

A Study of Adolescents Who Provide Tobacco to Other Adolescents in a Racial/Ethnic Diverse Population

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Abstract

This study examined the sources of tobacco and the adolescent provision of tobacco to other adolescents in an ethnically/racially diverse, large heterogeneous urban, adolescent population in Philadelphia, Pennsylvania. A stratified multistage purposive sampling procedure was used to select an ethnically/racially diverse sample, which consisted of 569 students in grades 8-10 in five public and nonpublic funded schools. A logistical regression analysis was used to examine potential predictor variables of adolescent provision of tobacco to other adolescents. Social sources of tobacco were more common than commercial. Gas stations/convenience stores, grocery stores, recreational/sports centers, and pharmacies were the most reported commercial sources. Among adolescent smokers, 46% of smokers gave tobacco to another adolescent. Tobacco was sold (32.2%) and given as a gift (67.8%). Positive correlates of adolescent provision included family availability, best friends and father smoked, purchased cigarettes in the last 30 days, and ownership of tobacco brand merchandise.

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Cigarette smoking rates vary among ethnic/racial groups in the United States (CDC, 1998; Livingood, Woodhouse, Sayre, & Wludyka, 2001). Adolescents obtain tobacco from commercial and social sources. Adolescents perceive that tobacco is readily available and availability is a primary factor for tobacco use onset (CDC, 1995; Florida Department of Health, 1998; Forster, Wolfson, Murray, Wagenaar, & Claxton, 1997). Adolescent smoking rates remain high among American teens. Over one-third of students smoke by the time they leave high school and one-fifth are smoking monthly by the eighth-grade (Johnston, O'Malley, & Bachman, 2000). Current cigarette smoking is higher among white (38.6%), than Hispanic (32.7%), and Black (19.7%) students (CDC, 2000). In Philadelphia, results from the 1999 Youth Risk Behavior Surveillance (YRBS) survey showed that 67.9% of adolescents used cigarettes in their lifetime, 23% currently used, and 10.3% were frequent users and use varies by ethnic/racial group (CDC, 2000; Ma, Shive, Legos, & Tan, 2003).

Primary commercial sources of cigarettes for occasional and regular smokers include gas stations, convenience stores, vending machines, grocery stores, drug stores, stealing, and taverns (Cismoski & Sheridan, 1993; Forster, Knut-Inge, & Jeffery, 1989; Forster et al., 1997; Hinds, 1992). Commercial sources were determined to be an important source of tobacco to minors and efforts were made to restrict youth access. Previous studies have shown that there are racial/ethnic differences in merchant sales to adolescents. In a California study, an analysis of 432 purchase attempts which used Black, White, and Latino adolescent confederates, found that older (16-year-old) Black males and females were the most likely to be sold cigarettes (Klonoff, Landrine, & Alcaraz, 1997). Clerks were more likely to sell to a minor if that minor was 14-16 years old, Latino, or a 16 year old Black girl or boy, whereas being a Latino boy decreased the likelihood of sales. Black children were sold more packs of cigarettes in Black neighborhoods than White children (Landrine & Klonoff, 1997). Further, 91% of cigarettes sold

to both White and Black children were by non-Black clerks, and of those packs sold to Black children in Black neighborhoods, 93% were sold by non-Black clerks. Representative non-Black clerks selling cigarettes to Blacks in Black neighborhoods were Asians (67%), Whites (12.7%), and Latinos (13%). Black (7%) clerks were the least likely to sell tobacco to Black minors in Black neighborhoods. There are differences in merchant sales of tobacco to different racial/ethnic minors, and in clerks' willingness to sell. It appears that socio-cultural variables play an important role in access to tobacco by minors.

Adolescents can also obtain tobacco from social sources. These social sources include parents, older siblings, other adults, peer friends, and theft (Forster, et al., 1997; Florida Department of Health, 1998; Forster, et al., 1989). The majority of current smokers obtained their first cigarette from family or friends (CDC, 1996; Florida Department of Health, 1998; Forster, et al., 1997; Wolfson & Forster, 1997). There is a pressing need to address the social availability of tobacco to youth (Wolfson & Forster, 1997).

