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Those who believe they can, do: The relationship between smoking avoidance beliefs, perceived risks of smoking, and behavior in a sexual and gender minority young adult sample

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Abstract

An individual's beliefs in their perceived risk and ability to resist smoking have been found to be associated with smoking behavior. The current study explores the effects of confidence in one's ability to avoid smoking, measured by avoidance beliefs, on the relationship between perceived risks of smoking and behavior. This analysis was done using 2016 baseline data collected among 4057 participants aged 18–24 for the evaluation of a large-scale public education campaign in the U.S. aimed at reducing tobacco use among sexual and gender minority young adults. The analytic sample included roughly 3493 participants per analysis. Analyses used the following measures: (1) perceived risks of smoking (e.g., smoking cigarettes will shorten my life); (2) confidence to avoid smoking in various situations (i.e., avoidance beliefs), and (3) past 30-day cigarette smoking.

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CRedit authorship contribution statement

Mario A. Navarro: Conceptualization, Formal analysis, Visualization, Supervision. **Leah Hoffman:** Methodology. **Ollie Ganz:**

Jamie Guillory: Methodology, Investigation. **Erik C. Crankshaw:** Methodology, Investigation.

M.N. conceived the idea. L.H. and J.G. planned the methodology and data collection. M.N. conducted the analyses with reviews from L.H., O. G., J.G., and E.C. All authors contributed to the writing in the introduction and discussion. The Methods and Results sections were written by M.N., J.G., and E.C. All of the authors reviewed the manuscript and its various iterations.

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Declaration of 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.

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Binary logistic regression models with interaction analyses assessed the relationship between perceived risks of smoking and past 30-day smoking behavior using the interaction term of avoidance beliefs. An interaction between perceived risks of smoking and avoidance behaviors interaction emerged, such that the negative relationship between perceived risks of smoking and smoking behavior was stronger for those who believed that they could avoid smoking in various situations. This suggests that the relationship between perceived risk and smoking behavior can be bolstered if one's beliefs about their ability to avoid smoking are strong. Campaigns that build smoking avoidance confidence may enhance the effects of tobacco outcome expectations-related messaging on smoking.

Keywords

Tobacco; Beliefs; Self-efficacy; Avoidance beliefs; Sexual and gender minorities

1. Introduction

Sexual and gender minorities (e.g., lesbian, gay, bisexual, transgender, genderqueer, and gender variant) are at elevated risk for Tobacco use. Tobacco use prevalence is higher among those who are sexual minorities compared with those who are straight (Jamal et al., 2016; Schuler, Stein, & Collins, 2019). Studies that have examined tobacco disparities between cisgender and transgender individuals have been less conclusive (Buchting et al., 2017; Hoffman et al., 2018; Delahanty et al., 2019). Understanding self-efficacy and outcome expectancies among sexual and gender minority populations, specifically young adults, may provide insight into potential intervention targets that may help prevent regular use.

Within the context of smoking prevention among those who have ever smoked, confidence to resist smoking in certain situations has been labeled as self-efficacy (Fagan et al., 2003; Gwaltney, Metrik, Kahler, & Shiffman, 2009; Haaga & Stewart, 1992). Studies have investigated both resistance self-efficacy (i.e., the ability to resist smoking) and quitting self-efficacy (i.e., the ability to quit smoking). Resistance self-efficacy has been found to be negatively associated with transitioning from experimentation with cigarettes to regular smoking among youth (Tucker, Ellickson, & Klein, 2003). Interventions increasing quitting self-efficacy have found that those who were told that they had a higher chance of quitting smoking, through a computerized test, had a significantly greater chance of quitting, compared with those who were told they just had an average chance of quitting (Shadel et al., 2017).

Perceived risks of smoking, also conceptualized as outcome expectancies or smoking consequences, are beliefs about the behavioral consequences that occur if an individual smokes, or otherwise uses tobacco products (smoking consequences, Brandon & Baker, 1991; outcome expectancies, Stacy et al., 1990; Wetter et al., 1994). These beliefs include perceived negative consequences of smoking (e.g., “by smoking I risk developing heart disease and lung cancer”), as well as perceived positive consequences (e.g., “cigarettes taste good”) (Brandon & Baker, 1991; Wetter et al., 1994). While these studies investigate the overall structure and metrics of the measure, in doing so many correlates and differentiators

were found. Brandon and Baker (1991) found differences in perceived negative consequences and perceived positive reinforcement between daily smokers, occasional smokers, ex-smokers, triers, and never smokers, thus demonstrating the utility of measuring perceived risk. In addition, positive reinforcement has been found to be positively associated with nicotine dependence as well as symptoms of withdrawal such as negative affect, perceived stress, withdrawal, anger, anxiety, difficulty concentrating, depressing, hunger, impatience, and perceived stress (Wetter et al., 1994).

