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Association between anti-smoking campaign types and smoking cessation attempts

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ABSTRACT

Objective: This study explored the association between anti-smoking campaign types and smoking cessation attempts.

Methods: This study included 4,594 individuals (3,292 male and 1,302 female) from the Korea Youth Risk Behavior Web-based Survey (KYRBWS) in 2018 and 2020. The methods of anti-smoking promotion were divided into online, offline, online and offline, and none. Attempts to quit smoking were classified as yes or no. Multiple logistic regression was performed to examine the association between antismoking campaign type and smoking cessation attempts.

Results: Those who saw anti-smoking advertisements both online and offline were found to have tried to quit smoking more than those who did not. (Online & offline: male, odds ratio [OR] 1.36; 95% confidence interval [95% CI], 1.08–1.71; female, OR, 1.75; 95% CI 1.21–2.54) In a subgroup analysis of the independent variables into which smoking cessation advertisements were subdivided, males were found to have the highest OR for smoking cessation attempts when they encountered advertisements in newspapers. (Newspaper: male, OR, 2.25; 95% CI, 1.00–5.02) Females had the highest OR for smoking cessation attempts when accessed via the Internet. (Internet: female, OR, 1.93; 95% CI, 1.07–3.50).

Conclusion: This study showed that there is a correlation between smoking cessation advertisements and adolescents' smoking cessation attempts. The possibility of smoking cessation attempts is high when encountering smoking cessation advertisements both online and offline. Although offline smoking cessation advertisements have a great effect on adolescents' smoking cessation attempts, it can be confirmed that the frequency of exposure for offline advertisements is less than that for online advertisements.

1. Introduction

Smoking is a common substance abuse behavior among adolescents (Leatherdale & Burkhalter, 2012). Unfortunately, cigarettes contain carcinogens and other harmful substances that cause various physical and mental health problems (Harris, Zopey, & Friedman, 2016). Smoking, especially during adolescence, causes serious cell and tissue damage, which soon develops into chronic and cardiovascular diseases and causes mental health issues, such as depression (Chaiton, Cohen, O'Loughlin, & Rehm, 2009). Although smoking is a known cause of mortality and morbidity, the prevalence of smoking among adolescents remains high globally, and the age at which children begin smoking is gradually getting younger. Despite the fact that smoking at an early age causes various diseases, Korea's starting age for smoking is 12.7 years, which is earlier than the international average of 13–15 years (Joo, Joo, Kim, Park, & Jang, 2022). Adolescents deal with challenges, new experiences, and changes in their behavioral, psychological, and social levels; they also tend to exhibit increased curiosity, leading to their engagement in high-risk behaviors and substance use (Christie & Viner, 2005; Obeid, Hallit, Sacre, & Salameh, 2022; Petersen, 1988; Steinberg & Morris, 2001). As smoking initiation at a young age increases tobacco consumption in terms of quantity, frequency, and duration, adolescent smoking cessation has significant public health impacts (Mermelstein, 2003).

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The World Health Organization (WHO) recommends that each country implement a price policy and a non-price policy simultaneously to lower the smoking rate (WHO, 2017) Accordingly, the Korean government expanded its anti-smoking policy in accordance with the enforcement of the Health Promotion Act in 1995. In particular, price-related policies (increase in cigarette prices) and non-price-related policies (attaching warning signs to cigarette packs, prohibiting cigarette advertisements, designating non-smoking areas, and promoting anti-smoking advertisements and programs) were established.

Smoking cessation advertisements are an effective means of preventing smoking in adolescents (Branstetter, Horn, Dino, & Zhang, 2009; Wakefield et al., 2003). These advertisements have been used in various media (e.g., newspapers and posters) to convey the harmful effects of smoking (Park et al., 2019). However, a limited number of studies have explored the effect of anti-smoking advertising on youth smoking rates (Krishnan-Sarin et al., 2007; Levy, Romano, & Mumford, 2005; Stone & Kristeller, 1992). Therefore, in this study, the Korean Adolescent Health Behavior Survey data were used to determine the relationship between various types of anti-smoking advertisements and adolescents' smoking cessation attempts.

