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Media Exposure and Tobacco Product Addiction Beliefs: Findings from the 2015 Health Information National Trends Survey (HINTS–FDA 2015)

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Abstract

Background—Addiction beliefs about tobacco use are associated with intentions to use and use of tobacco products. Exposure to information about tobacco products in media sources may affect addiction beliefs.

Purpose—To examine the relationship between media exposure and tobacco product addiction beliefs.

Methods—A nationally representative sample of US adults (n=3,738) from the 2015 National Cancer Institute's Health Information National Trends Survey was used to examine addiction beliefs about cigarettes, cigars, smokeless tobacco, electronic cigarettes, hookah/waterpipe tobacco, and roll-your-own cigarettes. We used logistic regression to examine the relationship between media exposure and addiction beliefs. We defined media exposure by hours exposed, as well as exposure to tobacco use health effects information through media sources including social media. We categorized media sources by whether respondents actively or passively engaged with the source.

Findings—A majority (60.6% to 87.3%) of respondents believed that cigarettes, cigars, roll-your-own cigarettes and smokeless tobacco are addictive. Less than half of respondents believed that electronic cigarettes or hookah/waterpipes are addictive (45.2% and 49.8%, respectively).

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Respondents exposed to messages about tobacco use health effects on active media channels (e.g., social media) had greater odds of believing that smokeless tobacco (adjusted odds ratio [AOR] = 1.48), hookah/waterpipe (AOR=1.69), and roll-your-own cigarettes (AOR=1.61) are addictive. Respondents exposed to tobacco use health effects messages on passive media channels (e.g., television), had greater odds of believing that cigarettes (AOR=2.76) and electronic cigarettes (AOR=2.12) are addictive.

Conclusions—US adult exposure to information about the health effects of tobacco use was associated with addiction beliefs about tobacco products.

INTRODUCTION

A diverse marketplace with many types of tobacco products can create different beliefs about the addictiveness and harms of particular products [1, 2]. According to health behavior theories, beliefs are important determinants of behavior [3]. Studies suggest that beliefs about tobacco product addictiveness are associated with intention to use and product use in youth and young adulthood [4–6]. Although studies haven't examined addiction beliefs and adult tobacco use, other beliefs are related to quit intentions among adults [7–9]. Because 38% of adult tobacco users currently use multiple products with the potential to transition products [10], addiction beliefs and their correlates may have important behavioral implications.

Previous studies in adults explored beliefs about the addictiveness of cigarettes [11] and addictiveness of e-cigarettes and hookah/waterpipes relative to cigarettes [12–16]. However, if respondents have varied knowledge about the comparison products, relative addictiveness measures may not reliably capture perceived differences [17–19]. Three studies assessed absolute beliefs about e-cigarette addictiveness without comparison to another tobacco product [20–22], finding that addiction beliefs differed by current cigarette smoking status, gender, income, and education [20–22]. One study found that smokeless tobacco addiction beliefs were lower than cigarettes but higher than cigars, hookah, e-cigarettes, and marijuana [23].

Beliefs about addictiveness may differ by tobacco product depending on an individual's experience with tobacco [14, 20] or based on the amount and type of information individuals are exposed to about different products including through media sources [6]. One study found that adults reported television, in-person conversations and the internet as sources for e-cigarette information [24]. To date, only one study has examined the relationship between e-cigarette information exposure from media and addiction beliefs; exposure to e-cigarette information was not associated with e-cigarette addiction beliefs but was associated with reduced harm perceptions [22].

Growing evidence suggests that active information seeking and routine exposure to health information in the media influences health knowledge, beliefs, and behaviors [25, 26]. Studies suggest that media content predicts viewers' beliefs about health and social issues [27, 28]. Some communication channels are focused on active health-oriented information seekers (e.g., social media), while others cater to individuals who gather information

passively (e.g., television) [29, 30]. Using media for specific messaging through anti-tobacco public education campaigns can promote smoking cessation among adults [31–35].

The U.S. Food and Drug Administration (FDA) has authority to regulate tobacco products [36]. As part of this authority, FDA can define product standards such as nicotine yield or can review claims observed in online marketing [e.g., 37, 38] about reduced exposure to harmful substances. In 2016, FDA expanded its tobacco regulatory authority to include cigars, e-cigarettes, and hookah/waterpipes [39]; providing the opportunity in this study to describe a baseline for adult beliefs about the addictiveness of these products prior to regulation.

The current study seeks to (1) explore beliefs regarding the addictiveness of tobacco products and (2) examine whether media exposure (including amount and content of information) is associated with tobacco product addiction beliefs. Given that public education campaigns on various media platforms focus on cigarette smoking harms [31], we hypothesized that media exposure is associated with increased addiction beliefs for all products, except e-cigarettes and hookah/waterpipes. We anticipated that media exposure is associated with reduced addiction beliefs because some advertising promotes e-cigarettes and hookah/waterpipes as less harmful than cigarettes [40, 41].

