



Sources of Cigarettes among Adolescent Smokers: Free or Purchased?

Paul Jansen, Traci L. Toomey, Toben F. Nelson, Lindsey E. A. Fabian, Kathleen M. Lenk, and Jean L. Forster

ABSTRACT

Background: Few studies have described youth cigarette sources in terms of whether the cigarettes were free or purchased. Understanding the different ways youth obtain tobacco can guide development of interventions to more effectively reduce youth smoking. **Purpose:** To determine the propensity for youth to purchase cigarettes versus obtain cigarettes for free, and the factors associated with each obtainment method. **Methods:** Our sample included 812 youth ages 12-17 who reported ever smoking a whole cigarette. Our outcome was the source of the last cigarette smoked (purchased vs. free) and independent variables included demographics, smoking behaviors, and smoking status of parents/siblings/friends. We conducted logistic regression to assess relationships between outcome and independent variables. **Results:** Eighty-four percent of youth obtained their last cigarette for free and 16% purchased their last cigarette. Youth who smoked less and had less weekly spending money were more likely to have obtained their last cigarette for free. **Discussion:** Youth smokers appear to have a high propensity to obtain their cigarette for free, particularly those who smoke relatively infrequently. **Translation to Health Education Practice:** Interventions that target sources of free cigarettes have the potential to reduce the progression of youth smoking at a critical stage in its development.

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BACKGROUND

Youth smoking remains a significant health concern in the United States, with 20% of high school students reporting current cigarette use in 2009.¹ One strategy to prevent and reduce youth smoking is limiting access to cigarettes.² Most of the research on youth access to cigarettes has focused on two types of sources: social (e.g., friends, family members, acquaintances from whom youth buy or receive cigarettes) versus commercial (e.g., businesses that illegally sell cigarettes to youth). A 2003 study of youth from 29 Minnesota communities found that 80% of past-month smokers obtained their last cigarette from a social source—54% obtained it from a friend, 12% obtained it from

an adult, 8% obtained it from another teen, and 6% obtained it from a sibling—while 16% purchased their last cigarette from a commercial source and 4% reported stealing their last cigarette.³ A national survey of adolescents found that 51% of past-month

smokers reported purchasing cigarettes commercially and 65% obtained at least one cigarette from friends or relatives in the past month.⁴ A few studies have found factors such as age, gender, race/ethnicity and frequency of smoking may be associated with

Paul Jansen is a graduate student in the School of Public Health, University of Minnesota, Suite 300, Minneapolis, MN 55454; E-mail: jansenpa@gmail.com. Traci L. Toomey is a professor in the School of Public Health, University of Minnesota, Suite 300, Minneapolis, MN 55454. Toben F. Nelson is an assistant professor in the School of Public Health, University of Minnesota, Suite 300, Minneapolis, MN 55454.

Lindsey E. A. Fabian is a senior research coordinator in the School of Public Health, University of Minnesota, Suite 300, Minneapolis, MN 55454. Kathleen M. Lenk is a Research Fellow in the School of Public Health, University of Minnesota, Suite 300, Minneapolis, MN 55454. Jean L. Forster is a professor in the School of Public Health, University of Minnesota, Suite 300, Minneapolis, MN 55454.



whether youth obtain their cigarettes from social versus commercial sources.^{4,7}

Understanding the different ways that youth obtain tobacco can guide development of interventions to more effectively reduce access to tobacco and, ultimately, reduce smoking rates among youth. Research studies have shown that just reducing one type of access to tobacco (e.g., commercial access) may not be sufficient to reduce tobacco use - youth will shift to or increase use of other sources of tobacco.^{8,9}

Whereas there have been several studies investigating social and commercial sources, we found only two studies describing youth cigarette sources in terms of whether the cigarettes were free or purchased.^{6,10} One study found that those who usually purchased their cigarettes from a commercial source were more likely to be male and in 12th grade (vs. 9th grade), while those who usually gave someone else money to purchase cigarettes from a commercial source were more likely to be female and to be white (vs. black or Hispanic) and to be Hispanic (vs. black).⁶ Youth who usually purchased their cigarettes from stores and/or other people were more likely to be frequent smokers; youth who usually obtained cigarettes for free from somebody else were likely to be female and to be black (vs. white).⁶ A study of youth in the United Kingdom found that regular smokers were more likely to buy cigarettes from commercial sources while occasional smokers were more likely to obtain cigarettes socially, and that most youth using social sources were obtaining free cigarettes.¹⁰

PURPOSE

This study builds upon these earlier studies, assessing the propensity for youth to obtain cigarettes for free versus purchasing cigarettes and factors associated with each method of obtaining cigarettes. In addition, the study describes the specific sources of cigarettes for each method of obtainment.

