Exposure to smoking in soap operas and movies: smoking cessation and attempts to quit

Exposição ao cigarro em telenovelas e filmes: tentativas de parar de fumar e abstinência

Exposición al tabaco en telenovelas y películas: dejar de fumar e intentos de abandono de este hábito

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Abstract

The objectives of this research were to evaluate whether there was an association between seeing an actor smoke in telenovelas, Brazilian films, or international films, and trying to quit and quitting among adult Brazilian smokers. Data from 39,425 participants in the Global Adult Tobacco Survey *were used. Quit ratio (former smoker/former smoker + ever smoker) and proportions of current, former, and never smokers were calculated. Multivariable weighted regression was used to determine significant associations between quitting smoking and exposure to telenovelas and films. For current smokers, the odds of trying to quit were significantly higher among those who saw an actor smoking in a Brazilian film. Those who believed smoking caused serious illness and had rules in the home prohibiting smoking were significantly more likely to have tried to quit or had quit smoking. Exposure to smoking in the media may be different in adults than adolescents. Influential factors for trying to quit and quitting are rules prohibiting smoking at home, belief that smoking causes serious illness, and hearing about dangers of smoking in media.*

Smoking Cessation; Smoking; Television; Adult

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Introduction

The morbidity and mortality of tobacco-related diseases have been studied extensively in the developed world. With globalization, tobacco consumption has shifted so that almost 80% of the world's smokers now live in low- and middle-income countries [1]. Although tobacco-related deaths are expected to increase by 50% in developed countries over the next century, an increase of 700% is predicted in low- and middle-income countries [2,3].

Over 180,000 Brazilians die every year from tobacco-related diseases [4]. Of all deaths in Brazil, 13% were attributable to smoking, equivalent to 357 deaths per day from tobacco-related disease [5]. The overall prevalence of smoking in Brazil among people 18 years or older in 2013 was 15% (21.9 million people), a significant reduction from the 34% reported in 1989 [6,7]. There was a concomitant decline in tobacco usage among individuals aged 25 years or less [8,9,10]. This reduction could largely be attributed to tobacco control measures including price increases, smoke-free air laws, marketing restrictions, health warnings, anti-smoking media campaigns, and cessation treatment programs [11].

At the time this study was conducted, Brazil had prohibited tobacco use in public places such as schools, government buildings, theaters, and public transportation. However, smoking was permitted in public and private enclosed places if there was a ventilated designated smoking area. A federal law also introduced graphic warnings on one side of cigarette packages and prohibited tobacco advertisements in magazines, newspapers, television, radio, and outdoor billboards, restricting tobacco advertisements to points of sale only [12]. Since the time of this study, Brazil has passed new tobacco control measures, including Article 49 of *Law 12.546* [13], which requires warnings on 30% of the front of a cigarette pack in addition to the 100% warning covering the back of the pack, prohibits the advertisements of cigarettes everywhere including points of sale, and bans smoking in all enclosed workplaces and public places. However, it does not prohibit smoking imagery in media [14,15,16].

The association between exposure to smoking imagery and advertising in movies, television, magazines, newspapers, and the internet, and its effect on smokers has been studied extensively in developed nations [17,18,19,20,21,22], where almost half of popular films contained tobacco imagery. A positive association has been seen between exposure to smoking imagery and initiation among non-smokers. Dalton et al. [23] observed that 10% of adolescents aged 10-14 years exposed to smoking in films initiated smoking within a 13-26 month follow up period. These findings are consistent with other studies [24,25,26].

There is less information about the associations between exposure to smoking imagery in media and trying to quit and quitting among current smokers. In Brazil, there is one television for every 4.5 persons. *Telenovelas*, a very popular type of soap opera, are the most frequently watched television programs in Brazil, inextricably a part of Brazilian life and culture. Brazilians watch an average of 3 to 4 *telenovelas* daily, smoking is commonly portrayed in these, and one study showed that 47.9% of Brazilian adults noticed an actor or character smoking in *telenovelas* 30 days prior to the survey [27,28]. This study uses cross-sectional data from the Brazilian 2008 *Global Adult Tobacco Survey* (GATS) to evaluate the associations between exposures to smoking imagery in various media on trying to quit and quitting smoking.

Materials and methods

Study design

This is a cross-sectional study of Brazilian adults, ages 15 years and older, surveyed in 2008, which evaluated the associations between exposure to smoking in Brazilian television and domestic and international films and trying to quit and quitting smoking.

