Original Investigation

Smoking Behaviors and Attitudes During Adolescence Prospectively Predict Support for Tobacco Control Policies in Adulthood

Jonathan T. Macy, Ph.D., M.P.H.,¹ Laurie Chassin, Ph.D.,² & Clark C. Presson, Ph.D.²

¹ Department of Applied Health Science, Indiana University, Bloomington, IN

² Department of Psychology, Arizona State University, Tempe, AZ

Corresponding Author: Jonathan T. Macy, Ph.D., M.P.H., Department of Applied Health Science, Indiana University, 1025 East 7th Street, Bloomington, IN 47405, USA. Telephone: 812-856-0704; Fax: 812-855-3936; E-mail: jtmacy@indiana.edu

Received July 22, 2011; accepted November 17, 2011

Abstract

Introduction: Several cross-sectional studies have examined factors associated with support for tobacco control policies. The current study utilized a longitudinal design to test smoking status and attitude toward smoking measured in adolescence as prospective predictors of support for tobacco control policies measured in adulthood.

Methods: Participants ($N = 4,834$) were from a longitudinal study of a Midwestern community-based sample. Hierarchical multiple regression analyses tested adolescent smoking status and attitude toward smoking as prospective predictors (after controlling for sociodemographic factors, adult smoking status, and adult attitude toward smoking) of support for regulation of smoking in public places, discussion of the dangers of smoking in public schools, prohibiting smoking in bars, eliminating smoking on television and in movies, prohibiting smoking in restaurants, and increasing taxes on cigarettes.

Results: Participants who smoked during adolescence demonstrated more support for discussion of the dangers of smoking in public schools and less support for increasing taxes on cigarettes but only among those who smoked as adults. Those with more positive attitudes toward smoking during adolescence demonstrated less support as adults for prohibiting smoking in bars and eliminating smoking on television and in movies. Moreover, a significant interaction indicated that those with more positive attitudes toward smoking as adolescents demonstrated less support as adults for prohibiting smoking in restaurants, but only if they became parents as adults.

Conclusions: This study's findings suggest that interventions designed to deter adolescent smoking may have future benefits in increasing support for tobacco control policies.

Introduction

Because of the tremendous burden of disease that results from cigarette smoking, a variety of interventions have been implemented to prevent and reduce tobacco use. Increasingly, interventions

have involved changing public policy related to the use, manufacture, and sale of tobacco products. Bierer and Rigotti (1992) described three categories of policy measures. The first category, efforts to inform or persuade, includes policies that require warning labels, mandatory education programs in schools and through the mass media, restrictions on tobacco advertising, and the issuance of government reports. Second, economic incentives to discourage tobacco use includes increased tobacco taxation, insurance incentives such as higher premiums for smokers and covering the cost of smoking cessation treatment, and changing the tobacco crop price support system to encourage the growing of alternative crops. The third category, direct restraints on tobacco use, includes restricting smoking in certain places, restricting sales of tobacco to minors or through certain means such as vending machines, and regulating production of tobacco products. The current study tests predictors of adults' support for policy options from each of the three categories.

Importantly, tobacco control policies have been shown to be effective in reducing smoking behavior. For example, there is significant evidence that laws that restrict smoking in public places and workplaces result in quitting smoking or smoking less (Bauer, Hyland, Li, Steger, & Cummings, 2005; Fichtenberg & Glantz, 2002; Hahn et al., 2008; Moskowitz, Lin, & Hudes, 2000), and policy-based approaches have been shown to be effective in reducing youth tobacco use (Forster, Widome, & Bernat, 2007). Despite these successes, there is not always widespread public support for tobacco control policies. Poland et al. (2000) found that certain segments of both the smoking and nonsmoking populations (e.g., "adamant" smokers and "unempowered" and "laissez-faire" nonsmokers) were relatively unsupportive of smoking restrictions. In addition, recent research has found a lack of public support for restrictions on point-of-sale tobacco product marketing (Schmitt, Elek, Duke, & Watson, 2010). Therefore, effective tobacco control policy campaigns must build grassroots support for the proposed policy (Cummings et al., 1991). Such support is needed to convince policy makers to enact legislation and to succeed with ballot initiatives or referenda that result in tobacco control policy change.

doi:10.1093/ntr/ntr301

Advance Access Published on December 21, 2011

© The Author 2011. Published by Oxford University Press on behalf of the Society for Research on Nicotine and Tobacco. All rights reserved. For permissions, please e-mail: journals.permissions@oup.com

