

# Prevalence and correlates of US adult opinions on restricting exposure of children to smoking in movies: The 2020 Health Information National Trends Survey

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## KEYWORDS

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## ABSTRACT

**INTRODUCTION** Legislative policies aimed at curbing early exposure to smoking among youth are a crucial public health strategy. Yet little is known about US adults' public opinion on restricting exposure of children to movies depicting smoking. This study sought to characterize US adults' levels of support to restrict the exposure of children to smoking in movies and explore associations with sociodemographic characteristics.

**METHODS** We used cross-sectional data from the 2020 Health Information National Trends Survey (HINTS, n=3750) of adults in the United States to estimate the prevalence of opinions toward restricting the exposure of children to smoking in movies and examine correlates of support using weighted logistic regression.

**RESULTS** In all, 48.2% of adults endorsed a supportive opinion. In multivariable logistic regression analysis, the odds of endorsing a supportive opinion were higher among Black/African American adults (OR=1.61; 95% CI: 1.04–

2.49, p=0.033), and Hispanics (OR=1.78; 95% CI: 1.17–2.72, p=0.008) when compared to Whites. Similarly, compared to those aged 18–34 years, the odds of endorsing a supportive opinion were also greater among those aged 50–64 years (OR=2.15; 95% CI: 1.43–3.24, p<0.001) or aged ≥65 years (OR=3.83; 95% CI: 2.31–6.36, p<0.001). Higher odds for support were observed among those exposed to federal court-ordered anti-smoking tobacco messages (OR=1.37; 95% CI 1.06–1.78, p=0.018) and among those who reported using social media to share health information (OR=1.51; 95% CI: 1.02–2.23, p=0.041).

**CONCLUSIONS** Only 48% of US adults endorsed support for restricting the exposure of children to smoking in movies. This study has identified subgroups of US adults for whom tailored communication interventions may increase support for policies that protect children from early initiation of smoking.

## INTRODUCTION

Despite robust anti-tobacco policies restricting and

prohibiting cigarette marketing to youth, tobacco use remains prevalent among children and young people in the

US. Data from the CDC shows that between 2017 and 2018, use of tobacco products grew by 38.3% among high school students<sup>1</sup>. About 4.9 million youth used tobacco in 2018<sup>1</sup>. Although, most of the spike in tobacco products in the past decade is as a result of the rapid uptake of electronic cigarette products, conventional tobacco use remains a leading preventable cause of morbidity and mortality, accounting for nearly half a million deaths annually in the United States<sup>2</sup>.

The onset of tobacco use typically occurs during childhood or adolescence. Adolescence is a critical transitional period characterized by risk-taking and experimentation. Nearly 9 out of 10 adults who smoke cigarettes daily first tried smoking by the age of 18 years, and available data indicate that each day in the US, about 1600 youth smoke their first cigarette<sup>3</sup>. This represents a serious public health problem, as evidence suggests that earlier age of cigarette initiation is associated with increased nicotine dependence, higher risk for chronic diseases, and earlier mortality<sup>4</sup>. Therefore, policies and interventions to prevent the initiation of tobacco use among youth are highly needed.

Multiple studies have examined the reasons and potential factors influencing adolescent tobacco initiation. Some studies have found that psychological factors such as depression and ADHD may play a role<sup>5,6</sup>. Other factors identified in published literature include peer influence, rebelliousness, thrill-seeking, family and parental exposure to smoking, exposure to cigarette marketing and socioeconomic status<sup>7-9</sup>.