Questionnaire

In February 2007, the World Health Organization (WHO) and US Centers for Disease Control and Prevention (CDC) launched the GATS as part of the *Global Tobacco Surveillance System* to monitor and

measure tobacco use in 14 low- and middle-income countries [1]. The countries studied account for 61% of the world's adult population and 62% of the world's adult smokers [29]. GATS has subsequently expanded to cover a total of 19 low- and middle-income countries [30]. In Brazil, GATS was part of the *Brazilian National Household Sample Survey* (PNAD) [28].

GATS Brazil uses a standardized core questionnaire that is approved by the GATS Collaborative Group of international experts. The survey instrument covers socio-demographic characteristics; tobacco and smokeless tobacco usage; several cessation-related behaviors; secondhand smoke exposures; economic issues; media exposures to tobacco control and popular imagery; and knowledge, attitudes, and perceptions about tobacco use. Some changes were made to the original GATS questionnaire to better reflect the socio-cultural characteristics of the Brazilian population [28]. For GATS Brazil, portable handheld devices were used to collect data. Details of the interview process and data compilation are given elsewhere [28].

Study population

GATS Brazil included both males and females aged 15 years and older living in private or collective households throughout Brazil. Residents were defined as Brazilian citizens or non-citizens who had lived in Brazil for at least half the time during the previous year and who consider the selected household to be their primary residence. People living in embassies, consulates, and legations were excluded, as were those living in institutional households including barracks, prisons, schools, orphanages, nursing homes, hospitals, convents, or monasteries [28].

PNAD employs stratified multistage cluster sampling in which probability-proportional-to-size random selection methods are used to select household samples in several stages in order to adequately represent the population. PNAD had three selection stages: municipalities in the first, census tracts in the second, and private and collective households in the third. The final stage in GATS Brazil randomly selected one resident 15 years of age or older from each household [28].

Because of the complex sampling design involving clustering and stratification, sample weights were used during data analysis to obtain accurate point estimates and variances that reflect tobacco use patterns in the total population [30]. Sample weights were designed to adjust for non-response (empty household, refusal to participate, etc.); the non-response rate varied by gender, and thus weighting was adjusted by gender as well [28].

GATS Brazil sought to interview 40,000 individuals, representative of Brazil's five geographical regions [28]. The final sample included 51,011 households, representing one-third of households. The household response rate was 95%, the person response rate was 98.9%, and the overall response rate was 94%. There were a total of 39,425 completed interviews including 33,680 in urban areas and 5,745 in rural areas [28].

Variables

The outcome variables of the study included: tried to stop smoking in last 12 months (yes, no); and smoking status (current smoker, former smoker, and never smoker). Categories for smoking status included "daily" and "less than daily" smokers as well as smoking any tobacco product.

The key exposure variables were "noticed an actor or character smoking on TV, in national films, in international films, or in stage play, in the last 30 days (yes, no)". The "no" category also included "not attend" and "did not know/remember".

Covariates included "had seen or heard information about the dangers of smoking on television, on the radio, in newspapers or magazines, on billboards, or on fliers (yes, no)", of which the latter three were collapsed into "other" to prevent over adjusting (these variables were found to be highly correlated); "had seen warning labels on cigarette packages (yes, no)"; "had seen signs promoting cigarettes in sales points, in national films, in international films, on the internet, or elsewhere (yes, no)", which were also collapsed into "any of the above". The "no" category also included "has not seen/heard" and "did not know/remember". Other confounders included whether participants believe smoking/secondhand smoke causes serious illness, stroke, heart attack, or cancer (yes, no), which were collapsed into "any of the above". The "no" category also included "did not know". Participants also reported

whether smoking was allowed inside the home (allowed, never allowed). The "allowed" category also included "is usually not allowed, with exceptions" and "there is no standard". Also included was whether participants believed advertising cigarettes in media was prohibited or not. The "not totally prohibited" category also included "did not know".

Other covariates included: sex, age group (15-24, 25-44, 45-64, and 65+), literacy (yes, no), highest level of school completed (< middle, middle to secondary, and some university), employment status (employed, unemployed), and self-reported race/skin color (Asian, Black, Brown, Indigenous, and White).

Analysis

Descriptive frequencies are reported for each exposure variable stratified by smoking status (former, current, or never smoker). Quit ratios were calculated by dividing former smoking prevalence by prevalence of ever having smoked (former + current). The odds ratio (OR) was used to evaluate the magnitude of the associations between exposures of interest (whether participants noticed an actor smoking in media, whether they had seen warnings about dangers of smoking in media or on cigarette packages, whether they had seen signs promoting cigarettes in media, their rule about smoking at home, their beliefs that smoking or secondhand smoke causes illness, stroke, heart attack, or cancer, their understanding of whether cigarette advertising is prohibited in media, gender, age, literacy, education, employment and race) and outcomes (trying to quit and quitting). Statistical significance was evaluated through the chi-square test. OR and 95% confidence intervals (95%CI) were calculated using Proc Logistic in SAS V.9.3 (SAS Inst., Cary, USA). The "surveyfreq" and "surveylogistic" procedures were used to account for cluster, strata, and weight factors.