METHODS

This study has a cross sectional design, using data from the Minnesota Adolescent Community Cohort (MACC) study.¹¹

Participants were recruited through modified random digit dial sampling to create a statewide representative sample. Participants were surveyed via telephone every six months, beginning with Round 1 in fall 2000 and continuing with subsequent rounds every spring and fall.¹¹ Data from the fourth round of surveys (collected spring 2002) were used for this study because the majority of youth surveyed were under the legal age to purchase tobacco (18) at that time and because this round was the first to include important variables for this study (i.e., weekly hours worked at a job and whether parents and siblings smoke in the home). The response rate was 93.74% as of the fourth round of data collection.

We restricted the study sample to respondents who had ever smoked a whole cigarette and were under age 18 (18-year-olds were excluded because they were of legal age to purchase tobacco). We excluded 67 participants who reported stealing their last cigarette, 176 who did not report the source of their last cigarette and one participant who did not report smoking frequency. Individuals who “took” their last cigarettes were excluded from this study because this study focused on youth obtaining cigarettes through social or commercial transactions; theft does not involve a transaction with a consenting source. The final analytic sample for the study was 812. This study was reviewed and approved by the University of Minnesota Institutional Review Board.

Survey

Clearwater Research Inc. conducted the recruitment and telephone surveys using random digit dial sampling, using the following specifications: (1) eligible households were those with at least one youth between the ages of 12 and 16 years at the time of the initial survey (fall 2000), and (2) respondents from eligible households were randomly selected from within age quota cells. Trained interviewers conducted the 15-minute telephone survey using a Computer Assisted Telephone Interviewing (CATI) system. Participants received \$10. To protect confidentiality, we phrased questions so that someone listening to the respondent

could not understand the meaning of their responses. Interviewers obtained consent over the telephone from parents or guardians. Although the MACC questionnaire has not undergone reliability and validity testing, the MACC survey questions were carefully chosen from standard items on national survey instruments (e.g., the National Youth Tobacco Survey; http://www.cdc.gov/tobacco/data_statistics/surveys/nyts/index.htm). Studies have shown that measures of self-reported behaviors such as smoking among adolescents are reliable and valid.^{12,13}

Measures

The outcome variable for these analyses was the source of the last cigarette smoked, and was coded as 0 = “purchased” or 1 = “free.” It was derived from the following question: “How did you get the last cigarette you smoked? (Response options used: “I got it from someone” and “I bought it”).

Four types of independent variables were included in these analyses: demographic information, smoking behavior, personal income, and smoking status of parents, siblings and friends. Demographic information included sex, age (12-14 years vs. 15-17 years), and socioeconomic status measured by the education level of the parent with the highest education (“college degree” vs. “no college degree”). Dichotomous variables were created based on the distribution of the original variables. Based on a review by Mayhew and colleagues,¹⁴ we developed a five-point smoking variable that places smokers into five smoking stages and constitutes a scale describing frequency of smoking. These stages were developed using frequently used measures of tobacco use included in our survey that have been validated in other studies:¹¹ (1) Trier = smoked one whole cigarette or a few puffs; (2) Less than monthly = smoked more than a whole cigarette but did not smoke in the past 30 days; (3) Experimental = smoked on between 1 and 20 days in the last 30 but did not smoke in the last 7 days; (4) Regular = smoked on between 1 and 20 days in the last 30 and smoked in the last 7 days; and (5) Established = smoked on at least 20



of the last 30 days. The smoking stage variable enables us to assess differences among smokers who are just starting, smoking intermittently, or smoking heavily. Due to low numbers of participants in stages 1, 2, and 3, we collapsed these into a new stage called “Sporadic smokers” for these analyses. Personal income was based on amount of weekly spending money (\leq \$10 per week, \$11-\$25 per week, \$26-\$50 per week, and $>$ \$50 per week) as well as the number of hours worked each week during the school year (no paid job, $<$ 10 hours, 10-20 hours, and $>$ 20 hours). Parent and sibling smoking status was characterized by whether the participant lived with at least one parent who smoked (yes, no), and whether they lived with at least one sibling who smoked (yes, no). The number of the four closest friends who smoked was measured as a continuous variable with values ranging from 0 to 4. We selected independent variables based on findings from previous studies assessing sources of cigarettes.^{3,5-7,15-19} We did not examine racial/ethnic differences due to the small number of non-white youth in our sample.

