Original Investigation

Association of Media Literacy With Cigarette Smoking Among Youth in Jujuy, Argentina

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Abstract

Introduction: Latin America has the highest prevalence of tobacco use by youth. Higher media literacy, defined as the ability to analyze and evaluate media messages, has been associated with lower smoking among youth in the United States. The objective of this study was to determine whether media literacy related to smoking is independently associated with current smoking and susceptibility to future smoking in a sample of mostly indigenous youth in Jujuy, Argentina.

Methods: In 2006, a self-administered survey was conducted among 10th grade students sampled from 27 randomly selected urban and rural schools in Jujuy. Survey items measured smoking behavior (ever, never, and current), susceptibility to future smoking among never-smokers (definitely not accept a cigarette from a friend or to smoke in the future), 5 items assessing smoking media literacy (SML), and risk factors for smoking.

Results: Of the 3,470 respondents, 1,170 (34%) reported having smoked in the previous 30 days (current). Of the 1,430 students who had never smoked, 912 (64%) were susceptible to future smoking. High media literacy was present in 38%. Using multiple logistic regression, fully adjusted models showed that high media literacy was significantly associated as a protective factor of being a current smoker (odds ratio [OR] = 0.81; 95% CI = 0.67–0.97) and of being susceptible to future smoking (OR = 0.73; 95% CI = 0.58–0.92) among those who had never smoked.

Conclusions: Among youth in Jujuy, higher SML was significantly associated with both lower current smoking and susceptibility to future smoking. Teaching SML may be a valuable component in a prevention intervention in this population.

Introduction

Smoking initiation usually occurs before 18 years of age (U.S. Department of Health and Human Services, 1994), and Latin America has the highest prevalence of tobacco use by youth (The Global Youth Tobacco Survey Collaborative Group, 2002, 2003). In Argentina, the Global Youth Tobacco Survey found that 30.2% of students aged 13–15 years smoked cigarettes (Centers for Disease Control and Prevention, 2000).

Research has demonstrated a strong association between exposure to certain mass media messages and smoking among adolescents and between smoking imagery shown in movies and youth smoking initiation (Charlesworth & Glantz, 2005; Hanewinkel & Sargent, 2007; Heatherton & Sargent, 2009; National Cancer Institute, 2008; Wilkinson et al., 2009). Media literacy, defined as the ability to analyze and evaluate media messages (Centers for Disease Control and Prevention, 1998), may buffer the association between media messages and smoking and potentially affects attitudes and normative beliefs related to smoking, influencing actual smoking behavior. For example, increased information processing and critical analysis of a pro-tobacco media message may lessen an individual's belief in the message's implied benefits of smoking (Kupersmidt, Scull, & Austin, 2010; Levin-Zamir, Lemish, & Gofin, 2011) and may reduce the individual's perception that smoking is a normative behavior (B. Primack, Switzer, & Dalton, 2007). Thus, teaching skills to decode media meanings and to critically evaluate

message content (American Academy of Pediatrics, 1999) will increase media literacy and may ultimately lessen the impact of a protobacco message on participant behavior (Centers for Disease Control and Prevention, 2003; Kupersmidt et al., 2010; Levin-Zamir et al., 2011; Page, Huong, Chi, & Tien, 2011). The use of media literacy materials has been recommended for reducing tobacco use (American Academy of Pediatrics, 1999; Centers for Disease Control and Prevention, 1998).

Argentinean adolescents are also heavy consumers of mass media, and a survey conducted in 2006 reported that the total daily time in contact with media (TV, radio, newspaper, movies, books, and Internet) for adolescents between 11 and 17 years old was 6 hr/day, that the average time spent in front of the television was 2–3 hr/day, and that their average use of internet was between 30 and 60 min/day (Argentina: Ministerio de Educación, 2006). We previously reported analyses of factors associated with current cigarette smoking (having smoked a cigarette in the previous 30 days) in a representative sample of 8th grade students from Jujuy, Argentina (Alderete, Kaplan, Gregorich, Mejia, & Perez-Stable, 2009). The purpose of this study was to determine whether smoking media literacy is independently associated with current smoking and susceptibility to future smoking in this sample of youth.