2. Methods

2.1. Data

This study used data from the Korea Youth Risk Behavior Web-Based Survey (KYRBWS) for 2018 and 2021. The KYRBWS is an anonymous, self-administered, online survey conducted annually among middle and high school students in South Korea. Samples were collected in the following order: population selection, population stratification, and sampling. In total, 800 middle and high schools nationwide were selected as sample schools. These schools were selected from 17 cities which were classified into large-, small-, and medium-sized cities, and county areas (Jang et al., 2013).

The database included the responses of 114,888 adolescents in 2018 and 2020. Adolescents who had never smoked in their lifetime (n = 7,564), those whose body mass index was not measured (n = 8,796), those who did not respond to the item regarding the age at which smoking started (n = 72,927), and those who did not respond to the item about smoking amount (n = 842) were excluded. This study included students who had a history of smoking. The final study population included 4,594 participants.

Since the Korea Youth Risk Behavior Web-Based Survey (KYRBWS) data used in the study are supplementary datasets available in the public domain and do not contain any personal information, no institutional review board approval or informed consent was required.

2.2. Variables

2.2.1. Independent variable

The main independent variable in this study was the channel of anti-smoking promotion. For the channel of anti-smoking publicity, survey items were used. During the past 12 months, whether you have seen or heard any of the following anti-smoking advertisements (none, anti-smoking advertisements on TV, anti-smoking advertisements on radio, Internet anti-smoking advertisements, newspaper advertisements, and advertisements at subway or bus stations) were classified into 7 categories.

In this study, the independent variables were divided into four categories: none (never seen or heard of), online (TV, radio, TV programs and news, Internet), offline (newspaper, subway, or bus station), and online and offline.

2.2.2. Dependent variable

The dependent variable was the number of smoking cessation attempts. A questionnaire was used to assess the smoking cessation attempts. "In the last 12 months, have you tried to quit smoking?" Those who answered "yes" to this question were defined as having attempted to quit smoking.

2.2.3. Covariates

Sociodemographic variables included sex, grade, academic performance, household income, and residence type, peer group smoking, smoking cessation education at school. The variables were sex (male, female), grade (middle school, high school), academic performance (low and middle-low, middle, middle-high, high), household income (low, mid-low, middle, mid-high, high), and residence type (living with parents, not living with parents), peer group smoking (none, only a few smokers, most smokers, and all smokers), and smoking cessation education at school (no, yes).

Health-related covariates included body mass index (underweight, normal, overweight, obese), stress (no, yes), drinking experience (no, yes), and physical activity (no, yes).

Smoking habits were measured as onset of smoking, cigarettes per month, and smoking as a continuous habit. The variables were onset of smoking (elementary school students & before, middle school students, high school students), cigarettes per month (occasional smoking: one to five days per month, regular smoking: six to every day per month), smoking as a continuous habit (1–5 cigarettes/day, 2–5 cigarettes/day, six or more cigarettes/day).

2.2.4. Statistical analysis

To determine the association between anti-smoking campaign types and smoking cessation attempts, covariates were compared by performing a chi-square test. After considering covariates, which are potential confounding variables, including demographic, socioeconomic, and health-related characteristics, multiple logistic regression analysis was performed to determine the association between anti-smoking campaign types and smoking cessation attempts. The results were expressed as odds ratios (ORs) and 95% confidence intervals (CIs).

Multiple logistic regression was performed for subgroup analysis with independent variables stratified by sex. Results for the independent variable subgroups were reported using ORs and CIs. Data were analyzed using SAS 9.4 (SAS Institute Inc., Cary, North, USA) and stratified by sex. Statistical significance was set at $P < 0.05$.

3. Results

Table 1 shows the general characteristics of the study subjects. Of the males (N = 2,371) who had attempted to quit smoking, the majority (N = 1,052) had seen smoking cessation advertisements online, and females who encountered online smoking cessation advertisements (N = 406) made up the majority of those who had tried smoking cessation (N = 951) (Table 1).

Table 2 shows the association between adjusted smoking cessation attempts and smoking cessation advertisements after controlling for sociodemographic variables, health behavioral factors, and smoking habits covariates. A multiple logistic regression analysis was performed to determine the association between smoking cessation attempts and the type of smoking cessation advertisement. All control variables were adjusted during the analysis. In males, the odds ratios of smoking cessation attempts were the highest when viewing an offline smoking cessation advertisement compared to the group who had never seen a smoking cessation advertisement, but it was not statistically significant. (OR, 1.37; 95% CI, 0.91–2.05). Among the statistically significant values, the OR of trying to quit smoking was highest when viewing smoking cessation advertisements both online and offline; the same tendency was observed for females (Table 2).