Participant Characteristics

The majority of the sample was between the ages of 15 and 17 (83%), had a paid job (59%), and had at least \$26 dollars per week for discretionary spending (55%). Of the youth who reported living with at least one parent, 44% said that they lived with a parent who smoked, 41% said they did not live with a parent who smoked, and 15% had missing data for this item. Twenty-one percent of the respondents reported living with a sibling who smoked. Forty-eight percent of respondents were male.

Analyses

We first conducted bivariate analyses comparing the source of the last cigarette to each independent variable. We then conducted logistic regression to assess the relationship between source of last cigarette and all independent variables. We assessed collinearity among the variables and did not find this was a significant concern. Because participants in the MACC study were clustered within geopolitical units (GPUs), po-

tentially resulting in youth within a GPU being more similar to each other than to youth in other GPUs, we controlled for this nesting using a random effects estimator with GPU as the clustering unit. Skip patterns within the survey generated missing values for the following variables: parent education, parent smoking status, and sibling smoking status. In order to retain observations with missing values for those fields in the logistic analyses, dummy variables were created which treated missing values as independent variables in the multivariate analysis. We used STATA software Version 10 for all analyses.

RESULTS

Eighty-four percent of our sample reported getting their last cigarette for free, while 16% reported purchasing their last cigarette. Of the 679 youth that obtained their last cigarette for free, 90% ($N = 608$) received it from another youth and 10% ($N = 71$) received it from an adult. Of the 133 youth that purchased their last cigarette, 46% ($N = 61$) purchased it from another person and 54% ($N = 72$) purchased it from a store or vending machine.

Results of the bivariate analyses are shown in Table 1. Source of the last cigarette varied significantly by smoking status. Ninety-six percent of “Sporadic smokers” obtained their last cigarette for free, as compared with 85% of “Regular smokers,” and 52% of “Established smokers.” Source of the last cigarette varied significantly by most other independent variables—younger youth, those not living with a parent who smoked (vs. those living with a smoking parent), those not living with a sibling who smoked (vs. those living with a smoking sibling), those who reported fewer friends who smoked, those who worked fewer hours, and those who had less spending money were more likely to obtain their last cigarette for free. Parent education level and gender were not significantly associated with obtaining the last cigarette for free ($P > 0.05$).

In the multivariate model that included all independent variables, only smoking stage and weekly spending money were significantly associated with source of last

cigarette ($P < .05$; Table 2). The odds of obtaining the last cigarette for free were 16 times greater among “Sporadic smokers” than “Established smokers,” and five times greater among “Regular smokers” than “Established smokers.” Individuals who had \$10 or less in weekly spending money were more likely to obtain their last cigarette for free than those who had \$50 or more.

DISCUSSION

We found that most youth (84%) in our sample obtained their last cigarette for free from another person, while 16% purchased their last cigarette from either a commercial source or another person. Similar to previous studies,^{6,10} we found the source of the last cigarette was associated with smoking status, with sporadic smokers having 16 times greater odds than established smokers of obtaining their last cigarette for free (vs. purchased), and regular smokers having 5 times greater odds than established smokers of obtaining their last cigarette for free (vs. purchased). In addition, having less discretionary income was significantly associated with youth obtaining their last cigarette for free. Weekly number of hours worked and discretionary income were both similar measures of weekly income and yet the weekly number of hours worked was not significant in multivariate analysis, possibly because weekly number of hours worked is not a direct measure of money that a person can spend as he/she chooses.

Unlike Jones et al.⁶ we did not find that age was associated with obtaining their last cigarette for free. One explanation may be that a small percentage (17%) of our participants was in the younger age group (ages 12-14). We also did not find gender to be significantly associated with source of last cigarette whereas Jones et al.⁶ found males more likely to obtain cigarettes from commercial sources.