Methods

Setting, Participants, and Procedures

The study setting was in Jujuy, Argentina, a northwest province where a majority of the population is of indigenous background, and tobacco farming is an important economic activity (Argentina: Ministerio de Ciencia Tecnología e Innovación Productiva, 2004; Mejia & Pérez-Stable, 2006). Respondents were sampled from secondary schools (8th through 12th grades) and were randomly selected within one of three geographical regions. A detailed description of the population and procedures was previously published. (Alderete et al., 2009). Students were surveyed once a year using a self-administered Spanish language questionnaire conducted in class with research staff and school coordinators present as proctors. The cross-sectional analysis presented here corresponds to data obtained in the 2006 survey. The study was approved by the human research board at "Centro de Educación Médica e Investigaciones Clínicas" in Buenos Aires, Argentina, and the University of California San Francisco (UCSF) Committee on Human Research.

SML Scale

The main explanatory variable for the current analysis was the SML scale, 18 items used to assess SML and its relationship to smoking history among students in the United States (B. A. Primack, Gold, Land, & Fine, 2006; B. A. Primack & Hobbs, 2009; B. A. Primack, Sidani, Carroll, & Fine, 2009). For this study, 9 of the 18 items were selected based on relevance to this population. Items in English underwent forward–backward translation and were reconciled by two native Spanish speakers.

Factor analysis with oblique rotation was conducted to assess the factor structure of the nine media literacy items and showed one factor with good reliability (Cronbach alpha = .79). The five items were "When people make movies and TV shows, every camera shot about smoking is very carefully planned,"

"There are often hidden messages in cigarette ads," "Most movies and TV shows that show people smoking make it look more attractive than it really is," "Cigarette ads show green, natural, healthy scenes to make people forget about the health risks," and "When you see a smoking ad, it is very important to think about what was left out of the ad." Students were asked to respond to each of these items with options ranging from 1 (*strongly disagree*) to 4 (*strongly agree*). High media literacy was defined as an average response score ≥ 3 based on prior published work (B. A. Primack et al., 2009).

Other Explanatory Variables

To report their ethnic background, students had to choose between being Indigenous, of mixed indigenous and European background (referred to as Mixed), or European (single response). Students also reported parent's formal education and employment status, the number of adults in the household, if they were catholic or not, whether they have ever repeated a grade, whether they drank at least one "serving" of alcohol in the previous week, whether adults smoked at home, the number of their friends who smoked, and whether they were employed during the school year. Depression was ascertained by asking whether the respondent had felt sad and could not carry on his/her normal activities for at least 2 weeks in the past year (Benjet et al., 2007). Thrill-seeking attitude was assessed by three items from an established scale using a 5-point disagreement–agreement response set (Vega, Zimmerman, Warheit, Apospori, & Gil, 1993).

Smoking Behavior

Current smokers reported smoking at least one cigarette in the 30 days prior to the survey. Never-smokers reported that they had never smoked cigarettes. Susceptibility to future smoking, defined as the absence of having made a decision not to smoke in the future, constitutes a stage of the smoking continuum that precedes experimentation and during which the never-smoker is susceptible to take up smoking (Conrad, Flay, & Hill, 1992; Flay, d'Avernas, Best, Kersell, & Ryan, 1983; Flay, Hu, & Richardson, 1998; Pierce, Choi, Gilpin, Farkas, & Merritt, 1996). It was measured only among never-smokers and assessed using two of three items from a validated scale (Pierce et al., 1996), "If one of your best friends were to offer you a cigarette, would you smoke it?" and "Do you think you will be smoking cigarettes one year from now?" To be classified as nonsusceptible, a student had to answer "definitely not" to both questions. Among the U.S. adolescents who never smoked, those lacking a commitment not to smoke are more likely to try a cigarette in the ensuing 4 years (Pierce et al., 1996).

Data Analysis

Descriptive analysis compared the sample by current smoking status and susceptibility to smoking using chi-square test for categorical variables. Statistical significance was defined with a two-sided alpha of .05.