METHODS

Data

This study utilized a special 2015 cycle of the National Cancer Institute's Health Information National Trends Survey (HINTS), herein referred to as HINTS-FDA 2015. HINTS-FDA 2015 was approved by the Office of Management and Budget (OMB #0925-0538) and was deemed exempt by the National Institute of Health Office of Human Subjects Research. HINTS-FDA 2015 was a self-administered paper instrument mailed to adults aged 18 and older in the US civilian non-institutionalized population. Data were collected May 29–September 8, 2015 using a random sample of US postal addresses, stratified by county-level smoking rates, with an oversample of high and medium-high smoking strata. The response rate for HINTS-FDA 2015 was 33% (N=3738) [42].

Measures

Beliefs about addiction—Our primary dependent variable was addiction beliefs about tobacco products. Respondents were asked, “How addictive do you believe each of the following is: cigarette smoking, cigar smoking, smokeless tobacco use, using e-cigarettes, hookah/waterpipe tobacco smoking, and roll-your-own cigarette smoking.” Response options were “Not at all addictive,” “Moderately addictive,” “Very addictive,” and “Don't know.” We present descriptive findings of the four response categories for each product. In the final model, we dichotomized the responses into *addiction belief* (“Moderately addictive” and “Very addictive”) and *no addiction belief* (“Not at all addictive” and “Don't know”), similar to how previous studies have analyzed addiction beliefs [6, 14].

General media exposure—Our primary independent variable was media exposure. Respondents were asked the number of hours spent watching television, listening to the

radio, and using the internet for personal reasons on a typical weekday and weekend. Newspaper exposure was measured as the number of days in the past week that a respondent read a newspaper. Online or print format was not delineated in HINTS-FDA 2015. We explored exposure to television, radio, and internet as separate continuous and binary variables split at natural breaks and breaks based on American media exposure [43]. We explored newspaper exposure as a binary variable. Given the variability in estimates of average media exposure [44] and our desire to retain as much information as possible, we created a composite variable to capture hours of exposure to television, radio, and internet by calculating the average hours of exposure on a typical weekday and weekend. Based on the variable's skewed distribution, we log transformed it.

Exposure to information about the health effects of tobacco use in the media

—Respondents were asked to report how often they had seen, heard, or read a message about tobacco use health effects from the following media sources in the past 30 days: television, news websites, health websites, government websites, social media, magazines, newspapers, radio, billboards, public transportation, mailings, community events, and at the point of sale. Response options were:

“Never,” “A couple of times,” and “A lot of times.” Research suggests that individuals who seek health information use active media sources, such as social media, while individuals that are not health motivated obtain information from passive sources, such as television [29]. Given that the media source affects how individuals seek and receive health information, we wanted to explore how the source providing tobacco use health information was associated with addiction beliefs. Therefore, we categorized each media source as active or passive and created binary variables that represented exposure to the source “A lot of times” or “A couple of times” compared to “Never.” Respondents could be exposed to both active and passive media sources.

One item asked respondents if they had ever looked for information about the health effects of tobacco products (e.g., cigarettes, cigars, or chewing tobacco) from any source; response options were “Yes” or “No.” Of HINTS-FDA 2015 respondents who reported information seeking about e-cigarettes (n=479), 10% said they looked for information on the health effects of e-cigarettes. This necessitated the exclusion of this item from our analyses because of small cell sizes.

Tobacco use behavior and perceptions—Respondents were asked if they had smoked at least 100 cigarettes in their lifetime and if they now use cigarettes “Every day,” “Some days,” or “Not at all.” Items assessed the number of cigars, cigarillos, or little filtered cigars smoked in the respondent's lifetime, as well as current use. Respondents were asked if they had used chewing tobacco, snus, snuff, or dip at least 20 times in their lifetime and if they were currently using smokeless products. Current use of a tobacco product was defined as having used at least 100 cigarettes, 100 or more cigars, or 20 smokeless products in a lifetime and currently using cigarettes, cigars, and/or smokeless tobacco products some days or every day. Current hookah/waterpipe and e-cigarette use could not be assessed with HINTS-FDA 2015 because items assessing their use were limited to whether respondents had ever tried those devices. We were interested in past 30-day health effects message

exposure and resultant beliefs, and therefore included current use rather than ever use in order to account for potential confounding by recent use during the timeframe of message exposure.

One item asked respondents how much they agree or disagree with a statement that smoking is a behavior that a person can't change [45]. Response options were: "Strongly agree," "Somewhat agree," "Somewhat disagree," and "Strongly disagree."

