009; Farrelly et al., 2009; Slocum et al., 2022) or as a factor influencing support for tobacco control policy (Macy et al., 2012), rather than examining actual behavior or behavioral intention. In this study, attitudes toward tobacco control were considered as a mediator of antismoking campaign effectiveness, and the results from this study suggest that the role of attitudes should not be limited to being a passive health outcome. This prompts us to reconsider the broader roles and impacts of attitudes in health campaigns.

In conclusion, this study explored the relationship between four key variables (i.e., social media exposure, interpersonal communication, attitude, and behaviors including egoistic behavioral intention and altruistic behavioral intention) in tobacco control campaigns. The findings suggest that social media exposure, interpersonal communication, and attitudes play a significant role in shaping behavioral intentions. Additionally, the study confirmed the mediating role of interpersonal communication in the relationship between social media exposure and behaviors. Furthermore, the study discussed the moderating effect of attitudes toward tobacco control in the campaign. Overall, these findings contribute to our understanding of the complex dynamics involved in tobacco control efforts. Notably, our study revealed that social media exposure plays a significant role in motivating both egoistic and altruistic behavior among non-smokers and quitters, facilitated through interpersonal communication about tobacco risks. Furthermore, we observed that attitudes toward tobacco control have a moderating effect on the influence of campaign message exposure on health intentions, mediated by interpersonal communication. These findings underscore the importance of interpersonal communication as a mediating factor and attitudes as a moderating factor in health campaigns. As a result, we have proposed an integrated model that incorporates the moderating role of attitudes in the direct and indirect effects of social media exposure on behavioral intention. This study contributes to the existing literature and offers practical insights for tobacco control campaign strategies.

In theory, this study provided empirical evidence confirming interpersonal communication as an indirect pathway for the effect of an antismoking campaign. Additionally, it examined the moderating role of attitudes, thereby broadening the theoretical understanding of attitudes. Future research should continue to explore the potential roles and impacts of interpersonal communication and attitudes in various health communication formats. In practice, recent attempts to promote antismoking through targeted media campaigns should pay more attention to encouraging conversations among family members and friends. Available studies suggest that highly emotional messages (Hafstad and Aaro, 1997; Dunlop et al., 2014) and loss-framed messages (Wong et al., 2013) have been effective in stimulating interpersonal communication among family members and friends. The future antismoking campaign should explore messages with intense emotions or information emphasizing the loss of health to provoke positive conversations about smoking hazards and cessation. Furthermore, as people increasingly engage with social media and more antismoking campaigns are managed on social media platforms in recent years, interactions and conversations among the public and professionals are facilitated through the capabilities of media affordance, such as commenting and questioning (Heldman et al., 2013). Future campaign makers should make efforts to fully utilize social media to facilitate conversations among the public. Given that tobacco control issues receive less attention than entertainment topics online, professionals, opinion leaders, and celebrities should also be involved in discussion networks.

There are several strengths in this study. Firstly, it provides focused attention to non-smoking groups. A significant number of previous studies have primarily focused on smokers in tobacco control campaigns. However, non-smokers constitute a large group that plays a dual role in promoting tobacco control: the egoistic act of not smoking themselves and the altruistic act of supporting smokers to quit. It is crucial to pay attention to this group. It is worth noting that non-smokers are often more vulnerable to tobacco and exhibit less opposition to smoking in both attitude and behavior (Poland et al., 2000). Considering the complexity and multifaceted nature of the variables under investigation, concentrating on a specific subgroup of participants (quitters and non-smokers) allows for a more focused examination of the relationships of interest. Second, attitudes toward tobacco predict intent to smoke in the future (Chassin et al., 1984), and program components targeting a reduction in tobacco use can benefit from changing attitudes (Goldman and Glantz, 1998). Previous studies have documented attitudes as health outcomes (Tessier et al., 1989, 1992a,b; Cowell et al., 2009; Farrelly et al., 2009; Huang et al., 2015) or mediators (MacKinnon et al., 2002; Sargent et al., 2002; Roberts et al., 2022), considering attitudes as a passive variable. However, we argue that attitudes toward tobacco exist prior to campaign exposure and have confirmed that attitudes toward tobacco control act as a moderator for the effects of health campaigns. Additionally,

this study proposes a model that demonstrates a pathway linking information exposure and health behaviors, with interpersonal communication as a mediator and attitude as a moderator, in order to improve the effectiveness of antismoking campaigns. This contribution to both research and practice holds significant value.

