Published in final edited form as:

Am J Health Promot. 2018 February ; 32(2): 294–300. doi:10.1177/0890117117696350.

Barriers to Quitting Smoking Among Young Adults: The Role of Socioeconomic Status

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Abstract

Purpose—The aims of this analysis were to explore how self-reported barriers to quitting vary by socioeconomic status (SES) among young-adult smokers and to assess their relationship to quitting.

Design—This analysis uses 2 waves of telephone-survey data from the Minnesota Adolescent Community Cohort (MACC) study.

Setting—Midwestern United States.

Subjects—Participants (n = 419) were smokers aged 17 to 24 years.

Measures—Socioeconomic status was estimated by using the highest level of education completed by the participants' parents. Demographics, smoking behavior, and perceived barriers to quitting were collected via survey questions.

Analysis—Differences in barriers by SES were assessed using prevalence ratios (PRs). Relative risks were calculated to assess the association between barriers and quitting status one year later, testing for effect modification by SES.

Results—Compared to the high SES group (n=314), the low SES group (n=105) was more likely to report several barriers to quitting; however only the risk of gaining weight was significantly more common (PR: 1.38 [1.05–1.83]). There were no significant associations between barriers and quitting status 1 year later, but the number of cigarettes per day was consistently related to the likelihood of quitting 1 year later, regardless of SES.

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CONFLICTS OF INTERESTS

The authors declare that there are no conflicts of interest.

Conclusions—Despite the limited generalizability to racially diverse populations and different geographic locations, the results suggest perceived barriers may not differ by SES or predict quitting among young adults; however, nicotine dependence may play an important role.

Keywords

barriers; cessation; smoking; socioeconomic status; young adults

PURPOSE

Despite decreases in overall smoking rates in the United States, populations of low socioeconomic status (SES) still have a high smoking prevalence compared to high SES groups.¹ According to the Centers for Disease Control and Prevention, in 2013 41.4% of adults over age twenty-five with a General Education Diploma (GED) and 22% with less than a high school diploma smoked cigarettes, compared to 5.6% with graduate degree.² Not only are low SES populations more likely to smoke,³ but they also have higher levels of nicotine dependence.⁴ Low SES populations are equally likely to make quit attempts as higher SES populations, but they are less successful.^{2,5–7}

There are probable reasons why low SES populations face greater barriers to quitting smoking that can be directly or indirectly linked to the experience of living in a low socioeconomic environment. For example, prior research provides evidence that compared to higher SES populations, low SES populations are exposed to more pro-smoking social norms,⁸ have relatively lower self-efficacy for quitting,^{4,9} are more likely to initiate smoking at a younger age,¹⁰ and report more negative affect and stress in their everyday life,¹¹ all of which can affect quitting success.

An individual's smoking behavior is reinforced by several mechanisms. A transdisciplinary framework by Unger et al. (2003) explains this occurrence as complex and multidimensional.¹² The dimensions can act synergistically or attenuate each other to influence the tobacco use of an individual. For example, a genetic predisposition to smoking may not matter if strong laws are in place to deny youth access to tobacco. On the other hand, an adolescent whose friends pressure him or her to smoke may initiate smoking, even with a lack of a genetic predisposition. Several of these dimensions may loom larger for low SES individuals compared to high SES individuals. Individuals with less socioeconomic advantage might be exposed to more tobacco advertising and fewer smoke-free policies (or policies that are not adequately enforced).^{8,13–15}

There is evidence that pro-tobacco social norms and pressures in low SES populations may be more intense and contribute to smoking prevalence disparities. In a qualitative study on the social context of smoking, the low SES participants were more likely to report a lack of restrictions on smoking at work, and less likely to report that smoking while walking in public was inappropriate.⁸ Additionally, if smoking is the norm within a group of friends, someone who quits smoking may be socially excluded.¹⁶ Christakis and Fowler (2008) found that “decisions to quit smoking are not made solely by isolated persons, but rather they reflect choices made by groups of people connected to each other both directly and indirectly at up to three degrees of separation”.¹⁷

To our knowledge, the relationship between specific perceived barriers to quitting and subsequent likelihood of quitting smoking in young adults has not previously been studied. Understanding the role that barriers play in quitting smoking for low SES populations is important because alleviation of these barriers could lead to more successful quit attempts, and in turn, decrease smoking disparities. A one-size-fits-all approach to tobacco cessation may not be effective, and exploring more targeted cessation options could prove beneficial. Targeted smoking cessation interventions for young adults are especially important because young adulthood is when life-long addictions to nicotine are most likely to be established, and quitting before age 30 reduces more than 97% of the lifelong health hazards attributable to smoking.¹⁸