Dependence was assessed with one item: how soon after waking they use any tobacco product. Response options were: "No Use," "Within 5 minutes," "6 to 30 minutes," "31 to 60 minutes," "After 60 minutes," and "Rarely."

Sociodemographics—Sociodemographic variables included in our analysis were gender, education, annual household income, and race/ethnicity.

Statistical analysis

The statistical software program Stata 14 was used for the current analysis [46]. To account for the complex sampling design and to generate nationally representative estimates, all analyses incorporated jackknife replicate weights. We examined bivariate associations using chi-square tests for categorical variables and t-tests for continuous variables.

The tobacco use dependence variable was collinear with current tobacco use, and therefore, was not retained in the final multivariable models. Our composite measure of media exposure from television, radio, and internet, as well as newspaper exposure were not significant; however, we retained these variables in the final model because we wanted to adjust exposure to messaging about tobacco use health effects by overall level of media exposure.

We constructed six multivariable logistic regression models to examine correlates of beliefs about each specific product. Model fit statistics were assessed and all analyses were weighted for the sampling design.

RESULTS

Overall, a majority of respondents believed that smoking cigarettes, cigars, roll-your-own cigarettes, and using smokeless tobacco are very or moderately addictive. Beliefs about the addictiveness of each tobacco product are presented in Table 1. More than 85% of respondents believed that cigarette smoking is addictive, while more than 60% believed that cigar smoking, roll-your-own cigarette smoking, and smokeless tobacco use are addictive. In contrast, less than 50% of respondents believed that using e-cigarettes and smoking tobacco in a hookah/waterpipe are addictive. Use of e-cigarettes and hookah/waterpipe had the lowest proportion of respondents who believed the products are very addictive (28.7% and 26.4%, respectively) and the highest proportion of respondents who responded "Don't know" regarding their addictiveness (39.0% and 41.9%, respectively).

Figure 1 illustrates exposure to tobacco use health effects in various media sources. For all sources except television, more than 40% of respondents reported never seeing messages

about the health effects of a tobacco product on the source. In contrast, more than 40% of respondents reported seeing messages “A couple of times” and more than 30% reported seeing messages “A lot of times” on television.

Demographic, media exposure, and tobacco use characteristics by addiction beliefs are presented in Table 2. Beliefs about the addictiveness of smokeless tobacco differed by gender, with more males than females believing that the products are addictive. An age gradient emerged for e-cigarettes, hookah/waterpipe, smokeless tobacco, and roll-your-own cigarettes; the proportion of respondents holding an addiction belief was lower with increasing age. Higher education and household income were associated with believing tobacco products are addictive with one exception: hookah/waterpipe addiction beliefs did not differ by income.

In examining media exposure variables, a greater proportion of respondents held addiction beliefs about non-cigarette tobacco products if they saw tobacco use health effects messaging on an active media source that required searching or reading the source “at least a couple of times” during the past 30 days compared to those not exposed to active media sources. Respondents who reported exposure to tobacco use health effects messages on passive media channels (e.g., television, radio), had a higher proportion of addiction beliefs for cigarettes, cigars, e-cigarettes, and smokeless tobacco products. Respondents who reported ever looking for information about the health effects of tobacco products had a higher proportion of addiction beliefs for e-cigarettes and hookah/waterpipe compared to those who did not report such searching.

A greater proportion of current users of one or more tobacco products believed that cigarettes are addictive compared to never and former users. A smaller proportion of current tobacco product users believed that cigars and hookah/waterpipe are addictive compared to non-current users. Respondents with the opinion that a person can change his/her smoking behavior had greater addiction beliefs about e-cigarettes, smokeless tobacco, hookah/waterpipe, and roll-your-own cigarettes compared to respondents that believed someone's smoking behavior is invariable.

The fully adjusted models for addiction beliefs about each type of tobacco product are presented in Table 3. Several factors remained significant. The oldest age group (aged 65 and older) had lower odds of believing several tobacco products are addictive (e-cigarettes, smokeless products, hookah/waterpipe, and roll-your-own cigarettes) compared to those aged 18 to 34.

Black non-Hispanic respondents had lower odds of believing cigarettes, e-cigarettes, smokeless tobacco products and roll-your-own cigarettes were addictive compared to Whites. Hispanic respondents also had lower odds of believing cigarette smoking and smoking roll-your-own cigarettes were addictive. For all products except e-cigarettes and roll-your-own cigarettes, respondents with at least a college degree had 2 to 5 times the odds of holding addiction beliefs compared to those with less than a high school education.

In the fully adjusted models, addiction beliefs by income were only significantly different for hookah/waterpipe, with higher household income associated with 35% to 41% lower

odds of believing hookah/waterpipe is addictive compared to those with incomes less than \$35,000. Compared to respondents who were not currently using tobacco products, respondents who currently used tobacco products had more than double the odds of believing that cigarettes are addictive but 37% lower odds of believing hookah/waterpipe is addictive.

