The Roles of Education, Family & Religion in the Smoking Behaviors of Young Adults

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Cigarette smoking has long been a serious concern to public health workers and policy makers alike. Smoking is associated with higher rates of morbidity and mortality in addition to the economic costs to society as a whole that come with an unhealthy population (Nelson et al. 2008). Adolescents are a particularly important group to study with regards to smoking behavior because adolescents comprise the largest category of smoking initiates in the U.S. and adolescent initiates go on to become the majority of adult smokers (Tomar 2003; Johnson and Hoffmann 2000). Although the vast majority of adolescents are healthy, they are at risk of developing unhealthy behaviors that can affect their life-long health. The increasing stratification of educational opportunity in high schools, with some students preparing for college and others dropping out, also renders adolescence important to understanding the sources of stratification of health.

There are multiple developmental trends, like increasing independence from families, the quest for self-identity, and a desire to fit in with peers, that coincide in adolescence and render youth susceptible to developing potentially harmful behaviors, like smoking (Furstenberg 2000; Harris 2010). Unlike childhood, where the family is the primary socializing institution, adolescents experience increasing independence from families. Their ability to make good decisions about the behaviors they engage in and who they spend time becomes key to a healthy transition to adulthood.

Our primary research questions investigate adolescent decision-making surrounding smoking. Specifically, we examine what experiences during adolescence related to education, religion and family, have a lasting effect on adolescents' smoking behaviors in young adulthood.

We explore whether there are differences in how these three domains of socialization protect adolescents from trying smoking versus becoming regular smokers in order to shed light on how these social institutions may affect adolescents' decision-making frameworks. Finally, we examine whether any of these processes differ by gender. To analyze these questions, we use the National Longitudinal Study of Adolescent Health's survey data from Waves I (1994-1995), Wave IV (2008), and the high school transcripts of all Wave III Add Health participants.

BACKGROUND

Behaviors that begin in childhood or adolescence carry on into adulthood, changing from incidental behaviors to patterns, and these patterns persist through the life course both by their existence and their effects on later transitions (Elder 1998). By examining adolescents as they become young adults, we have the opportunity to investigate the factors that affect the likelihood that these incidental behaviors become daily behaviors that could lead to morbidity. During adolescence, education is still accumulating, which allows us the chance to dissect the effect of the schooling experience on decision-making. When discussing the prevention of risky or addictive behaviors, the goal is more than protecting the health of the individual. In the long run, prevention is safer and more cost-effective than treatment, not only for the individual, but for the nation as a whole.

Education

During adolescence, educational trajectories become increasingly stratified, with more learning opportunities offered to students in the higher tracks or advanced classes (Oakes; Hallinan). These learning opportunities affect the quality of curriculum students receive (particularly in terms of how challenging or stimulating it is) (Oakes) and translate into different likelihoods of going on to college and getting a college degree (Oakes). Academic achievement,

as measured by grade point average (GPA), has been previously linked to smoking behaviors in high school (Schulenberg et al. 1994). What is less certain is whether this protective effect persists into young adulthood?

GPA can have many meanings in adolescents' lives. It represents the amount of success and positive or negative feedback adolescents have received from teachers. A part of getting good grades is conforming to adult expectations (the teacher's, society's) and meeting the demands of the classroom. As a result, adolescents who have high GPA's may conform more to prosocial attitudes, and this may translate into avoiding other illegal or unsanctioned behaviors, such as smoking. The opposite of a prosocial attitude may be captured by whether or not an adolescent has failed any classes in high school. Course failures, like GPA, may represent deviant behavior or nonconformity to adult expectations. They also may be indicative of emotional distress or other developmental difficulties. This may also include an increasing sense of a loss of personal control or a willingness to engage in illegal activities like smoking.

In addition to a prosocial attitude, GPA also represents doing well in school, which in part indicates that a student is mastering the material they are exposed to – with mastery, may come an increased sense of personal control and increased cognitive abilities or human capital which may in turn contribute to better decision-making about health behaviors such as smoking. What GPA cannot capture is how difficult the material presented to a student is. It is a different academic experience to achieve an "A" in a difficult or challenging class, as opposed to an "A" in a class that predominantly emphasizes rote memorization.