Variables found to be significant from bivariate analyses at p < 0.10 were included in step-wise multivariable logistic regression models to evaluate associations with the outcomes of interest. Variables that were associated with outcomes at p < 0.05 were retained in the final model. Adjusted OR (aOR) and 95%CI are reported.

The order of variables included in the models was determined by significance and relevance. When there was a tie for significance between variables, the more relevant variable to the research question was entered first. After all significant variables from the bivariate analysis were introduced, interaction terms that were cited in the literature [31,32] were assessed.

Results

Of the 39,425 participants surveyed, 17.8% were current smokers, 18.8% were former smokers, and 63.4% were never smokers.

Tried to quit

Trying to quit was associated with noticing an actor smoking in a *telenovela* (OR = 1.31, 95%CI: 1.17; 1.47), a Brazilian film (OR = 1.38, 95%CI: 1.21; 1.56), or an international film (OR = 1.17, 95%CI: 1.04; 1.31, Table 1). However, after adjusting for noticing an actor smoking in a national film, the belief that smoking causes serious illness, the rule about smoking at home, seeing information about the dangers of smoking on television, gender, and race, trying to quit was not associated with noticing an actor smoking in a *telenovela* (aOR = 1.10, 95%CI: 0.96; 1.25) or an international film (aOR = 0.91, 95%CI: 0.78; 1.07, Table 2). Therefore, we cannot reject the null hypothesis that there is no association between trying to quit and exposure to smoking imagery in *telenovelas*.

The multivariable analysis also showed a significant association between trying to quit and noticing an actor smoking in a Brazilian film (aOR = 1.28, 95%CI: 1.08; 1.51) for adults aged 15 and older. In addition, the analysis showed that trying to quit was associated with seeing information about the dangers of smoking on television, the belief that smoking causes serious illness, the rules prohibiting smoking at home, the belief that advertising cigarettes in media is prohibited, female gender, and brown race. Interactions between seeing an actor smoking in a *telenovela*, Brazilian film, or international

Table 1

Associations between trying to quit and noticing smoking imagery on TV, national films, international films, other venues, among current smokers. Brazil *Global Adult Tobacco Survey* (GATS), 2008.