Table 3 shows the results of the subgroup analysis regarding the effects of the onset of smoking, cigarettes per month, smoking as a continuous habit, grade, household income, physical activity, peer group smoking, and nonsmoking education in school on smoking

Table 1
General characteristics of the study population.

Variables	Smoking cessation trial												
	Male							Female					
	Total		No		Yes		*P-value*	Total		No		Yes		*P-value*
	N		N	%	N	%		N		N	%	N	%	
Total (N = 4,594)	3,292	100.0	921	28.0	2,371	72.0		1,302	100.0	351	27.0	951	73.0	
Antismoking advertisements							<.0001							0.0048
None	887	26.9	311	35.1	576	64.9		268	20.6	93	34.7	175	65.3	
Offline	148	4.5	42	28.4	106	71.6		97	7.5	28	28.9	69	71.1	
Online	1,426	43.3	374	26.2	1,052	73.8		550	42.2	144	26.2	406	73.8	
Online & Offline	831	25.2	194	23.3	637	76.7		387	29.7	86	22.2	301	77.8	
Onset of smoking							0.0014							0.1482
Elementary school & before	707	21.5	224	31.7	483	68.3		165	12.7	53	32.1	112	67.9	
Middle school	2,184	66.3	567	26.0	1,617	74.0		863	66.3	219	25.4	644	74.6	
High school	401	12.2	130	32.4	271	67.6		274	21.0	79	28.8	195	71.2	
Cigarettes per month							0.0037							0.4435
Occasional smoking	408	12.4	89	21.8	319	78.2		265	20.4	66	24.9	199	75.1	
Periodic smoking	2,884	87.6	832	28.8	2,052	71.2		1,037	79.6	285	27.5	752	72.5	
Smoking as a continuous habit							<.0001							0.0637
1–5/day	282	8.6	83	29.4	199	70.6		182	14.0	53	29.1	129	70.9	
6–9/day	1,184	36.0	262	22.1	922	77.9		596	45.8	142	23.8	454	76.2	
≥10/day	1,826	55.5	576	31.5	1,250	68.5		524	40.2	156	29.8	368	70.2	
Grade							0.0178							0.2450
Middle school	502	15.2	118	23.5	384	76.5		271	20.8	65	24.0	206	76.0	
High school	2,790	84.8	803	28.8	1,987	71.2		1,031	79.2	286	27.7	745	72.3	
Academic performance							0.2112							0.9133
Low & Mid-low	1,809	55.0	528	29.2	1,281	70.8		783	60.1	212	27.1	571	72.9	
Middle	784	23.8	204	26.0	580	74.0		284	21.8	74	26.1	210	73.9	
High	699	21.2	189	27.0	510	73.0		235	18.0	65	27.7	170	72.3	
Household income							0.6162							0.9355
Low & Mid-low	612	18.6	181	29.6	431	70.4		303	23.3	84	27.7	219	72.3	
Middle	1,414	43.0	389	27.5	1,025	72.5		643	49.4	171	26.6	472	73.4	
Mid-high & High	1,266	38.5	351	27.7	915	72.3		356	27.3	96	27.0	260	73.0	
Residence type							0.0763							0.9937
Lives with parents	3,057	92.9	843	27.6	2,214	72.4		1,211	93.0	327	27.0	884	73.0	
Not living with parents	235	7.1	78	33.2	157	66.8		91	7.0	24	26.4	67	73.6	
Stress							0.8721							0.1507
No	2,642	80.3	737	27.9	1,905	72.1		1,214	93.2	321	26.4	893	73.6	
Yes	650	19.7	184	28.3	466	71.7		88	6.8	30	34.1	58	65.9	
Drinking experience							0.2942							0.8254
No	180	5.5	57	31.7	123	68.3		44	3.4	13	29.5	31	70.5	
Yes	3,112	94.5	864	27.8	2,248	72.2		1,258	96.6	338	26.9	920	73.1	
Physical activity							0.0275							0.9375
No	846	25.7	262	31.0	584	69.0		619	47.5	168	27.1	451	72.9	
Yes	2,446	74.3	659	26.9	1,787	73.1		683	52.5	183	26.8	500	73.2	
Peer group smoking							<.0001							0.0003
None	179	5.4	72	40.2	107	59.8		46		24	52.2	22	47.8	
Only partially smoking	987	30.0	233	23.6	754	76.4		525	40.3	129	24.6	396	75.4	
Mostly smoking	2,126	64.6	616	29.0	1,510	71.0		731	56.1	198	27.1	533	72.9	
Nonsmoking education in school							<.0001							<.0001
No	1,145	34.8	421	36.8	724	63.2		405	31.1	144	35.6	261	64.4	
Yes	2,147	65.2	500	23.3	1,647	76.7		897	68.9	207	23.1	690	76.9	
Obesity status (BMI)							0.5980							0.2227
Underweight	230	7.0	64	27.8	166	72.2		121	9.3	31	25.6	90	74.4	
Normal	2,259	68.6	625	27.7	1,634	72.3		963	74.0	249	25.9	714	74.1	
Overweight	313	9.5	83	26.5	230	73.5		103	7.9	35	34.0	68	66.0	
Obese	490	14.9	149	30.4	341	69.6		115	8.8	36	31.3	79	68.7	