This study has several limitations that need to be acknowledged. One primary limitation is the small sample size used in the study, particularly in a country with a large population. This may limit the generalizability of the final findings. While a larger sample size would have been desirable, our primary focus was on exploring the underlying mechanisms and associations between these variables rather than providing nationally representative estimates. This study was conducted as a pilot study, and the results will guide our future research, which will involve larger sample sizes to provide a broader perspective on the population-level impact of social media campaigns for tobacco control. Another major limitation is that our data were collected using self-reported measures, which rely on people's memory to assess the messages. This approach inevitably introduces recall biases, which may affect the accuracy of the data and its reflection of the actual events. Third, this study defined two types of interpersonal communication: sharing tobacco risks and talking about tobacco risks. However, the study did not demonstrate the process of interpersonal communication assessed through media or face-to-face and how the interactive process works, which could potentially influence the findings. Finally, although we discovered that attitudes moderate the effects of the antismoking campaign on social media exposure and behavioral intentions, we did not discuss whether other factors such as emotion, social norms, and self-efficacy can act as mediators in antismoking campaigns. Future research should make attempts to explore more associations between social media exposure, interpersonal communication, attitudes, and behaviors in the context of health campaigns. Additionally, there is a need to explore more factors that can influence the effectiveness of health campaigns.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

SL conceived and designed the study, collected data, performed the analysis, and writing—original draft and paper. QW performed the analysis and writing—original draft and paper. XL writing—original draft and paper. YC collected data and reviewed paper. JX conceived and designed the study, review and editing, and provided research funding. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

References

Alwitt, L. F., and Berger, I. E. (1993). "Understanding the link between environmental attitudes and consumer product usage: Measuring the moderating role of attitude strength," in *Advances in Consumer Research, Vol. 20,* eds L. McAlister and M. L. Rothschild (Provo, UT: Association for Consumer Research), 189–194.

Bhattacherjee, A., and Sanford, C. (2009). The intention–behaviour gap in technology usage: the moderating role of attitude strength. *Behav. Inform. Technol.* 28, 389–401. doi: 10.1080/01449290802121230

Brannon, L. A., Tagler, M. J., and Eagly, A. H. (2007). The moderating role of attitude strength in selective exposure to information. *J. Exp. Soc. Psychol.* 43, 611–617. doi: 10.1016/j.jesp.2006.05.001

Brehm, J. W. (1966). *A Theory of Psychological Reactance*. New York, NY: Academic Press.

Chassin, L., Presson, C. C., Sherman, S. J., Corty, E., and Olshavsky, R. W. (1984). Predicting the onset of cigarette smoking in adolescents: a longitudinal study 1. *J. Appl. Soc. Psychol.* 14, 224–243. doi: 10.1111/j.1559-1816.1984.tb02233.x

Clee, M. A., and Wicklund, R. A. (1980). Consumer behavior and psychological reactance. *J. Cons. Res.* 6, 389–405. doi: 10.1086/208782

Cowell, A. J., Farrelly, M. C., Chou, R., and Vallone, D. M. (2009). Assessing the impact of the national "truth" antismoking campaign on beliefs, attitudes, and intent to smoke by race/ethnicity. *Ethnicity Health* 14, 75–91. doi: 10.1080/13557850802257715

