

Ethnic Background, Parental Education, and Tobacco Curiosity among US Adolescents

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Abstract

Background: Although high parental education reduces adolescents' tobacco use, this effect may be weaker for ethnic minorities than non-Latino White adolescents.

Aim: To study the association between parental education at baseline and adolescents' subsequent tobacco curiosity overall and by ethnicity.

Methods: The current study used four years of follow-up data from the PATH-Adolescents) study. All participants were 12 to 17-year-old non-smokers at baseline and were successfully followed for four years (n = 3109). The outcome of interest was curiosity about (traditional and electronic) cigarettes in year four. The predictor of interest was baseline parental education, the covariates were age, sex, and parental marital status at baseline, and the moderator was ethnicity.

Results: According to our linear regressions, higher parental education at baseline was predictive of adolescents' subsequent tobacco curiosity at year four; however, this association was weaker for Latino than non-Latino adolescents. We did not find a significant difference in the effect of baseline parental education on subsequent tobacco curiosity of White and African American adolescents.

Conclusion: The effect of high parental education on tobacco curiosity differs between Latino and non-Latino adolescents. Future research should test the role of advertisement exposure, the prevalence of smokers, as well as other contextual factors at school and neighborhood conditions that may increase curiosity toward cigarettes in Latino adolescents regardless of parental education. The role of high-risk peers, family, friends, proximity to tobacco outlets, and other contextual conditions should be tested in future multi-level research.

Keywords: Population groups; risk behavior; tobacco curiosity; ethnic groups

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1. Background

Adolescents are at risk of tobacco use¹. Adolescents from high socioeconomic status (SES) backgrounds, particularly those with high parental education, may have a lower risk of tobacco use². Some of the effects of high parental education on adolescents' tobacco use are through cognitive factors³ such as perceived social norms, perceived harm, perceived expectations, and tobacco curiosity, which are under the influence of cigarette use by their peers, friends, and family members⁴. Adolescents' tobacco curiosity may also depend on the availability of tobacco and the prevalence of smokers, as well as the

density of tobacco outlets and advertisements in the neighborhood and community⁵.

Although adolescents with highly educated parents are protected against tobacco use, the effect of parental education on adolescents' tobacco use is shown to differ between diverse ethnic groups of adolescents⁶. Marginalization-related diminished returns (MDRs) theory⁷ suggests that due to racism and social stratification, family-level and individual-level resources and assets such as parental education may be associated with lower levels of economic, behavioral, developmental

returns for ethnic minorities than non-Latino White adolescents⁸⁻¹⁰. As a result, disparities such as those related to tobacco use in marginalized and racialized groups tend to sustain across all SES levels^{11,12}.

A growing body of research has documented ethnic differences in the protective effects of family SES indicators on adolescents' health and behaviors, such as tobacco use^{8-10,13,14}. The associations between parental education and health and behavioral outcomes are weaker for ethnic minority than ethnic majority adolescents¹⁵⁻¹⁷. Ethnic minority adolescents attend worse schools than White adolescents across all parental education levels¹⁸. Similarly, across all parental education levels, ethnic minority adolescents are more likely to have family members who use substances compared to their White adolescents¹⁹. When high-SES ethnic minority adolescents move to high-SES (predominantly non-Latino White) neighborhoods and schools, they become even more exposed^{20,21}, and vulnerable²² to discrimination. These observations explain marginalization-related diminished returns (MDRs). Thus, due to racism, family SES resources may generate fewer behavioral, developmental, and health outcomes for marginalized and racialized groups such as African Americans and Latinos than non-Latino Whites¹¹. Even when SES and other resources are available, societal and environmental conditions such as social stratification, segregation, racism, and discrimination make it more difficult for African Americans and Latinos than non-Latino White families and individuals to secure outcomes. In this view, what makes a large change for Whites may generate smaller real-life changes for ethnic minority individuals^{23,24}.

Curiosity toward tobacco use is one factor that shapes susceptibility to tobacco use²⁵. Among non-smokers, adolescents who have a higher curiosity toward subsequent tobacco use are more likely to use tobacco in the future²⁶. As such, in the non-smoking section of adolescents, curiosity about tobacco can reflect the risk of tobacco use in the future²⁷. This is particularly important if we seek non-smokers at risk of transitioning to tobacco use²⁸. As such, this variable can reflect a proxy of the risk of tobacco use in the future²⁹. As high parental education is associated with lower tobacco use in adolescents, it is possible that parental education would also be associated with a lower level of tobacco curiosity, which would reflect the risk of transitioning to tobacco use in the future³⁰. However, we are unaware of previous studies that tested ethnic differences in the association between baseline parental education and subsequent tobacco curiosity in adolescents.