One form of social source of tobacco to minors is adolescent provision of tobacco to other adolescents. Friends and family are important sources of tobacco to adolescents (Cummings, Sciandra, Pechacek, Orlandi, & Lynn, 1992; Forster, et al., 1997; Greenlund, Johnson, Webber, Berenson, 1997) and the source of cigarettes is a function of frequency of use (Emery, Gilpin, White, & Pierce, 1999). As adolescents progressively smoke more than one cigarette a day, they purchase cigarettes themselves rather than relying on others to give or purchase cigarettes for them. Students perceive that tobacco is easy to get, especially from friends and family (Forster, et al., 1997). A study found that of those students who reported smoking in the past 30 days, 68% of them reported providing tobacco to another adolescent during that period. Of those that provided tobacco, 66.3% gave to someone their age, 37.4% gave to a younger friend, 16.6% gave to a sibling, and 12.9% gave to a stranger (Wolfson & Forster, 1997).

Factors which correlate with adolescent provision of tobacco to other adolescents have included adolescent smokers who: were heavy smokers, had many friends who smoked, had mothers who smoked, owned tobacco related merchandise, and had access to commercial sources (Wolfson & Forster, 1997). This study suggests that there may be a close relationship between social and commercial availability, a finding supported in previous studies (Hinds, 1992). The authors caution that the results of this cross-sectional study are limited, due to the sample selected. The characteristics of samples of the available research literature tend to emphasize rural, small, homogeneous populations, and typically include students who attend public schools. There is a need to determine sources of tobacco to youth in a large urban, heterogeneous population, to distinguish between gift or sale, and to include students from public and nonpublic schools, such as in Philadelphia. Further, there is a need to address the social availability of tobacco to youth, and to further assess the extent and predictors of adolescent provision of tobacco to other adolescents (Wolfson & Forster, 1997). Past studies which have investigated the relationship between tobacco use and the various psychosocial factors may not be applicable with other ethnic/racial populations.

The purpose of this study was to examine the sources of tobacco and the adolescent provision of tobacco to other adolescents in an ethnically/racially diverse and large urban student population in Philadelphia, Pennsylvania.

Methods

The sample for this study included 569 students from grades 8-10 attending five public (n = 290) and nonpublic (n = 355) funded schools in a racially and ethnic diverse part of Philadelphia, Pennsylvania. Students completed a voluntary and anonymous 68-item questionnaire in spring 2000. Grades 8-10 were chosen as the sample for the survey because these students would be no older than 15 or 16 years old and therefore they would be old enough to have started to smoke in large numbers and yet too young to be sold cigarettes legally. A stratified, multistage purposive sampling procedure was used in

selecting the sample. The diverse section of Philadelphia was chosen to conduct the study, due to the heterogeneity of its culturally diverse population and a health service agency estimated that merchant sales of tobacco to minors was the highest in Philadelphia. Klepp et al. (1996) suggested that a student population be chosen for conducting a study in which tobacco use was a salient issue. Students from public and nonpublic funded schools located in a diverse section of Philadelphia were selected in the sample to be more inclusive and representative of the neighborhood population.

A current list (1997-1998) of schools in the diverse section of a Philadelphia school cluster was obtained from the School District of Philadelphia and the Pennsylvania Department of Education. The primary sampling unit was comprised of students in five (5) schools in the diverse section of Philadelphia, a public funded middle and high school, and two nonpublic funded elementary schools and one high school. Seven schools were approached and 2 did not want to participate. The first stage consisted of selecting neighborhood (few nonresident enrollment) schools that were ethnically/racially diverse. The second stage involved selecting classrooms in the schools to administer the survey. In the high schools, subjects such as Health, Physical Education, English, and Social Studies were chosen because these were required and there was very little overlap of students.

Sample Characteristics

The sample consisted of 75% males and 25% females (Table 1). There was an equal distribution of males (46.7%) and females (53.3%) in the eighth grade, but there were more males than females in grades 9-10 due to the unisex character of the nonpublic high school surveyed. The sample included Asians (12%), African Americans (32.9%), Hispanics (3.3%), American Indians (0.7%), and Whites (50.9%). Measures of disposable weekly income indicated that 22.5% had less than \$10 a week for

discretionary income, and 54.8% had more than \$25 to spend. The reported level of cigarette use included ever (48.9%), past month (19.3%), weekly (17%), and daily (15.3%) use (Table 1). More ninth graders indicated that they smoked in these four categories than eighth and tenth graders. On average, smokers reported smoking eight cigarettes daily, and 40 cigarettes weekly. The mean age of initiation for the total sample was approximately 12 years. Smokers were sure that they could quit ($M=5.0$, $SD=2.2$) and attempted to approximately 2 times in the last year ($M= 1.8$, 4.2).