Czarnecka, B., and Schivinski, B. (2019). Do consumers acculturated to global consumer culture buy more impulsively? The moderating role of attitudes towardand beliefs about advertising. *J. Global Mark.* 32, 219–238. doi: 10.1080/08911762.2019.1600094

Defever, C., Pandelaere, M., and Roe, K. (2011). Inducing value-congruent behavior through advertising and the moderating role of attitudes toward advertising. *J. Advert.* 40, 25–38. doi: 10.2753/JOA0091-3367400202

Donovan, R. (2000). *Tracking the National Tobacco Campaign Phase Two. Australia's National Tobacco Campaign Evaluation Report Volume Two*. Canberra: Department of Health and Aged Care, 115–132.

Doxiadis, S., Trihopoulos, D., and Phylactou, H. D. (1985). Impact of a nationwide anti-smoking campaign. *Lancet* 326, 712–713. doi: 10.1016/S0140-6736(85)92945-9

Dunlop, S. M., Cotter, T., and Perez, D. (2014). When your smoking is not just about you: antismoking advertising, interpersonal pressure, and quitting outcomes. *J. Health Commun.* 19, 41–56. doi: 10.1080/10810730.2013.798375

Farrelly, M. C., Davis, K. C., Duke, J., and Messeri, P. (2009). Sustaining "truth": changes in youth tobacco attitudes and smoking intentions after 3 years of a national antismoking campaign. *Health Educ. Res.* 24, 42–48. doi: 10.1093/her/cym087

GBD 2019 Tobacco Collaborators (2021). Spatial, temporal, and demographic patterns in prevalence of smoking tobacco use and attributable disease burden in 204 countries and territories, 1990–2019: a systematic analysis from the Global Burden of Disease Study 2019. *Lancet* 397, 2337. doi: 10.1016/S0140-6736(21)01169-7

Goldman, L. K., and Glantz, S. A. (1998). Evaluation of antismoking advertising campaigns. *JAMA* 279, 772–777. doi: 10.1001/jama.279.10.772

Hafstad, A., and Aaro, L. E. (1997). Activating interpersonal influence through provocative appeals: evaluation of a mass media-based antismoking campaign targeting adolescents. *Health Commun.* 9, 253–272. doi: 10.1207/s15327027hc0903_4

Hamill, S., Turk, T., Murukutla, N., Ghamrawy, M., and Mullin, S. (2015). I 'like'MPOWER: using Facebook, online ads and new media to mobilise tobacco control communities in low-income and middle-income countries. *Tob. Control* 24, 306–312. doi: 10.1136/tobaccocontrol-2012-050946

Hansen, T., Mukherjee, A., and Thomsen, T. U. (2011). Anxiety and search during food choice: the moderating role of attitude toward nutritional claims. *J. Cons. Mark.* 3, 608. doi: 10.1108/07363761111127608

Hayes, A. F. (2015). An index and test of linear moderated mediation. *Multivariate Behav. Res.* 50, 1–22. doi: 10.1080/00273171.2014.962683

Hayes, A. F. (2018). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach (2nd ed.)*. New York, NY: The Guilford Press.

Heldman, A. B., Schindelar, J., and Weaver, J. B. (2013). Social media engagement and public health communication: implications for public health organizations being truly "social". *Public Health Rev.* 35, 1–18. doi: 10.1007/BF03391698

Hendriks, H., van den Putte, B., Bruijn, d. e., and de Vreese, G. J. C. H. (2014). Predicting health: the interplay between interpersonal communication and health campaigns. *J. Health Commun.* 19, 625–636. doi: 10.1080/10810730.2013.837552

Henriksen, L., Flora, J. A., Feighery, E., and Fortmann, S. P. (2002). Effects on youth of exposure to retail tobacco advertising 1. *J. Appl. Soc. Psychol.* 32, 1771–1789. doi: 10.1111/j.1559-1816.2002.tb00258.x