Characteristic	Total Proportion % (SE)	Tried to quit Prevalence % (SE)	OR (95%CI)
In the past 30 days, noticed actor smoking			
In *telenovelas*	49.1 (0.8)	44.4 (1.0)	1.31 (1.17; 1.47)
In Brazilian films	26.0 (0.7)	46.9 (1.4)	1.38 (1.21; 1.56)
In international films	36.9 (0.8)	43.5 (1.2)	1.17 (1.04; 1.31)
In a stage play	0.9 (0.1)	42.6 (6.4)	1.07 (0.64; 1.79)
Has seen or heard information about the dangers of smoking			
On television	64.5 (0.8)	44.8 (0.9)	1.56 (1.37; 1.77)
On the radio	32.2 (0.8)	45.7 (1.2)	1.32 (1.17; 1.49)
On newspapers or magazines, billboards, or fliers	41.1 (0.7)	45.6 (1.1)	1.42 (1.26; 1.59)
Any of the above	73.3 (0.7)	44.2 (0.9)	1.66 (1.45; 1.89)
Has seen warning labels on cigarette packages	87.7 (0.5)	42.3 (0.8)	1.56 (1.29; 1.88)
Has seen signs promoting cigarettes			
In cigarette sales points	36.7 (0.8)	41.5 (1.2)	1.03 (0.91; 1.16)
In Brazilian films	8.6 (0.4)	51.3 (2.4)	1.57 (1.30; 1.91)
In international films	10.2 (0.5)	48.0 (2.3)	1.37 (1.14; 1.65)
On the internet	3.2 (0.3)	49.7 (4.5)	1.43 (1.00; 2.05)
Elsewhere	1.8 (0.2)	60.7 (5.0)	2.25 (1.49; 3.40)
Any of the above	42.5 (0.8)	42.9 (1.1)	1.14 (1.01; 1.28)
Rule about smoking inside home	26.9 (0.7)	48.4 (1.6)	1.50 (1.31; 1.73)
Smoking tobacco causes			
Serious illness	93.0 (0.4)	42.6 (0.8)	2.95 (2.20; 3.95)
Stroke	70.1 (0.7)	44.5 (0.9)	1.63 (1.43; 1.86)
Heart attack	81.5 (0.6)	43.9 (0.8)	1.94 (1.65; 2.27)
Cancer	90.6 (0.5)	42.7 (0.8)	2.23 (1.77; 2.81)
Secondhand smoke causes illness	86.3 (0.5)	43.3 (0.8)	2.07 (1.72; 2.49)
Any of the above	94.1 (0.4)	42.5 (0.8)	3.29 (2.37; 4.55)
Believes that advertising cigarettes in media is prohibited	37.6 (0.8)	45.1 (1.1)	1.30 (1.67; 1.45)
Sex, female	39.8 (0.7)	44.8 (1.1)	1.29 (1.15; 1.46)
Age (years)			
65	7.8 (0.4)	36.2 (2.5)	0.79 (0.60; 1.03)
45-64	35.7 (0.7)	40.1 (1.2)	0.93 (0.77; 1.12)
25-44	42.0 (0.8)	42.6 (1.1)	1.03 (0.86; 1.24)
15-24	14.4 (0.6)	41.9 (2.1)	1.00
Knows how to read and write	84.5 (0.5)	42.0 (0.8)	1.30 (1.12; 1.52)
Highest level of school completed			
At least some university	8.0 (0.4)	37.7 (2.5)	0.85 (0.68; 1.06)
Middle to secondary (8-11 years)	32.7 (0.7)	40.6 (1.3)	0.95 (0.84; 1.08)
Less than middle (< 7 years)	59.3 (0.8)	41.8 (0.9)	1.00
Employed (Sept 21-27, 2008)	68.4 (0.7)	41.4 (0.9)	1.04 (0.92; 1.18)
Race			
Asian	0.7 (0.1)	39.3 (8.7)	1.01 (0.49; 2.08)
Black	9.2 (0.4)	41.1 (2.2)	1.09 (0.89; 1.34)
Brown	45.9 (0.8)	43.1 (1.0)	1.18 (1.05; 1.34)
Indigenous	0.4 (0.1)	37.7 (7.5)	0.95 (0.51; 1.78)
White	43.8 (0.8)	39.0 (1.1)	1.00

95%CI: 95% confidence interval; OR: odds ratio; SE: standard error.

Table 2

Associations of tried to quit and quitting with noticing an actor smoking in various media among all participants surveyed ages 15 and older. Brazil *Global Adult Tobacco Survey* (GATS), 2008.

Characteristic	Tried to quit aOR (95%CI)	Quit smoking (former vs. current) aOR (95%CI)
Noticed actor smoking on telenovela in last 30 days [ref.: no]	1.10 (0.96; 1.25)	1.01 (0.91; 1.12)
Noticed actor smoking in Brazilian films [ref.: no]	1.28 (1.08; 1.51)	0.96 (0.85; 1.10)
Noticed actor smoking in international films [ref.: no]	0.91 (0.78; 1.07)	0.94 (0.84; 1.06)
Has seen smoking danger warnings on television [ref.: no]	1.35 (1.18; 1.54)	–
Has seen smoking danger warnings in newspapers, magazines, billboards, fliers, or elsewhere [ref.: no]	–	1.33 (1.21; 1.47)
Has seen warning labels on cigarette packages [ref.: no]	–	0.25 (0.22; 0.28)
Believes that smoking tobacco causes serious illness [ref.: no]	2.72 (1.96; 3.77)	3.95 (3.11; 5.01)
Smoking inside home never allowed [ref.: allowed]	1.45 (1.26; 1.67)	2.80 (2.55; 3.08)
Believes that cigarette advertising is prohibited [ref.: not prohibited]	1.24 (1.10; 1.38)	–
Age (years) [ref.: 15-24]		
65	–	5.14 (4.18; 6.31)
45-64	–	2.60 (2.21; 3.06)
25-44		1.55 (1.31; 1.84)
Female [ref.: male]	1.31 (1.17; 1.48)	1.14 (1.04; 1.25)
Highest level of school completed [ref.: less than middle (< 7 years)]		
At least some university	–	1.56 (1.32; 1.84)
Middle to secondary (8-11 years)	–	1.23 (1.11; 1.37)
Race [ref.: white]		
Asian	1.06 (0.52; 2.19)	0.75 (0.42; 1.36)
Black	1.09 (0.89; 1.34)	0.72 (0.61; 0.84)
Brown	1.24 (1.10; 1.40)	0.90 (0.82; 0.99)
Indigenous	0.87 (0.45; 1.67)	0.97 (0.55; 1.73)
Employed (Sept 21-27, 2008) [ref.: unemployed]	–	0.85 (0.77; 0.94)

95%CI: 95% confidence ingterval; aOR: adjusted odds ratio for all of the other variables listed in the model.

film, and seeing or hearing information about the dangers of smoking on television were not significant at p < 0.05. Other variables significant at p < 0.10 from bivariate analyses can be found in Table 1.

