Journal of Community Health (2019) 44:534–543
https://doi.org/10.1007/s10900-019-00652-7

ORIGINAL PAPER

Sex Differences in the Association Between School Experiences and Marijuana Use Among African American Adolescents

Rebecca A. Vidourek[1] · **Keith A. King**[1]

Published online: 9 April 2019

Abstract
This study examined whether past month marijuana use among African American adolescents differed based on school experiences and individual feelings toward school. A secondary analysis of the 2012 National Survey on Drug Use and Health was conducted to answer research questions. Results from the multivariable logistic regression analyses revealed that female students at highest risk for recent use included those who held negative feelings toward school (OR 2.723, CI 1.683, 4.406, $p < .001$), felt courses were not interesting (OR 2.695, CI 1.513, 4.798, $p < .01$), and received mostly C's/D's/ F's in the last semester (OR 2.520, CI 1.614, 6.711,$p < .001$). For males, results indicated that male students at highest risk included those who held negative feelings toward school (OR 2.364, CI 1.365, 4.094, $p < .01$), felt things learned in school would not be important later in life (OR 3.470, CI 1.951, 6.173, $p < .001$), and received mostly C's/ D's/F's in the last semester (OR 2.733, CI 1.734, 4.309, $p < .001$). In the final model, of those who felt that most or all students in their grade used marijuana, males were 3 ½ times (OR 3.418, CI 1.741, 6.711, $p < .001$) and females were 8 times (OR 8.288, CI 3.526, 19.480, $p < .001$) more likely to have recently used marijuana. Such findings can be used by prevention specialists and health educators to develop and implement marijuana prevention programs and interventions specifically tailored to African American adolescents. Recommendations for future research are included.

Keywords Marijuana use · African American · Adolescents · School · Sex differences

Introduction

Marijuana is the most commonly used illicit substance in the United States among adolescents [1]. Marijuana use among African American adolescents has continued to increase and is considerably higher than that of the previous decade [2–5]. Data from the 2017 Youth Risk Behavior Survey (YRBS) revealed that 42.8% of African American students have used marijuana, which is significantly higher than white students [6]. The prevalence of having tried marijuana for the first time before age 13 years was higher among black (9.8%) than white (4.7%) students [6]. Also, having tried marijuana before age 13 years was higher among black male (12.8%) than black female (6.8%) students. One in four (25.3%) African American students used marijuana in the past 30 days (current marijuana use), significantly higher than white (17.7%) students. African American females (25.0%) and African American males (17.2%) were significantly more likely to have currently used marijuana than white females (17.2%) and white males (18.1%), respectively.

Several deleterious consequences exist with African American youth marijuana use, including impairment to short-term memory and judgment, perceptual distortion [3, 7–9], difficulties with specific learning and memory tasks [8–10], harm to the developing youth brain which can contribute to a lower adult IQ [8–11], decreased educational outcomes, and increased likelihood to use other illicit drugs [3, 8, 9, 12, 13]. Further problems include adverse psychosocial outcomes, increased risk for dependence, increased risk of schizophrenia and development of psychotic symptoms Hall [8]. Regular marijuana use is also linked to lower educational attainment, lower income, lower life satisfaction and increased welfare dependence, unemployment, criminal behavior, and school dropout [7, 14]. Since adverse

✉ Rebecca A. Vidourek
rebecca.vidourek@uc.edu

Keith A. King
keith.king@uc.edu

[1] Center for Prevention Science, Health Promotion and Education, University of Cincinnati, Cincinnati, OH 45221-0068, USA

consequences of drug use are reportedly greater among African American individuals than individuals of other racial/ethnic groups, the consequences of African American adolescent marijuana use is of increased concern [3, 15–17].

Marijuana use is a multivariable and multifactorial issue with risk and protective factors occurring within individuals, neighborhoods, families, schools and peer groups [18, 19]. At the school level, students who feel positively connected to school are significantly less likely to engage in marijuana use [20, 21]. School connectedness refers to feeling supported by important others, such as teachers and peers, and feeling that one positively fits in at their school. Resnick et al. [21] conducted the National Longitudinal Study on Adolescent Health and found that the leading school protective factor against adolescent marijuana use was having a positive sense school connectedness. Struggling academically and having poor grades is also associated with marijuana use [18]. Thus an inverse relationship between academic achievement and substance use exists among African American youth [22].

Research also indicates that African American adolescents who have friends who use marijuana, alcohol and tobacco are significantly more likely than their adolescent counterparts to use marijuana [17]. One of the largest predictors of substance abuse among adolescents is having peers who use [23]. Adolescents who use marijuana tend to perceive higher use of marijuana and blunts among their siblings and peers [24]. One in four (25%) of adolescents who stated that their friends used marijuana had a 27% greater odds of using marijuana.