Few studies have simultaneously investigated both perceived risks of smoking and confidence to resist smoking. Gwaltney, Metrik, Kahler, and Shiffman (2005) found that resistance self-efficacy and outcome beliefs both independently predicted a smoking lapse among a smoking cessation cohort without moderating or mediating each other's effects. Outcome beliefs have been found to be associated with quitting self-efficacy (Shadel et al., 2017), though Shadel et al. (2017) used a specific manipulation (i.e., providing feedback on a task that was inaccurate but was intended to bolster self-efficacy) that may not have ecological validity.

The work of Gwaltney et al. (2005) and Shadel et al. (2017) comprise the literature on simultaneously investigating these constructs. There is a gap in research exploring preventative factors of smoking escalation among sexual and gender minority young adults, many of whom are ever cigarette smokers (Delahanty et al., 2019). The current study goes beyond studying the independent effects of confidence to resist smoking and perceived risks of smoking in relation to one another and investigates the interaction between perceived risks of smoking and avoidance behaviors, a conceptualization of confidence to resist smoking, among sexual and gender minority young adults, thus addressing both gaps. Specifically, we hypothesize that individual perceived risks will interact with avoidance beliefs, such that those who have stronger avoidance beliefs have a stronger negative relationship between their perceived risks of smoking and past 30-day use.

2. Methods

Data for the present study come from the baseline survey of the evaluation of the U.S. Food and Drug Administration's (FDA) *This Free Life* tobacco public education campaign. This campaign was designed to prevent escalation from occasional to daily smoking among sexual and gender minority young adults using content on digital platforms, out-of-home advertising, and events. Data were collected between February and May 2016. RTI International's Institutional Review Board approved the study. The current set of analyses are supplementary analyses to the primary goal of evaluating the campaign.

Participants were recruited to complete a screening instrument via two methods: intercept screening via tablets in social venues (in-person) and paid Facebook and Instagram ads. These ads included images of LGBT young adults and provided information regarding the incentive (\$20). Eligibility requirements were that participants must have been aged 18 to 24, self-identified as LGBT, and lived in one of the 24 study DMAs. Eligible participants recruited via intercept received an email link to complete the survey instrument and eligible

participants recruited via social media ads proceeded directly from the screener to complete the survey instrument. For more detail see Guillory et al. (2018).

2.1. Measures

Baseline survey instrument items included tobacco use, tobacco-related attitudes and beliefs, media use and exposure, sexual and gender minority identity, and demographic characteristics. The present study focuses on the measures described below.

2.1.1. Independent variables—Both independent measures were developed for use in the *This Free Life* evaluation. While they are inspired by other measures, the primary goal of these was not to create conceptualizations of a specific construct or metric but rather to be used to measure campaign effectiveness and changes in attitudes and beliefs targeted by the campaign. The first independent variable was avoidance beliefs, a measure of confidence in resistance to smoking, which is focused on perceived ability to avoid smoking in a variety of social situations. Avoidance beliefs were measured by asking participants 5 questions with the stem ‘How sure are you that, if you really wanted to, you could avoid smoking cigarettes if...’ accompanied by the following scenarios: ‘you are at a party bar or club,’ ‘you are in a place where most people are smoking,’ ‘someone you know offers it,’ ‘someone you want to get to know offers it,’ ‘someone offers it to take a break’. Items were adapted from an item from the Pierce Susceptibility to Smoking Scale (‘If one of your best friends were to offer you a cigarette, would you smoke it?’) (Pierce, Farkas, Evans & Gilpin, 1995; Pierce, Choi, Gilpin & Farkas, 1996) to capture refusal self efficacy and decreased openness to smoking in scenarios that young adults were likely to encounter in daily life. The Pierce Susceptibility to Smoking Scale is a standard measure in tobacco research and often associated with future use of tobacco (e.g., Pierce et al., 1996). Response options were not at all (1), slightly sure, somewhat sure, mostly sure, and completely sure (5). Items were averaged to form an avoidance beliefs scale with high inter-item reliability (Cronbach’s $\alpha = 0.96$).