Hornik, R., and Yanovitzky, I. (2003). Using theory to design evaluations of communication campaigns: the case of the national youth anti-drug media campaign. *Commun. Theory* 13, 204–224. doi: 10.1111/j.1468-2885.2003.tb00289.x

Hornik, R. C. (2002). "Introduction public health communication: making sense of contradictory evidence," in *Public Health Communication* (pp. 17-36). Routledge. doi: 10.4324/9781410603029-6

Huang, L. L., Thrasher, J. F., Jiang, Y., Li, Q., Fong, G. T., Chang, Y., et al. (2015). Impact of the "Giving Cigarettes is Giving Harm" campaign on knowledge and attitudes of Chinese smokers. *Tobacco Cont.* 24, iv28–iv34. doi: 10.1136/tobaccocontrol-2013-051475

Hwang, Y. (2012). Social diffusion of campaign effects: Campaign generated interpersonal communication as a mediator of antitobacco campaign effects. *Commun. Res.* 39, 120–141.

Jäger, T., and Eisend, M. (2013). Effects of fear-arousing and humorous appeals in social marketing advertising: the moderating role of prior attitude toward the advertised behavior. *J. Curr. Issues Res. Adv.* 34, 125–134. doi: 10.1080/10641734.2013.754718

Jeong, M., Tan, A. S., Brennan, E., Gibson, L., and Hornik, R. C. (2015). Talking about quitting: interpersonal communication as a mediator of campaign effects on smokers' quit behaviors. *J. Health Commun.* 20, 1196–1205. doi: 10.1080/10810730.2015.1018620

Jiang, S., and Beaudoin, C. E. (2016). Smoking prevention in China: a content analysis of an anti-smoking social media campaign. *J. Health Commun.* 21, 755–764. doi: 10.1080/10810730.2016.1157653

Karletsos, D., Hutchinson, P., Leyton, A., and Meekers, D. (2021). The effect of interpersonal communication in tobacco control campaigns: a longitudinal mediation analysis of a Ghanaian adolescent population. *Prev. Med.* 142, 106373. doi: 10.1016/j.ypmed.2020.106373

Kim, A., Hansen, H., Duke, J., Davis, K., Alexander, R., Rowland, A., et al. (2016). Does digital ad exposure influence information-seeking behavior online? Evidence from the 2012 tips from former smokers national tobacco prevention campaign. *J. Med. Int. Res.* 18, e299. doi: 10.2196/jmir.4299

Knyazev, G. G. (2004). Behavioural activation as predictor of substance use: mediating and moderating role of attitudes and social relationships. *Drug Alcohol Depend.* 75, 309–321. doi: 10.1016/j.drugalcdep.2004.03.007

Korhonen, T., Uutela, A., Korhonen, H. J., and Puska, P. (1998). Impact of mass media and interpersonal health communication on smoking cessation attempts: a study in North Karelia, 1989–1996. *J. Health Commun.* 3, 105–119 doi: 10.1080/108107398127409

Lazarsfeld, P., and Berelson, B. and Gaudet, H. (1948). *The People's Choice: How the Voter Makes up His Mind in a Presidential Campaign*. New York: Columbia University Press.

Li, L., Borland, R., Yong, H. H., Fong, G. T., Jiang, Y., Li, Q., et al. (2014). Reported exposures to anti-smoking messages and their impact on Chinese smoker's subsequent quit attempts. *Int. J. Behav. Med.* 21, 667–676. doi: 10.1007/s12529-013-9349-3

Lyu, J. C., Sung, H. Y., Yao, T., Quah, A. C., Jiang, Y., Fong, G. T., et al. (2022). Receiving and giving electronic cigarettes as gifts in China: findings from International Tobacco Control China Survey. *Preventive Med. Reports* 27, 101763. doi: 10.1016/j.pmedr.2022.101763