Smoking status

Being a former smoker compared to a current smoker was negatively associated with noticing an actor smoking in a *telenovela* (OR = 0.86, 95%CI: 0.79; 0.93), a Brazilian film (OR = 0.80, 95%CI: 0.73; 0.88), or an international film (OR = 0.78, 95%CI: 0.72; 0.85, Table 3). However, after adjusting for seeing information about the dangers of smoking in newspapers, magazines, billboards, or fliers, seeing warning labels on cigarette packages, the belief that smoking tobacco causes serious illness, the rule about smoking at home, age, gender, the highest level of school completed, race, and employment status, having quit smoking was not associated with noticing an actor smoking in a *telenovela* (aOR = 1.01, 95%CI: 0.91; 1.12), a Brazilian film (aOR = 0.97, 95%CI: 0.85; 1.10), or an international film (aOR = 0.94, 95%CI: 0.84; 1.06, Table 2). Therefore, we cannot reject the null hypothesis that there is no association between smoking status and exposure to smoking imagery in *telenovelas*. The multivariable analyses also found that having quit smoking was negatively associated with seeing information about the dangers of smoking in newspapers, magazines, billboards, or fliers, seeing warning labels on cigarette packages, black and brown races and employment, and positively associated with the belief that smoking causes serious illness, rules that prohibited smoking at home, older age, female gender,

and higher education. Interactions between seeing an actor smoking in a *telenovela*, Brazilian film, or international film, and employment were not significant at p < 0.05. Other variables significant at p < 0.10 from bivariate analyses can be found in Table 3.

The quit ratios for smokers who noticed an actor smoking in a *telenovela*, a Brazilian film, or an international film were 49.3%, 47.2%, and 47.4%, respectively, compared to 53.3%, 52.8%, and 53.5% among those who did not.

Discussion

This study sought to determine whether trying to quit and quitting were associated with noticing an actor smoking in a *telenovela,* movies, or plays. Before adjusting for multiple covariates, there was a significant association between trying to quit and quitting, and seeing an actor smoking in these various media. After adjusting for covariates, however, most of these associations were no longer significant, except for the association between trying to quit and noticing an actor smoking in a Brazilian film. The analyses revealed significant associations with other variables that were included in the final models: rules prohibiting smoking at home, the belief that smoking causes serious illness, and seeing or hearing information about the dangers of smoking in media. These conditions appear to have a more significant influence on adult smokers who are trying to quit than only media exposure to smoking.

These results are in accordance with research [33,34,35,36,37,38] that suggests that the risk of being a current smoker or having ever smoked is significantly lower in homes where smoking is not permitted. Engaging family or household members in creating a smoke-free environment is one of the most effective means of reducing smoking [35,39,40,41,42].

This study also confirms that the belief that smoking and secondhand smoke cause serious illness is a significant positive influence on trying to quit. Our results indicate that trying to quit is almost three times more likely for someone who believes smoking causes serious illness than for someone who does not. This finding is also consistent with previous studies [43,44,45] that show health concern as the main motive for cessation.

Our results also suggest that seeing or hearing about the dangers of smoking in various media is associated with trying to quit. This further supports previous research [46,47] which demonstrated that mass media campaigns promote quitting, particularly those messages displaying negative health effects and that are emotionally evocative. Increasing exposure to anti-smoking media reinforces beliefs about the harms of smoking and increases smoking quit and intention to quit rates [43,48,49,50,51].

Trying to quit was associated with seeing an actor smoking in Brazilian films. Although this finding may appear counterintuitive, a closer examination of relevant studies may reveal an explanation. Many studies [36,46,52,53,54,55,56,57] suggest a dose-response relationship between smoking imagery in films and smoking initiation among adolescents and young adults. Other studies [33,58,59] linked exposure to smoking in films and craving among current smokers. This is the first study to our knowledge to focus on trying to quit, quitting, and quit ratios for adults, and the results suggest that exposure to smoking in media for adult smokers may have a different implication than exposure to smoking imagery for adolescents. Adults may be more likely to associate smoking imagery with serious health problems; they believe that smoking causes serious health illness, and they may be reminded of this when they see someone smoking in a film, which, in turn, makes them want to quit. They may, in fact, notice smoking more readily in films if they intend or have been trying to quit. Smokers who have no intention to quit may not notice smoking imagery since it is part of their social norm. However, the quit ratios were higher for those who did not notice an actor smoking than those who did. People who have already quit smoking may be less likely to notice smoking imagery than current smokers who are trying to quit.