Thus, an understanding of the modifiable determinants of support for tobacco control policies is needed to help move these efforts forward. Several studies have examined factors associated with support for policies. Findings have consistently demonstrated that adults who smoke are more likely to oppose tobacco control policy measures (Ashley, Bull, & Pederson, 1995; Bernat, Klein, Fabian, & Forster, 2009; Blake, Viswanath, Blendon, & Vallone, 2010; Hamilton, Beiner, & Rodger, 2005; Osypuk & Acevedo-Garcia, 2010; Poland et al., 2000; Quick, Bates, & Romina, 2009; Schumann et al., 2006; Smith et al., 2008). Blake et al. (2010) found that knowledge of the negative effects of tobacco was associated with positive attitudes toward tobacco control. A study of support for clean indoor air laws among young adults found that support was higher among those currently living with such laws (Bernat et al., 2009). In terms of sociodemographic characteristics, support for policies has been found to be more likely among females (Bernat et al., 2009; Doucet, Velicer, & Laforge, 2007; Hamilton et al., 2005; Osypuk & Acevedo-Garcia, 2010), racial/ethnic minorities (Doucet et al., 2007; Hamilton et al., 2005; Osypuk & Acevedo-Garcia, 2010), those with more education (Bernat et al., 2009; Doucet et al., 2007; Hamilton et al., 2005), and those with children (Hamilton et al., 2005). Findings regarding age have differed based on the policy measure under consideration. Hamilton et al. (2005) found that younger adults were more likely to support a tobacco tax increase, whereas Doucet et al. (2007) reported that older adults were more supportive of restrictions on advertising and promotion, increasing public education, and increasing environmental restrictions.

All the published studies to date have utilized cross-sectional designs to identify proximal determinants of support, measured in adulthood. The current study extends this work by utilizing a large, community-based, longitudinal sample to test whether or not smoking status and attitude toward smoking measured in adolescence retained any unique, long-term effects on adult support for tobacco control policies. Viewing this question from a life span development perspective, there are many reasons to expect connections between adolescence and adulthood (McLeod & Almazan, 2003). Indeed, other domains of substance use have demonstrated long-lasting connections between adolescent factors and adult behaviors (Schulenberg & Maggs, 2008). For example, Merline, Jager, and Schulenberg (2008) reported that several individual and contextual adolescent factors predicted adult alcohol use and abuse. In yet another health domain, adolescents' attitudes toward exercise and fitness predicted physical activity 5 and 10 years later (Graham, Sirard, & Neumark-Sztainer, 2011). If this connection holds true for adolescent smoking attitudes, then antismoking interventions targeted to adolescents might have long-term benefits not only in reducing smoking behavior but also in increasing the future levels of community support for tobacco control policies.

Because attitudes have been shown to be important predictors of behavior in general (Ajzen & Fishbein, 1977) and smoking behavior in particular (Rise, Kovac, Kraft, & Moan, 2008), we hypothesized that adolescents' attitudes toward smoking would predict support for tobacco control policies in adulthood. Specifically, we predicted that adolescents with more negative attitudes toward smoking and those who were nonsmokers as adolescents would report higher levels of support for tobacco control policies as adults. One explanation for this relation is

that adult variables mediate the effect of the adolescent factors on support for tobacco control policies. That is, adolescent smoking behavior and attitudes might be correlated with their later support for tobacco control policies only because adolescents with positive attitudes toward smoking grow up to be smokers or maintain their positive attitudes or smoking behavior in adulthood. Another possibility is that because adolescents who smoke or have prosmoking attitudes are more likely to be rebellious and reactant (Burt, Dinh, Peterson, & Sarason, 2000; Elkins, McGue, & Iacano, 2007; Forrester, Biglan, Severson, & Smolkowski, 2007; Fuemmeler, Kollins, & McLernon, 2007), their personality characteristics may make them less likely to support policy interventions, regardless of whether they maintain their smoking behavior and smoking attitudes in adulthood.

It is also possible that certain characteristics of adulthood might moderate the influence of adolescent smoking behavior and attitudes on support for tobacco control policies. For example, the effect of one's adolescent smoking behavior and attitudes on support for policies may differ based on parent status. Because those with children are more likely to support policies (Hamilton et al., 2005), many of which are intended to prevent children from starting to smoke (Forster, Widome, & Bernat, 2007), we predicted that the association between adolescent factors and adult support for policies would be stronger for those who became parents as compared with those who did not. Similarly, adult smoking status could have a moderating effect on the relation between adolescent smoking attitudes and behaviors and adult support for tobacco control policies. We predicted that the association between adolescent factors and adult support for policies would be stronger for those who smoked as adults.

In sum, the current study considered two primary research questions. First, do smoking behavior and attitude toward smoking during adolescence prospectively predict support for tobacco control measures in adulthood over and above sex, age, educational attainment, parent status, adult smoking status, and adult attitude toward smoking? We controlled for these adult factors because they might be mediators of the effects of adolescent smoking and adolescent attitudes. Second, are the effects of adolescent smoking and attitude toward smoking on support for tobacco control policies moderated by parent status and smoking status in adulthood?

Methods

Participants

Participants were from the Indiana University Smoking Survey, an ongoing cohort-sequential study of the natural history of cigarette smoking (Chassin, Presson, Sherman, & Pitts, 2000). Between 1980 and 1983, all consenting 6th to 12th grades in a Midwestern county school system completed annual surveys. The total sample size of those who were assessed at least once was 8,487. Follow-up surveys were conducted in 1987, 1993, 1999, and 2005. In each case, 70% or more of the original sample were retained. The original 1980–1983 survey data were collected with group-administered questionnaires in school. In 1987, these procedures were followed for cohorts who were still in high school. For older cohorts and for all participants in 1993, 1999, and 2005, a survey was sent by mail followed by

telephone interviews if surveys were not returned. Participants were paid \$15–\$30 over the waves, and in 1999 and 2005, they were also entered into lottery drawings for cash prizes.