cessation attempts according to anti-smoking promotion. Males who periodically smoked had the highest ORs for non-smoking advertisements to attempt to quit (OR, 1.58; 95% CI, 1.01–2.47). Males who were high school students also showed the highest OR for non-smoking advertisements (OR, 1.77; 95% CI, 1.12–2.80). If most of the peer groups were smokers, males had the highest OR for non-smoking attempts when viewed offline (OR, 1.95; 95% CI, 1.16–3.28), and females had the highest ORs for non-smoking attempts when viewed both online and offline (OR, 2.62; 95% CI, 1.55–4.42) (Table 3).

Table 4 shows the association of anti-smoking advertisements with smoking cessation attempts by type after adjusting for all covariates. The analysis results show that males had the highest ORs for cessation attempts among offline smoking cessation advertisements when they encountered newspapers (OR, 2.25; 95% CI, 1.00–5.02). Exposure to TV also affected cessation attempts (OR, 1.31; 95% CI, 1.09–1.58). Among online anti-smoking advertisements, females' ORs for trying to quit smoking increased the most when exposed to the Internet (OR, 1.93; 95% CI, 1.07–3.50), followed by TV anti-smoking advertisements (OR, 1.52; 95% CI, 1.11–2.08). Moreover, it can be confirmed that most anti-smoking advertisements, excluding newspapers, have a greater influence on females (Table 4).

4. Discussion

Our findings revealed that the likelihood of attempting to quit smoking may increase when encountering smoking cessation advertisements through online and offline channels. The effect of smoking cessation advertisements on smoking cessation attempts was more

Table 2
Results of factors associated between onset alcohol use and depression symptoms.

Variables	Smoking cessation trial			
	Male		Female	
	OR	95% CI	OR	95% CI
Antismoking advertisements				
None	1.00		1.00	
Offline	1.37	(0.91–2.05)	1.54	(0.89–2.64)
Online	1.25	(1.03–1.52)	1.45	(1.04–2.02)
Online & Offline	1.36	(1.08–1.71)	1.75	(1.21–2.54)
Onset of smoking				
Elementary school & before	1.16	(0.87–1.55)	0.95	(0.60–1.50)
Middle school	1.37	(1.07–1.76)	1.17	(0.83–1.64)
High school	1.00		1.00	
Cigarettes per month				
Occasional smoking	1.00		1.00	
Periodic smoking	0.69	(0.52–0.91)	0.76	(0.53–1.10)
Smoking as a continuous habit				
1–5/day	1.00		1.00	
6–9/day	1.57	(1.14–2.16)	1.44	(0.95–2.17)
≥10/day	1.08	(0.78–1.49)	1.13	(0.72–1.75)
Grade				
Middle school	1.11	(0.87–1.42)	1.12	(0.79–1.59)
High school	1.00		1.00	
Academic performance				
Low & Mid-low	0.86	(0.70–1.07)	0.97	(0.67–1.41)
Middle	0.97	(0.76–1.25)	1.05	(0.77–1.43)
High	1.00		1.00	
Household income				
Low & Mid-low	0.98	(0.77–1.23)	0.90	(0.65–1.24)
Middle	1	(0.84–1.20)	0.96	(0.73–1.27)
Mid-high & High	1.00		1.00	
Residence type				
Lives with parents	1.00		1.00	
Not living with parents	0.83	(0.62–1.13)	1.08	(0.64–1.81)
Stress				
No	1.00		1.00	
Yes	0.97	(0.79–1.19)	0.68	(0.42–1.12)
Drinking experience				
No	1.00		1.00	
Yes	1.23	(0.87–1.75)	0.85	(0.43–1.69)
Physical activity				
No	0.88	(0.74–1.06)	1.00	(0.77–1.30)
Yes	1.00		1.00	
Peer group smoking				
None	1.00		1.00	
Only partially smoking	1.60	(1.11–2.30)	2.92	(1.51–5.64)
Mostly smoking	1.39	(0.98–1.96)	2.86	(1.49–5.48)
Nonsmoking education in school				
No	1.00		1.00	
Yes	1.65	(1.39–1.96)	1.68	(1.28–2.21)
Obesity status (BMI)				
Underweight	1.02	(0.75–1.40)	1.01	(0.64–1.61)
Normal	1.00		1.00	
Overweight	1.03	(0.78–1.36)	0.71	(0.45–1.11)
Obese	0.91	(0.73–1.13)	0.77	(0.50–1.20)