Another emerging risk factor for earlier age of tobacco use among youth is the exposure to smoking in movies. The portrayal of cigarette smoking is pervasive in movies. Between 2010 and 2018, estimates indicate that tobacco incidents in top-grossing movies increased 57%, including a 120% increase in those rated PG-13<sup>10</sup>. So far, empirical evidence from cross-sectional analysis, longitudinal studies and systematic reviews points to a link between exposure to smoking in movies and subsequent uptake of tobacco among youth<sup>11-13</sup>. In fact, the US Surgeon General has concluded that there is a causal relationship between exposure to depictions of smoking in movies and initiation of tobacco in adolescence<sup>4,10</sup>. Most importantly, there is also evidence suggesting that restricting adolescents from watching movies which portray smoking, strongly predicts a lower risk of trying smoking in the future<sup>14-16</sup>. Given that most of youth tobacco use is in the form of electronic cigarette products, a recent systematic review found that a similar association exists between vaping imagery in films and subsequent uptake of vaping among youth<sup>17</sup>. As a result, leading health organizations, policy makers and relevant stakeholders have proposed an R rating for movies depicting smoking as a critical step to eliminate adolescent initiation of smoking<sup>18-20</sup>.

Despite expert recommendations, current US tobacco regulatory policy and the Motion Picture Association of America (MPAA) ratings system does not explicitly demand

an R rating for all movies depicting tobacco use. Prior research has examined US adults' opinion and attitudes regarding whether smoking scenes should be considered as a criterion in movie ratings<sup>21-23</sup> and found widely varying levels of support. However, existing studies were performed some time ago<sup>21-23</sup>, and as recreational screen time and digital media become more prevalent among youth<sup>24</sup>, it is possible that opinions and preferences may have changed over time. Additionally, prior studies were restricted to parents, and were not nationally representative<sup>23</sup>. Thus, a nuanced, updated and better understanding of public opinion towards policies restricting adolescent's exposure to smoking in movies is crucial to understanding the public's perspective to inform potential interventions aimed at curbing youth tobacco use.

Therefore, drawing from a nationally representative sample, the current study describes the extent to which US adults are supportive, neutral, or opposed to restricting the exposure of youth to smoking in movies and examines sociodemographic and health related factors associated with support.

## METHODS

### Overview of the Health Information National Trends Survey

For this study, we examined data from the 2020 Health Information National Trends Survey (HINTS) 5, Cycle 3 (H5c4). The HINTS is a nationally representative survey administered in multiple iterations by the National Cancer Institute (NCI). As with all previous iterations of HINTS, the target sample for H5c4 was non-institutionalized civilian adults (aged  $\geq 18$  years) living in the United States (US). Data collection for H5c4 began on 24 February and concluded on 15 June 2020.

The HINTS collects data from the general population related to health information communication technology, and health behaviors. H5c4 included a self-administered mailed questionnaire to survey respondents. The sample frame for H5c4 was derived using the Marketing Systems Group database of addresses and included all non-vacant residential addresses in the US. This was then grouped into two specific sampling strata: high concentrations of minority populations (from areas with at least 34% population proportion of Hispanics or African Americans), and low-concentration minority populations (from areas with less than 34% population proportion of Hispanics or African Americans). H5c4 utilized the next-birthday method for respondent selection. In this method, households from residential addresses across the US are first selected using an equal-probability method, then one adult within each household is selected to participate in the survey. Written informed consent for H5c4 was obtained from study participants. HINTS 5 received approval from the Westat IRB on 28 March 2016 and was subsequently reviewed by the NIH Office of Human Subjects Research and given a non-human subjects

determination via exemption #13204 on 25 April 2016. This secondary analysis involves a de-identified, publicly available dataset, so institutional review board approval was not required. Full details about the HINTS methodology and data collection have been published elsewhere<sup>25</sup>.

### Study design and participants

A cross-sectional design was used to examine participant responses from H5c4. The total number of addresses selected for Cycle 4 was 15350; 11050 from the high minority stratum and 4300 from the low minority stratum. The high-minority stratum’s proportion of the sampling frame was 26.5% and it was oversampled so that its proportion of the sample was 72.0%. The low minority stratum comprised 73.5% of the sampling frame but made up just 28.0% of the sample. A total of 3865 completed surveys were collected with a response rate of 37%. A total of 115 (2.98%) participants had missing data to the policy variable and were excluded in the analysis. The final analytical sample included 3750 participants.