The second set of independent variables focused on perceived risks of smoking every day or on some days. Participants completed the same set of 7 perceived risk items rated on a 5-point Likert scale for every day and some day smoking using the question stem ‘If I smoke cigarettes [every day/some days], I will...’ followed by a series of risk perceptions (‘shorten my life,’ ‘be able to stop smoking when I want to,’ ‘damage my immune system,’ ‘turn off potential partners,’ ‘damage my teeth,’ ‘damage my skin,’ ‘develop lung cancer’). Response options included strongly disagree (1), disagree, neither agree or disagree, agree, and strongly agree (5). The perceived risk of ‘be able to stop smoking when I want to’ was eliminated from the analyses because of the similarity to the avoidance beliefs construct. Items referencing some day smoking were not reported in this manuscript as it would detract from the theoretical crux of the manuscript by using items that have less sensitive variation. Each item was analyzed individually as the risk perceptions were short term, long term, physical, or social.

2.1.2. Dependent variable—The dependent variable was past 30-day cigarette smoking, a consistent measure of current use (see Nguyen et al., 2019 for an example), defined as yes (smoked on 1 to 30 of the past 30 days) or no (did not smoke in the past 30

days). Participants who responded ‘no’ to ‘have you ever tried cigarette smoking, even one or two puffs?’ or responded ‘yes’ to this question but smoked on 0 of the past 30 days, were coded as not being past 30-day cigarette smokers.

2.1.3. Covariates—Covariates included in analyses were income, gender and sexual identity (cisgender lesbian/gay women, cisgender gay men, cisgender bisexual men and women, gender minorities [transgender, genderqueer, and gender-variant men and women], and other sexual minorities [pansexual, omnisexual, trisexual]), race/ethnicity (white non-Hispanic, black non-Hispanic, Hispanic, other non-Hispanic), age (in years), education (high school or less, some college, college plus), and recruitment source (intercept, social media). These covariates are robust and common predictors within the domain of tobacco research (e.g., Hymowitz et al., 1997; Strong et al., 2020). Gender and sexual identity were included as separate covariates as people’s behaviors and perceptions differ by specific sexual and gender identity (Smalley, Warren & Barefoot, 2016). Recruitment source has been used as a covariate in other studies utilizing this dataset (Navarro, Hoffman, Crankshaw, Guillory, & Jacobs, 2019).

2.2. Data analyses

The current study utilizes binary logistic regressions along with simple effects tests using STATA (Version 15.1). Simple effects tests are follow-up tests that break down an interaction through independent group difference tests within one level of the other variable (see Buis, 2010 for example). This is used to test if the relationship between the independent variable (each individual perceived risk) and the dependent variable (past 30-day use) is significant at low (1 standard deviation (SD) below the mean) or high levels (1 SD above the mean) of the moderator (i.e., avoidance beliefs). Multiple binary logistic regression models were run as there were six perceived risk items included in the analyses. For each of the binary logistic regression models, the covariates listed in the methods section were all inputted in the model. For the categorical variables with more than two categories (i.e., gender and sexual identity, race/ethnicity), dummy variables were created with cisgender gay men and white non-Hispanic as the reference groups. Simple effects analyses were then run, with the margins command in STATA, after the interaction was found to be significant.

3. Results

Descriptive statistics revealed a young adult sample that skewed older and was mostly comprised of cisgender gay males who were ethnically and racially diverse, had some college education, and came from diverse income brackets. For descriptive statistics of the sample, please see Table 1.

Tables 2–5 report findings from the binary logistic regression models for each individual outcome belief item, when the interaction was significant. Two interactions were not significant and thus were removed from the results. The interaction between the perceived risk, “If I smoke cigarettes every day, I will turn off potential partners”, and avoidance beliefs was not significant ($p = .797$). Also the interaction between the perceived risk, “If I smoke cigarettes every day, I will develop lung cancer”, and avoidance beliefs was not significant ($p = .272$).