After adjusting for other covariates, the exposure to smoking imagery in *telenovelas* and international films was not statistically significant. Interestingly, however, exposure to smoking in Brazilian films did have a significant association. One explanation for the lack of association with international film imagery is that Brazilians may be able to identify more with films from their own country. However, this would not explain why there was no similar finding for Brazilians watching *telenovelas*,

Table 3

Associations of smoking status and noticing smoking imagery in TV, national films, international films, theater, and confounders among all participants surveyed ages 15 and older. Brazil *Global Adult Tobacco Survey* (GATS), 2008.

Characteristic	Total	Current smoker	Former smoker	Never smoke	Quit ratio (%)	Being a former smoker vs. a current smoker
	Proportion % (SE)	Prevalence % (SE)	Prevalence % (SE)	Prevalence % (SE)	Former/(former + current)	OR (95%CI)
In the past 30 days, noticed actor smoking						
In telenovelas	47.6 (0.4)	17.7 (0.4)	17.3 (0.3)	65.0 (0.4)	49.3	0.86 (0.79; 0.93)
In Brazilian films	25.9 (0.4)	17.2 (0.5)	15.4 (0.4)	67.4 (0.6)	47.2	0.80 (0.73; 0.88)
In international films	37.2 (0.4)	17.1 (0.4)	15.4 (0.4)	67.6 (0.5)	47.4	0.78 (0.72; 0.85)
In stage play	1.1 (0.1)	13.8 (1.7)	14.0 (1.9)	72.2 (2.4)	50.4	0.96 (0.66; 1.40)
Has seen or heard information about dangers of smoking						
On television	63.9 (0.4)	17.3 (0.3)	18.4 (0.3)	64.2 (0.4)	51.6	1.02 (0.94; 1.10)
On the radio	30.3 (0.4)	18.3 (0.4)	20.4 (0.4)	61.4 (0.5)	52.7	1.08 (0.99; 1.17)
In newspapers or magazines, billboards, or fliers	64.7 (0.3)	15.9 (0.3)	18.0 (0.3)	66.2 (0.4)	53.1	1.14 (1.05; 1.24)
Any of the above	73.7 (0.4)	17.1 (0.3)	18.4 (0.3)	64.6 (0.4)	51.8	1.06 (0.98; 1.16)
Has seen warning labels on cigarette packages	68.9 (0.4)	21.9 (0.3)	17.0 (0.3)	61.1 (0.4)	43.7	0.26 (0.23; 0.28)
Has seen signs promoting cigarettes						
In cigarette sales points	30.4 (0.4)	20.8 (0.5)	16.6 (0.4)	62.7 (0.6)	44.4	0.66 (0.61; 0.72)
In Brazilian films	8.6 (0.2)	17.1 (0.8)	15.7 (0.7)	67.2 (1.0)	47.8	0.85 (0.74; 0.98)
In international films	11.3 (0.2)	15.4 (0.7)	16.6 (0.7)	68.0 (0.9)	51.7	1.02 (0.89; 1.16)