The aims of this study were 1) to explore how self-reported barriers to quitting vary by SES among young-adult smokers, and 2) to examine how these reported barriers relate to quitting one year later. The low SES group consisted of participants whose parents had a high school degree (or equivalent) or less education, and the high SES group consisted of participants with at least one parent who had attended at least some college. It was hypothesized that the barriers to quitting smoking would vary by SES, with the low SES group reporting more barriers. Specifically, we expected that cost of quit aids/programs and friends' smoking would play a bigger role in barriers to quitting for participants from low SES populations. We also hypothesized that barriers to quitting would be associated with subsequent quitting behavior one year later, and that this relationship would vary by SES, with barriers hindering quitting among low-SES more than higher SES individuals.

METHODS

Design

This analysis uses two waves of survey data from the Minnesota Adolescent Community Cohort (MACC) study. MACC was a population-based, longitudinal study beginning in the year 2000 that enrolled 3,636 adolescents from Minnesota and 605 from comparison states: North Dakota, South Dakota, Kansas, and Michigan (ages 12–16). An additional 583 12-year-old participants were enrolled in 2001, creating a total sample size of 4,824 participants. They were surveyed via telephone approximately every six months until 2007, and then annually until 2012–2013. Information was gathered on the participants' tobacco-related attitudes and behaviors. One of the main aims of MACC was to define the patterns of tobacco initiation and use in adolescents. Further details on the MACC survey methods are available elsewhere.¹⁹

Sample

In the present analysis, we included participants who were smokers on the survey that took place between October 2007 and March 2008 (referred to as Wave One in this paper; n=419). These survey responses were compared to the next survey that took place between October 2008 and March 2009 (Wave Two; n=345). Data from these two surveys were specifically selected from the MACC study to examine the adolescent sample as they reached early adulthood. Additionally, these were the only two surveys in the MACC study

that included questions about perceived barriers to quitting smoking. All procedures were approved by the University of Minnesota Institutional Review Board.

Measures

Socioeconomic Status (SES)—Since the participants were 21 years old on average in Wave One, estimating their SES based on their current education or income would inaccurately characterize their socioeconomic position; some participants were full-time students, and others were living with their parents and not financially self-sufficient. For this reason, SES was estimated by using the highest level of education completed by the participants' parents. The different levels of parent education were: 1. high school graduate or less, 2. some college or associate degree, 3. college graduate, and 4. some graduate school or graduate degree holder. Level 1 formed the “low SES” group and levels 2, 3, and 4 were combined to form the “high SES” group. The groups were divided this way to allow for the biggest contrast in parent education levels, thus creating the most restrictive low SES group possible based on parent education.

Barriers to Quitting—In the Wave One survey, the participants were asked: “Think about some reasons that might discourage you from quitting smoking...for each, please tell me if it is a reason that might keep you from quitting smoking”. They responded yes or no to the following six items (chosen by the MACC study co-investigators):

1. cost of quit aids
2. cost of classes or programs
3. risk of gaining weight
4. loss of a way to handle stress
5. all my friends smoke
6. craving or withdrawal from nicotine.

Smoking behavior—In an attempt to capture mostly regular smokers, participants who reported smoking at least 15 of the previous 30 days at the time of the Wave One survey were classified as smokers and included in our sample. To determine this, participants were first asked, “Do you consider yourself a smoker?”. If yes, they were also asked, “Thinking about the last 30 days, on how many of those days did you smoke a cigarette, even one or two puffs?”. Cigarettes per day (CPD) was measured as a covariate with the following survey question in both Waves 1 and 2, “About how many cigarettes do you smoke per day on the days that you smoke?”.

Quitting behavior—The participants included in the Wave One sample were classified as having quit smoking in Wave Two if they reported smoking zero days in the following survey question, “Thinking about the last 30 days, on how many of those days did you smoke a cigarette, even one or two puffs?”.

Demographics—The demographics assessed were age (in years) at the time of the survey, sex (male/female), race, and community type. Due to lack of diversity in this sample, race

categories were analyzed as white race vs. nonwhite race. Community type was assessed at participant enrollment in MACC, using the 2003 United States Department of Agriculture Economic Research Service Rural-Urban Continuum Codes which provide a scale from (1) Metro-counties in metro areas of 1 million population or more, to (9) Nonmetro-completely rural or less than 2,500 urban population, not adjacent to a metro area.