A discussion of the estimates of reliability and validity were reported elsewhere (Ma, et al., 2003). Items measuring social and commercial sources of tobacco had good levels of test-retest reliability, based on values of Kappa between 0.40 and 0.75 (SPSS, 1999).

Data Analysis

Data were analyzed with SPSS version 10.0. The statistical tests used in the data analysis included descriptive statistics, the Phi, contingency, and point biserial correlations, and logistical regression analyses. Descriptive statistics were reported for the demographic variables (gender, race, grade, and disposable income), and smoking behavior (frequency, age of initiation, ability to quit, and quit attempts), perceived availability (1=very difficult and 7=not at all difficult), and sources (commercial or social) of tobacco. Correlations were also reported. The dependent variable was adolescent provision of tobacco to other adolescents in the past month. The independent variables were demographics, social influences (friend or family), perceived sanctions (high, medium, low), perceived availability, source of most recent cigarettes (commercial or social), age of initiation, purchase attempts, number of weekly cigarettes, and ownership of tobacco merchandise. School sanctions were defined as low (nothing to sent to the office), medium (stay after school to required to attend special class), and high (suspended from activities to expelled).

Table 1
 Characteristics of Respondents by Grade

	Grade (%)			
	Grade 8 (n = 75)	Grade 9 (n = 184)	Grade 10 (n = 310)	Total (N = 569)
Demographics				
Gender				
Male	46.7	77.2	80.3	74.9
Female	53.3	22.8	19.7	25.1
Racial/ethnic group				
Asian or Asian America	2.7	10.9	14.8	12.0
African American or Black	58.1	27.2	30.3	32.9
Hispanic or Latino	1.4	4.3	3.2	3.3
American Indian	1.4		1.0	0.7
White	36.5	57.1	50.6	50.9
Amount of disposable weekly income				
≤ \$10	41.9	19.3	19.4	22.5
\$11-25	27.0	27.3	19.0	22.8
>25	31.1	53.4	61.5	54.8
Cigarette Use (%)				
Ever use	48.0	52.2	47.2	48.9
Past Month	12.0	20.9	20.2	19.3
Weekly	8.0	20.7	17.1	17.0
Daily	8.0	19.0	14.8	15.3
Smokers (Mean (SD))				
Cigarettes smoked past 24 hours:	5.0 (7.5)	8.3(8.9)	8.0(6.7)	7.9 (7.7)
Cigarettes smoked past week:	30.3 (49.2)	40.0 (52.0)	41.4 (42.9)	40.1 (46.7)
Age of initiation:	10.7 (2.0)	11.9 (2.3)	12.2 (2.1)	11.9 (2.2)
Certain in ability to quit ^a	5.8 (1.9)	4.7 (2.3)	5.0 (2.2)	5.0 (2.2)
Quit attempts:	1.7 (2.3)	2.3 (4.5)	1.4 (4.2)	1.8 (4.2)

^a Mean responses are on a 7-point scale, where 1 = I am sure I could not quit and 7 = I am sure I could quit.

A logistic regression analysis was used to identify potential predictor variables of adolescent provision of tobacco to other adolescents using SAS 8.0. The independent variables were demographics, social influences, perceived sanctions, perceived availability, sources of cigarettes, smoking behavior, and ownership of tobacco brand items. The dependent variable was adolescent provision of tobacco to other adolescents in the last 30 days. Variables were included in the final logistic regression model by forward stepwise selection. The likelihood-ratio(LR) test was used to determine removal of variables from the model at each step. Entry of variables at each step based on .25 and the significance criterion for selection of whether a variable remained in the

model was .05 (Allison, 1999). Nagelkerke's Max-rescaled R² was used to estimate the variation in the outcome variable explained by the logistic regression model (Nagelkerke, 1991; Norusis, 1999).