We fit a logistic model regressed current smoking outcomes onto the binary indicator of SML using generalized estimating equations to account for clustering of students within schools. We performed an unadjusted model and two adjusted models by adding sequentially the following covariates: demographic and family characteristics variables (age, gender, ethnicity, parent's education level, parent's employment status, and two

Table 1. Individual and Family Characteristics and Tobacco Use Risk Factors of the of 3,470 Youth Aged 12–17 years, Proportion of Current Smokers by These Characteristics, and Proportion of Never-Smokers Susceptible to Future Smoking by These Characteristics, Jujuy, Argentina, 2006

	Total sample (N = 3,470) Percent[a]	N and % current smokers by each variable N (%)	N of never-smokers and % susceptible to future smoking by each variable[b] N (%)
Individual characteristics (N)			
Age			
≤14 (163)	5	43 (26)**	79 (58)
15 (1,943)	56	573 (29)	870 (64)
16 (864)	25	328 (37)	319 (68)
17 (480)	14	226 (47)	157 (59)
Gender			
Boys (1,635)	47	616 (38)**	648 (64)
Girls (1,835)	53	554 (30)	777 (64)
Ethnicity			
Indigenous (2,321)	67	790 (34)	947 (66)*
European (306)	9	102 (33)	135 (53)
Mixed (740)	21	240 (32)	305 (65)
Work during class period			
Yes (495)	14	229 (46)**	159 (64)
No (2,953)	85	934 (32)	1256 (64)
Religion: Catholic			
Yes (2,913)	84	1011 (35)**	1157 (67)**
No (538)	16	155 (29)	256 (52)
Ever repeated a grade			
Yes (1,440)	42	632 (44)**	483 (71)**
No (2,013)	58	535 (27)	932 (61)
Family characteristics			
Parental education			
No education (196)	6	73 (37)**	81 (69)*
Elementary school (1,413)	41	503 (36)	562 (68)
High school (1,122)	32	391 (35)	462 (62)
More than high school (711)	20	188 (26)	313 (58)
Parental employment status			
Employed (2,542)	73	826 (32)**	1073 (63)
Welfare (474)	14	170 (36)	184 (66)
Unemployed (165)	5	46 (28)	72 (68)
Retired (251)	7	106 (42)	84 (64)
Two parents in household			
Yes (2,286)	66	721 (32)**	1012 (64)
No (1,180)	34	446 (38)	413 (65)
Other risk factors			
Parent(s) smoke at home			
Yes (1,628)	47	638 (39)**	588 (69)**
No (1,798)	52	524 (29)	816 (61)
Friends who smoke			
None (381)	11	21 (6)**	263 (44)**
One to four friends smoke (770)	22	184 (24)	369 (67)
Five or more friends smoke (1,991)	57	858 (43)	655 (72)
Alcohol use in previous week			
Yes (1,233)	36	810 (66)**	188 (81)**
No (2,161)	62	330 (15)	1217 (61)
Depressive symptoms			
Yes (1,332)	38	517 (39)**	482 (72)**
No (2,054)	59	632 (31)	903 (60)

Table 1. Continued

Table 1. Continued

	Total sample (N = 3,470) Percent[a]	N and % current smokers by each variable N (%)	N of never-smokers and % susceptible to future smoking by each variable[b] N (%)
Thrill-seeking attitude			
Yes (454)	13	215 (47)**	142 (73)*
No (3,001)	86	948 (32)	1278 (63)
High SML (1,302)	38	404 (31)**	557 (61)*
Low SML (2,168)	62	766 (35)	868 (66)

Note. Significance level indicated as follows: **$p < .01$. *$p < .05$. SML = smoking media literacy.

[a]Totals may not add to 100% due to missing data.

[b]Five students with unknown susceptibility status were not included.

parents household) and other risk factors (parental smoking, friends smoking, depressive symptoms, thrill seeking orientation, alcohol use in the past week, work during class period, religion, and ever repeated a grade). Following a similar procedure, we then assessed the association between media literacy items and susceptibility to smoking among those students who had never smoked.

Results

In 2006, 3,752 students or 92% of those present in class between 12 and 17 years completed the survey. Of these, 282 (8%) were excluded from the analysis (missing gender: 1, <1%; discordant answers about smoking status: 137, 4%; unknown smoking status: 5, <1%; and missing responses to SML scale: 139, 4%) for a final sample of 3,470.

Demographics and Smoking Behavior

Table 1 summarizes the individual and family characteristics and tobacco use risk factors of the sample, the proportion who were current smokers and the proportion of never-smokers who were susceptible to future smoking. Girls represented about half of the sample (53%), and the majority of respondents were of indigenous (67%) or mixed Indigenous/European (21%) ethnicity. About a third of students (34%) reported having

smoked in the previous 30 days, and among the 1,430 never-smokers, 912 (64%) were susceptible to future smoking.