Demographically, the sample is similar to the community from which it was drawn. For example, the marriage rate is 64% in this sample compared with 66% among similarly aged adults in the Midwest (Lugaila, 1998), and the high school graduation rate is 97% in this sample compared with 92% among similarly aged adults in the Midwest (Day & Curry, 1998). At the most recent follow-up conducted in 2005, the smoking rate in the sample was 23% compared with a 2006 statewide rate of 24% (Centers for Disease Control and Prevention, 2006) and regional rate of 17% (Indiana Tobacco Prevention and Cessation, 2006). Thus, the sample is representative of its community, one that is well educated and predominately white. At the most recent follow-up, 45.7% reported educational attainment of at least a bachelor's degree. Because the sample is 96% non-Hispanic Caucasian, ethnic differences are not considered. Attrition biases have been discussed in detail elsewhere (Rose, Chassin, Presson, & Sherman, 1996). For each follow-up, those who were lost were compared with those who were retained in terms of their earlier data. Those lost to follow-up were more likely to be smokers, have more positive attitudes and beliefs about smoking, and have parents and friends who smoked. Although these biases are small in magnitude, caution is warranted when making generalizations.

For the current study, we selected participants who provided data at least once as an adolescent and as an adult at the most recent follow-up in 2005. For participants who provided data

more than once as an adolescent, we selected the assessment closest to age 16 because this was the mean age for participants measured only once as an adolescent. This yielded a sample of 4,834 (mean age at adolescent assessment = 15.6, *SD* = 1.4, range 10–19; mean age at adult assessment = 37.8, *SD* = 2.7, range 32–44). Sample characteristics are shown in Table 1.

Measures

Sociodemographics

Participants reported their sex (54% female), age (mean = 37.8), and the highest level of education completed. For analyses, educational attainment was dichotomized into less than a bachelor's degree (52%) versus bachelor's degree or higher (48%).

Smoking Status

At the adolescent measurement, participants self-reported their smoking status as "I have never smoked a cigarette, not even a few puffs," "I have smoked one cigarette or a few cigarettes 'just to try' but I have not smoked in the past month," "I no longer smoke but in the past I was a regular smoker," "I smoke regularly but no more than one cigarette a month," "I smoke regularly but no more than one cigarette a week," or "I smoke more than one cigarette a week." Those who smoked at least monthly (15%) were classified as current smokers. As adults, participants similarly self-reported their smoking status except that the last adolescent response option was changed to "I smoke cigarettes, but no more than one a day," and the response option "I smoke more than one cigarette a day" was added. Again, those who smoked at least monthly (21%) were classified as current smokers.

Table 1. Sample Characteristics and Descriptive Statistics on Predictor Variables and Support for Tobacco Control Policies (N = 4,834)

Characteristic/variable	Mean	SD	Range
Sociodemographics			
Age at adolescent assessment	15.6	1.4	10–19
Age at adult assessment	36.8	3.5	27–44
	Number	Percent	
Sex (percent female)	2,600	53.8	
Educational attainment as an adult (percent with bachelor's degree or higher)	2,313	47.8	
Smoking status			
Adolescent smoking status (percent smokers)	714	14.8	
Adult smoking status (percent smokers)	1,008	20.9	
Parent status (percent with one or more children)	3,496	72.3	
Attitude toward smoking^a			
Adolescent attitude	1.86	0.87	1–5
Adult attitude	1.70	0.85	1–5
Adult support for tobacco control policies^b			
In general, regulation of smoking in public places is a good thing (<i>n</i> = 4,832)	4.22	1.11	1–5
Public schools should be required to discuss the dangers of smoking in their classes (<i>n</i> = 4,832)	4.54	0.71	1–5
Smoking should be permitted in bars ^c (<i>n</i> = 4,827)	3.26	1.31	1–5
Smoking on television and in movies should be eliminated (<i>n</i> = 4,828)	3.07	1.18	1–5
Smoking should not be permitted in restaurants (<i>n</i> = 4,831)	4.15	1.12	1–5
Taxes on cigarettes should be increased (<i>n</i> = 4,833)	3.49	1.31	1–5

Note. ^aHigher values reflect more positive attitudes toward smoking.

^bHigher values reflect more support for the policy.

^cResponses were reverse coded to be consistent with other items.

Parent Status

As adults, participants reported the number of children they had at the time of the 2005 follow-up. For analyses, we dichotomized parent status into nonparents (those with zero children [28%]) versus parents (those with one or more children [72%]).

Attitude Toward Smoking

At the adolescent and adult measurements, participants reported their global attitude toward smoking using a semantic differential measure of smoking as “nice versus awful,” “pleasant versus unpleasant,” and “fun versus not fun” (Ajzen & Fishbein, 1970). In support of the predictive validity of this measure, it has been used at each wave of the Indiana University Smoking Survey and has successfully prospectively predicted smoking transitions (Chassin, Presson, Sherman, Corty, & Olshavsky, 1984). Responses to the three items were averaged. Higher scores reflect more positive attitudes toward smoking. At the adolescent measurement, the overall mean was 1.86 ($SD = 0.87$, range 1–5), and at the adult measurement, the overall mean was 1.70 ($SD = 0.85$, range 1–5).