3.1. If I smoke cigarettes every day, I will shorten my life

For more details on the regression model, see Table 2. Overall, the binary logistic regression model was significant (Likelihood Ratio $\chi^2 = 1392.26$, $N = 3,493$, $p < .001$). The interaction between the perceived risk, “If I smoke cigarettes every day, I will shorten my life”, and avoidance beliefs was significant ($p < .001$). The covariates of age ($p = .03$) and recruitment source ($p < .001$) were significant. Looking closer at the simple effects, the effect of the perceived risk was significant ($Z = -8.41$, $p < .001$, $[-0.13, -0.08]$), negatively, for those with high levels of avoidance beliefs and not significant ($Z = -0.22$, $p = .82$, $[-0.03, 0.02]$) for those with low levels of avoidance beliefs. In other words, among those who felt more strongly that they could avoid smoking cigarettes in different situations, the perceived risk that everyday smoking can shorten one’s life was associated with being less likely to smoke cigarettes in the past 30 days. This was not the case for those who had low agreement with avoidance beliefs.

3.2. If I smoke cigarettes every day, I will damage my immune system

For more details on the regression model, see Table 3. Overall, the binary logistic regression model was significant (Likelihood Ratio $\chi^2 = 1367.63$, $N = 3,493$, $p < .001$). The interaction between the perceived risk, “If I smoke cigarettes every day, I will damage my immune system”, and avoidance beliefs was significant ($p = .01$). The covariates of age ($p = .02$) and recruitment source ($p < .001$) were significant. Looking closer at the simple effects, the effect of the perceived risk was significant ($Z = -6.35$, $p < .001$, $[-0.10, -0.05]$), in a negative direction, for those with high levels of avoidance beliefs and not significant ($Z = -1.13$, $p = .26$, $[-0.04, 0.01]$) for those with low levels of avoidance beliefs. In other words, among those who were more confident that they can remain smoke-free in various situations, the perceived risk that smoking could hurt their immune system was associated with a lower risk of past 30-day use. This was not the case for those who had low agreement with avoidance beliefs.

3.3. If I smoke cigarettes every day, I will damage my teeth

For more details on the regression model, see Table 4. Overall, the binary logistic regression model was significant (Likelihood Ratio $\chi^2 = 1365.29$, $N = 3493$, $p < .001$). The interaction between the perceived risk, “If I smoke cigarettes every day, I will damage my teeth” and avoidance beliefs was significant ($p < .001$). Age ($p = .02$) and recruitment source ($p < .001$) covariates were significant. Looking closer at the simple effects, the effect of the perceived risk was significant ($Z = -6.75$, $p < .001$, $[-0.12, -0.07]$), in a negative direction, for those with high levels of avoidance beliefs and not significant ($Z = -0.02$, $p = .99$, $[-0.02, 0.02]$) for those with low levels of avoidance beliefs. In other words, among those who felt more confident that they could remain smoke-free, the perceived risk that smoking would damage their teeth negatively predicted past 30-day smoking. This was not the case for those who had low agreement with avoidance beliefs.

3.4. If I smoke cigarettes every day, I will damage my skin

For more details on the regression model, see Table 5. Overall, the binary logistic regression model was significant (Likelihood Ratio $\chi^2 = 1379.72$, $N = 3493$, $p < .001$). The interaction

between the perceived risk, “If I smoke cigarettes every day, I will damage my skin”, and avoidance beliefs was significant ($p < .001$). The covariates of age ($p = .02$) and recruitment source ($p < .001$) were significant. Looking closer at the simple effects, the effect of the perceived risk was significant ($Z = -7.63, p < .001, [-0.11, -0.07]$), in a negative direction, for those with high levels of avoidance beliefs and not significant ($Z = -0.20, p = .85 [-0.03, 0.02]$) for those with low levels of avoidance beliefs. In other words, for those more confident they could remain smoke-free, the skin damage-related perceived risk was associated with a lower risk of past 30-day smoking. This was not the case for those who had low agreement with avoidance beliefs.

4. Discussion

This study investigated the interaction of avoidance beliefs with six different perceived risks and past 30-day smoking among sexual and gender minority young adults, who are at elevated risk of tobacco use. This is the first study to examine these constructs among sexual and gender minority young adults. We hypothesized that the six individual perceived risks would individually interact with the avoidance beliefs scale such that the negative relationship between each perceived risk and past 30-day use would be stronger for those with stronger avoidance beliefs. The findings of the current study are nuanced as four perceived risk of physical harm items, out of the 6 perceived harms, significantly interacted with avoidance beliefs. These results demonstrate that when an individual believes that they could maintain being tobacco-free in various social settings, their negative risk perceptions about tobacco and past 30-day cigarette use are aligned, such that someone who holds negative perceptions about tobacco is more likely to have not used cigarettes in the past 30 days. Previous investigations by Gwaltney et al. (2005) and Shadel et al. (2017) clarify the relationships that simultaneously exist for risk perceptions and behavior, and self-efficacy, confidence and behavior. The current investigation contributes new support for interactions between risk perceptions and avoidance beliefs, as well as highlights this relationship in a specific population-sexual and gender minorities.