pronounced among females than among males.

In the male group, offline smoking cessation advertisements had the greatest effect on smoking cessation attempts, but the impact was not statistically significant. In the female group, online and offline exposure had the greatest impact on smoking cessation attempts. In particular, the effect of offline smoking cessation advertisements was not statistically significant in both groups possibly because the degree of exposure to advertisements differs between individuals and the difference in motivation to quit smoking may be an influencing factor. Males and females were found to be most likely to try to quit smoking upon seeing an anti-smoking advertisement in the newspaper and on the Internet, respectively.

Similarly, previous studies have shown that problem behavior among adolescents decreases in areas with the highest newspaper coverage. Moreover, adolescents may be more sensitive to newspapers because they are more likely to believe in newspapers as a medium for reporting non-fiction information. Hence, objective facts, information, and trust in data can affect behavioral changes (Cummings, Sciandra, & Markello, 1987). Among various anti-smoking advertising media, we found that newspaper advertisements, in particular, had an effect on smoking cessation in male adolescents and that Internet advertisements increased the likelihood of quitting smoking in female adolescents. These results may be due to the fact that students are more frequently exposed to online advertisements than newspaper advertisements. In addition, online anti-smoking advertisements are highly likely to be recalled because they realistically show emotionally stimulating messages or depictions of the health effects of smoking (Dono, Miller, Ettridge, & Wilson, 2020; Durkin & Wakefield, 2010). This finding is consistent with current research confirming that exposure to smoking cessation advertisements and programs on TV and the Internet is associated with an increased likelihood of attempting to quit smoking among adolescents.

Numerous studies have examined how to effectively deliver anti-smoking advertisements (Edwards, Harris, Cook, Bedford, & Zuo, 2004; Ibrahim, 2021; Samu & Bhatnagar, 2007). One study showed that an advertisement depicting an extreme scene is more persuasive than one that shows something fun. (Nicolini & Cassia, 2021). This means that when evaluating the change in social norms through a campaign, the message the campaign is trying to convey should not be evaluated in isolation.

Several studies have also shown that frequent exposure to smoking cessation advertisements is effective in cessation attempts, but they have mainly focused on the message rather than the medium that delivers these advertisements (Dono, Bowden, Kim, & Miller, 2019; White, Durkin, Coomber, & Wakefield, 2015). According to a study on smoking cessation targeting adolescents, smoking cessation messages were ineffective for adolescent females (Shukr et al., 2023). However, our findings show that exposure to smoking cessation advertisements can effectively help both male and female adolescents quit smoking. In particular, smoking cessation advertisements were most effective for adolescents when they encountered anti-smoking advertisements both online and offline. To encourage youth to quit smoking and prevent smoking attempts, advertisements should be designed such that they show the negative effects of smoking in various ways rather than through a single method.

This study offers important insights, but it has some limitations. First, as the study was cross-sectional, identifying the temporal trend was not possible. Therefore, additional research on the long- and short-term effects of smoking cessation attempts is needed. Such research can help prevent excess smoking and facilitate the planning of smoking cessation programs for adolescents. Second, this study did not consider the warnings presented in anti-smoking advertisements. Further research on advertising copies will contribute to motivating young people to quit smoking. Therefore, future studies on how to develop smoking cessation-based messages are needed. Third, recall bias is possible in this study because the survey used self-reported survey data on past events. Finally, the KYRBWS data used in this study are secondary data. Therefore, we were unable to include the specific variables we wanted to consider in this study. Although many previous studies have claimed that self-efficacy is an important factor because it increases the understanding of smoking cessation advertisements and affects self-control, it could not be investigated in this study.