Adult Support for Tobacco Control Policies

As adults, participants reported their level of support for six tobacco control policy interventions. Response options for each were on a 5-point scale from strongly disagree to strongly agree. Table 1 displays the six items and their mean level of endorsement.

Data Analyses

Hierarchical multiple regression models were used to test the associations between the predictor variables and the six tobacco control policy support outcomes. Sex, age at adult measurement, adult educational attainment, adult smoking status, parent status, and adult attitude toward smoking were entered in the first block. To test the unique contribution of the adolescent factors over and above these adult and sociodemographic covariates, adolescent smoking status, and adolescent attitude toward smoking were entered in the second block. Finally, we tested the moderating effect of two adult factors, parent status and smoking status, on the association between adolescent attitude and smoking on support for tobacco control policy. Therefore, 4 two-way interactions, adolescent attitude by parent status, adolescent smoking by parent status, adolescent attitude by adult smoking status, and adolescent smoking status by adult smoking status, were entered in the final block. Interaction terms were computed with mean-centered variables. To probe significant interactions, we split the sample and again used hierarchical multiple regression. We entered sociodemographics and variables measured as an adult in the first block and variables measured as an adolescent in the second block. Again, this analytic strategy was used to test the unique contribution of the adolescent factors over and above the adult and sociodemographic covariates.

Results

Mean levels of support for the six tobacco control policies considered in the current study are shown in Table 1. All the means were greater than three on a 5-point scale. The highest mean level of support was for requiring public schools to discuss the dangers of smoking in their classes, and the lowest was for eliminating smoking on television and in movies.

Sociodemographics, Adult Smoking Status, and Adult Attitude Toward Smoking

Table 2 displays the results for the full models predicting support for the six tobacco control policies. For every policy, females reported more support than did males (all $p < .001$), and those with a more positive attitude toward smoking as an adult reported less support (all $p < .001$). Older individuals expressed more support for eliminating smoking on television and in movies ($p < .001$). For every policy except eliminating smoking on television and in movies, those with higher educational attainment expressed more support ($p < .001$). However, for eliminating smoking on television and in movies, those with higher educational attainment expressed significantly lower levels of support ($p < .001$). Those who smoked as adults expressed less support than did nonsmoking adults for every policy ($p < .001$) except discussion of dangers of smoking in public schools and eliminating smoking on television and in movies. Participants who were parents expressed more support than did not-parents for discussion of dangers of smoking in public schools ($p < .05$) and eliminating smoking on television and in movies ($p < .001$). However, parents expressed significantly less support for not permitting smoking in bars ($p < .01$).

Adolescent Smoking Status and Adolescent Attitude Toward Smoking

After controlling for sociodemographics, adult smoking, and adult attitude toward smoking, the adolescent factors made a significant contribution to support for prohibiting smoking in bars (R^2 change = .002; $p < .01$), eliminating smoking on television and in movies (R^2 change = .001; $p < .05$), prohibiting smoking in restaurants (R^2 change = .001; $p < .05$), and increasing taxes on cigarettes (R^2 change = .003; $p < .001$). There was a significant main effect of adolescent smoking such that those who smoked as adolescents expressed significantly lower levels of support than did adolescent nonsmokers for increasing taxes on cigarettes ($p < .05$). However, those who smoked as adolescents expressed more support for discussion of the dangers of smoking in public schools ($p < .05$). There was a significant main effect of adolescent attitude toward smoking such that those with more favorable attitudes toward smoking as adolescents expressed lower levels of support as adults for not permitting smoking in bars ($p < .05$), eliminating smoking on television and in movies ($p < .05$), and not permitting smoking in restaurants ($p < .05$).

Adolescent Attitude by Parent Status Interactions

For one policy measure, not permitting smoking in restaurants, there was a significant adolescent attitude toward smoking by parent status interaction. To probe this significant interaction, we split the sample by parent status to test the effect of adolescent attitude on support for this policy measure. Table 3 shows the results from hierarchical multiple regression analyses modeled separately for nonparents and parents. Among those who were parents, those who had a more positive adolescent attitude toward smoking expressed significantly less support for the policy ($p < .01$).

Table 2. Results for Full Hierarchical Regression Models Predicting Support for Tobacco Control Policies