On the internet	4.7 (0.1)	11.6 (1.0)	10.2 (0.9)	78.2 (1.2)	46.9	0.83 (0.65; 1.07)
Elsewhere	1.8 (0.1)	17.3 (1.6)	19.3 (1.8)	63.4 (2.3)	52.8	1.06 (0.80; 1.40)
Any of the above	38.5 (0.4)	18.9 (0.4)	16.4 (0.4)	64.7 (0.5)	46.1	0.72 (0.66; 0.79)
Smoking inside home not allowed	46.8 (0.4)	9.9 (0.3)	19.3 (0.4)	70.8 (0.4)	66.2	2.64 (2.46; 2.93)
Smoking tobacco causes						
Serious illness	96.1 (0.2)	16.6 (0.2)	18.3 (0.3)	65.1 (0.3)	52.4	2.21 (1.83; 2.68)
Stroke	73.1 (0.4)	16.5 (0.3)	18.7 (0.3)	64.9 (0.4)	53.1	1.28 (1.18; 1.40)
Heart attack	85.6 (0.3)	16.3 (0.3)	18.5 (0.3)	65.2 (0.3)	53.1	1.53 (1.37; 1.71)
Cancer	94.7 (0.2)	16.4 (0.2)	18.3 (0.3)	65.3 (0.3)	52.6	2.03 (1.73; 2.38)
Secondhand smoke causes illness	91.4 (0.2)	16.2 (0.2)	18.3 (0.3)	65.5 (0.3)	53.0	1.84 (1.61; 2.09)
Any of the above	96.7 (0.2)	16.7 (0.2)	18.3 (0.3)	65.0 (0.3)	52.2	2.20 (1.80; 2.70)
Believes that advertising cigarettes in media is prohibited	36.3 (0.4)	17.8 (0.4)	18.7 (0.4)	63.5 (0.5)	51.3	0.99 (0.91; 1.08)
Sex, female	52.1 (0.3)	13.1 (0.3)	15.2 (0.2)	71.7 (0.4)	53.7	1.17 (1.08; 1.27)
Age (years)						
65	10.4 (0.2)	12.9 (0.6)	36.4 (0.9)	50.7 (0.9)	73.9	6.09 (5.12; 7.24)
45-64	27.0 (0.3)	22.7 (0.5)	29.2 (0.6)	48.0 (0.6)	56.3	2.77 (2.40; 3.20)
25-44	39.5 (0.3)	18.3 (0.4)	13.5 (0.3)	68.2 (0.4)	42.5	1.59 (1.37; 1.84)
15-24	23.1 (0.3)	10.7 (0.4)	5.0 (0.3)	84.3 (0.5)	31.8	1.00
Knows how to read and write	90.2 (0.2)	16.1 (0.2)	17.0 (0.2)	66.9 (0.3)	51.4	0.99 (0.89; 1.10)
Highest level of school completed						
At least some university	12.6 (0.3)	10.9 (0.5)	15.7 (0.7)	73.4 (0.8)	59.0	1.38 (1.19; 1.60)
Middle to secondary (8-11 years)	41.3 (0.3)	13.6 (0.3)	13.4 (0.3)	73.0 (0.4)	49.7	0.94 (0.86; 1.03)
Less than middle (< 7 years)	46.1 (0.4)	22.1 (0.4)	23.1 (0.4)	54.8 (0.5)	51.1	1.00
Employed (Sept 21-27, 2008)	60.9 (0.3)	19.3 (0.3)	17.2 (0.3)	63.5 (0.4)	47.2	0.63 (0.58; 0.68)
Race						
Asian	0.7 (0.1)	16.9 (2.8)	18.3 (3.3)	64.8 (4.0)	52.0	0.91 (0.55; 1.51)
Black	7.4 (0.2)	21.3 (0.9)	17.8 (0.8)	60.9 (1.0)	45.5	0.70 (0.61; 0.81)
Brown	42.3 (0.4)	18.6 (0.4)	18.1 (0.4)	63.3 (0.5)	49.3	0.82 (0.75; 0.89)
Indigenous	0.4 (0.4)	18.4 (3.7)	25.4 (4.3)	56.2 (5.1)	58.0	1.16 (0.66; 2.05)
White	49.2 (0.5)	15.3 (0.3)	18.2 (0.4)	66.5 (0.5)	54.4	1.00