### Measures

#### Television ‘R’ rating policy

Respondents rated the extent they would support or oppose the following: ‘Just like with violence and sex, movies with cigarette smoking should be rated R to protect children and youth from seeing cigarette smoking in movies.’ Responses were dichotomized for logistic regression: ‘neutral or opposed’ (neither support nor oppose; oppose and strongly oppose) versus ‘supportive’ (support; strongly support).

#### Participant characteristics and covariates

Several demographics and health-related factors were examined to assess how they predicted support or opposition for restricting the exposure of children to movies depicting smoking. The H5c4 data set includes the following respondent demographics: age, race/ethnicity, sex, education level, annual household income, children in the household (yes/no); shared health information via social networking site (e.g. Facebook, LinkedIn) in the prior 12 months (yes/no; labelled ‘social media use’), geographical residence (rural vs urban) and political affiliation (reported from a seven-point scale from very liberal to very conservative and categorized as liberal or moderate). Health-related characteristics include BMI (kg/m<sup>2</sup>) weight status category calculated from self-reported height and weight (normal 18.5–24.9; overweight: 25.0–29.9 and obese: ≥30.0 kg/m<sup>2</sup>); having a regular health provider (yes/no), and current smoking status (yes/no).

### Statistical analysis

Analyses were conducted using the *svy* command in Stata 17.0 statistical software (StataCorp LP, College Station, Texas, USA). Final person weights and jack-knife replicate weights provided within the H5c4 dataset were used to provide national estimates representative of the US population.

We first conducted basic descriptive statistics for the entire study sample to estimate the prevalence of support or opposition towards policy restricting the depiction of cigarette smoking in movies. Both unweighted frequencies and weighted percentages are presented. Chi-squared tests were used to assess the associations between support versus neutral or opposition, and the sociodemographic and health-related characteristics of the study population. We used multivariable logistic regression to examine the odds of support versus being neutral or opposed to restricting the exposure of children to smoking in movies adjusting for age, education level, gender, income, race/ethnicity, political affiliation, social media use, exposure to anti-tobacco messages, geographical location (rural vs urban), BMI, current smoking status, and having a child in the household. All tests were two-sided and a  $p < 0.05$  was considered statistically significant.

## RESULTS

The final analytic sample included 3750 adult respondents with complete information on policy opinion regarding limiting exposure of children to smoking scenes in movies. Of these, 31%, 48.2%, and 20.8% endorsed neutrality, support and opposition for policy proposing to limit youth exposure to smoking by assigning R ratings to movies portraying smoking, respectively. Overall, a slight majority of respondents were either neutral or opposed to the ‘R’ rating policy (51.8 %). (Table 1)

In bivariate analysis (Table 2), those with reported exposure to at least one form of anti-tobacco message (52.6% vs 45.2%;  $p = 0.004$ ), were more likely than their counterparts to show support for the policy. Similarly, older adults were more likely than younger adults to endorse supportive opinions. Support for R rating of films with smoking scenes did not differ according to current smoking status, political affiliation, race, income level, living with a child in the household, and level of education.

In the multivariable logistic regression analysis (Table 3), compared to Whites, Black/African American adults had 60% greater odds and Hispanic adults had 78% greater odds

**Table 1. Prevalence of public support, opposition or neutrality for policy to assign movies with smoking scenes an R rating among US adults in the HINTS 2020 Survey (N=3750)**

Public opinion	Analytic sample n	Weighted %
Strongly oppose	284	8.3
Oppose	411	12.5
Neither support nor oppose	1098	31.0
Support	858	22.2
Strongly support	1099	26.0