Results

Sources of Tobacco

Smokers perceived that it was easy to get cigarettes from friends, vending machines, and over-the-counter purchases (Table 2). It was difficult to get cigarettes from family members (M = 3.4) and by stealing (M = 3.0) them from a store. Weekly smokers reported that it was not difficult to get cigarettes from friends (M = 6.2), vending machines (M = 5.5), and through over-the-counter purchases (M = 5.2). Weekly

smokers (M = 4.1) perceived that it was easier to get cigarettes from family members than ever smokers (M = 3.4). Friends accounted for the largest reported source of initial, most recent and ever source of cigarettes. Family accounted for the second largest initial and ever source. Store purchases accounted for the second most recent source. If family and friends are combined as an

initial source of tobacco, approximately 93% of ever smokers obtained cigarettes from social sources, compared with 6% who obtained them from commercial sources. Less than 1% reported getting their most recent cigarettes by stealing them from a store. Students were certain in their ability to quit smoking (M=5.0, SD=2.2).

Table 2
Sources Of Cigarettes To Ever Smokers By Grade And Weekly Smokers

	Ever Smokers (%)				Weekly Smokers (n = 93),%
	Grade 8 (n = 36)	Grade 9 (n = 95)	Grade 10 (n = 146)	Total (n = 277)	
Source of First Cigarette					
Friend	60.0	76.5	72.4	72.0	64.5
Family	28.6	16.5	20.9	20.5	24.7
Vending Machine	0	1.2	1.5	1.2	1.1
Over-the-Counter purchase	5.7	3.5	2.2	3.1	3.2
Stolen from business	0	1.2	1.5	1.2	2.2
Other	5.7	1.2	1.5	2.0	2.2
How long after starting to use tobacco, purchased own					
Never bought	53.6	39.1	42.9	43.1	8.9
Within month	42.9	42.0	38.1	40.1	62.2
Within year	0	11.6	10.5	9.4	18.9
>Year	3.6	7.2	8.6	7.4	9.5
Source of most recent cigarette					
Friend	73.1	69.5	63.0	66.5	43.0
Family	15.4	11.0	9.2	10.6	8.6
Vending machine	0	2.4	0.8	1.3	3.2
Over-the-counter purchase	11.5	14.6	26.1	20.3	40.9
Stolen from business	0	1.2	0.8	0.9	1.1
Other	0	1.2	0	0.4	1.1
Attempts to purchase, last 30 days:					
None	86.1	74.7	69.2	73.3	44.3
1-5 times	13.9	13.8	17.8	15.8	28.9
6-10 times	0	3.2	6.2	4.3	9.3
>11 times	0	8.5	6.9	6.5	17.5
Ever obtained cigarettes					
Friend	80.8	84.1	89.5	86.6	90.2
Family	38.5	39.8	43.9	41.8	71.7
Vending Machine	11.5	28.4	22.8	23.6	47.8
Over-the-Counter	42.3	34.1	42.3	39.2	71.7
Stolen from business	0	9.1	4.1	5.5	8.7
Type of business ever a source (%)					
Restaurant	15.4	20.0	22.6	20.9	18.5
Gas station/convenience store	61.5	40.0	46.8	45.2	42.4
Grocery store	30.8	37.5	37.1	36.5	32.6
Pharmacy	15.4	17.5	22.6	20.0	17.4
Bar, Tavern, Pub, liquor store	0	10.0	19.4	13.9	14.1
Hotel/motel	0	5.0	6.5	5.2	6.5

	Ever Smokers (%)				Weekly Smokers (n = 93),%
	Grade 8 (n = 36)	Grade 9 (n = 95)	Grade 10 (n = 146)	Total (n = 277)	
Discount store	15.4	12.5	11.3	12.2	13.0
Recreational/Sports center	7.7	20.0	40.3	29.6	29.3
Other	15.4	5.0	3.2	.2	2.2
Perceived availability ^a					
Friend	6.3	6.1	6.2	6.2	6.2
Family	3.2	3.4	3.6	3.4	4.1
Vending machine	4.6	5.5	5.6	5.4	5.5
Over-the-counter	4.9	4.7	4.8	4.8	5.2
Steal from store	3.2	2.9	2.9	3.0	2.9

^a Mean responses are on a 7-point scale, where 1 = very difficult and 7 = not at all difficult.