In order to capture the level of difficulty of the courses an adolescent takes in high school, we also investigate the role of math-course taking by the end of high school. Successfully completing advanced math courses, such as Algebra II or Calculus, serves as a gateway for other

advanced courses and is a robust predictor of college entry (Adelman 1999; Sells 1973; Simpkins et al. 2006). Math courses also are defining courses for the social organization of schools (in terms of adolescents other courses) and often help delineate academic tracks (Gamoran and Hannigan 2000; Lucas and Good 2001; Stevenson, Schiller, and Schneider 1994). As such, we use this measure as a proxy for student's overall track placement and as one measure of exposure to challenging curriculum.

Though math course-taking is often indicative of the level of difficulty an adolescent is exposed to, there are also significant differences across schools in the level of difficulty of classes even with the same title (such as Algebra II). Because more developed cognitive abilities come from more learning opportunities in the classroom which come from better curriculum and are likely associated with better decision-making abilities with regard to health behavior, we also investigate the effect of challenging math curriculum on better smoking-behaviors in young adulthood.

Finally, one of the primary functions of high schools is to prepare and select talented students for college. Thus, it is worth investigating whether the effect of educational variables in high school are absorbed by the fundamental stratifying act of whether or not an individual goes to college. Do high schools matter above and beyond college-going?

Our overall goal of our exploration of the detailed pathways that education may affect smoking behaviors in young adulthood is to investigate three research questions (that fall within our previously stated research goals). Is it through conformity to more prosocial roles (as captured by GPA) or is it the opportunities to develop higher-order thinking skills in challenging classrooms that that influences smoking in young adulthood? Is there a different effect of these two on experimenting with smoking versus becoming a regular smoker? We hypothesize that

education may not protect against experimentation with cigarettes, but may help adolescents control the escalation of experimentation into regular smoking.

Family & Religion

Religion and family are two additional salient contexts where adolescents learn behaviors, values, and decision-making frameworks. As such, it may be important to consider the potential effects educational experiences in high school within the larger context of adolescents' whole lives. Though families diminish in importance during the high school years, their influence as socializers of their children does not disappear. In particular with regard to smoking, the household may be one of the first places that youth are exposed to cigarettes and learn values related to cigarette smoking. Prior research has consistently shown when significant others smoke, adolescents are more likely to pick up smoking behaviors themselves (Flay et al. 1994). The influence of significant others, like parents, may be through modeling of smoking behaviors, or it may be because smoking becomes less stigmatized when parents' do not disapprove of it. For example, adolescent girls are much more likely to smoke when parents' express approval of smoking, they (Flay et al. 1994).

Religion too, particularly for adolescents who have internalized the religious beliefs they were brought up with, can affect adolescents' experience of their social world in schools (Ellison et al. 2000). Research has shown that religious involvement promotes health lifestyles, like not smoking, improves coping skills (like resisting peer pressure), and provides social ties and support, all of which can lead to more positive health outcomes (Buck, Williams, Musick, Sternthal 2009; Ellison et al. 2000; Regnerus and Smith 2005). Religious importance, which is explained as an unmeasured combination of personality and habits, has been shown to be protective for health (Regnerus and Smith 2005). This may be because religiosity promotes a

pro-social attitude in adolescents (Regnerus and Elder 2003) and increases youth's ability to control their impulses (Miller and Gur 2002). Thus, in order to obtain a full picture of the multiple influences to smoke, to not smoke, or to experiment with smoking, the multiple contexts of adolescents' lives must be taken into account.

Why Would Gender Matter?

Though boys and girls tend to have similar rates of smoking during adolescence (Johnston et al. 2007), boys and girls tend to respond to social influences differently. Research generally finds that females are more in tune with, and reactive to, their social surroundings and the people within them, largely as a consequence of gender socialization beginning in early childhood (Gilligan 1982). Furthermore, as girls grow older they attach greater importance to their social relationships. This is perhaps most pronounced during adolescence as girls turn to those around them for encouragement and validation as they forge their adult identity and sense of self (Eccles, Adler, and Meece 1984; Gilligan 1982).

METHODS

This study employs data from the National Longitudinal Study of Adolescent Health (Add Health). Add Health contains a nationally-representative sample of U.S. adolescents in grades 7-12 in 132 middle and high schools in 80 different communities. From a list of all schools containing an eleventh grade in the U.S., Add Health selected a nationally-representative sample of schools utilizing a school-based, cluster sampling design, with the sample stratified by region, urbanicity, school type, ethnic composition, and size. Additionally, a feeder school (that contained a 7^{th} grade and sent graduates to the Add Health high school) was chosen for each Add Health high school. From these high schools, Add Health selected a nationally-representative sample of adolescents.