Built on the MDRs literature on tobacco use^{31,32}, we conducted this study with two aims: the first was to test the association between parental education and adolescents' tobacco curiosity overall. The second aim was to test the variation of this association by ethnicity of the adolescent. Our first hypothesis was that, overall, high parental education is associated with lower tobacco curiosity in adolescents. Our second hypothesis was that this inverse association would be weaker for ethnic minority than non-Latino White adolescents.

2. Methods

This was a longitudinal study. For this study, we conducted a secondary analysis of the baseline and year four data of the Population Assessment of Tobacco and Health (PATH) Adolescents study³³. The PATH-Adolescents is the state-of-the-art study of tobacco use among US adolescents³⁴. Baseline data were collected for wave 1 in 2013-2014. Follow-up data were collected in 2017-2018.

Participants and sampling

In the PATH study³⁵, participants are selected randomly. A stratified and clustered random sample was selected from all US states. The eligibility for the PATH-Adolescents sample was non-institutionalized members of US households having an age between 12 and 17 at baseline.

Analytical Sample

For this analysis, we limited the sample to individuals who remained adolescent during the four years of the follow-up and were never smokers at wave 4. This decision was made because PATH study only measures tobacco curiosity in never smokers. Participants' age at the start point of the study was 12-14 in 96.6%. Only non-Latino, Latino, White, or African American adolescents were enrolled. Participants who identified with any other ethnic groups or did not report their ethnicity were excluded. Participants were all never smokers at baseline. Overall, n that was enrolled included 3109.

Study Variables

Study variables in this analysis included ethnicity, parental education, parental marital status, age, sex, and tobacco curiosity. Age was a dichotomous variable 0 for lower than 15 and 1 for 15 and above. Sex was 1 for males and 0 for females. Parental education was the independent variable with five levels, and tobacco curiosity was the outcome. Both parental education and tobacco curiosity were treated as continuous measures.

Tobacco Curiosity.

Tobacco curiosity was self-reported and measured using the following indicators: (1) Have you ever been curious

about smoking a cigarette? and (2) Have you ever been curious about using an electronic nicotine product? The correlation between these two items was high. Each item was on a 1 (not at all curious) to 4 (very curious) response scale. We calculated a total score with a range of total scores between 2 and 8, with a higher score indicating higher tobacco curiosity and electronic cigarettes²⁵.

Parental Education.

Parental education was a five-level variable as below: 1 = "Some high school," 2 = "Completed high school," 3 = "Some college," 4 = "Completed college," 5 = "Graduate or professional school after college." This variable was treated as a continuous variable ranging between 1 to 5.

Parental Marital Status. Parental marital status was a dichotomous variable that reflected married parents (coded as 1) compared to any other conditions (divorced, not married, partnered, etc.) (coded as 0).

Ethnicity. Ethnicity was self-identified as non-Latino or Latino and African American or White. Ethnicity was the effect modifier (moderator).

2.1. Data analysis

Data analysis was performed using SPSS 24. SPSS was used for univariate, bivariate, and multivariable analysis. First, we tested the normality of the distribution of our continuous variables such as parental education and tobacco curiosity. Parental education and tobacco curiosity were used as continuous variables because of their near-to-normal distribution. For univariate analysis we reported descriptive statistics such as mean (standard deviation [SD]) and frequency (%). With the outcome being tobacco curiosity four years later, the predictor variable being parental education, the moderator (effect modifier) being ethnicity, and age, sex, and parental marital status being the covariates, six linear regression models were applied for multivariable modeling. Model 1 and Model 2 were run in the pooled sample. Model 3 and Model 4 were performed on non-Latino and Latino adolescents. Model 5 and Model 6 were performed on White and African American adolescents. Model 1 did not have, and Model 2 had the interaction term between ethnicity and parental education, our predictor variable. This was because Family SES is shown to protect and benefit White children more than ethnic minority children for various outcomes³⁶⁻³⁸. Model 5 and Model 6 were not shown because there were no differences between White and African American adolescents in associations. B, SE, 95% CI, and p were reported from each model. For power analysis, we expected the association between parental education and outcome as 0.0, 0.0, and 0.2 in African American, Latino, and non-Latino Whites, respectively. As such, we expected the main effect of parental

education as .1 and beta coefficient for group difference as .1. The sample size of 3109 would give us a power of more than .8 to test our main effect and statistical interaction with our assumed effect sizes.

2.2. Institutional Review Board (IRB).

This study used publicly available PATH data. All data are fully de-identified. Thus the study was not human subject research and was exempt from a full IRB review.

3. Results

Three thousand one hundred nine adolescents were entered and followed for four years. Descriptive data are reported in [Table 1](#).