Analysis

Descriptive statistics were calculated to summarize the demographic characteristics and smoking behavior of the participants (mean and standard deviation for continuous variables and proportions for categorical variables). Potential confounders were assessed based on previous literature, including participants' race, age, sex, community type (urban/rural), and number of cigarettes per day (CPD). Chi-square tests were used to assess the difference in race, sex, and community type by SES. T-tests were used to assess the difference in CPD and age by SES. In the Wave Two sample, chi-square tests and t-tests were used to assess differences in demographics and smoking characteristics between the smokers and the participants who quit smoking.

Descriptive characteristics of the participants who dropped out between Wave One and Two were compared to the participants who completed the Wave Two survey using t-tests and chi-square tests.

Prevalence ratios (PRs) were calculated to assess differences in the explanatory variable, SES, among the six barriers to quitting using generalized linear models with binomial distribution and log-linear link function. Unadjusted PRs were calculated, as well as PRs adjusted for age, community type, sex, and CPD. A basic factor analysis was run to assess clustering of the six barriers to quitting using PROC FACTOR in SAS v.9.4. Factors were retained based on eigenvalues >1, and factor loadings were calculated using a varimax orthogonal rotation.

Relative risks (RRs) were calculated to assess the relationship between each of the six barriers to quitting reported in the first wave and subsequent prevalent quitting in the second wave using generalized linear models with a binomial distribution and log-linear link. RRs were adjusted for age, community type, sex, and CPD, and an interaction term for SES was tested in each model for significance. Results are reported with the corresponding 95% confidence intervals (CIs). P-values less than 0.05 were considered statistically significant. Analyses were performed using statistical software SAS v. 9.4 (SAS Institute Inc., Cary, NC).

RESULTS

In the first wave, the participants (n=419; Table 1) were 21 years old on average (range 17–24 years old), 49% female, 88% white, and smoked an average of 10 CPD. In the second wave, the participants (n=345; Table 1) were 22 years old, 49% female, 89% white, and smoked an average of slightly less than 10 CPD. There were significant differences between the low SES and high SES groups in Wave One (Table 1). For example, the low SES group,

as compared to the high SES group, was slightly younger (20 vs. 21 years old, $p=0.02$), and lived in more rural areas (3.66 vs. 2.99, $p=0.02$).

Approximately 18% ($n=74/419$) of participants in the first wave did not complete the survey in the second wave. No statistically significant differences were found in sex, race, SES, community type, age, or CPD between the participants who completed the second wave and those who did not (data not shown).

Barriers to Quitting Smoking

Twelve percent of participants (51/419) reported none of the six possible barriers, and the majority of participants reported between one and three barriers (68%, 286/419). Only 20% (82/419) reported between four and six barriers. The most common barrier reported was friends' smoking (69%, 288/419), followed by the loss of a way to cope with stress (55%, 229/419), craving or withdrawal from nicotine (37%, 154/419), the cost of quit aids (29%, 120/418), the risk of gaining weight (22%, 93/419), and lastly, the cost of classes or programs (15%, 62/419). In the factor analysis, two factors had eigenvalues >1 and accounted for 52% of the variability. Clustering and factor loading was as follows: factor 1 (cost of quit aids 0.87, and cost of classes or programs 0.88); factor 2 (risk of weight gain 0.62, loss of a way to cope with stress 0.72, friends' smoking 0.62, and craving or withdrawal from nicotine 0.50).

The average number of barriers did not differ by SES group, with the low SES group reporting 2.32 ± 0.11 barriers and the high SES group reporting 2.24 ± 0.10 barriers ($p=0.6076$). Of these six barriers to quitting smoking, only one was significantly associated with SES in the unadjusted model and adjusted models (Table 2). After adjusting for sex, age, community type, and CPD, participants in the low SES group were 1.38 times more likely to report the risk of gaining weight as a barrier to quitting smoking, compared to the participants in the high SES group (PR: 1.38 [1.05–1.83]).