The preliminary In-School Survey collected data from all students in all Add Health high schools (n=90,118 students) in 1994-1995; from this sample, a nationally-representative sub-sample was interviewed at Wave I (n=20,745) slightly after the In-School Survey (in 1994-95); Wave II followed in 1996 and collected information from 14,738 of the participants from Wave I. Wave III was collected in 2001-2002 and followed up the entire Wave I sample who were then approximately ages 18-23. In 2001, the Adolescent Health and Academic Achievement (AHAA) study collected the high school transcripts for approximately 12,000 members of the Wave III Add Health sample and recoded them, thereby providing the educational data for the Add Health sample (Muller, Pearson et al. 2007). In particular, we use the AHAA data to measure educational attainment in depth by the end of high school. In 2008-2009, Add Health conducted the most recent data collected with Wave IV. By 2008, the Wave I sample has all transitioned to early adulthood, all had a chance to go to college and enough time to obtain a college degree. The Wave IV sample is between seven and twelve years post-high school and consists of 15,701 respondents. Additional information about Add Health can be found in Bearman, Jones, and Udry (1997) and Harris et al. (2009).

Sample Selection

We employ two selection filters to determine our final analytic sample. First, because we are conducting a longitudinal analysis that includes the education data in Add Health, respondents in our analytic sample must have participated in Wave I, IV and the transcript study. Because the complex sampling design of Add Health requires weights be used in analyses, our second selection filter eliminates students who are not assigned a valid sample weight at Wave IV. Third, we excluded adolescents who were missing responses on our dependent variables

(smoking in young adulthood, Wave IV). Any other missing data was handled using the multiple imputation procedure in SAS.

Measures

Dependent Variables:

Our first dependent variable is a dichotomous variable titled "Ever Smoked One Cigarette" by Wave IV. It is based on the question "Have you ever smoked an entire cigarette?" 36% of respondents answered that they had never smoked an entire cigarette. At Wave III, only 19% of respondents had resopnded that they had never smoked an entire cigarette, and 27% of respondents reported having tried smoking, at least one or two puffs.

Our second dependent variable is a dichotomous variable indicating whether or not a young adult is a regular smoker. To be defined as a regular smoker, they must have smoked at least one cigarette every day for the past 30 days.

Individual-Level Independent Variables

Education

We analyze the role of a variety of educational experiences in protecting or exacerbating adolescents' risks of smoking in young adulthood. These variables are cumulative measures that take into account all available years of information from respondents' high school transcripts. For most adolescents, these variables are measured at the end of high school (except in the case of dropping out). We analyze the role of cumulative grade point average (GPA), highest math course taken, whether or not an adolescent has any report of failing a course on their transcript, whether they received challenging math curriculum that was rich in critical-thinking skills, and flags for whether the respondent had a college degree or had attended some college by Wave IV.

Religion

Our measure of religion is based on the question "how important is religion to you?" and respondents were able to respond very, fairly important, fairly unimportant, and not important. We then recoded adolescents who responded that religion was "very important" as 1 on a dichotomous indicator representing high religious importance during adolescence. We explored other aspects of religion and found that religious attendance was not consistantly or significantly associated with smoking behaviors, whereas measures capturing the potential internalization of religious beliefs, such as religious importance, were. Thus, final models only include religious importance.

Family

Our primary family variable of interest is whether or not adolescents were exposed to a smoker in their household during adolescence (at Wave I). This variable is based on the parent's report and in most cases, the parent themselves in the smoker. We ran additional models with a dichotomous variable indicating whether or not the parent smoked (instead of someone in the household smoking) and did not find a substantive difference in our findings.

Controls

All models also include a variety of controls, primarily from Wave I, including age, race and ethnicity, parents' highest education level, living with two biological parents (during adolescence), and whether or not they have ever been married in young adulthood (from Wave IV). Race and ethnicity is coded as five dichotomous variables: Latina, Black, Asian, and Other, with White as the reference category. Parents' education is taken from Add Health's parent questionnaire and the maximum value was taken in the case of two parents. If the information is missing from the parent questionnaire, the students' reports of their parents' education levels are used. Parents' education is coded as (0) for never went to school; (1) less than high school

graduation; (2) high school diploma or equivalent; (3) some college, but did not graduate; (4) graduated from a college or university; and (5) professional training beyond a four-year college or university.