Table 1. Descriptive data overall in adolescents (n = 3109).

	N	%
Ethnicity		
Whites	2436	78.4
African Americans	673	21.6
Non-Latino		
Latino	764	24.6
Age		
12-14	3002	96.6
15-18	107	3.4
Sex		
Female	1537	49.4
Male	1572	50.6
Marital Status of the Parents		
Not Married	1059	34.1
Married	2050	65.9
	Mean	SD
Parental education (1-5)	2.8916	1.26079
Tobacco curiosity (2-8)	2.4886	0.94454

[Table 2](#) presents the summary of linear regressions for *Model 1* and *Model 2* that were fitted to the pooled sample. This model shows that higher parental education was associated with lower tobacco curiosity; however, this association was stronger for non-Latino than Latino adolescents. White and African American adolescents did not show a difference in the slope of the effect of parental education on the outcome.

Table 2. Pooled Sample Models in US adolescents.

	Unstandardized B	Unstandardized Std. Error	Standardized Beta	Lower Bound	Upper Bound	Sig.
Model 1 (All, Main Effects)						
African American	-0.07	0.04	-0.03	-0.16	0.02	.121
Latino	-0.01	0.04	-0.01	-0.09	0.07	.814
Male	-0.11	0.03	-0.06	-0.18	-0.04	.001
Age	0.06	0.09	0.01	-0.12	0.24	.519
Parents Married	0.09	0.04	0.04	0.01	0.16	.021
Parental Education (1-5)	0.06	0.02	0.08	0.03	0.09	.000
Model 2 (All, M1 + Ethnicity Interaction)						
African American	-0.03	0.11	-0.01	-0.24	0.18	.800
Latino	0.20	0.10	0.09	0.01	0.38	.038
Male	-0.11	0.03	-0.06	-0.18	-0.05	.001
Age	0.06	0.09	0.01	-0.12	0.24	.520
Parental Education (1-5)	0.09	0.04	0.04	0.01	0.16	.025
Parental Education (1-5) x Race (African American)	-0.01	0.04	-0.01	-0.08	0.06	.769
Parental Education (1-5) x Ethnicity (Latino)	-0.09	0.04	-0.10	-0.15	-0.02	.013

Outcome: Tobacco curiosity Score; **Data:** Population Assessment of Tobacco and Health (PATH).

[Table 3](#) presents the summary of linear regressions for *Model 3* and *Model 4* that were fitted to White and African American adolescents, respectively. As these

models show, higher parental education was associated with a lower tobacco curiosity for non-Latino but not for Latino adolescents.

Table 3. Stratified models in non-Latino and Latino adolescents.

	Unstandardized B	Unstandardized Std. Error	Standardized Beta	Lower Bound	Upper Bound	Sig.
Model 3 (Non-Latino)						
African American	-0.05	0.05	-0.03	-0.15	0.04	.273
Male	-0.09	0.04	-0.05	-0.17	-0.01	.020
Age	0.07	0.10	0.01	-0.13	0.26	.516
Parents Married	0.07	0.05	0.03	-0.02	0.16	.140
Parental Education (1-5)	0.08	0.02	0.11	0.05	0.12	.000
Model 4 (Latino)						
African American	-0.10	0.12	-0.03	-0.34	0.14	.402
Male	-0.18	0.07	-0.10	-0.31	-0.05	.008
Age	0.03	0.24	0.00	-0.45	0.50	.909
Parents Married	0.13	0.07	0.07	0.00	0.27	.058
Parental Education (1-5)	0.00	0.03	-0.01	-0.06	0.06	.898

Outcome: Tobacco curiosity Score; **Data:** Population Assessment of Tobacco and Health (PATH).

4. Discussion

The current study was performed with two main aims: one to evaluate the overall association between parental education and tobacco curiosity in US adolescents, and two to test variation in this association by ethnicity. The first aim showed an inverse association between parental education and tobacco curiosity overall. The second aim showed moderation by ethnicity. The protective association between parental education and adolescents' tobacco curiosity was weaker for Latinos than non-Latinos. This association did not differ between African American and White adolescents. Thus, Latino adolescents seemed to have high tobacco curiosity regardless of their parental education.

The inverse association between parental education and tobacco curiosity is in line with theories of fundamental causes, social determinants, social status, status syndrome, and several other models that explain the lower risk of high-SES populations and individuals³⁹⁻⁵⁰. Due to historical racism, social stratification, and segregation, ethnic differences in living conditions sustain across all levels of SES inequalities⁵¹⁻⁵⁴. According to ecological theories, individuals who live in or in proximity to low-SES neighborhoods, peers, schools, and families will have a higher health and behavioral risk, including those related to tobacco⁵⁵. However, many mechanisms, such as peer risk, poor neighborhoods, schools, and other contextual factors, may explain why high family SES is linked to lower tobacco use and tobacco-related cognitive measures such as tobacco curiosity in adolescents⁵⁶⁻⁶⁶.