Barriers and Quitting Status One Year Later

Nine percent of the participants who completed both surveys quit smoking in Wave Two ($n=30/345$). When looking at the low and high SES groups separately, 13% (11/84) of the low SES group quit smoking while 7% (19/261) of the high SES group quit smoking. This was not a statistically significant difference ($p=0.0999$). However, it is noteworthy that among the participants who quit smoking, the average number of cigarettes smoked per day in Wave One was significantly fewer than those who continued to smoke (7 vs. 10 respectively; $p=0.0041$). There were no other statistically significant characteristics between those who quit and those who continued to smoke (Table 3). Of the six barriers to quitting assessed (Table 4), none were significantly associated with subsequent quitting. No significant interactions between the barriers and SES were found when adding an interaction term to Model 2 (data not shown).

DISCUSSION

Although the low SES young adults in this study had higher prevalence of most (5/6) of the barriers compared to the high SES group, only one of the barriers (risk of gaining weight)

was statistically associated with SES. These results are different from findings in prior studies that reported barriers to quitting smoking as more common among low SES populations in other age groups, i.e. social barriers,⁸ more negative affect,¹¹ and greater nicotine dependence.⁴ A systematic review published in 2014 identified perceived barriers to smoking cessation among six vulnerable groups, one of which was low SES. Barriers common to all vulnerable groups in this review were similar to the barriers examined in our study: smoking for stress management, acceptability of smoking in their community, and lack of support from health providers.²⁰ The lack of associations in our sample may suggest that perceived barriers are more similar between SES groups among young-adults than they are among all adults.

In our sample, those with a low socioeconomic status had 1.38 times higher prevalence of concern about weight gain as a barrier to quitting compared to those with a higher socioeconomic status. In general, research shows that children become aware that smoking is used for weight-control at an early age,²¹ and weight concerns among young adults is associated with higher likelihood of smoking.²² Body image and body weight concerns are complex factors for young-adult smokers.²³ Although low-SES adolescents are more likely to be overweight,²⁴ the research findings on weight-concerns and SES are mixed, with some finding no association between weight-concerns and SES in adolescents,²⁵ and other findings indicating fewer weight-concerns among low-SES groups.²⁶ However, these studies did not look at smokers specifically. Thus, it is possible that young-adult low-SES smokers have different experiences and concerns with weight-related issues than the general population.

It was surprising that the cost of quit aids as a barrier was not more common among the low SES group than the high SES group; however, it is possible that financial difficulties are a concern for all young adults regardless of SES, given that young adults in this age range (17–24) are often full-time students or living with their parents and not financially self-sufficient. Additionally, a study by Curry et al. found that young-adult smokers are about half as likely to use pharmacotherapy as adult smokers.²⁷ So it may be that they aren't considering pharmacotherapy at all. Lack of statistical significance in our data may be because there are real differences in the prevalence of the barriers, but they are too small to be detected with the sample size available for this analysis, or it may be that there truly is no difference, and these barriers affect young adults from low and high SES groups similarly.

As for the association between perceived barriers and quitting success, the results differed from the authors' hypotheses. There were no statistically significant relationships between the perceived barriers to quitting among young-adult smokers and quitting status one year later. These findings are inconsistent with research on similar topics, but there have not been articles published on our particular topic before. It may be that there are other factors playing a role in these associations, such as nicotine dependence. In this sample, participants who quit smoking smoked approximately 3 CPD fewer in Wave One than those who continued to smoke. CPD as a covariate was consistently significantly related to the likelihood of quitting. Consequently, it is possible that young adults who have a harder time quitting are more addicted, and regardless of the barriers they perceive, addiction might be the key predictor of quitting for this age-group. Unfortunately, this study did not collect

information on nicotine dependence. Further studies should examine how dependence affects the relationship between barriers to quitting smoking and quitting outcomes for young adults. It is also possible that most reported barriers individually do not accurately predict probability of quitting smoking for young adults, and it might be more appropriate to assess barrier combinations rather than individual barriers.

There are a few important limitations to note when interpreting the results of this study. First, it is unclear how accurately participants can report barriers that they feel affect them. Additionally, the barriers that the participants could choose from were pre-defined, and developed by the investigators of MACC. Consequently, these questions were not from a validated survey. Quitting was defined as smoking zero days out of the past thirty at the time of the survey; however, it is possible some participants may have relapsed shortly after the survey. Lastly, SES is a very complex construct, and using the parents' educational attainment may not fully represent the true SES of the participants. Education is just a piece of SES, and is often also combined with income and occupation. However, parents' income and occupation(s) were not collected in MACC. Even if the barriers to quitting smoking are equally distributed between SES groups, there is a possibility that they are harder to overcome for the low SES populations. This idea was not tested in the current analyses, but is an important possibility to keep in mind when interpreting the results. The generalizability of these data to more racially diverse populations and different geographic locations is limited due to the relatively homogenous white population of participants from Minnesota and a few comparison states in the Midwestern United States.