The overall amount of exposure to media sources, including television, radio, and internet, was not associated with addiction beliefs for any product. However, respondents who had seen, heard, or read a message about tobacco use health effects in the past 30 days on active media channels, such as social media, had 1.5 times the odds of believing that smokeless tobacco, hookah/waterpipe, and roll-your-own cigarettes are addictive compared to respondents not exposed to health messages on these media sources. Meanwhile, exposure to messages about the health effects of tobacco use on passive media channels, such as television, was associated with twice the odds of believing cigarettes and e-cigarettes are addictive compared to those not exposed to messages on these sources.

DISCUSSION

In a nationally representative sample of US adults, beliefs about the addictiveness of tobacco products differed by product type. Most respondents believed that using conventional products including cigarettes, cigars, roll-your-own cigarettes, and smokeless tobacco is addictive. However, less than half of respondents believed that using e-cigarettes or hookah/waterpipes is addictive. Furthermore, more than one third of respondents reported that they did not know the addictiveness of using e-cigarettes and hookah/waterpipe. In comparison, a recent study of current US adult cigarette smokers found that 78% of respondents believed e-cigarettes are addictive [22] and a study of young adults aged 20 to 28 in Minnesota found that 15% of e-cigarette ever users believed e-cigarettes are less addictive than cigarettes and 8% were undecided [14]. The variety in tobacco product addiction beliefs may illustrate that information gaps exist and that communication is needed to clarify the potential addictiveness of these products. The need for more communication about the addictiveness of e-cigarettes and hookah/waterpipe is complicated by the comparatively less research on the addictiveness of these products compared to cigarettes and cigars, as well as the influence of product marketing and advertising shaping addiction beliefs [47, 48].

Our analysis indicated that beliefs about the addictiveness of tobacco products varied by age, race/ethnicity, education, and income. Younger respondents held more addiction beliefs about tobacco products compared to older respondents, including products such as e-cigarettes and hookah/waterpipe. Given that young adults may start using tobacco products like hookah/waterpipe [49, 50], beliefs about the addictiveness of these products could illustrate a positive public health trend if addiction beliefs act as a deterrent for product experimentation. Higher education was associated with greater odds of addiction beliefs for cigarettes, cigars, smokeless and hookah/waterpipe. Higher income was associated with lower odds of addiction beliefs about hookah/waterpipe use suggesting that, in contrast to cigarettes [51], higher income is not a protective characteristic for knowledge about hookah/waterpipe use.

Addiction beliefs differed by race and ethnicity, such that Black non-Hispanic and Hispanic respondents had lower addiction beliefs about cigarettes and roll-your-own cigarettes compared to Whites. This is a worrisome finding; it is well established that whether the cigarettes are manufactured or roll-your-own, the tobacco filler contains nicotine, which is addictive [52]. These differences in beliefs by race and ethnicity are also concerning if messages about the addictiveness of tobacco products, particularly products such as cigarettes, are not reaching all audiences. Since a majority of Black non-Hispanic cigarette smokers use menthol cigarettes [53], one possibility is that perceptions of menthol may influence addictiveness perceptions.

In contrast to our study hypothesis, general media exposure was not associated with addiction beliefs. Similarly, Blake et al. (2015) did not find an association between information exposure and e-cigarette addiction beliefs among current US adult cigarette smokers [22]. We thought based on the empirical and theoretical literature noting that media could affect beliefs and behaviors [31, 48, 54], as well as the media campaigns [33–35, 55–56] focused on tobacco product harms that media exposure would be associated with addiction beliefs. The diverse media landscape makes it challenging to identify an association between general media exposure and specific beliefs, like addiction beliefs. Respondents may be exposed to media sources with conflicting information about tobacco product addictiveness, and therefore, identifying a clear relationship between media exposure and beliefs could be challenging. A more nuanced measure of media may be warranted as we found that self-reported exposure to information on tobacco product health effects through passive and active media channels was associated with addiction beliefs. Exposure to health effects messages on passive media sources was associated with increased addiction beliefs about cigarettes and e-cigarettes. Exposure to health effects messages on active media sources was associated with increased addiction beliefs about smokeless, hookah/waterpipe, and roll-your-own cigarette products.