Common commercial sources for ever obtaining cigarettes were from gas stations/convenience stores, grocery stores, recreational/sports center, restaurant, pharmacy, bar or tavern, and discount stores. Among ever smokers, 40% purchased their own cigarettes within a month after starting. Weekly smokers were more likely to have attempted to purchase tobacco in the last 30 days and were also less likely to have the store clerks refuse to sell them cigarettes, than ever smokers.

Adolescent Provision of Tobacco to Other Adolescents

Of the students sampled, 18.6% reported that they gave tobacco to another adolescent minor in the past month. Among smokers, 45.6% gave tobacco to another adolescent. Recipients included siblings (4.9%), same age friend (20.4%), younger friend (10%), and strangers (10.3%). Tobacco was sold (32.2%) and given as a gift (67.8%). Further, 17.9% of students

reported that they had been given money to purchase tobacco for another adolescent.

Table 3 shows the correlation between each independent variable with the dependent variable of adolescent provision. The following independent variables were significantly ($p < .05$) positively correlated with the dependent variable: race, gender, amount of disposable weekly income, whether the father, mother, siblings, and best friends smoke, the number of friends who smoke, and the perceived percentage in the grade who smoke, perceived difficulty of getting cigarettes from family and a salesperson, the most recent source of a cigarette, purchase attempts in the last 30 days, the number of weekly cigarettes smoked, and the ownership of tobacco brand merchandise. Low and medium school sanctions and parental sanctions were significantly ($p < .05$) negatively correlated with the dependent variable.

Table 3
Correlation of Indep. Variables with Adolescent Provision of Tobacco to Other Adolescents (N=569)

Independent Variables	Adolescent provision of tobacco to other adolescents
Demographics	Correlations
Race ^a	.19***
Father's education ^a	.09
Mother's education ^a	.09
Gender ^b	.14***
Grade ^a	.07
Disposable income ^a	.22***
Social Influences	

Independent Variables	Adolescent provision of tobacco to other adolescents
Demographics	Correlations
Father smokes ^b	.19 ^{***}
Mother smokes ^b	.19 ^{***}
Sibling smokes ^b	.20 ^{***}
Best friend smokes ^b	.40 ^{***}
Number of friends who smoke ^a	.44 ^{***}
Perceived percentage in grade who smoke ^a	.20 ^{***}
Perceived Sanctions	
Low school sanctions ^b	-.08 [*]
Medium school sanctions ^b	-.12 ^{**}
High school sanctions ^b	-.04
Parental sanctions ^b	-.32 ^{***}
Perceived Availability	
Difficulty of getting cigarettes from friend ^a	.09
Difficulty of getting cigarettes from family ^a	.26 ^{***}
Difficulty of getting cigarettes from vending machine ^a	.09
Difficulty of getting cigarettes from salesperson ^a	.13 ^{**}
Difficulty of getting cigarettes from stealing ^a	.08
Source of most recent cigarette ^a	.49 ^{***}
Purchase attempt in last 30 days ^a	.51 ^{***}
Age initiated smoking ^c	.17
Number of weekly cigarettes ^c	.73 ^{***}
Own tobacco brand products ^b	.21 ^{***}
^a Contingency coefficient. ^b Phi correlation. ^c Point biserial correlation. * p < .05, ** p < .01, *** p < .001	

Table 4 contains the final logistic regression results. The following variables were all positively associated with adolescent provision of tobacco to other adolescents: family availability (FA), best friends smoked (BFS), best friends do not smoke (BFDS), father smokes (FS), father does not smoke (FDS), purchased cigarettes but not in the last 30 days (PANPM), purchased cigarettes in the last 30 days (PA), and ownership of tobacco brand merchandise (OTM). The logistic regression equation for the probability of adolescent

provision of tobacco to another adolescent was: $Z_{(provision)} = 1.35(FA) + 0.92(PANPM) + 0.29(PA) - 0.62(FDS) + 0.41(FS) - 0.08(BFDS) + 1.08(BFS) + 0.78(OTM) - 1.91$. Z represents the linear combination of each correlated variable and is used to calculate the probability of the occurrence of the outcome variable of provision of tobacco. The Max-rescaled R² was 0.52 which indicates that 52% of the variance in adolescent tobacco provision is explained by the logistic regression model.