Smoking Media Literacy

High SML was reported by 38% of the students. For most individual items, there was no significant difference between the groups (data not shown). Nevertheless, students with high SML were less likely to be current smokers, and among those students who had never smoked, those with high SML were less likely to be susceptible to future smoking (Table 1).

SML, Current Smoking, and Susceptibility to Future Smoking

Unadjusted models showed that students with higher media literacy had lower odds of being current smokers (odds ratio [OR] = 0.83; 95% CI = 0.73–0.95; Table 2). Due to missing data, the iterative addition of sets of variables into the model caused a reduction in the total number of students included in the analysis when adding demographic and family characteristics ($N = 156$; model 2) and in the fully adjusted model ($N = 510$; model 3), and the total sample was reduced to 2,804. Nevertheless, the association remained significant after adjustments ($OR = 0.81$; 95% $CI = 0.67–0.97$; Table 2).

We also assessed the association between media literacy and susceptibility to smoking. Of the 1,430 students who never

Table 2. Multivariate Associations Between SML Scale and Smoking Outcomes

SML scale	Current smoker[a]		Susceptibility to smoke[b] (never-smokers only)	
	OR (95% CI)	p Value	OR (95% CI)	p Value
Model 1	0.83 (0.73–0.95)	.007	0.79 (0.65–0.97)	.024
Model 2	0.84 (0.72–0.97)	.015	0.79 (0.64–0.97)	.025
Model 3	0.81 (0.67–0.97)	.025	0.73 (0.58–0.92)	.007

Note. Generalized estimating equation models accounting for clustering by school of attendance. Model 1: unadjusted. Model 2: adjusted for age, gender, ethnicity, parent's education level, parent's employment status, two parents household. Model 3: model 2 + parental smoking, friends smoking, depressive symptoms, thrill seeking orientation, alcohol use in the past week, work during class period, religion, and ever repeated a grade. OR = odds ratio; SML = smoking media literacy.

[a]Odds of being a current smoker (vs. non- and ex-smokers) for those who responded to survey items in a way that denotes high media literacy ($OR = 1$ for students with low media literacy).

[b]Odds of being susceptible to smoke for those who responded to survey items in a way that denotes high media literacy ($OR = 1$ for students with low media literacy).

smoked, 5 (0.4%) did not answer both susceptibility questions and 276 were excluded due to missing data in models 2 and 3. In all models, high SML was associated with lower odds of being susceptible to future smoking (unadjusted: *OR* = 0.79, 95% *CI* = 0.65–0.97; fully adjusted: *OR* = 0.73, 95% *CI* = 0.58–0.92; Table 2).

Discussion

Our study is the first to assess the association between media literacy and smoking prevalence among youth in a Latin American country. We found that higher SML was significantly associated with both lower current smoking among all students and less susceptibility to future smoking among students who had never smoked. These findings are consistent with prior data showing SML to be independently associated with reduced smoking outcomes among students in the United States (B.A. Primack et al., 2006, 2009).

An important limitation of this study involves the measurement of media literacy using Likert-type items such as these. Although these items may measure aspects of media literacy, such as knowledge about media, they are not as able to detect differences in "active processing" of media messages (Austin, Pinkleton, Hust, & Cohen, 2005; Pinkleton, Weintraub, Cohen, Miller, & Fitzgerald, 2007). It is possible that using a more complete measure of media literacy may have led to different results. These items are also prone to social response bias because they were all worded positively, and thus, possible "test-taking" skills rather than media literacy was evaluated. Future studies should include more neutral and/or negatively worded items in media literacy assessments.

Our use of cross-sectional data is also a limitation. Although it makes theoretical sense to determine that SML has an impact on smoking behavior, causality or temporal relationships cannot be inferred from our results. Finally, we used only 5 of the original 18 items of the media literacy scale. These items do not represent all domains from the original instrument; however, we selected these five items based on a systematic process involving relevance in this population and factor analysis and not based on their associations with smoking outcomes.

By extending previously reported observations among U.S. adolescents of an association between SML and both current cigarette smoking and susceptibility to future smoking to a culturally and geographically different population, this study supports the presence of common themes and mechanisms for behavior change among youth. Future longitudinal research will be necessary to evaluate the potential causal association between media literacy and smoking behavior. There is sufficient evidence now to evaluate the incorporation of a media literacy curriculum as a standard component of school-based education and to investigate anti-SML interventions among diverse populations.

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Declaration of Interests

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