The relationship between exposure to health effects messages and addiction beliefs suggests three considerations for tobacco education campaigns. First, a majority of respondents were exposed to messages about tobacco use health effects on television. Therefore, of the media channels studied, television may offer the largest audience reach for health messaging. Second, understanding which media channels are associated with addiction beliefs for specific products could inform messaging and media purchasing decisions. Information from active media channels including websites and social media was associated with addiction beliefs for products such as hookah/waterpipe and smokeless tobacco, but not for cigarettes, cigars, or e-cigarettes. Therefore, campaigns using internet and social media platforms may consider new approaches to messaging in order to broaden their reach to cigarettes, cigars, and e-cigarettes. Third, even after accounting for individuals searching for health information, the current analysis found that exposure to messages in active and passive media channels was associated with addiction beliefs for some products. Therefore, regardless of whether individuals seek out information about the health effects of tobacco, providing messages about health effects may still affect addiction beliefs.

Study limitations

The study's cross-sectional design limits an assessment of temporality. Respondents holding addiction beliefs may be more likely to read and report health effects message exposure as opposed to exposure shaping beliefs. Longitudinal studies are needed to further examine this relationship. Second, we collapsed the dependent variable of addiction beliefs, combining the categories of "Not at all addictive" and "Don't know." Respondents who reported "Don't know" may differ from those responding "Not at all" by education or another characteristic that would change our findings if we had examined these categories separately. Given the comparatively large proportion of respondents answering "Don't know", we expect that this response was driving our findings. Third, we did not account for the potential confounders of e-cigarette information-seeking and current use of e-cigarettes or hookah/waterpipes. Fourth, we do not know the source or content of messages regarding tobacco use health effects. It is possible that incorporating the source, such as an advertisement from a manufacturer, would yield different results. Fifth, media exposure was assessed by self-report. Sixth, our sample was adults. Given that most tobacco users begin before age 18, youth are an area for future research.

CONCLUSIONS

This is the first nationally representative study assessing addiction beliefs about cigarettes and other tobacco products and their relationship to exposure to messages about the health effects of tobacco use in various media sources in the US. The current study found that exposure to messages about the health effects of tobacco use is associated with addiction beliefs. This may reflect the effect of previous and current public education efforts. Understanding the contributors to addiction beliefs, as well as the effect of addiction beliefs on subsequent initiation and use of tobacco products, can inform message development aimed at shaping consumer understanding and preventing youth initiation of tobacco products.

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Highlights

- Most US adults believe that cigarettes, cigars, roll-your-own cigarettes, and smokeless tobacco are addictive.
- Less than half of US adults believe that e-cigarettes and hookah/waterpipe are addictive.
- Exposure to messages about the health effects of tobacco use was associated with addiction beliefs.

Figure 1. Exposure to tobacco use health effects by media source

Note: Active media channels include news websites, newspaper, magazine, health websites, government websites, and social media. Passive media channels include television, radio, billboard, public transportation, mailings, community event and at the point of sale.

Table 1

Beliefs about the addictiveness of tobacco product use

	Not at all addictive weighted % (n)	Moderately addictive weighted % (n)	Very addictive weighted % (n)	Don't know weighted % (n)
Cigarette smoking	2.7 (67)	10.5 (372)	76.8 (2,938)	7.6 (265)
Cigar smoking	8.3 (242)	33.0 (1,247)	34.1 (1,243)	21.0 (865)
Smokeless tobacco use	4.3 (111)	20.1 (674)	40.5 (1,512)	30.1 (1,251)
Using electronic cigarettes (also known as vape-pens, e-hookah/waterpipes, or e-vaporizers)	7.4 (189)	21.1 (770)	28.7 (974)	39.0 (1,656)
Smoking tobacco in a hookah/waterpipe	8.5 (205)	18.8 (597)	26.4 (940)	41.9 (1,822)
Smoking roll-your-own cigarettes	10.1 (4.3)	16.0 (524)	49.2 (1,896)	26.6 (1,080)

Note: The weighted proportions do not add up to 100% due to missing data. The proportion of missing responses for each product type accounts for less than 5% of the responses.

Table 2
Proportion of addiction beliefs about tobacco products by demographic characteristics, media exposure, and tobacco use