Most existing research on youth access to tobacco is focused on commercial versus social sources of cigarettes, as opposed to obtaining cigarettes for free or via purchasing.⁴⁻⁷ However, it may be useful to frame the findings of this study in terms of social

**Table 1. Bivariate Results: Characteristics of Youth by Source of Last Cigarette (N = 812)**

| Independent variables | Source of last cigarette | | P-value ¹ |
|---|--------------------------|--------------------|----------------------|
| | Free N (%) | Purchased N (%) | |
| Smoking stage | | | <0.001 |
| Sporadic | 481 (96) | 22 (4) | |
| Regular | 95 (85) | 17 (15) | |
| Established | 103 (52) | 94 (48) | |
| Age | | | <0.001 |
| 12-14 | 125 (91) | 13 (9) | |
| 15-17 | 554 (82) | 120 (18) | |
| Sex | | | 0.144 |
| Male | 321 (82) | 72 (18) | |
| Female | 358 (85) | 61 (15) | |
| Lives with at least one parent who smokes (N = 687) ^a | | | 0.049 |
| Yes | 294 (82) | 64 (18) | |
| No | 288 (88) | 41 (12) | |
| Lives with at least one sibling who smokes (N = 791) ^b | | | 0.002 |
| Yes | 129 (76) | 40 (24) | |
| No | 535 (86) | 87 (14) | |
| Number of 4 closest friends who smoke | | | <0.001 |
| 0 | 164 (92) | 14 (8) | |
| 1 | 177 (91) | 17 (9) | |
| 2 | 168 (90) | 19 (10) | |
| 3 | 78 (75) | 26 (25) | |
| 4 | 92 (62) | 57 (38) | |
| Weekly hours worked during school year (N = 787) ^b | | | <0.001 |
| No paid job | 292 (87) | 43 (13) | |
| < 10 | 139 (87) | 21 (13) | |
| 10 to 20 | 145 (85) | 26 (15) | |
| > 20 | 86 (71) | 35 (29) | |
| Weekly spending money (N = 790) ^b | | | 0.005 |
| < \$10 | 158 (92) | 14 (8) | |
| \$11-\$25 | 143 (85) | 26 (15) | |
| \$26-\$50 | (83) | 29 (17) | |
| > \$50 | 220 (79) | 58 (21) | |
| Education of parent with highest education (N = 595) ^a | | | 0.848 |
| College degree | 332 (85) | 59 (15) | |
| No college degree | 172 (84) | 32 (16) | |

^aLower N due to skip patterns and missing data for that item.

^bLower N due to missing data for that item.

¹P-values generated through Chi-square analyses.



Table 2. Multivariate Results: Odds of Obtaining Last Cigarette for Free (N = 812)

| Independent variables | Odds of obtaining last cigarette for free | | |
|---|---|--------------|---------|
| | OR | 95% CI | P-value |
| Smoking Stage | | | |
| Sporadic | 16.01 | 8.63 , 29.69 | <0.001 |
| Regular | 5.00 | 2.63, 9.49 | <0.001 |
| Established | (ref) | | |
| Age | | | |
| 12-14 | 1.03 | 0.49, 2.17 | 0.93 |
| 15-17 | (ref) | | |
| Sex | | | |
| Male | (ref) | | |
| Female | 1.50 | 0.94, 2.40 | 0.09 |
| Lives with at least one parent who smokes | | | |
| Yes | (ref) | | |
| No | 1.18 | 0.68, 2.04 | 0.56 |
| Missing | 0.99 | 0.55, 1.76 | 0.96 |
| Lives with at least one sibling who smokes | | | |
| Yes | (ref) | | |
| No | 1.47 | 0.85, 2.51 | 0.17 |
| Missing | 0.71 | 0.18, 2.75 | 0.62 |
| Number of 4 closest friends who smoke | | | |
| Continuous (0-4) | 0.85 | 0.70, 1.03 | 0.10 |
| Weekly hours worked during school year | | | |
| Missing | 0.30 | 0.03, 2.84 | 0.29 |
| No paid job | 1.92 | 0.89, 4.16 | 0.10 |
| <10 | 1.32 | 0.58, 3.00 | 0.51 |
| 10-20 | 1.56 | 0.77, 3.17 | 0.22 |
| >20 | (ref) | | |
| Weekly spending money | | | |
| Missing | 4.04 | 0.39, 42.17 | 0.24 |
| ≤\$10 | 2.33 | 1.00, 5.42 | 0.05 |
| \$11-\$25 | 0.74 | 0.34 to 1.59 | 0.44 |
| \$26-\$50 | 0.84 | 0.42 to 1.66 | 0.61 |
| >\$50 | (ref) | | |
| Education of parent with highest education | | | |
| College degree | (ref) | | |
| No college degree | 1.14 | 0.64, 2.05 | 0.65 |
| Missing | 0.95 | 0.55, 1.65 | 0.87 |

versus commercial sources while still considering whether these cigarettes were free or purchased. In this study, 91% (N = 740) of youth obtained cigarettes socially, that is, by obtaining them or buying them from

friends, family members, or other individuals. Of the 740 youth who obtained cigarettes socially, approximately 92% obtained their last cigarette for free and approximately 8% purchased their last cigarette. This finding is

similar to that of a study of youth in the UK, in which most youth using social sources were obtaining free cigarettes.¹⁰