5. Conclusion

Our study shows that smoking cessation advertisements are associated with smoking cessation attempts and that the occurrence of smoking cessation attempts can be the highest when online and offline are combined. The effect of smoking cessation advertisements was more evident among females than males. In addition, when most of the peer groups were smokers, smoking cessation advertisements had a great

Table 3
Results of subgroup analysis stratified by independent variables.

	Smoking cessation trial													
	Male							Female						
	Antismoking advertisements													
	none	offline		online		offline&online		none	offline		online		offline&online	
	OR	OR	95% CI	OR	95% CI	OR	95% CI	OR	OR	95% CI	OR	95% CI	OR	95% CI
Onset of smoking														
Elementary school & before	1.00	1.46	(0.70–3.01)	2.26	(1.44–3.54)	2.00	(1.17–3.39)	1.00	1.71	(0.44–6.58)	2.15	(0.83–5.60)	3.17	(1.07–9.34)
Middle school	1.00	1.70	(0.92–3.15)	1.08	(0.82–1.42)	1.37	(1.00–1.88)	1.00	1.23	(0.64–2.39)	1.19	(0.79–1.80)	1.63	(0.98–2.72)
High school	1.00	2.20	(0.72–6.67)	1.23	(0.68–2.24)	0.98	(0.52–1.85)	1.00	3.22	(1.12–9.22)	2.20	(1.05–4.59)	2.52	(1.04–6.12)
Cigarettes per month														
Occasional smoking	1.00	1.66	(0.38–7.15)	1.18	(0.59–2.36)	1.42	(0.64–3.11)	1.00	0.96	(0.15–5.89)	1.08	(0.47–2.47)	1.54	(0.66–3.56)
Periodic smoking	1.00	1.58	(1.01–2.47)	1.30	(1.03–1.64)	1.42	(1.10–1.84)	1.00	1.51	(0.86–2.65)	1.44	(1.01–2.06)	1.85	(1.20–2.87)
Smoking as a continuous habit														
1–5/day	1.00	0.94	(0.20–4.38)	0.95	(0.49–1.85)	1.66	(0.74–3.73)	1.00	5.40	(0.37–78.78)	1.00	(0.36–2.75)	1.29	(0.44–3.81)
6–9/day	2.00	5.44	(1.78–16.65)	1.31	(0.90–1.91)	1.13	(0.72–1.78)	2.00	1.40	(0.59–3.29)	1.28	(0.79–2.08)	1.87	(1.06–3.29)
≥10/day	3.00	1.45	(0.86–2.42)	1.34	(1.00–1.78)	1.59	(1.15–2.20)	3.00	1.49	(0.75–2.96)	1.63	(0.96–2.75)	2.04	(1.04–4.00)
Grade														
Middle school	1.00	0.76	(0.20–2.80)	1.15	(0.67–1.98)	1.92	(0.92–4.01)	1.00	1.47	(0.30–7.05)	0.68	(0.30–1.49)	0.64	(0.24–1.70)
High school	1.00	1.77	(1.12–2.80)	1.34	(1.05–1.70)	1.41	(1.08–1.84)	1.00	1.58	(0.90–2.75)	1.66	(1.15–2.39)	2.26	(1.47–3.48)
Household income														
Low & Mid-low	1.00	1.46	(0.62–3.42)	1.69	(1.03–2.78)	2.79	(1.51–5.12)	1.00	0.41	(0.13–1.30)	0.62	(0.29–1.33)	2.14	(0.96–4.76)
Middle	1.00	1.42	(0.74–2.73)	1.24	(0.91–1.68)	1.42	(0.74–2.73)	1.00	2.56	(1.23–5.31)	1.94	(1.17–3.22)	1.64	(0.90–3.00)
Mid-high & High	1.00	1.49	(1.00–2.21)	1.20	(0.83–1.73)	1.49	(1.00–2.21)	1.00	1.06	(0.34–3.28)	1.26	(0.59–2.68)	1.72	(0.81–3.65)
Physical activity														
No	1.00	1.90	(0.87–4.16)	1.55	(1.05–2.29)	1.70	(1.07–2.72)	1.00	1.58	(0.66–3.76)	1.26	(0.79–2.00)	2.23	(1.24–4.02)
Yes	1.00	1.41	(0.86–2.32)	1.19	(0.91–1.54)	1.31	(0.98–1.77)	1.00	1.22	(0.60–2.45)	1.69	(1.01–2.83)	1.58	(0.91–2.76)
Peer group smoking														
None	1.00	1.31	(0.18–9.54)	1.19	(0.48–2.91)	1.06	(0.35–3.20)	1.00	1.10	(0.41–2.89)	1.50	(0.08–25.17)	0.17	(0.01–2.47)
Only partially smoking	1.00	0.91	(0.36–2.29)	1.04	(0.68–1.60)	1.10	(0.66–1.85)	1.00	2.02	(1.09–3.76)	1.19	(0.69–2.04)	1.37	(0.76–2.45)
Mostly smoking	1.00	1.95	(1.16–3.28)	1.39	(1.06–1.82)	1.54	(1.14–2.08)	1.00	2.02	(1.09–3.76)	1.79	(1.18–2.72)	2.62	(1.55–4.42)
Nonsmoking Education in school														
No	1.00	1.84	(0.95–3.57)	1.44	(1.04–2.00)	1.31	(0.86–1.99)	1.00	2.22	(1.02–4.83)	1.66	(0.96–2.86)	3.03	(1.58–5.79)
Yes	1.00	1.27	(0.72–2.24)	1.16	(0.86–1.58)	1.40	(1.01–1.95)	1.00	1.00	(0.48–2.08)	1.13	(0.73–1.74)	1.36	(0.83–2.23)