**Table 2. Sample population demographic characteristics in the HINTS 2020 Survey (N=3750)**

Characteristics	Analytic sample (n=3750) %	Neutral or opposed (n=1793) %	Supportive (n=1957) %	Test-statistic	p
<b>Gender</b>				0.194	0.170
Female	51.1	49.6	50.4		
Male	48.9	53.6	46.4		
<b>Age (years)</b>				12.17	<0.001
18–34	26.6	63.1	36.9		
35–49	25.3	52.3	47.7		
50–74	27.9	50.3	49.7		
≥75	20.2	36.6	63.4		
<b>Education level</b>				1.72	0.171
Less than college	38.9	50.1	49.9		
Some college	30.5	49.9	50.1		
College graduate	19.0	58.0	42.0		
Postgraduate	11.6	51.0	49.0		
<b>Household income (US\$)</b>				0.258	0.896
<20000	15.1	51.0	49.0		
20000–34999	11.2	51.5	48.5		
35000–49999	12.6	49.6	50.4		
50000–74999	18.4	50.3	49.7		
≥75000	42.7	53.2	46.8		
<b>Race</b>				2.14	0.109
White	63.7	54.5	45.5		
African American	11.1	44.8	55.2		
Hispanic	16.7	47.1	52.9		
Other	8.5	48.4	51.6		
<b>Child in household</b>				0.383	0.540
No	65.8	52.4	47.6		
Yes	34.2	50.5	49.5		
<b>Political affiliation</b>				0.439	0.640
Moderate	37.1	52.5	47.5		
Somewhat/very liberal	29.4	51.7	48.3		
Somewhat/very conservative	33.5	49.0	51.0		
<b>Residence</b>				2.43	0.126
Urban	87.7	51.0	49.0		
Rural	12.3	57.5	42.5		
<b>Having a regular provider</b>				3.23	0.078
No	37.4	55.4	44.6		
Yes	62.6	49.7	50.3		
<b>Current smoking status</b>				0.90	0.35
No	86.0	51.4	48.6		
Yes	14.0	56.0	44.0		

Continued

Table 2. Continued

Characteristics	Analytic sample (n=3750) %	Neutral or opposed (n=1793) %	Supportive (n=1957) %	Test-statistic	p
<b>BMI (kg/m<sup>2</sup>)</b>				1.94	0.170
Not obese	66.5	50.4	49.6		
Obese	33.5	54.6	45.4		
<b>Heard anti-tobacco messages</b>				8.91	<b>0.004</b>
No	58.9	54.8	45.2		
Yes	41.1	47.4	52.6		
<b>Social media use</b>				0.254	0.117
No	86.0	52.9	47.1		
Yes	14.0	45.4	54.6		

of endorsing restrictions. Similarly, compared to those aged 18–34 years, the odds of endorsing a supportive opinion were 2.18 times and almost 4 times greater among those aged 50–64 years, and ≥65 years, respectively. Those exposed to court ordered anti-tobacco messages and those who reported using social media to share health information had 37% and 51% greater odds for support, respectively. Being overweight was associated with 31% lower odds of support for restricting exposure of children to smoking in movies. Political affiliation, having a child in the household, gender, education level and smoking status were not significantly associated with support or opposition for giving movies that depict tobacco smoking an R rating.

Table 3: Multivariable logistic regression for predictors of smoking policy support in the HINTS 2020 Survey

Variables	AOR	95% CI	p
<b>Gender</b>			
Female (Ref.)	1		
Male	0.99	0.75–1.29	0.911
<b>Age (years)</b>			
18–34 (Ref.)	1		
35–49	1.65	1.09–2.52	<b>0.020</b>
50–74	2.18	1.45–3.28	<b>&lt;0.001</b>
≥75	3.94	2.39–6.51	<b>&lt;0.001</b>
<b>Education level</b>			
Less than college (Ref.)	1		
Some college	1.04	0.72–1.51	0.831
College graduate	0.72	0.44–1.19	0.198
Postgraduate	0.91	0.59–1.40	0.664