As mentioned previously, the results for these analyses are nuanced and not all components of the research question were fully supported. For the risk perceptions related to risk of lung cancer and turning off potential partners, relationships may not have been like the other risk perceptions because the content is so different from the others, in that they focus on the long-term health consequences and social impact of smoking. The other beliefs reflect immediate physical harms such as shortening one’s life or damaging their teeth. As such, the relationships with avoidance beliefs and behavior could differ as risks of lung cancer and turning off potential partners are very different from immediate physical harms and these may be of more relevance to this population.

As mentioned previously, confidence in resisting smoking and self-efficacy have been found to be associated with lower risk to smoke (Cengelli et al., 2012; Gwaltney et al., 2009). Building upon previous studies that investigated both constructs (Gwaltney et al., 2005; Shadel et al., 2017), the current study found interactions between perceived risks of smoking and avoidance beliefs. Although data are cross-sectional, the current study suggests that self-efficacy may have more than a direct effect on tobacco use and may bolster the effects of

someone's negative beliefs about smoking. This bolstering is what can be associated with more belief-behavior consistency, which gives an opportunity for tobacco campaigns. Longitudinal studies are needed to examine the direction of the relationship between self-efficacy and cigarette smoking.

Negative beliefs about smoking are generally universal (Leatherdale, Sparks, & Kirsh, 2006), yet smoking behavior among those who have negative beliefs, or negative risk perceptions about smoking, may persist. A public education campaign focused on building confidence to avoid smoking may be able to reduce smoking behavior among those who already hold negative beliefs but smoke regularly anyway. A campaign using this strategy could feature relatable characters encountering realistic situations where they feel tempted to smoke but are able to avoid smoking without negative social consequences. This modelling of desired behavior in campaign content could help the behavior seem more achievable. Further, use of empowering themes overall may help sexual and gender minority young adults feel they have the power to successfully navigate social situations while remaining true to their values. Future studies could examine the effectiveness of messages focused on increasing confidence in resisting smoking among sexual and gender minority young adults.

5. Limitations and future directions

The current study has several limitations. Since this study utilized a non-probability sample of in-person and social media recruitment aimed at identifying sexual and gender minority young adults who are at particularly high risk for occasional cigarette smoking, these results may not be generalized to the overall sexual and gender minority young adult population or other populations. This study, while utilizing many different outcome beliefs, only used avoidance beliefs to measure one's confidence in their actions of avoiding smoking. As such, future tobacco studies could investigate other forms of this construct that may interact with perceived risks and other beliefs. Finally, not all of the perceived risks had a significant interaction with avoidance beliefs. While a lack of a significant interaction may be because of the perceived risk chosen, there may be a chance that the interaction effects are not as robust as hypothesized.

6. Conclusions

The study findings suggest that there is an interaction between avoidance beliefs, an individual's beliefs in their ability to resist smoking, and perceived risks about smoking on past 30-day smoking among a sample of sexual and gender minority young adults. These results have implications for tobacco research and public education campaigns among sexual and gender minority young adults as they suggest that by bolstering avoidance beliefs it may be possible to strengthen the association between risk perceptions and their associated behavior. Avoidance belief-building tactics include, for example, modeling desired behavior in challenging and realistic social circumstances and employment of empowering content featuring relatable characters to the specific population of interest.

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Table 1

Demographic Characteristics.

Characteristic	N = 3611	Unweighted %
Age		
18	270	7.48%
19	305	8.45%
20	356	9.86%
21	674	18.67%
22	585	16.20%
23	737	20.41%
24	684	18.94%
Gender & Sexual Identity		
Cisgender Lesbian/Gay Females	790	21.92%
Cisgender Gay Males	1626	45.12%
Cisgender Bisexual Females	563	15.62%
Cisgender Bisexual Males	190	5.27%
Gender Minorities	301	8.35%
Cisgender Other Sexual Minorities	134	3.72%
Race/Ethnicity		
White, non-Hispanic	1700	47.08%
Black, non-Hispanic	366	10.14%
Hispanic	1066	29.52%
Other, non-Hispanic	479	13.27%
Education		
High School or Less	872	24.33%
Some College	1870	52.18%
College plus	842	23.49%
Income		
Less than \$10,000	756	21.09%
\$10,000–\$14,999	476	13.28%
\$15,000–\$24,999	560	15.63%
\$25,000–\$34,999	488	13.62%
\$35,000–\$49,999	435	12.14%
\$50,000–\$99,999	544	15.18%
\$100,000 plus	325	9.07%
Recruitment Method		
Social Media	1463	40.52%
In-Person	2148	59.48%

^aNumbers may not total sample total (N = 3611) due to missing respondent data.