	Overall n (weighted % or mean)	Cigarette smoking Weighted %		Cigar smoking Weighted %		Using electronic cigarettes Weighted %		Smokeless tobacco use Weighted %		Smoking tobacco in a hookah/waterpipe Weighted %		Smoking roll-your- own cigarettes Weighted %	
		No/D	Yes	No/D	Yes	No/D	Yes	No/D	Yes	No/D	Yes	No/D	Yes
Overall		10.3	87.3	29.4	67.1	46.6	49.8	34.3	60.6	50.3	45.2	30.9	65.3
Gender													
Male	1,497 (46.5)	10.5	89.5	29.6	70.3	46.1	53.9	32.3*	67.7*	51.2	48.8	30.6	69.4
Female	2,018 (48.2)	10.1	89.9	31.1	68.9	48.7	51.3	39.2*	60.8*	53.2	46.8	32.0	67.9
Age (years)													
18–34	455 (29.5)	12.1	87.9	28.0	71.9	35.8*	64.2*	25.4*	74.6*	43.2*	56.7*	26.0*	73.9*
35–49	659 (24.3)	9.9	90.1	31.8	68.2	47.3*	52.7*	37.5*	62.5*	50.9*	49.1*	32.4*	67.6*
50–64	1,226 (24.9)	7.8	92.2	29.3	70.7	50.3*	49.6*	36.2*	63.8*	52.7*	47.3*	30.2*	69.8*
65+	1,288 (18.4)	12.7	87.3	33.9	66.0	65.1*	34.9*	52.0*	47.9*	68.8*	31.2*	41.4*	58.5*
Race/Ethnicity													
White , non-Hispanic	2,918 (64.9)	7.1*	92.8*	28.8	71.2	46.1*	53.9*	32.4*	67.5*	53.3	46.7	27.7*	72.3*
Black non-Hispanic	278 (12.2)	16.6*	83.4*	35.0	65.0	60.0*	40.0*	48.1*	51.9*	55.8	44.1	42.6*	57.4*
Hispanic	251 (15.2)	19.3*	80.7*	31.4	68.6	48.4*	51.6*	42.4*	57.6*	48.4	51.6	43.3*	56.7*
Multiple races or other	291 (7.6)	13.3*	86.7*	35.5	64.5	46.7*	53.2*	37.5*	62.5*	50.2	49.8	31.7*	68.3*
Education													
Less than high school	239 (10.9)	23.2*	76.8*	43.1*	56.9*	66.7*	33.3*	55.8*	44.2*	69.1*	30.9*	46.6*	53.4*
High school graduate	239 (21.1)	14.1*	85.8*	35.3*	64.7*	52.8*	47.2*	41.4*	58.6*	59.7*	40.3*	39.2*	60.8*
Vocational or some College	1,154 (32.7)	7.1*	92.9*	28.8*	71.2*	44.8*	55.2*	31.0*	68.9*	51.2*	48.8*	29.3*	70.7*
College or post-graduate	1,606 (35.2)	7.9*	92.0*	25.6*	74.4*	43.5*	56.5*	32.3*	67.7*	45.4*	54.6*	26.5*	73.5*
Household income													
<\$35,000	1,170 (32.1)	15.3*	84.7*	35.5*	64.5*	55.3*	44.7*	43.3*	56.7*	53.9	46.1	38.3*	61.7*
\$35,000 to \$74,999	1,020 (27.0)	8.9*	91.0*	29.7*	70.3*	47.1*	52.9*	35.4*	64.6*	54.0	45.9	30.7*	69.3*

	Overall n (weighted % or mean)	Cigarette smoking Weighted %		Cigar smoking Weighted %		Using electronic cigarettes Weighted %		Smokeless tobacco use Weighted %		Smoking tobacco in a hookah/waterpipe Weighted %		Smoking roll-your- own cigarettes Weighted %	
		No/D	K	Yes	No/D	K	Yes	No/D	K	Yes	No/D	K	Yes
\$75.0 00 or more	1,548 (40.8)	8.0 *		92.0 *	27.1 *		72.9 *	43.6 *		56.4 *	31.3 *		68.6 *
Current tobacco use ^d													
Yes	594 (17.5)	5.3 *		94.6 *	37.6 *		62.4 *	53.3		46.7	34.3		65.7
No	3,043 (79.8)	11.9 *		88.0 *	29.2 *		70.8 *	47.3		52.7	36.8		63.2
Daily media exposure (mean hours) ^b	3,361 (7.8)	8.3		7.8	8.2		7.7	7.9		7.8	8.0		7.7
Read new spaper 1 or more days in past week													
Yes	2,155 (49.9)	9.9		90.1	29.7		70.3	48.6		51.4	34.9		65.1
No	1,453 (46.5)	11.0		89.0	30.7		69.3	46.9		53.0	36.7		63.3
Exposure to tobacco use health effects via <i>active</i> media channels ^c													
A lot or a couple of times	2,513 (72.3)	9.0		91.0	28.5 *		71.5 *	44.6 *		55.4 *	33.0 *		66.9 *
Never	986 (22.7)	14.3		85.7	36.4 *		63.6 *	57.1 *		42.9 *	43.8 *		56.2 *
Exposure to tobacco use health effects via <i>passive</i> media channels ^d													
A lot or a couple of times	3,065 (85.2)	9.1 *		90.9 *	28.9 *		71.0 *	45.5 *		54.5 *	34.2 *		65.8 *
Never	537 (12.3)	20.3 *		79.7 *	40.4 *		59.6 *	64.2 *		35.8 *	47.4 *		52.6 *
Ever looked for information about the health effects of tobacco products													
Yes	648 (20.3)	10.6		89.4	29.7		70.3	41.2 *		58.8 *	31.2		68.8
No	2,866 (73.9)	10.2		89.8	30.3		69.7	49.2 *		50.8 *	36.9		63.1
Smoking opinion ^e													
Agree	893 (24.6)	11.9		88.1	33.9		66.1	54.9 *		45.1 *	42.7 *		57.3 *
Disagree	2,755 (73.6)	9.9		90.0	29.2		70.8	45.7 *		54.3 *	33.8 *		66.2 *
Tobacco dependence ^f													