Continued

Table 3. Continued

Variables	AOR	95% CI	p
<b>Household income (US\$)</b>			
<20000 (Ref.)	1		
20000–34999	0.86	0.54–1.38	0.536
35000–49999	1.02	0.61–1.72	0.926
50000–74999	1.11	0.68–1.83	0.662
≥75000	1.05	0.68–1.64	0.822
<b>Race</b>			
White (Ref.)	1		
Black/African American	1.60	1.04–2.48	<b>0.034</b>
Hispanic	1.78	1.17–2.72	<b>0.008</b>
Other	1.55	0.94–2.54	0.085
<b>Child in household</b>			
No (Ref.)	1		
Yes	1.27	0.94–1.71	0.122
<b>Political affiliation</b>			
Moderate (Ref.)	1		
Somewhat/very liberal	1.16	0.81–1.68	0.409
Somewhat/very conservative	1.11	0.77–1.59	0.567
<b>Residence</b>			
Urban (Ref.)	1		
Rural	0.81	0.55–1.18	0.258
<b>Having a regular provider</b>			
No (Ref.)	1		
Yes	0.97	0.71–1.34	0.867

Continued

**Table 3.** Continued

Variables	AOR	95% CI	p
<b>Current smoking status</b>			
No (Ref.)	1		
Yes	0.84	0.53–1.34	0.462
<b>BMI</b>			
Not obese (Ref.)	1		
Obese	0.69	0.50–0.95	<b>0.023</b>
<b>Heard anti-tobacco messages</b>			
No (Ref.)	1		
Yes	1.36	1.05–1.77	<b>0.021</b>
<b>Social media use</b>			
No (Ref.)	1		
Yes	1.50	1.02–2.23	<b>0.043</b>

AOR: adjusted odds ratio. Variables included in the analysis: age, education level, gender, income, race/ethnicity, political affiliation, social media use, exposure to anti-tobacco messages, geographical location (rural vs urban), BMI (kg/m<sup>2</sup>), current smoking status, and having a child in the household.

## DISCUSSION

Generally, this study sought to expand the literature on adults’ opinions regarding legislative policies aimed at minimizing adolescent initiation of smoking. To do so, we drew data from the 2020 Health Information National Trends Survey, to ascertain the levels of support for restricting the exposure of children to smoking in movies and explore associations with sociodemographic and health-related characteristics. Two major themes emerged from our analysis: 1) less than half (48.2%) of adults supported the movies smoking restriction policy, and 2) opinion differed according to sociodemographic and health-related factors.

Our finding that almost half of adults endorsed support for assigning movies depicting smoking an R rating is relatively higher than the 29% by Longacre et al.<sup>22</sup> and the 40% by Blake et al.<sup>21</sup> that have been reported, but also considerably lower than estimate of 70% reported by McMillen et al.<sup>23</sup>. Notably, differences in study population, survey sampling approaches, study time, and anti-tobacco advocacy climate may account for the disparities in estimates of support. For example, the study by Longacre et al.<sup>22</sup> was limited to parents specifically in the New England region of the US. Thus, direct comparisons with our current analysis may not be worthwhile. Yet, considering the recent aggressive anti-tobacco legislature, research, and public health efforts aimed at curbing youth initiation of tobacco<sup>26</sup>, our finding of relatively modest levels of support were somewhat surprising and may indicate a lack of public awareness regarding the link between smoking in movies and

subsequent tobacco adoption in adolescence. Our results provide preliminary evidence that efforts to stimulate public support for restricting youth exposure to smoking in movies are highly needed given that youth tobacco use remains a significant public health threat.

Mass media educational campaigns may induce public support for tobacco legislative campaigns. Our findings suggest that exposure to anti-tobacco corrective messages via mass media and using social media to share health-related information may influence policy support. Adults were 37% and 50% more likely to endorse support for the R rating policy if they were exposed to anti-tobacco corrective statements or used social media for health-related purposes, respectively, than their counterparts who did not. Our observation aligns with previous research supporting the notion that reported exposure to tobacco-specific media messages is associated with adult attitudes towards movie-specific policy measures<sup>21</sup>. Thus, these observations highlight mass media and social media tools as potentially modifiable targets and platforms for tobacco-specific communication designed to increase policy support.