Table 4
Final Logistic Regression: Predictor Variables of Adolescent Smokers' Provision of Tobacco Products to Other Adolescents

(n = 221)	Coefficient (SE)	Odds Ratio	95% Confidence Interval
Family availability	1.35 (0.37)**	3.86	1.87, 8.18
Purchased cigarettes, but not last 30 days	0.92 (0.19)***
Purchase cigarettes in last 30 days	0.29 (0.19)***
Father smokes	0.41 (0.56)*	1.51	0.53, 4.67
Father does not smoke	-0.62 (0.61)*	0.54	0.16, 1.79
Best friend smokes	1.08 (0.61)*	2.96	0.93, 10.55
Best friend does not smoke	-0.08 (0.64)*	0.93	0.27, 3.47
Owns tobacco brand merchandise	0.78 (0.38)*	2.19	1.04, 4.70

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

The odds that adolescent smokers would provide tobacco were 3.8 times higher if tobacco was perceived to be readily available from family members. The more students indicated that they attempted to purchase tobacco, the greater the odds that they had provided tobacco. The odds of adolescent provision of tobacco were 1.5 times higher if the father smoked compared to a father who had no influence. Those fathers who did not smoke provided a protective factor from adolescents smoking compared to those fathers who had neutral influence. The odds of adolescent provision were 2.2 times higher if the student owned tobacco brand merchandise.

Discussion

Prevalence of smoking among adolescents in Philadelphia remains high, with approximately 49% having ever used, 19% in the past month, 17% weekly, and 15% used daily. The TPOP study conducted in Minnesota showed similar findings with 50% ever smoked, 20% the last 30 days, 17% weekly and 11% smoked daily (Forster, et al., 1997). These findings also lend further support to those studies which have found similarities in adolescent smoking rates in rural and urban locations (Cronk & Sarvela, 1997). Also consistent with previous literature, the mean age of initiation was 12 years (Johnston, et al., 2000). Overall, smokers were confident in their ability to quit smoking, however, they tried to quit on average less than 2 times in the past month. These findings

present a challenge to reducing this health problem. This study shows that while there may be differences in smoking rates between ethnic/racial groups, smokers may share many similar factors related to smoking behavior.

Social sources were the most prevalent source of tobacco to adolescents in Philadelphia. Friends were perceived as the least difficult to get tobacco from, and in fact accounted for the largest reported initial, most recent and ever source of tobacco. Family was a more important initial and ever source of tobacco than commercial sources, lending support to previous studies (CDC, 1995; Forster, et al., 1997; Forster, et al., 1989; Greenlund, et al., 1997; Hinds, 1992). Family members also serve as social influences by imitating behavior and providing norms for use. They are influential in smoking initiation and maintenance of use among children (Jackson, Bee-Gates, & Henriksen, 1994; Males, 1995). In the current study, mothers were more likely to be reported as a source of tobacco than fathers, an observation made in previous studies (Ahlgren, Norem, Hochhauser, & Garvin, 1982; Gfroerer, 1987; Kandel & Wu, 1995). While it is beyond the scope of the design of this study to determine if social sources have increased due to enforcement efforts to reduce commercial access to tobacco as found in other studies (Hinds, 1992), social sources will need to be addressed in tobacco use prevention curricula used in

Philadelphia. Parents and peers serve as a primary source of tobacco in the sample. Despite increased law enforcement policies, students still perceive that tobacco is readily available, especially from family and friends, but also from commercial sources. Students obtained less tobacco from commercial sources than social, which may be some indication that enforcement of youth restriction laws to reduce commercial access are working.