	Overall n (weighted % or mean)	Cigarette smoking Weighted %		Cigar smoking Weighted %		Using electronic cigarettes Weighted %		Smokeless tobacco use Weighted %		Smoking tobacco in a hookah/waterpipe Weighted %		Smoking roll-your- own cigarettes Weighted %	
		No/D K	Yes	No/D K	Yes	No/D K	Yes	No/D K	Yes	No/D K	Yes	No/D K	Yes
Do not use	2,945 (77.6)	11.9 *	88.1 *	28.9	71.1	47.5	52.5	37.1	62.8	50.8	49.2	32.2	67.8
Rarely want product	177 (5.8)	7.4 *	92.6 *	35.1	64.9	48.5	51.5	28.6	71.4	63.5	36.5	37.2	62.8
Within more than 30 minutes	194 (5.2)	3.6 *	96.4 *	27.3	72.7	50.1	49.9	26.3	73.3	52.6	47.4	27.7	72.3
Within 30 minutes	327 (9.4)	5.7 *	94.3 *	42.1	57.8	52.6	47.4	38.7	61.3	61.7	38.3	29.8	70.2

Note:

* $P < 0.05$.

^a Current tobacco use is defined as smoking at least 100 cigarettes, 100 cigars, or use of 20 smokeless products in a lifetime and now using cigarettes, cigars, and/or smokeless products some or every day.

^b Media exposure is the mean number of hours on a typical day watching television, listening to radio, and using the internet for personal reasons.

^c Active media channels include news websites, newspaper, magazine, health websites, government websites, and social media.

^d Passive media channels include television, radio, billboard, public transportation, mailings, community event and at the point of sale.

^e Smoking opinion is agreement or disagreement with the following statement, "Smoking behavior is something basic about a person that they can't change very much."

^f Tobacco dependence was assessed by asking the following question, "How soon after you wake up do you usually use any tobacco product?"

Table 3

Multivariable logistic regression models: Belief that tobacco product use is very or moderately addictive

	Cigarette smoking AOR (95% CI)	Cigar smoking AOR (95% CI)	Using electronic cigarettes AOR (95% CI)	Smokeless tobacco use AOR (95% CI)	Smoking tobacco in a hookah/waterpipe AOR (95% CI)	Smoking roll-your- own cigarettes AOR (95% CI)
Gender						
Male	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>
Female	1.24 (0.65, 2.38)	0.91 (0.70, 1.18)	0.92 (0.71, 1.20)	0.80 (0.59, 1.08)	0.92 (0.72, 1.18)	1.01 (0.73, 1.38)
Age						
18–34	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>
35–49	1.22 (0.55, 2.70)	0.83 (0.52, 1.32)	0.59 [*] (0.36, 0.96)	0.56 [*] (0.34, 0.95)	0.77 (0.47, 1.27)	0.74 (0.47, 1.15)
50–64	2.26 (0.89, 5.73)	0.97 (0.65, 1.47)	0.57 [*] (0.37, 0.87)	0.60 (0.36, 1.02)	0.82 (0.50, 1.33)	0.90 (0.56, 1.44)
65+	1.09 (0.53, 2.24)	0.80 (0.54, 1.20)	0.31 [*] (0.19, 0.48)	0.27 [*] (0.17, 0.43)	0.41 [*] (0.27, 0.62)	0.48 [*] (0.31, 0.75)
Race/Ethnicity						
White non-Hispanic	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>
Black non-Hispanic	0.37 [*] (0.16, 0.84)	0.71 (0.44, 1.15)	0.51 [*] (0.32, 0.82)	0.43 [*] (0.28, 0.67)	0.82 (0.54, 1.24)	0.53 [*] (0.31, 0.88)
Hispanic	0.34 [*] (0.14, 0.79)	0.87 (0.48, 1.58)	0.93 (0.56, 1.55)	0.64 (0.39, 1.06)	1.27 (0.82, 1.96)	0.54 [*] (0.35, 0.85)
Multiple races or other	0.59 (0.27, 1.28)	0.64 (0.39, 1.05)	0.87 (0.56, 1.35)	0.68 (0.40, 1.17)	0.90 (0.55, 1.49)	0.74 (0.45, 1.22)
Education						
Less than high school	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>
High school graduate	1.65 (0.52, 5.22)	1.20 (0.53, 2.69)	1.33 (0.54, 3.24)	1.36 (0.60, 3.09)	1.47 (0.58, 3.75)	1.04 (0.44, 2.49)
Vocational or some college	4.55 [*] (1.45, 14.2)	1.76 (0.80, 3.87)	1.85 (0.83, 4.13)	2.20 [*] (1.03, 4.66)	2.49 (1.01, 6.10)	1.73 (0.74, 4.05)
College or post-graduate	5.58 [*] (2.00, 15.6)	2.28 [*] (1.04, 5.01)	1.87 (0.87, 4.01)	2.20 [*] (1.03, 4.71)	3.18 [*] (1.37, 7.39)	2.22 (0.97, 5.08)
Household income						
<\$35,000	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>
\$35,000 to \$74,999	1.26 (0.58, 2.74)	0.90 (0.61, 1.31)	0.99 (0.69, 1.42)	0.91 (0.59, 1.38)	0.59 [*] (0.41, 0.85)	0.93 (0.62, 1.39)
\$75,000 or more	1.28 (0.67, 2.42)	0.95 (0.66, 1.37)	1.28 (0.91, 1.81)	1.09 (0.77, 1.54)	0.65 [*] (0.46, 0.91)	0.95 (0.67, 1.35)
Current tobacco use ^a						
No	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>