This study has several limitations. First, the outcome variable refers to the last ciga-



rette obtained rather than the usual means of obtaining cigarettes; however, a common assumption is that the source of the last cigarette, on average, represents the typical source of tobacco. Additionally, asking youth about the source of their last cigarette is less ambiguous than asking about their “usual” or “typical” source of cigarettes. Last source of cigarette is also less like to have recall bias than other measures of cigarette sources. Second, this sample was drawn exclusively from Minnesota and may not be generalizable to other areas. Many Minnesota communities had strong restrictions on commercial access at the time these data were collected and the methods in which youth access cigarettes may differ in areas with weaker or no restrictions; however, many communities across the country have similar restrictions. Finally, because this study is cross-sectional, we were not able to assess directionality between our independent variables and source of last cigarette. Further research is needed to identify the directionality of these relationships.

Despite some limitations, this study contributes significantly to the existing literature on sources of cigarettes among youth. Addiction is a dynamic process that usually begins with infrequent smoking and progresses to a higher frequency of smoking.^{20,21} We found that more advanced smoking stage and having more discretionary money available were associated with purchasing the last cigarette, while earlier smoking stage and having less spending money was associated with obtaining the last cigarette for free. If smoking stages are assumed to be dynamic, sporadic smokers may be at a tipping point where there is ambivalence about smoking and environmental and social pressures may be especially influential. Hence, interventions that target sources of free cigarettes have the potential to reduce the progression of youth smoking at a critical stage in its development.

A small proportion of our total sample obtained cigarettes by buying them from commercial sources. However this small group may contribute to the social exchange of cigarettes among youth. It is possible

that youth who buy cigarettes illegally from commercial sources in turn become social sources of cigarettes for others. Croghan et al.¹⁰ found that youth who usually purchased cigarettes from a shop typically purchased 10 cigarettes at a time, while those who purchased from a student or another social source, usually purchased only one cigarette at a time, suggesting that youth who purchased from commercial sources may have more cigarettes available to disseminate to other youth. Youth who reported buying their most recent cigarette were the most likely to report giving cigarettes to other youth²² and that utilization of commercial sources is a strong predictor of social exchange of cigarettes.³ This suggests that increased enforcement of policies restricting commercial access to cigarettes remains an important strategy for preventing cigarettes from reaching the social market.

Most youth who purchased their last cigarette reported buying it from a store (54%), but a large percentage (46%) purchased their last cigarette from another person. This type of exchange differs from social exchange of cigarettes that does not involve money. More research is needed to understand how to prevent youth and adults from selling or giving cigarettes to youth.

TRANSLATION TO HEALTH EDUCATION PRACTICE

Results from this study have direct implications for health education practice. First, this study suggests that how youth obtain cigarettes varies by smoking status. Practitioners need to consider the targeted group and intended goal when designing interventions to prevent youth access to cigarettes. For example, if the goal of the intervention is to prevent progression from sporadic smoking to regular or established smoking, then an intervention that targets free sources of cigarettes (from other youth and adults) may be most appropriate (e.g., enforce policies prohibiting the use or possession of cigarettes in schools, educate parents about the risks of giving cigarettes to their children or other youth, and about the need to keep their cigarettes in a place not ac-

cessible to their children such as in a locked drawer). However, if the goal is to reduce smoking among adolescents who are already daily smokers, focusing on preventing access to free sources of cigarettes is unlikely to achieve that goal; in this situation, interventions would be more effective if focused on paid sources. For example, to prevent or reduce illegal cigarettes sales to minors, compliance checks can be conducted at retail stores. If youth who are supervised by law enforcement attempt to purchase cigarettes and the sale is made, the clerk and/or owner can be penalized. Similarly, youth who approach adults outside stores to ask them to purchase cigarettes for them, and the adult purchases them; then they are penalized. Because our study shows that many youths get cigarettes from other youths, either for free or for purchase, then interventions are needed to prevent them from obtaining a supply of cigarettes from which they provide to others. For example, interventions to prevent cigarette sales to youth, such as compliance checks (as mentioned above) would be useful. Unfortunately, little research is available to guide practitioners about what specific types of interventions would be effective in targeting the various sources of cigarettes among youth. Given this scarcity of research, it is important that practitioners evaluate and disseminate effects of interventions they implement aimed at reducing youth access to cigarettes.

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