Furthermore, we found differences in opinion by race/ethnicity, age, and BMI category. Compared to Caucasians, Black/African American and Hispanic adults had greater odds of supporting the tobacco movies restriction policy. One potential reason that could explain the higher likelihood of support among Blacks/African American adults stems from previous research suggesting that Black parents were more likely to be asked by pediatricians about smoking<sup>27</sup>. Expectedly, compared to those aged 18–34 years, adults aged ≥50 years had greater odds of policy support. A potential rationale for this finding may be that older adults may have more awareness and knowledge about the dangers and adverse health effects of youth tobacco use than their younger counterparts. Those who were overweight were less likely to endorse support for rating movies portraying smoking scenes an R. The reason for this finding in our study remains unclear and may be the focus for future research.

Surprisingly, we observed that being a current smoker, and living in a household with children was not associated with support for the movie restriction policy. While the reasons for support or opposition to the policy were not included in the survey items, several theories may explain our findings. First, it may be that individuals who are current smokers, and have children living with them may not perceive movies portraying tobacco scenes as a risk factor for subsequent youth tobacco use. Another plausible explanation is that those survey items did not specify whether the adults sampled were parents. Also, the amount of exposure to television screen time was not assessed. All of these are likely confounding factors that may have influenced our findings. Thus, future research should investigate how these characteristics influence public opinion regarding policies restricting children’s exposure to smoking portrayals in films.

### Strengths and limitations

Strengths of this study include the large sample size which ensures that our sample is adequately powered. Also, our results are based on recent data using the 2020 iteration of the HINTS, a nationally representative sample of US adults. Further, our analysis utilized replicate weights to generate estimates for improved generalizability of the HINTS data to the entire US population. Nevertheless, several limitations of the study are worth mentioning. First, the survey utilizes self-reported information and required respondents to recall past behaviors; thus, there is the possibility of recall bias. Second, the response rate for HINTS 5 cycle 4 data used was 37%, suggesting the potential for selection bias. That notwithstanding, the HINTS has been used extensively in published literature<sup>28-30</sup>. Third, given the nature of the survey, we did not assess participants' awareness of research linking movie smoking exposure with adolescent smoking behavior. Therefore, it is unclear whether participants' relatively modest support for an R rating for movie smoking reflects a deficiency of knowledge about its impact on youth tobacco initiation or whether participants' were aware of this research but held strong beliefs that smoking content does not warrant an R rating. Finally, we could also not explore the reasons for participants' policy opinion. Future studies should evaluate the impact of these factors on public opinion regarding rating movies portraying tobacco smoking an R rating in order to minimize youth tobacco initiation.

### CONCLUSIONS

The current study offers valuable insights and extends the available literature on US adults' support for policy efforts that aim to regulate the portrayal of tobacco smoking in movies. We identified sub-groups of the population – particularly Caucasians, and younger age adults for whom targeted interventions aimed at promoting awareness of the link between smoking depiction in movies and proximal initiation of tobacco use among youth, may be needed. Our results also support the use of social media and mass media platforms as assertive communication interventional tools that may enhance public support for tobacco legislation.

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#### CONFLICTS OF INTEREST

The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none was reported.

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#### ETHICAL APPROVAL AND INFORMED CONSENT

Ethical approval was not required for this study, as this is a secondary analysis of a de-identified, publicly available dataset. HINTS 5 study was approved by the Westat IRB (Date: 28 March 2016) and was subsequently reviewed by the NIH Office of Human Subjects Research, and given a

non-human subjects determination via exemption #13204 (Date: 25 April 2016). Written informed consent for H5c4 was obtained from study participants.

#### DATA AVAILABILITY

The data supporting this research are available from the HINTS 5 methodology report at [https://hints.cancer.gov/docs/methodologyreports/HINTS5\\_Cycle4\\_MethodologyReport.pdf](https://hints.cancer.gov/docs/methodologyreports/HINTS5_Cycle4_MethodologyReport.pdf)

#### PROVENANCE AND PEER REVIEW

Not commissioned; externally peer reviewed.