95%CI: 95% confidence interval; OR: odds ratio; SE: standard error.

which are very popular soap operas watched daily by a large percentage of the Brazilian population [60,61]. One possible explanation for the difference in reaction to smoking imagery in *telenovelas* versus smoking in Brazilian films may be the composition of the population watching the imagery. While this was not examined as a part of this study, there may be differences in socioeconomic status between the population viewing *telenovelas* and the population attending the theater to watch Brazilian films. A report by the Motion Picture Association of America [62] found that people who attend theaters to watch films tend to be of a higher socioeconomic status than those who are limited to television viewing. Another factor that might play a role in explaining this finding is the frequency with which these two types of media are being viewed. *Telenovelas* appear daily on television [60,61]. People are therefore far more likely to see them frequently than they are to see an actor smoking in a Brazilian film shown in a theater.

As discussed above, although previous studies suggest that smoking imagery in the media is associated with initiation in adolescents and craving in current smokers, it may concomitantly be associated with a desire to quit among adult smokers if that population is also exposed to smoking warnings and develops a belief that smoking causes illness.

The findings of this study are subject to several limitations. The use of cross-sectional survey data limits our ability to make causal inferences between the exposure variables and trying to quit and quitting. The negative association between being a former smoker and noticing smoking imagery in *telenovelas* differs from the positive association between attempts to quit and noticing smoking imagery for current smokers. Other potential limitations to the data include self-reporting, recall, and survival biases [9,63]. Classification errors leading to residual confounding may also have influenced the associations described [64]. On the other hand, the study utilized the GATS data set, which provides a representative large sample. Additional longitudinal and qualitative studies are needed in order to understand the potential associations between smoking imagery in entertainment media and quitting behavior.

Conclusions

This study showed the most influential factors on trying to quit and quitting smoking were rules about not smoking at home, the belief that smoking causes serious illness, and seeing or hearing about the dangers of smoking in media. In addition, quit ratios were higher for those who did not notice an actor smoking than those who did. Interventions on smoking cessation in Brazil should focus on advertisements explaining that cigarettes are harmful and on education on the adverse health effects of smoking. More research is needed to understand any cause and effect relationships, including studies that can measure a dose-response for exposures and outcomes.

Recognizing that the present study is cross-sectional and focused only on Brazil, further studies to compare data between countries might help determine whether the outcomes are similar or vary across countries. For example, exposure to *telenovelas*, pervasive in Brazilian households, may be less important in other countries or regions of the world. The GATS data used here are also available for 19 other low and middle income countries, which might allow for fruitful comparisons of smoking and quitting patterns across nations [30].

Contributors

Z. J. Madewell researched the topic of study, wrote the first draft, performed analyses, assembled data, and coordinated the manuscript preparation. V. C. Figueiredo posed the research question, assisted with interpretation of data and manuscript editing. J. Harbertson contributed with analyses and interpretations, provided edits for the manuscript, and assisted with preparation of the abstract and tables. R. L. Pérez contributed with study background and provided edits for the abstract and discussion. T. Novotny contributed with study design, provided research contacts, and assisted throughout the preparation of the manuscript.

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Resumo

O objetivo foi avaliar a existência de uma associação entre o fato de ver um ator fumando em telenovela brasileira, filme brasileiro ou filme internacional e as tentativas de parar de fumar e abstinência entre fumantes adultos brasileiros. Foram utilizados os dados de 39.425 participantes da versão brasileira do Global Adult Tobacco Survey. *O estudo calculou a prevalência de ex-fumantes (ex- fumantes/ex-fumantes + fumantes atuais) e as proporções de fumantes atuais, ex-fumantes e indivíduos que nunca fumaram. Foi utilizada a regressão ponderada multivariada para testar associações significativas entre cessação e exposição ao tabagismo em telenovelas e filmes. Para fumantes atuais, as chances de tentar de parar foram significativamente mais altas entre aqueles que haviam visto ator fumando em filme brasileiro. Aqueles que acreditavam que o fumo causa doenças graves e tinham regras contra fumar em casa apresentavam chances significativamente maiores de terem tentativas de parar e de abstinência. A exposição ao tabagismo na mídia pode ser diferente em adultos e adolescentes. Fatores que influenciam as tentativas e o sucesso na cessação incluem as regras contra fumar em casa, a crença de que o fumo provoca doenças graves e receber informação sobre os perigos do tabagismo através da mídia.*

Abandono do Hábito de Fumar; Hábito de Fumar; Televisão; Adulto

Resumen

Este trabajo tiene el fin de evaluar si existe una asociación entre ver a un actor fumando en telenovelas brasileñas o películas internacionales y dejar de fumar o intentar dejarlo entre fumadores adultos brasileños. Se usaron datos de 39.425 participantes en la Global Adult Tobacco Survey. *La ratio de abandono de este hábito (ex fumadores/ex fumadores + fumadores) y los porcentajes de fumadores habituales, ex fumadores y no fumadores también fueron calculados. Se usaron análisis de regresión multivariable para determinar asociaciones significativas entre dejar de fumar y la exposición a telenovelas y películas. Para los fumadores habituales, la probabilidad de intentar dejar de fumar fueron significativamente mayores entre quienes vieron a un actor fumando en una película brasileña. Aquellos que creyeron que fumar causaba enfermedades serias y tenían normas en casa prohibiendo fumar eran más significativamente propensos a haber intentado dejar de fumar o haberlo dejado. La exposición al tabaco en los medios audiovisuales puede diferir entre adultos y adolescentes. Existen factores que influencian intentar o dejar de fumar y son: normas prohibiendo fumar en casa, y la creencia de que el tabaco provoca enfermedades muy serias, así como informarse sobre los peligros del tabaco en los medios de comunicación.*

Cese del Tabaquismo; Hábito de Fumar; Televisión; Adulto