Analytic Plan

To investigate our research questions and account for the complex sampling design of Add Health, with students cluster in schools, we used fixed effects models in SAS. Because boys and girls (and men and women) report important differences in educational experiences (and their meaning) in high school, and have different rates of smoking, we analyzed all models separately by gender.

One of the major analytic decisions when working with Add Health and the transition to adulthood, particularly when also including the education data, is how to correctly account for the developmental differences that come with the age and grade-level differences of the five cohorts of Add Health. Figure 1 illustrates the intersection of the Waves of Add Health survey data and the education transcript data. To control for some of the effect of cohort differences such as what it means to report religious importance at age twelve versus age eighteen, we controlled for respondents age and grade-level at Wave I. We also decided to use Wave IV measures of smoking and college-going so that more adolescents would have had time to graduate from high school and attend college than at Wave III (when some respondents were only one year out of high school). Finally, we also explored models where we analyzed the cohorts separately. This did not make a substantive difference in our findings.

Our final analytic decision was how to handle missing data. In general, Add Health does not have significant missing data for the variables used in this analysis. The only exception is variables dependent on parent's report, which have a higher rate of nonresponse than adolescent

reported variables. To handle missing data, we used the SAS PROC MI to impute five data sets using a Markov chain Monte Carlo method (Schafer 1997), constraining values for each variable to the range that occurred in the observed data. The imputed values were based on other variables in our models. Values were not imputed for the sample weight variable or the dependent variables (measures of smoking at Wave IV). This resulted in some limited amount of missing data.

RESULTS

Religion protects everyone from trying smoking (having ever reported smoking one full cigarette). It does not however protect men or women against regular smoking. High religious importance does help women avoid heavy smoking if they are already regular smokers.

Being exposed to smoking in one's childhood household is not associated with the likelihood of trying smoking (one full cigarette) for men or women, or for being a regular smoker (net of wave 1 smoking). Without controlling for Wave I smoking or other independent variables it is associated with a significant increase in the odds that an individual is likely to become a regular smoker by Wave 4. In models not shown (but available by request from the author) is becomes apparent that the effect of exposure to smoking in the household is explained away by the inclusion of Wave I smoking in the model along with other family and background controls. This suggests that part of the story is that adolescents that are exposed to smoking in their homes are likely to become regular smokers earlier. However, among regular smokers at Wave 4, the story is different. Being exposed to cigarettes in one's childhood home is associated with a higher likelihood of heavy smoking among regular smokers, regardless of whether the individual was smoking regularly at Wave 1 (in addition to all other independent variables).

The effect of GPA in HS is still maintained for both boys and girls into young adulthood – it protects against ever having tried smoking, regular smoking, and heavy smoking among regular smokers. (even net of many other indicators of academic status and success), including college-going, course-failures, and math course taking (a strong predictor of high achievement and college going as well as track placement in high school).

College degree is also a strong protective factor. Men and women with a college degree are less likely to be regular smokers and are less likely to be heavy smokers, if they smoke regularly. Interesting, given the importance of GPA, failing classes is virtually not associated with smoking in young adulthood for men and women. The one exception is that women smoke regularly and report having failed at least one class in high school are more likely to be heavy smokers, net of all other factors.

DISCUSSION

With this study, we aimed to investigate adolescent decision-making processes as they relate to an important health behavior with serious implications for long-term health. Specifically, we wanted to understand what experiences with regard to education, religion and family during adolescence, still affect the likelihood that an adolescent engages in smoking behavior in young adulthood and whether the importance of these domains of adolescent life were different for experimenting with cigarettes versus becoming a regular smoker. We also investigated whether or not there were gender differences in these processes.

With regard to religious importance, we found that adolescents who reported that religion was very important to them were less likely to experiment with smoking in young adulthood, though there was no protective effect for becoming a regular smoker. This suggests that religion may help adolescents avoid smoking entirely – not even experimenting with cigarettes – but that

it cannot help adolescents moderate their cigarette useage to prevent them from becoming daily smokers. Education, on the other hand, protects adolescents from experimenting with smoking and becoming daily smokers. Both GPA (which may represent conformity to adult expectations and high achievement) and college-going (high achievement and status attainment) work similarly to protect adolescents from all smoking behaviors in young adulthood. Interestingly, GPA in HS still shows an effect when adolescents are 10 years post-high school. This suggests that education may help adolescents both avoid and moderate their smoking. In terms of family, being exposed to smoking in the home during adolescence doesn't effect adolescence likelihood to have experimented or become daily smokers above and beyond their likelihood to have begun engaging in these behaviors during adolescence.