To the authors' knowledge, this is the first study to look at the relationship between young adults' self-reported barriers to quitting smoking and the likelihood of short-term smoking abstinence one year later, while taking SES into account. There is a need for additional research to improve smoking interventions for young adults, as evidence-based tobacco cessation treatments for this population are underutilized²⁷ and underdeveloped²⁸.

In conclusion, our results suggest that, other than the risk of gaining weight, several perceived barriers to quitting smoking (i.e. cost of aid, friends' smoking, perceived dependence, and smoking for coping with stress) may be similar between low SES and high SES groups of young adults. Additionally, our study did not find any associations between self-reported barriers to quitting and the probability of quitting smoking short-term. Rather, the only covariate that was consistently related to quitting was the number of cigarettes smoked per day. Thus, it is possible that perceived barriers may not actually be important factors in the cessation process for young adults, and may not vary between low and high SES groups in this age-range. More research is needed to verify these findings, and to further explore the role that nicotine dependence plays in quitting at this young age. This knowledge could lead to more targeted cessation interventions and more successful quit attempts for young adults.

Acknowledgments

FUNDING

This research was funded by the National Cancer Institute (R01 CA86191; Jean Forster, Principal Investigator) and ClearWay Minnesota (RC-2007-0018; Jean Forster and Debra Bernat, Co-Principal Investigators).

The authors thank Rose Hilk for her assistance with data management, Clearwater Research, Inc. for its careful implementation of the telephone survey procedures, and the University of Minnesota's Health Survey Research Center for its assistance with tracking participants.

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SO WHAT

Information on how self-assessed barriers relate to socioeconomic status and short-term quitting in young adults is limited. This study suggests that self-reported barriers to quitting smoking may be similar for low and high SES young adults, and might not predict future smoking abstinence; however, nicotine dependence may play an important role. Further research about the relationships between SES, barriers to quitting, nicotine dependence, and quitting success for this special population could be used to inform smoking cessation education, interventions, and policies focused on young adults.

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Table 1

Participants' demographics by socioeconomic status in Wave One and Wave Two

	Overall	Low SES	High SES	P-value ¹
Wave One				
n	419	105 (25.06%)	314 (74.94%)	
Age (mean ± sd)	20.61 ± 1.64	20.30 ± 1.57	20.71 ± 1.65	0.0236*
Sex (n, % female)	211 (48.84%)	59 (56.19%)	143 (45.54%)	0.0587
Race (n, % white)	370 (88.31%)	90 (85.71%)	280 (89.17%)	0.3399
CPD (mean ± sd)	10.14 ± 6.57	11.10 ± 6.40	9.82 ± 6.60	0.0831
Community Type (mean ± sd), <i>Scale ranges from (1) Most Urban to (9) Most Rural</i>	3.16 ± 2.44	3.66 ± 2.58	2.99 ± 2.38	0.0154*
Wave Two				
n	345	84 (24.35%)	261 (75.65%)	
Age (mean ± sd)	21.61 ± 1.65	21.36 ± 1.57	21.70 ± 1.67	0.1002
Sex (n, % female)	169 (48.99%)	47 (55.95%)	122 (46.74%)	0.1420
Race (n, % white)	307 (88.99%)	72 (85.71%)	235 (90.04%)	0.2709
CPD in Wave One (mean ± sd) ²	9.93 ± 6.53	11.02 ± 6.62	9.58 ± 6.48	0.0779
Community Type (mean ± sd)	3.13 ± 2.46	3.69 ± 2.65	2.95 ± 2.37	0.0169*

¹ p-values are from t-tests for continuous variables and χ^2 tests for categorical variables.

² CPD from Wave One is reported for the Wave Two subsample to display their smoking characteristics at baseline.