Table 2

Binary Logistic Regression of the outcome belief “If I smoke cigarettes every day I will shorten my life” (n = 3493).

Variable	Odds Ratio	B	SE	Z	95% CI
(Constant)	5.45	1.69	1.21	1.40	-0.67 to 4.06
Income	0.96	-0.36	0.22	-1.63	-0.08 to 0.01
Sexual and Gender Identity					
Cisgender Lesbian/Gay Females	1.02	0.02	0.11	0.14	-0.20 to 0.24
Cisgender Bisexual Females	1.22	0.20	0.12	1.61	-0.04 to 0.44
Cisgender Bisexual Males	0.78	-0.25	0.20	-1.26	-0.63 to 0.14
Gender Minorities	1.20	0.18	0.16	1.11	-0.14 to 0.50
Cisgender Other Sexual Minority	0.88	-0.12	0.24	-0.52	-0.59 to 0.34
Race/Ethnicity					
Black Non-Hispanic	0.75	-0.29	0.15	-1.93	-0.58 to 0.004
Hispanic	1.10	0.10	0.10	1.00	-0.10 to 0.29
Other Non-Hispanic	0.85	-0.16	0.14	-1.18	-0.43 to 0.11
Age	1.06*	0.06	0.03	2.16	0.01-0.11
Education Level	0.90	-0.10	0.07	-1.49	-0.24 to 0.03
Source of Recruitment (0 = In-person, 1 = Social Media)	0.54**	-0.62	0.10	-6.50	-0.81 to -0.43
“If I smoke cigarettes every day I will shorten my life”	2.11**	0.75	0.25	2.96	0.25-1.24
Avoidance Beliefs	0.87	-0.14	0.25	-0.57	-0.63 to 0.34
Outcome Belief × Avoidance Beliefs	0.76**	-0.27	0.06	-4.73	-0.39 to -0.16

Note. The reference group for the Sexual and Gender Identity variables is Cisgender Gay Male. The reference group for Race/Ethnicity is White Non-Hispanic.

* $p < .05$,

** $p < .01$.

Table 3

Binary Logistic Regression of the outcome belief “If I smoke cigarettes every day I will damage my immune system” (n = 3493).

Variable	Odds Ratio	B	SE	Z	95% CI
(Constant)	30.14**	3.41	1.27	2.69	-0.92 to 5.89
Income	0.97	-0.03	0.02	-1.55	-0.08 to 0.01
Sexual and Gender Identity					
Cisgender Lesbian/Gay Females	1.07	0.06	0.11	0.57	-0.16 to 0.28
Cisgender Bisexual Females	1.28*	0.24	0.12	1.98	0.002 to 0.49
Cisgender Bisexual Males	0.77	-0.26	0.20	-1.31	-0.64 to 0.13
Gender Minorities	1.22	0.20	0.16	1.25	-0.12 to 0.52
Cisgender Other Sexual Minority	0.94	-0.06	0.24	-0.24	-0.52 to 0.41
Race/Ethnicity					
Black Non-Hispanic	0.76	-0.27	0.15	-1.82	-0.56 to 0.02
Hispanic	1.13	0.12	0.10	1.24	-0.07 to 0.32
Other Non-Hispanic	0.85	-0.16	0.14	-1.16	-0.42 to 0.11
Age	1.06*	0.06	0.03	2.31	0.01-0.11
Education Level	0.88	-0.13	0.07	-1.93	-0.27 to 0.002
Source of Recruitment (0 = In-person, 1 = Social Media)	0.52**	-0.65	0.10	-6.83	-0.83 to -0.46
“If I smoke cigarettes every day I will damage my immune system”	1.40	0.34	0.27	1.26	-0.19 to 0.86
Avoidance Beliefs	0.54*	-0.62	0.26	-2.39	-1.14 to -0.11
Outcome Belief × Avoidance Beliefs	0.85**	-0.16	0.06	-2.70	-0.28 to -0.05

Note. The reference group for the Sexual and Gender Identity variables is Cisgender Gay Male. The reference group for Race/Ethnicity is White Non-Hispanic.