Finally, we found no gender differences.

Though this study provides interesting findings on the long-term influence of religion and education in adolescence, with our next steps we hope to delve even deeper into the processes that link education to young adult health behaviors. More work is needed to understand if there are educational factors that protect individuals who do not go to college from developing smoking habits in young adulthood. Additionally, we intend to explore motivations to quit smoking and what factors prevent individuals from becoming highly addicted to smoking.

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Figure 1

Intersection of Add Health survey data with AHAA high school transcript data

				Wave I	Wave II					Wave III						Wave IV
	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	01-02	2003	2004	2005	2006	2007	2008
Add Health Cohort										Years Post HS						Years Post HS
7th Grade				*7*	*8*	9 Year 1	10 Year 2	11 Year 3	12 Year 4	1						7
8th Grade				*8*	9 Year 1	10 Year 2	11 Year 3	12 Year 4		2						8
9th Grade				9 Year 1	10 Year 2	11 Year 3	12 Year 4			3						9
10th Grade			9 Year 1	10 Year 2	11 Year 3	12 Year 4				4						10
11th Grade		9 Year 1	10 Year 2	11 Year 3	12 Year 4					5						11
11th Grade	9 Year 1	10 Year 2	11 Year 3	12 Year 4						6						12

Items highlighted in grey are years from which analytic data is being used.

Table 2: Logistic Coefficients Predicting Smoking Behaviors of Young Adult Men and Women, Wave 4

	Ever Smoked One Full Cigarette, Wave 4						Regular Smoking, Wave 4					
	Women			Men			Women			Men		
	Beta	SE		Beta	SE		Beta	SE		Beta	SE	
Education												
GPA	-0.501	0.095	***	-0.521	0.096	***	-0.482	0.106	***	-0.650	0.098	***
Highest Math Course	0.047	0.032		0.057	0.034	+	0.040	0.037		0.022	0.038	
Ever Failed a Class	0.094	0.116		-0.052	0.129		-0.107	0.134		-0.237	0.143	+
Challenging Math Curriculum	0.136	0.128		-0.010	0.128		-0.022	0.132		0.045	0.206	
College Degree by Wave 4	-0.098	0.103		-0.545	0.122	***	-0.966	0.141	***	-1.266	0.152	***
Some College by Wave 4	-0.330	0.110	**	-0.039	0.122		-0.445	0.113	***	-0.068	0.122	
Religion												
High Religious Importance (Adolescence)	-0.323	0.090	***	-0.375	0.101	***	0.026	0.112		-0.018	0.116	
Family												
Parents' Education Level	0.113	0.038	**	0.203	0.044	***	0.048	0.048		0.100	0.050	*
Exposure to Smoking in Childhood Household	0.054	0.101		-0.101	0.099		0.192	0.103	+	0.140	0.120	
Lived with Two Biological Parents	-0.136	0.084		0.055	0.097		-0.325	0.098	***	-0.169	0.105	
Ever Married (Young Adulthood)	-0.004	0.082		-0.214	0.095	*	-0.434	0.101	***	-0.633	0.107	***
Controls												
African American	-1.087	0.146	***	-0.883	0.172	***	-1.225	0.200	***	-0.843	0.201	***
Latino/a	-0.141	0.158		0.122	0.182		-1.106	0.237	***	-0.564	0.224	*
Asian American	-0.684	0.223	**	0.268	0.246		-0.421	0.367		0.286	0.308	
Other Race/Ethnicity	-0.175	0.237		0.276	0.271		-0.038	0.268		0.570	0.268	*
Non-Hispanic White (Ref)	---	---		---	---		---	---		---	---	
Age	-0.281	0.075	***	-0.258	0.077	***	-0.126	0.091		-0.247	0.085	**
Regular Smoker by Wave 1 (Adolescence)	6.274	1.850	***	3.888	0.796	***	1.613	0.154	***	1.679	0.181	***
Intercept	9.269	1301.540	***	14.034	1390.036	***	-4.199	1958.368	***	0.729	2201.207	***
N	5731			4796			5731			4796		

$^{+}p<.10$, $^{*}p<.05$, $^{**}p<.01$, $^{***}p<.001$ (two-tailed tests)

Source: National Longitudinal Study of Adolescent Health