Predictor	Outcome variable					
	Regulation of smoking in public places is a good thing, β (SE) ($n = 4,832$)	Public schools should discuss dangers of smoking, β (SE) ($n = 4,832$)	Smoking should not be permitted in bars, β (SE) ($n = 4,827$)	Smoking on television and in movies should be eliminated, β (SE) ($n = 4,828$)	Smoking should not be permitted in restaurants, β (SE) ($n = 4,831$)	Taxes on cigarettes should be increased, β (SE) ($n = 4,833$)
Full model R^2	.19	.10	.26	.16	.28	.32
Sex (0 = male, 1 = female)	0.159 (0.030)***	0.103 (0.020)***	0.196 (0.033)***	0.330 (0.032)***	0.192 (0.028)***	0.096 (0.032)**
Age	-0.005 (0.005)	-0.001 (0.004)	0.004 (0.006)	0.027 (0.006)***	-0.003 (0.005)	-0.006 (0.006)
Education (0 = less than BA, 1 = BA or higher)	0.435 (0.031)***	0.094 (0.021)***	0.231 (0.034)***	-0.171 (0.033)***	0.179 (0.029)***	0.405 (0.033)***
Adult smoking (0 = no, 1 = yes)	-0.318 (0.051)***	0.030 (0.034)	-0.571 (0.057)***	0.023 (0.055)	-0.414 (0.048)***	-0.832 (0.055)***
Parent status (0 = no, 1 = yes)	0.008 (0.033)	0.046 (0.022)*	-0.125 (0.037)**	0.264 (0.036)***	0.021 (0.031)	-0.036 (0.036)
Adult attitude toward smoking ^a	-0.332 (0.023)***	-0.240 (0.016)***	-0.487 (0.026)***	-0.429 (0.025)***	-0.471 (0.022)***	-0.412 (0.025)***
Adolescent smoking (0 = no, 1 = yes)	0.090 (0.057)	0.083 (0.039)*	-0.088 (0.064)	-0.018 (0.062)	0.040 (0.054)	-0.145 (0.062)*
Adolescent attitude toward smoking ^a	-0.028 (0.021)	-0.010 (0.014)	-0.049 (0.023)*	-0.058 (0.022)*	-0.050 (0.020)*	-0.033 (0.022)
Adolescent attitude by parent status	-0.015 (0.044)	-0.056 (0.030)	-0.054 (0.050)	-0.092 (0.048)	-0.087 (0.042)*	-0.082 (0.048)
Adolescent smoking by parent status	0.218 (0.111)	0.052 (0.075)	0.114 (0.125)	0.037 (0.120)	0.110 (0.105)	-0.120 (0.120)
Adolescent attitude by adult smoking	0.027 (0.048)	0.011 (0.033)	0.027 (0.054)	0.088 (0.052)	-0.064 (0.046)	0.104 (0.052)*
Adolescent smoking by adult smoking	-0.109 (0.107)	-0.115 (0.072)	0.003 (0.120)	-0.005 (0.116)	-0.095 (0.101)	-0.255 (0.116)*

Note. ^aHigher value indicates more favorable attitude toward smoking.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Table 3. Results for Full Hierarchical Regression Models Predicting Support for Prohibiting Smoking in Restaurants, Separately for Nonparents and Parents (n = 4,831)

Predictor	Nonparents, β (SE)	Parents, β (SE)
Full model R^2	.26	.29
Sex (0 = male, 1 = female)	0.194 (0.055)***	0.193 (0.032)***
Age	-0.011 (0.010)	0.000 (0.006)
Education (0 = less than BA, 1 = BA or higher)	0.202 (0.058)***	0.167 (0.034)***
Adult smoking (0 = no, 1 = yes)	-0.387 (0.084)***	-0.476 (0.056)***
Adult attitude toward smoking ^a	-0.449 (0.041)***	-0.475 (0.026)***
Adolescent smoking (0 = no, 1 = yes)	-0.109 (0.097)	0.040 (0.056)
Adolescent attitude toward smoking ^a	0.006 (0.039)	-0.072 (0.023)**

Note. ^aHigher value indicates more favorable attitude toward smoking. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 4. Results for Full Hierarchical Regression Models Predicting Support for Increasing Taxes on Cigarettes, Separately for Adult Non-Smokers and Smokers (n = 4,833)

Predictor	Nonsmokers, β (SE)	Smokers, β (SE)
Full model R^2	.12	.13
Sex (0 = male, 1 = female)	0.149 (0.035)***	-0.135 (0.072)
Age	-0.007 (0.006)	-0.001 (0.014)
Education (0 = less than BA, 1 = BA or higher)	0.327 (0.035)***	0.852 (0.092)***
Parent status (0 = no, 1 = yes)	0.008 (0.040)	-0.127 (0.079)
Adult attitude toward smoking ^a	-0.504 (0.029)***	-0.205 (0.047)***
Adolescent smoking (0 = no, 1 = yes)	-0.177 (0.073)	-0.224 (0.093)*
Adolescent attitude toward smoking ^a	-0.035 (0.025)	0.029 (0.048)

Note. ^aHigher value indicates more favorable attitude toward smoking. * $p < .05$; ** $p < .01$; *** $p < .001$.

Adolescent Attitude Toward Smoking by Adult Smoking Status Interactions

For one policy, increasing taxes on cigarettes, there was a significant interaction involving adolescent attitude and adult smoking status. To probe this significant interaction, we split the sample by adult smoking status to test the effect of adolescent attitude on support for increasing taxes. However, as shown in Table 4, the effects of adolescent attitude on support for increasing taxes were not significant for nonsmoking and smoking adults when modeled separately.

Adolescent Smoking Status by Adult Smoking Status Interactions

For one policy, raising cigarette taxes, the role of adolescent smoking status interacted with adult smoking status. Again, we probed this significant interaction by splitting the sample by adult smoking status to test whether the effect of adolescent smoking status on support for raising taxes differed by adult smoking status. Both smoking and nonsmoking adults who smoked as adolescents expressed less support for increasing taxes than did those who were not smokers in adolescence, but the effect was significant only among adult smokers ($p < .05$).