* $p < .05$,

** $p < .01$.

Table 4

Binary Logistic Regression of the outcome belief “If I smoke cigarettes every day I will damage my teeth” (n = 3493).

Variable	Odds Ratio	B	SE	Z	95% CI
(Constant)	5.52	1.71	1.26	1.36	-0.76–4.17
Income	0.96	-0.04	0.02	-1.68	-0.08 to 0.01
Sexual and Gender Identity					
Cisgender Lesbian/Gay Females	1.06	0.06	0.11	0.50	-0.16 to 0.27
Cisgender Bisexual Females	1.26	0.23	0.12	1.84	-0.01 to 0.47
Cisgender Bisexual Males	0.80	-0.22	0.19	-1.13	-0.60 to 0.16
Gender Minorities	1.25	0.22	0.16	1.38	-0.10 to 0.54
Cisgender Other Sexual Minority	0.94	-0.06	0.24	-0.26	-0.52 to 0.40
Race/Ethnicity					
Black Non-Hispanic	0.75	-0.28	0.15	-1.91	-0.57 to 0.01
Hispanic	1.13	0.12	0.10	1.23	-0.07 to 0.32
Other Non-Hispanic	0.85	-0.17	0.14	-1.23	-0.43 to 0.10
Age	1.07*	0.06	0.03	2.42	0.01–0.11
Education Level	0.88	-0.13	0.07	-1.85	-0.26 to 0.01
Source of Recruitment (0 = In-Person, 1 = Social Media)	0.53**	-0.64	0.09	-6.71	-0.82 to -0.45
“If I smoke cigarettes every day I will damage my teeth”	2.05**	0.72	0.26	2.74	0.20–1.23
Avoidance Beliefs	0.80	-0.22	0.26	-0.83	-0.74 to 0.30
Outcome Belief × Avoidance Beliefs	0.78**	-0.25	0.06	-4.20	-0.37 to -0.14

Note. The reference group for the Sexual and Gender Identity variables is Cisgender Gay Male. The reference group for Race/Ethnicity is White Non-Hispanic.

* $p < .05$,

** $p < .01$.

Table 5

Binary Logistic Regression of the outcome belief “If I smoke cigarettes every day I will damage my skin” (n = 3493).

Variable	Odds Ratio	B	SE	Z	95% CI
(Constant)	7.92	2.07	1.17	1.76	-0.23–4.37
Income	0.96	-0.04	0.02	-1.76	-0.08 to 0.004
Sexual and Gender Identity					
Cisgender Lesbian/Gay Females	1.02	0.02	0.11	0.15	-0.20 to 0.24
Cisgender Bisexual Females	1.27	0.24	0.12	1.90	-0.01 to 0.48
Cisgender Bisexual Males	0.75	-0.28	0.20	-1.45	-0.66 to 0.10
Gender Minorities	1.20	0.19	0.16	1.14	-0.13 to 0.50
Cisgender Other Sexual Minority	0.92	-0.09	0.24	-0.36	-0.55 to 0.38
Race/Ethnicity					
Black Non-Hispanic	0.75	-0.28	0.15	-1.91	-0.57 to 0.01
Hispanic	1.12	0.11	0.10	1.15	-0.08 to 0.31
Other Non-Hispanic	0.83	-0.18	0.14	-1.33	-0.45 to 0.09
Age	1.07*	0.06	0.03	2.41	0.01–0.11
Education Level	0.88	-0.13	0.07	-1.83	-0.26 to 0.01
Source of Recruitment (0 = In-person, 1 = Social Media)	0.52*	-0.65	0.10	-6.84	-0.84 to -0.46
“If I smoke cigarettes every day I will damage my skin”	1.94**	0.66	0.25	2.69	0.18–1.14
Avoidance Beliefs	0.74	-0.31	0.24	-1.29	-0.77 to 0.16
Outcome Belief × Avoidance Beliefs	0.78**	-0.24	0.06	-4.32	-0.35 to -0.13

Note. The reference group for the Sexual and Gender Identity variables is Cisgender Gay Male. The reference group for Race/Ethnicity is White Non-Hispanic.

* $p < .05$,

** $p < .01$.