	Cigarette smoking AOR (95% CI)	Cigar smoking AOR (95% CI)	Using electronic cigarettes AOR (95% CI)	Smokeless tobacco use AOR (95% CI)	Smoking tobacco in a hookah/waterpipe AOR (95% CI)	Smoking roll-your- own cigarettes AOR (95% CI)
Yes	2.50 [*] (1.27, 4.93)	0.73 (0.46, 1.16)	0.73 (0.46, 1.16)	1.04 (0.69, 1.57)	0.63 (0.38, 1.02)	1.16 (0.74, 1.84)
Daily media exposure (mean hours) ^b	0.99 (0.56, 1.73)	0.82 (0.66, 1.03)	0.86 (0.69, 1.08)	0.80 (0.62, 1.03)	0.88 (0.68, 1.13)	0.82 (0.65, 1.03)
Read newspaper 1 or more days in past week						
No	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>
Yes	0.99 (0.50, 1.95)	1.12 (0.80, 1.56)	1.12 (0.81, 1.55)	1.26 (0.91, 1.75)	1.11 (0.79, 1.56)	1.12 (0.80, 1.56)
Exposure to tobacco use health effects via active media channels ^c						
Never	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>
A lot or a couple of times	1.59 (0.78, 3.22)	1.37 (0.85, 2.20)	1.35 (0.93, 1.96)	1.48 [*] (1.03, 2.12)	1.69 [*] (1.11, 2.56)	1.61 [*] (1.06, 2.43)
Exposure to tobacco use health effects via passive media channels ^d						
Never	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>
A lot or a couple of times	2.76 [*] (1.35, 5.64)	1.57 (0.92, 2.71)	2.12 [*] (1.32, 3.41)	1.55 (0.93, 2.59)	1.22 (0.72, 2.10)	1.16 (0.68, 1.99)
Ever looked for information about the health effects of tobacco products						
No	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>
Yes	0.85 (0.38, 1.91)	0.95 (0.62, 1.46)	1.16 (0.80, 1.69)	1.04 (0.73, 1.50)	1.23 (0.84, 1.82)	1.19 (0.81, 1.74)
Smoking opinion ^e						
Disagree	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>
Agree	1.57 (0.76, 3.23)	0.99 (0.68, 1.45)	0.92 (0.60, 1.41)	0.86 (0.55, 1.33)	0.92 (0.64, 1.34)	0.89 (0.59, 1.36)

Note:

^{*} $P < 0.05$. Each column represents a separate multivariable logistic regression model with the dependent outcome of belief that the tobacco product is very or moderately addictive compared to a belief that the product is not at all addictive or a response of "don't know." The models are adjusted for all of the variables contained in the rows. OR = Odds Ratio. CI = 95% Confidence Interval.

^a Current tobacco use is defined as smoking at least 100 cigarettes, 100 cigars, or use of 20 smokeless products in a lifetime and now using cigarettes, cigars, and/or smokeless products some or every day.

^b Media exposure is the mean number of hours on a typical day watching television, listening to radio, and using the internet for personal reasons.

^c Active media channels include news websites, newspaper, magazine, health websites, government websites, and social media.

^d Passive media channels include television, radio, billboard, public transportation, mailings, community event and at the point of sale.

Smoking opinion is agreement or disagreement with the following statement, "Smoking behavior is something basic about a person that they can't change very much."

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