Discussion

This is the first study to use longitudinal data to prospectively predict support for tobacco control policy measures in adulthood from smoking status and smoking attitudes measured in adolescence. The first finding of note was the generally moderate to high levels of support for the six tobacco control policies. This could reflect the fact that this sample is relatively well educated overall, which would be consistent with previous studies that have shown that education level is positively associated with support for tobacco control policies (Bernat et al.,

2009; Doucet et al., 2007; Hamilton et al., 2005). However, the level of support was not equally high for all policies. For example, the mean level of support was 3.26 for prohibiting smoking in bars compared with 4.15 for prohibiting smoking in restaurants. This same finding was demonstrated in a sample of young adults (Bernat et al., 2009).

In terms of the adult predictors of policy support tested in the current study, our findings were generally consistent with prior research. That is, females, those with higher educational attainment, non-smokers, and those with more negative attitudes toward smoking as adults expressed more support across the board for the tobacco control policy measures tested. One notable exception was seen for eliminating smoking on television and in movies. Those with higher educational attainment expressed significantly less support for such a policy. This could reflect a negative attitude toward what is perceived as censorship or restriction of free speech or creative license. Importantly, those who were parents expressed more support for eliminating smoking on television and in movies. Parents are a key target audience for this policy measure, given the substantial evidence of the association between exposure to smoking images in movies and adolescent smoking onset (Charlesworth & Glantz, 2005). Parents were less likely, however, to support prohibiting smoking in bars.

The primary objectives of the current study were to test whether adolescent smoking status and adolescent attitude toward smoking prospectively predicted support for tobacco control policies during adulthood and whether parent status and adult smoking moderated these relations. The adolescent factors considered in this study played a role in future support for policy measures from each of the three categories of Bierer and Rigotti (1992) of tobacco control policies. Those who smoked during adolescence reported more support for discussing the dangers of smoking in public schools and less support

for increasing taxes on cigarettes, but only if they smoked as adults. That is, we found evidence of a moderating effect of adult smoking status on the association between adolescent smoking and adult support for increasing taxes. Adolescents' positive attitudes toward smoking predicted less support for prohibiting smoking in bars and eliminating smoking on television and in movies. Also, for those who were parents, their adolescent attitude predicted support for prohibiting smoking in restaurants.

It is noteworthy that, in these data, adolescent smoking attitudes and behavior were significant predictors, over and above sociodemographic covariates, adult smoking status, and adult attitude toward smoking, of support for several different tobacco control policy measures. The fact that the magnitude of these effects was very small is not surprising. Long-term connections between adolescent and adult factors in alcohol use have also been shown to be small (Schulenberg & Maggs, 2008). In addition, it is likely that these adolescent factors are mediated by adult factors and moderated by adult or other factors so that the size of the effect is larger in some subgroups. Thus, although small in magnitude, the presence of significant unique effects of adolescent variables on adult support for tobacco control policies suggests that, in addition to preventing adolescent onset of smoking, antismoking campaigns designed to shape adolescents' attitudes toward smoking may have future benefits in terms of increasing the levels of community support for tobacco control policies. There are several potential sources of adolescents' attitudes toward smoking, including the media, peers, family, parenting received, personal experiences with tobacco and its impact on loved ones, and exposure to public health campaigns. Importantly, many of these sources represent opportunities for interventions to create more negative attitudes toward smoking among adolescents. For example, anti-industry media campaigns targeting adolescents have successfully modified attitudes (Hersey et al., 2003). At the same time, the tobacco industry continues to engage in marketing efforts to create more positive attitudes toward smoking among adolescents (Duke et al., 2009). Thus, it is important to continue to invest in adolescent antismoking interventions aimed at influencing attitudes toward smoking and preventing smoking initiation.

Although the current study contributes to the literature by being the first to test the unique effects of adolescent smoking behavior and attitudes on future support for tobacco control policies, the study also has limitations that must be considered. First, the community from which this representative sample was drawn is predominately White and well educated, so some caution is warranted in generalization. Second, because the sample is predominately White, we were unable to test racial or ethnic differences in support for policy interventions. Third, data were not available on additional factors that may be important predictors of support for policies. For example, we did not consider exposure to pro- and antismoking media messages and political ideology or party affiliation. In terms of support for restricting smoking in restaurants and bars, we did not consider whether the participant lived in a community with a smoke-free air law.

Despite these limitations, this study is important in utilizing longitudinal data to demonstrate the association between adolescent smoking and adolescent attitudes toward smoking and support for tobacco control policies in adulthood. Even

after controlling for multiple sociodemographic correlates and adult smoking attitudes and behavior, study participants who smoked or held more positive attitudes toward smoking as adolescents expressed less support for several tobacco control policy measures. These findings suggest that interventions designed to deter adolescent smoking may pay future dividends in the form of increased support for tobacco control policies.

Funding

This work was supported by the National Institute on Drug Abuse at the National Institutes of Health (DA013555).