* p-value <0.05; sd=standard deviation

Table 2

Participants' demographics by quitting status in Wave Two

	Participants who Quit Smoking in Wave Two	Smokers in Wave Two	P-value ^I
n	30 (8.70%)	315 (91.30%)	
Age (mean ± sd)	21.43 ± 1.61	21.63 ± 1.65	0.5297
Sex (n, % female)	118 (60.00%)	151 (47.94%)	0.2066
Race (n, % white)	26 (86.67%)	281 (89.21%)	0.6712
CPD in Wave One (mean ± sd)	6.67 ± 4.59	10.24 ± 6.61	0.0041 *
CPD in Wave Two (mean ± sd)	—	10.69 ± 6.39	
Community Type (mean ± sd)	3.73 ± 2.55	3.08 ± 2.45	0.1628
SES (n, %)			0.0999
Low	11 (36.67%)	73 (23.17%)	
High	19 (63.33%)	242 (76.83%)	

Abbreviations: CPD, cigarettes per day; SD, standard deviation; SES, socioeconomic status

^I p-values are from t-tests for continuous variables and χ^2 tests for categorical variables.

* p-value <0.05

Table 3

Association between low SES and reported barriers to quitting smoking in Wave One

Barriers to Quitting Smoking	Prevalence among Low SES	Prevalence among High SES	Model 1: Unadjusted Prevalence Ratios (95% CI), p-value	Model 2: Adjusted Prevalence Ratios (95% CI) ¹ , p-value
Cost of quit aids	32.38%	27.48%	1.17 (0.84, 1.64) 0.3290	1.09 (0.73, 1.54) ² 0.6261
Cost of classes or programs	20.00%	13.10%	1.53 (0.95, 2.46) 0.0822	1.65 (0.97, 2.82) ² 0.0665
Risk of gaining weight	31.43%	19.11%	1.64 (1.14, 2.36) 0.0072 *	1.38 (1.05, 1.83) ³ 0.0211 *
Loss of a way to handle stress	53.33%	55.27%	0.96 (0.79, 1.18) 0.7326	1.01 (0.80, 1.28) ⁴ 0.9161
Friends' smoking	74.29%	66.88%	1.11 (0.97, 1.27) 0.1325	1.03 (0.95, 1.12) ⁵ 0.4785
Craving or withdrawal from nicotine	38.10%	36.54%	1.04 (0.78, 1.39) 0.7736	1.22 (0.91, 1.65) ⁶ 0.1746

Reference group is high SES;

*
p-value <0.05; sd=standard deviation¹ Adjusted for sex, age, community type, and CPD² None of the covariates in the model were statistically significant³ Statistically significant covariates: Male (β : -0.579; p <0.0001); CPD (β : 0.022; p =0.03)⁴ Statistically significant covariates: CPD (β : 0.016; p =0.007)⁵ Statistically significant covariates: CPD (β : 0.005; p =0.01)⁶ Statistically significant covariates: Community type (β : -0.103; p =0.002)

Table 4

Reported barriers to quitting as predictors for quitting smoking one year later

Barriers to Quitting Smoking	Model 1: Unadjusted Relative Risks (95% CI)	Model 2: Adjusted Relative Risks (95% CI) ¹
Cost of quit aids	0.72 (0.32, 1.63) 0.4329	0.76 (0.31, 1.89) ² 0.5561
Cost of classes or programs	1.40 (0.60, 3.27) 0.4312	1.36 (0.51, 3.65) ³ 0.5399
Risk of gaining weight	1.40 (0.67, 2.93) 0.3761	1.62 (0.65, 4.04) ⁴ 0.3012
Loss of a way to handle stress	0.66 (0.33, 1.30) 0.2299	0.82 (0.37, 1.84) ⁵ 0.6366
Friends' smoking	0.88 (0.42, 1.80) 0.7176	1.19 (0.49, 2.89) ⁶ 0.6997
Craving or withdrawal from nicotine	1.45 (0.73, 2.87) 0.2851	1.73 (0.79, 3.80) ⁷ 0.1731

Abbreviations: CI, confidence interval; CPD, cigarettes per day; SES, socioeconomic status.

Reference group is "barrier = no"

*
p-value <0.05¹ Adjusted for sex, age, community type, SES, and CPD in Wave 1² Statistically significant covariates: CPD (β : -0.123; p=0.004)³ Statistically significant covariates: CPD (β : -0.125; p=0.003)⁴ Statistically significant covariates: CPD (β : -0.130; p=0.002)⁵ Statistically significant covariates: CPD (β : -0.122; p=0.004)⁶ Statistically significant covariates: CPD (β : -0.130; p=0.004)⁷ Statistically significant covariates: CPD (β : -0.129; p=0.003)