Commercial sources were also important sources of tobacco for adolescents. Among ever smokers, 40% reported that they purchased their own cigarettes within one month of starting to smoke. Further, 22.5% reported obtaining their most recent cigarettes from commercial sources. Types of businesses which served as an ever source included, gas stations/convenience stores (45%) were the most important sources followed by grocery stores (37%), recreational/sports centers (30%), restaurants (21%), pharmacies (20%), bars/taverns (14%), and discount stores (12%). These findings corroborate the results of previous studies which also found the same predominant commercial sources among small rural populations (Cismoski & Seridan, 1993; Forster, et al., 1997; Forster, et al., 1989). The present study also found that 26.6% of ever smokers tried to purchase tobacco from a store in the last 30 days, similar to the TPOP study in Minnesota (26.9%) (Forster, et al., 1997). Sources of cigarettes is a function of the frequency of use. The greater the quantity of cigarettes used daily, the more likely the adolescent is to purchase them commercially (Emery, et al., 1999). While enforcement of existing laws which prohibit the sale of tobacco to minors in Philadelphia has led to a reduction in sales of tobacco to minors (Jason et al., 1996; Ma, Shive, & Tracy, 2001), commercial sources are still readily available to minors in Philadelphia.

Among past month adolescent smokers, 46% gave tobacco to another adolescent. This finding was less than the TPOP study which found that 68% provided (Wolfson & Forster, 1997). Since, student's perceptions of the percentage of peers who smoke in their grade is correlated with tobacco provision supports the

notion that smoking may be a normative activity. As smoking increasingly is perceived as the norm, adolescents may be more likely to participate in the behavior. Adolescent provision of tobacco to other adolescents appears to be associated with belonging to a particular racial group, of a certain gender, the more disposable income, if family and friends smoke, if the student perceives that many peers smoke, if there are no or few school and parental sanctions, and if it is perceived that it is easy to get cigarettes from family and store clerks, the more cigarettes smoked per week, and whether the person has tobacco brand merchandise.

The independent variables which predicted adolescent provision of tobacco to other adolescents were perceived difficulty of obtaining tobacco from family (difficult, not difficult), best friends smoke, frequency of purchase attempts, father smokes, and ownership of tobacco brand merchandise were all positively associated with provision. These results suggest that, the odds of provision increase if cigarettes are readily available from the family, the higher the frequency of purchase attempts, if friends smoke, if the father smokes, and if the adolescent smoker owns tobacco brand items. These observations support other studies which indicate that adolescents were more likely to provide tobacco if they had many friends who smoke, they owned tobacco brand merchandise, and attempted to purchase tobacco in the last 30 days (Wolfson & Forster, 1997). Heavier smokers may have the largest supply and the easiest access to tobacco which enable them to give some to others. This study shows that knowledge of a father's tobacco use may influence adolescent provision. These findings also suggest that school and community based programs could include messages that discourage adolescent smokers from providing cigarettes to their friends. In addition, more emphasis will need to be placed on parenting programs which emphasize the role of parental influence in provision of tobacco among adolescents.

This study has several limitations. First, cross-sectional data cannot be used to establish cause and effect relationships between smoking

behavior and sources of tobacco. Second, the sample was restricted to an ethnically/racial heterogeneous urban adolescents who attend schools and so it may not be representative of all adolescents. Throughout this study, the results were compared with the TPOP study conducted in Minnesota to show consistencies across the two populations. While a direct statistical comparison is not possible, there are similarities in tobacco use behavior, sources of tobacco, and knowledge of and attitudes toward youth restriction policy which supports the validity of the findings and usefulness of both studies. Third, logistical regression analysis is useful for interpolation, but caution needs to be exercised in extrapolating to cases or populations beyond the range of observations. The results of this study may apply only to populations which are characteristic of a large heterogeneous urban area.

Despite these limitations, this study examined smoking behavior, tobacco sources, and factors

associated with adolescents who provide tobacco to minors, among a large ethnic/racial diverse, urban adolescent population in Philadelphia. Support was given to many of the findings of previous studies which had been conducted with other populations, allowing for more extensive generalization to other populations. Future research could be conducted to determine the dynamics of school and parental sanction implementation on smoking behaviors and social sources, and the role that these sanctions play in determining normative health behaviors.

Cigarette use is the leading cause of preventable death in the United States. Given the current prevalence and long term health consequences of tobacco use, parents, school and government personnel should carefully examine the challenges and opportunities that are available to design interventions which effectively address social sources and influences on tobacco use. This will be necessary to meet the tobacco use reduction objectives of *Healthy People 2010*.

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