Declaration of Interests

None declared.

References

- Ajzen, I., & Fishbein, M. (1970). The predictions of behavior from attitudinal and normative variables. *Journal of Experimental Social Psychology*, 6, 466–487. doi:10.1016/0022-1031(70)90057-0
- Ajzen, I., & Fishbein, M. (1977). Attitude–behavior relations: A theoretical analysis and review of empirical research. *Psychological Bulletin*, 84, 888–918. doi:10.1037/0033-2909.84.5.888
- Ashley, M. J., Bull, S. B., & Pederson, L. L. (1995). Support among smokers and nonsmokers for restrictions on smoking. *American Journal of Preventive Medicine*, 11, 283–287.
- Bauer, J. E., Hyland, A., Li, Q., Steger, C., & Cummings, M. K. (2005). A longitudinal assessment of the impact of smoke-free worksite policies on tobacco use. *American Journal of Public Health*, 95, 1024–1029. doi:10.2105/AJPH.2004.048678
- Bierer, M. F., & Rigotti, N. A. (1992). Public policy for the control of tobacco-related disease. *Medical Clinics of North America*, 76, 515–539.
- Bernat, D. H., Klein, E. G., Fabian, L. E. A., & Forster, J. L. (2009). Young adult support for clean indoor air laws in restaurants and bars. *Journal of Adolescent Health*, 45, 102–104. doi:10.1016/j.jadohealth.2008.12.023
- Blake, K. D., Viswanath, K., Blendon, R. J., & Vallone, D. (2010). The role of tobacco-specific media exposure, knowledge, and smoking status on selected attitudes toward tobacco control. *Nicotine & Tobacco Research*, 12, 117–126. doi:10.1093/ntn/ntp184
- Burt, R. D., Dinh, K. T., Peterson, A. V., & Sarason, I. G. (2000). Predicting adolescent smoking: A prospective study of personality variables. *Preventive Medicine*, 30, 115–125. doi:10.1006/pmed.1999.0605
- Centers for Disease Control and Prevention. (2006). *Behavioral Risk Factor Surveillance System Data*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