MacKinnon, D. P., Taborga, M. P., and Morgan-Lopez, A. A. (2002). Mediation designs for tobacco prevention research. *Drug Alcohol Depend.* 68, 69–83. doi: 10.1016/S0376-8716(02)00216-8

Macy, J. T., Chassin, L., and Presson, C. C. (2012). The association between implicit and explicit attitudes toward smoking and support for tobacco control measures. *Nicot. Tobacco Res.* 15, 291–296. doi: 10.1093/ntr/nts117

Maio, G. R., and Olson, J. M. (1995). Relations between values, attitudes, and behavioral intentions: the moderating role of attitude function. *J. Exp. Soc. Psychol.* 31, 266–285. doi: 10.1006/jesp.1995.1013

McAfee, T., Davis, K. C., Alexander, R. L. Jr., Pechacek, T. F., and Bunnell, R. (2013). Effect of the first federally funded US antismoking national media campaign. *Lancet* 382, 2003–2011. doi: 10.1016/S0140-6736(13)61686-4

Miller, C. H., Burgoon, M., Grandpre, J. R., and Alvaro, E. M. (2006). Identifying principal risk factors for the initiation of adolescent smoking behaviors: the significance of psychological reactance. *Health Commun.* 19, 241–252. doi: 10.1207/s15327027hc1903_6

Miller, C. L., Wakefield, M., and Roberts, L. (2003). Uptake and effectiveness of the Australian telephone Quitline service in the context of a mass media campaign. *Tobacco Control* 12, ii53–ii58. doi: 10.1136/tc.12.suppl_2.ii53

Naslund, J. A., Kim, S. J., Aschbrenner, K. A., McCulloch, L. J., Brunette, M. F., Dallery, J., et al. (2017). Systematic review of social media interventions for smoking cessation. *Addict. Behav.* 73, 81–93. doi: 10.1016/j.addbeh.2017.05.002

Noelle-Neumann, E. (1974). The spiral of silence a theory of public opinion. *J. Commun.* 24, 43–51. doi: 10.1111/j.1460-2466.1974.tb00367.x

Okoli, C. T., Richardson, C. G., and Johnson, J. L. (2008). An examination of the relationship between adolescents' initial smoking experience and their exposure to peer and family member smoking. *Addict. Behav.* 33, 1183–1191. doi: 10.1016/j.addbeh.2008.04.019

Parks, M. J., and Kim, S. (2018). Interpersonal communication in response to an intervention and its impact on smoking cessation within a low-income population. *Health Edu. Behav.* 45, 550–558. doi: 10.1177/1090198117749258

Poland, B. D., Cohen, J. E., Ashley, M. J., Adlaf, E., Ferrence, R., Pederson, L. L., et al. (2000). Heterogeneity among smokers and non-smokers in attitudes and behaviour regarding smoking and smoking restrictions. *Tob. Control* 9, 364–371. doi: 10.1136/tc.9.4.364

Qin, Y., Su, J., Xiang, Q., Hu, Y., Xu, G., Ma, J., et al. (2014). Effectiveness of a television advertisement campaign on giving cigarettes in a Chinese population. *J. Epidemiol.* 3, JE20130172. doi: 10.2188/jea.JE20130172

Rahimnia, F., and Arian, N. H. (2021). Luxury consumption and the moderating role of attitude toward counterfeits: the case of an emerging market. *J. General Manag.* 47, 41–55. doi: 10.1177/03063070211013335

Roberts, M. E., Keller-Hamilton, B., and Ferketich, A. K. (2022). Testing if attitudes mediate the association between advertising exposure and adolescent tobacco use. *Addict. Behav.* 134, 107415. doi: 10.1016/j.addbeh.2022.107415

Sargent, J. D., Dalton, M. A., Beach, M. L., Mott, L. A., Tickle, J. J., Ahrens, M. B., et al. (2002). Viewing tobacco use in movies: does it shape attitudes that mediate adolescent smoking?. *Am. J. Prev. Med.* 22, 137–145. doi: 10.1016/S0749-3797(01)00434-2