Multiple studies have documented ethnic variations in the association between SES, health, and behaviors, all showing weaker associations in ethnic minorities than non-Latino White adolescents⁶⁷. Studies also show weaker associations between SES and tobacco risk in African Americans and Latinos than non-Latino White individuals^{7-10, 13, 14}. However, we are unaware of any past studies on ethnic differences in the association between parental education and tobacco curiosity.

Most past research is conducted on African American, not Latino individuals. Our observation of a weaker association between parental education and tobacco curiosity in Latino than non-Latino adolescents is also in line with many previous publications on the MDRs. According to marginalization-related diminished returns, resources and assets generate fewer economic, behavioral, developmental, and health outcomes for marginalized groups than for White individuals.

This study expanded the MDRs literature, which is written on tobacco use^{31, 32}. Previous work has shown that SES –tobacco association use is racialized^{31, 32}. A

study showed that education –tobacco knowledge is also racialized in the US⁶⁸. This finding may be because high-SES White adolescents attend better schools than high-SES ethnic minority adolescents¹⁸. In addition, there are many challenges in the daily lives of ethnic minority adolescents in US schools^{69, 70}. Ethnic differences in the returns of education may be because of discrimination at schools⁶⁹ or neighborhoods²⁰.

In this study, we ran our models in never smokers. This was done for two reasons. First, PATH study only measures curiosity about tobacco in never-smokers. Thus, curiosity toward tobacco is meaning before the use of tobacco, and after tobacco is already tried, this construct becomes meaningless. In addition, we were particularly interested in the primary prevention of smoking (considering tobacco curiosity as a proxy of future risk); we believe that our results in never smokers at baseline can inform programs that aim at primary prevention of tobacco use in tobacco naïve adolescents. Thus, our work explored the relationship between social and cognitive determinants of curiosity toward tobacco use in tobacco-naïve adolescents (at baseline). Our results suggest that among never-smokers, the cognitive risk of tobacco use is different across ethnic groups of adolescents. In other terms, while in never-smoker adolescents, there is a social gradient in curiosity toward tobacco, this social gradient is reduced in ethnic minority adolescents.

Given the large body of previous research⁷¹⁻⁸⁵, it was unexpected that we did not find diminished returns of parental education for African American adolescents. A very large body of research^{18, 86-95} has shown that due to racism, MDRs are stronger for African American families than Latino families^{92, 96-99}. Future research should test why and how the same MDRs could not be found for African American adolescents.

Limitations

Our study is not without methodological limitations. First, all variables were self-reported. Thus our results may be affected by reporting bias, misclassification, or social desirability. Second, our variables were only measured from adolescents. Social norms could be measured from the social network of adolescents. Third, we measured only a few potential confounders, such as drug availability at home or neighborhood conditions, such as proximity to tobacco outlets. For example, tobacco outlets in the neighborhood are likely potential confounding or mediating factors. Future research should also include peer effects, mental health conditions, and parent tobacco use status, as reflected in the introduction and discussion sections. In addition, this was a study with an imbalanced sample size (larger n for non-Latino and White than Latino and African American adolescents). However, our

main inference was based on pooled sample analysis with interaction rather than stratified models (which would have different statistical power). Finally, our study did not evaluate sex differences in the relationship between parental education and adolescents' tobacco curiosity¹⁰⁰.

Conclusion

To conclude, although overall, high parental education is associated with lower tobacco curiosity in US adolescents, this inverse association is weaker for Latino than non-Latino adolescents. The diminished returns of parental education on adolescents' tobacco curiosity may be due to environmental and structural inequalities at neighborhoods, families, or schools, in part due to the segregation of ethnic minority communities.

Highlights

What is known?

Parental education is associated with lower adolescents' risk behaviors.

The effects of high parental education on reducing adolescents' risk behaviors is weaker for ethnic minority than ethnic majority families.

What this study adds?

Parental education is associated with lower adolescents' tobacco curiosity.

The effects of high parental education on reducing adolescents' tobacco curiosity is weaker for Latino than non-Latino families.

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Conflict of interest.

None

IRB.

This study used publicly available PATH data. All data are fully de-identified. Thus the study was not human subject research and was exempt from a full IRB review.

Author contribution:

BN, MD, and SA : conceptual design, data cleaning, analysis, draft, and revision. All authors approved the final draft.

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