Table 4
The result of subgroup analysis stratified by independent variable.

Variables	Smoking cessation trial			
	Male		Female	
	OR	95% CI	OR	95% CI
Antismoking advertisements				
TV (advertisements, programs, news)	1.31	(1.09–1.58)	1.52	(1.11–2.08)
Radio	1.17	(0.59–2.35)	1.65	(0.55–4.88)
Internet	1.12	(0.81–1.55)	1.93	(1.07–3.50)
Newspaper	2.25	(1.00–5.02)	0.96	(0.38–2.45)
Subway, Bus station	1.16	(0.73–1.83)	1.84	(0.99–3.41)
None	1.00		1.00	

influence on smoking cessation attempts; males showed a correlation with smoking cessation attempts when they saw news articles, and females saw smoking cessation advertisements on the Internet.

Encouraging smoking cessation through mass media involves educating youth about the dangers of smoking, changing attitudes and beliefs toward smoking, facilitating cessation efforts, and actively engaging in comprehensive tobacco control programs.

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Authors' statement

Kim DB designed the study, collected the data, performed the statistical analysis, and drafted the manuscript.

Park YS performed the statistical analysis.

Yun Il, and Park EC, Jang SI contributed to the discussion.

All authors reviewed and edited drafts of the manuscript and approved the final version. Jang SI is the guarantor of this work and assumes responsibility for the integrity of the data and the accuracy of the data analysis. All authors have approved the final manuscript.

Author contributions

Dan Bi Kim: Conceptualization, Formal analysis, Data curation, Writing – original draft, Writing – review & editing. Yu Shin Park: Conceptualization, Formal analysis, Writing – review & editing. Il Yun: Conceptualization, Writing – review & editing. Eun-Cheol Park & Sung-In Jang: Conceptualization, Formal analysis, Supervision, Data curation, Resources, Writing – review & editing.

Ethical Statement for solid state ionics

1) This material is the authors' own original work, which has not been previously published elsewhere.
2) The paper is not currently being considered for publication elsewhere.
3) The paper reflects the authors' own research and analysis in a truthful and complete manner.
4) The paper properly credits the meaningful contributions of co-authors and co-researchers.
5) The results are appropriately placed in the context of prior and existing research.
6) All sources used are properly disclosed (correct citation). Literally copying of text must be indicated as such by using quotation marks and giving proper reference.
7) All authors have been personally and actively involved in substantial work leading to the paper, and will take public responsibility for its content.

The violation of the Ethical Statement rules may result in severe consequences.

Declaration of competing interest

'Competing of interest: none'

Data availability

Data will be made available on request.

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