Slocum, E., Xie, Y., Colston, D. C., Emery, S., Patrick, M. E., Thrasher, J. F., et al. (2022). Impact of the tips from former smokers anti-smoking media campaign on youth smoking behaviors and anti-tobacco attitudes. *Nicotine Tobacco Res.* 3, 152. doi: 10.1093/ntr/ntac152

Tessier, J. F., Freour, P., Belougne, D., and Crofton, J. (1992a). Tobacco and health committee of the international union against tuberculosis and lung diseases. smoking habits and attitudes of medical students toward smoking and antismoking campaigns in nine Asian countries. *Int. J. Epidemiol.* 21, 298–304. doi: 10.1093/ije/21.2.298

Tessier, J. F., Freour, P., Crofton, J., and Kombou, L. (1989). Smoking habits and attitudes of medical, students toward smoking and antismoking campaigns in fourteen European countries. *Eur. J. Epidemiol.* 5, 311–311. doi: 10.1007/BF00144831

Tessier, J. F., Fréour, P. P., Nejjari, C., Belougne, D., and Crofton, J. W. (1992b). Smoking behaviour and attitudes of medical students toward smoking and anti-smoking campaigns: a survey in 10 African and Middle Eastern countries. *Tob. Control* 1, 95. doi: 10.1136/tc.1.2.95

Thrasher, J. F., Abad-Vivero, E. N., Huang, L., O'Connor, R. J., Hammond, D., Bansal-Travers, M., et al. (2016). Interpersonal communication about pictorial health warnings on cigarette packages: policy-related influences and relationships with smoking cessation attempts. *Soc. Sci. Med.* 164, 141–149. doi: 10.1016/j.socscimed.2015.05.042

Van den Putte, B., Yzer, M., Southwell, B. G., Bruijn, d. e., and Willemsen, G. J. (2011). Interpersonal communication as an indirect pathway for the effect of antismoking media content on smoking cessation. *J. Health Commun.* 16, 470–485. doi: 10.1080/10810730.2010.546487

Vraga, E. K., Thorson, K., Kliger-Vilenchik, N., and Gee, E. (2015). How individual sensitivities to disagreement shape youth political expression on Facebook. *Comput. Human Behav.* 45, 281–189. doi: 10.1016/j.chb.2014.12.025

Wakefield, M., Freeman, J., and Donovan, R. (2003). Recall and response of smokers and recent quitters to the Australian National Tobacco Campaign. *Tobacco Control* 12, ii15–ii22. doi: 10.1136/tc.12.suppl_2.ii15

Weeks, B. E., Lane, D. S., Kim, D. H., Lee, S. S., and Kwak, N. (2017). Incidental exposure, selective exposure, and political information sharing: integrating online exposure patterns and expression on social media. *J. Comp. Med. Commun.* 22, 363–379. doi: 10.1111/jcc4.12199

Wong, N. C., Harvell, L. A., and Harrison, K. J. (2013). The unintended target: assessing non-smokers' reactions to gain-and loss-framed antismoking public service announcements. *J. Health Commun.* 18, 1402–1421. doi: 10.1080/10810730.2013.798376

World Health Organization (2022). Tobacco. Available online at: https://www.who.int/news-room/fact-sheets/detail/tobacco (accessed October 25, 2022)

Xu, X., Alexander, R. L. Jr., Simpson, S. A., Goates, S., Nonnemaker, J. M., Davis, K. C., et al. (2015). A cost-effectiveness analysis of the first federally funded antismoking campaign. *Am. J. Prev. Med.* 48, 318–325. doi: 10.1016/j.amepre.2014.10.011

Zanna, M. P., and Rempel, J. K. (1988). "Attitudes: a new look at an old concept," in The Social Psychology of Knowledge, eds D. Bar-Tal and A.W.Kruglanski. (New York: Cambridge University Press), 315–334.