- Charlesworth, A., & Glantz, S. A. (2005). Smoking in the movies increases adolescent smoking: A review. *Pediatrics*, 116, 1516–1528. doi:10.1542/peds.2005-0141
- Chassin, L., Presson, C. C., Sherman, S. J., Corty, E., & Olshavsky, R. (1984). Predicting the onset of cigarette smoking in adolescents: A longitudinal study. *Journal of Applied Social Psychology*, 14, 224–243. doi:10.1111/j.1559-1816.1984.tb02233.x
- Chassin, L., Presson, C. C., Sherman, S. J., & Pitts, S. (2000). The natural history of cigarette smoking from adolescence to adulthood in a midwestern community sample: Multiple trajectories and their psychosocial correlates. *Health Psychology*, 19, 223–231. doi:10.1037//0278-6133.19.3.223
- Cummings, K. M., Sciandra, R., Carol, J., Burgess, S., Tye, J. B., & Flewelling, R. (1991). Approaches directed to the social environment. In D. R. Shopland, D. M. Burns, J. M. Samet, & E. R. Gritz (Eds.), *Strategies to control tobacco use in the United States: A blueprint for public health in the 1990's. Tobacco Control Monograph No. 1* (pp. 203-265). Washington, DC: U.S. Department of Health and Human Services.
- Day, J., & Curry, A. (1998). *Educational attainment in the United States: March 1998 (Update), U.S. Bureaus of the Census, Current Population Reports, Series P20-513*. Washington, DC: U.S. Government Printing Office.
- Doucet, J. M., Velicer, W. F., & Laforge, R. G. (2007). Demographic differences in support for smoking policy restrictions. *Addictive Behaviors*, 32, 148–157. doi:10.1016/j.addbeh.2006.04.003
- Duke, J. C., Allen, J. A., Pederson, L. L., Mowery, P. D., Xiao, H., & Sargent, J. D. (2009). Reported exposure to pro-tobacco messages in the media: Trends among youth in the United States, 2000–2004. *American Journal of Health Promotion*, 23, 195–202. doi:10.4278/ajhp.071130126
- Elkins, I. J., McGue, M., & Iacono, W. G. (2007). Prospective effects of attention-deficit/hyperactivity disorder, conduct disorder, and sex on adolescent substance use and abuse. *Archives of General Psychiatry*, 64, 1145–1152. doi:10.1001/archpsyc.64.10.1145
- Fichtenberg, C. M., & Glantz, S. A. (2002). Effect of smoke-free workplaces on smoking behaviour: Systematic review. *British Medical Journal*, 325, 188–194. doi:10.1136/bmj.325.7357.188
- Forrester, K., Biglan, A., Severson, H. H., & Smolkowski, K. (2007). Predictors of smoking onset over two years. *Nicotine and Tobacco Research*, 9, 299–310. doi:10.1080/14622200701705357
- Forster, J. L., Widome, R., & Bernat, D. H. (2007). Policy interventions and surveillance as strategies to prevent tobacco use in adolescents and young adults. *American Journal of Preventive Medicine*, 33, S335–S339. doi:10.1016/j.amepre.2007.09.014
- Fuemmeler, B. F., Kollins, S. H., & McLernon, F. J. (2007). Attention deficit hyperactivity disorder symptoms predict nicotine dependence and progression to regular smoking from adolescence to young adulthood. *Journal of Pediatric Psychology*, 32, 1203–1213. doi:10.1093/jpepsy/jsm051
- Graham, D. J., Sirard, J. R., & Neumark-Sztainer, D. (2011). Adolescents' attitudes toward sports, exercise, and fitness predict physical activity 5 and 10 years later. *Preventive Medicine*, 52, 130–132. doi:10.1016/j.ypmed.2010.11.013
- Hahn, E. J., Rayens, M. K., Butler, K. M., Zhang, M., Durbin, E., & Steinke, D. (2008). Smoke-free air laws and adult smoking prevalence. *Preventive Medicine*, 47, 206–209. doi:10.1016/j.ypmed.2008.04.009
- Hamilton, W. L., Biener, L., & Rodger, C. N. (2005). Who supports tobacco excise taxes? Factors associated with towns' and individuals' support in Massachusetts. *Journal of Public Health Management and Practice*, 11, 333–340.
- Hersey, J. C., Niederdeppe, M. A., Evans, W. D., Nonnemaker, J., Blahut, S., Farrelly, M. C., et al. (2003). The effects of state counterindustry media campaigns on beliefs, attitudes, and smoking status among teens and young adults. *Preventive Medicine*, 37, 544–552. doi:10.1016/j.ypmed.2003.07.002
- Indiana Tobacco Prevention and Cessation. (2006). *Indiana Adult Tobacco Survey Data*. Indianapolis, IN: Author.
- Lugaila, T. (1998). *Marital status and living arrangements: March 1998 (Update), U.S. Bureau of the Census, Current Population Reports, Series P20-514*. Washington, DC: U.S. Government Printing Office.
- McLeod, J. D., & Almazan, E. P. (2003). Connections between childhood and adulthood. In J. T. Mortimer & M. J. Shanahan (Eds.), *Handbook of the Life Course* (pp. 391–412), New York: Plenum Publishers.
- Merline, A., Jager, J., & Schulenberg, J. E. (2008). Adolescent risk factors for adult alcohol use and abuse: Stability and change of predictive value across early and midlife adulthood. *Addiction*, 103(Suppl. 1), 84–99. doi:10.1111/j.1360-0443.2008.02178.x
- Moskowitz, J. M., Lin, Z., & Hudes, E. S. (2000). The impact of workplace smoking ordinances in California on smoking cessation. *American Journal of Public Health*, 90, 757–761. doi:10.2105/AJPH.90.5.757
- Osypuk, T. L., & Acevedo-Garcia, D. (2010). Support for smoke-free policies: A nationwide analysis of immigrants, US-born, and other demographic groups, 1995–2002. *American Journal of Public Health*, 100, 171–181. doi:10.2105/AJPH.2009.160218
- Poland, B. D., Cohen, J. E., Ashley, M. J., Adlaf, E., Ferrence, R., Pederson, L. L., et al. (2000). Heterogeneity among smokers and non-smokers in attitudes and behaviour regarding smoking and smoking restrictions. *Tobacco Control*, 9, 364–371. doi:10.1136/tc.9.4.364
- Quick, B. L., Bates, B. R., & Romina, S. (2009). Examining antecedents of clean indoor air policy support: Implications for campaigns promoting clean indoor air. *Health Communication*, 24, 50–59. doi:10.1080/10410230802606992

Rise, J., Kovac, V., Kraft, P., & Moan, I. (2008). Predicting the intention to quit smoking and quitting behavior: Extending the theory of planned behavior. *British Journal of Health Psychology*, 13, 291–310. doi:10.1348/135910707X187245

Rose, J. S., Chassin, L., Presson, C. C., & Sherman, S. J. (1996). Demographic factors in adult smoking status: Mediating and moderating influences. *Psychology of Addictive Behaviors*, 10, 28–37. doi:10.1037//0893-164X.10.1.28

Schmitt, C., Elek, E., Duke, J., & Watson, K. (2010, November). *Is the public ready for policy change at the POS? Attitudes toward advertising at the POS and policies to regulate it*. Paper presented at the American Public Health Association Annual Conference, Denver, CO.

Schulenberg, J. E., & Maggs, J. L. (2008). Destiny matters: Distal developmental influences on adult alcohol use and abuse. *Addiction*, 103(Suppl. 1), 1–6. doi:10.1111/j.1360-0443.2008.02172.x

Schumann, A., John, U., Thyrian, J. R., Ulbricht, S., Hapke, U., & Meyer, C. (2006). Attitudes toward smoking policies and tobacco control measures in relation to smoking status and smoking behaviour. *European Journal of Public Health*, 16, 513–519. doi:10.1093/eurpub/ckl048

Smith, K. C., Siebel, C., Pham, L., Cho, J., Friedman Singer, R., Chaloupka, F. J., et al. (2008). News on tobacco and public attitudes toward smokefree air policies in the United States. *Health Policy*, 86, 42–52. doi:10.1016/j.healthpol.2007.09.015