While previous studies have also shown that school-level poverty, increased number of ethnic minority students, low achievement and high absenteeism is associated with youth substance use [25], research is needed to determine whether students' individual feelings towards their school, teachers, and courses are linked to marijuana use, especially among African American youth.

Study Purpose

Research gaps currently exist regarding how students feel towards specific aspects of school including their teachers, classes, classwork and the importance of such work and their potential relationship with African American adolescent marijuana use. The current study was conducted to examine whether school factors were significantly associated with marijuana use among African American adolescents. The following research questions were examined:

(1) What percent of African American adolescents report using marijuana in the past month?
(2) Does recent marijuana use (past month) differ based on specific school experiences and individual feelings toward school?
(3) Does the association between specific school experiences/individual feelings toward school and recent marijuana use differ between based on sex?

Methods

Participants

A national sample ($n = 2328$) of 12–17 year old individuals served as the participants of this study. All participants self-identified as African American. A stratified and multistage area probability sampling method was used to select a representative sample of U.S. non-institutionalized citizens. Students were requested to complete the National Survey on Drug Use and Health (NSUDH). Participation was strictly voluntary. Students who did not want to participate or who had parents that did not want them to participate were excluded from the NSDUH study.

Instrument

For this paper, three sections of the NSDUH were examined: (1) Marijuana use; (2) School experiences; and (3) Personal/family information.

Marijuana Use

Students were requested to report how many days they had used marijuana within the past month (recent marijuana use). Students who had used marijuana one or more days in the past 30 days were defined as having recently used marijuana. Responses were dichotomized into two levels (0 = no; 1 = yes).

School Experiences and Individual Feelings Toward School

School experiences and individual feelings were assessed via ten items. Items were subsequently dichotomized to allow for logistic regression analyses. Items assessed were the following: (1) How did you feel overall about going to school in the past 12 months? (0 = Liked going a lot/ Kind of liked going; 1 = Did not like going very much/Hated going); (2) During the past 12 months, how often did you feel that the school work you were assigned was meaningful and important? (0 = Always/ Sometimes; 1 = Seldom/ Never); (3) How important do you think the things you have learned in school during the past 12 months are going to be to you later in life? (0 = Very important/Somewhat important; 1 = Somewhat unimportant/Very unimportant); (4) How interesting do you think most of your courses at school during the past 12 months have been? (0 = Very interesting/Somewhat

interesting; 1 = Somewhat boring/Very boring); (5) During the past 12 months, how often did your teachers at school let you know you were doing a good job with your school work? (0 = Always/Sometimes; 1 = Seldom/Never); (6) What were your grades for the last semester or grading period you completed? (0 = A's/B's; 1 = C's/D's/F's); (7) How many of the students in your grade at school smoke cigarettes? (0 = None/A few; 1 = Most/All); (8) = How many of the students in your grade at school use marijuana or hashish (0 = None/A few; 1 = Most/All); (9) How many of the students in your grade at school drink alcoholic beverages? (0 = None/A few; 1 = Most/All); (10) How many of the students in your grade at school get drunk at least once a week? (0 = None/A few; 1 = Most/All).

Missing or ambiguous data was addressed using statistical imputation by the NSUDH research team. Recent marijuana use was recoded based on the imputation core marijuana variables. Missing variables were imputed to replace missing values with non-missing values using logically assigned or imputation-revised procedures.

Procedures

The National Survey on Drug Use and Health (NSDUH) is sponsored by the Substance Abuse and Mental Health Services Administration (SAMHSA) and the U.S. Department of Health and Human Services. Prior to completing the survey, participants were informed of the study purpose and voluntary nature of the study. Responses were kept confidential. Computer-assisted interviews were administered in participants' households. Professional RTI interviews made personal visits to the selected households prior to any participation. Once households were selected, no substitutions were made. NSDUH samples were based on national data and proportional to the general population. NSHUD data represented multiple types of youth throughout the U.S. Participants entered responses directly into a laptop computer. The interviewers read some questions aloud and then entered participants' responses into the computer. An English and Spanish version of the NSDUH was available. For the Spanish version, a certified bilingual interpreter administered the survey.

Computer-assisted interviews were monitored by certified RTI field interviewers. Before conducting the interviews, verbal consent was obtained from parents/guardians. Parents/guardians left the interview setting to allow participants to respond to items on their own. A code number was given to each interview data file and submitted the same day to the RTI. Respondent names were not included in the data file. Respondents were compensated $30. The NSDUH has been tested and shown to be a reliable and valid instrument, with percent agreements of greater than 80% [26–28]. The survey has also been edited carefully to ensure high internal consistency reliability. The Institutional Review Board granted approval for this study.

Data Analysis

Data analyses were performed using SPSS (Version 23.0). Demographic and background characteristics were computed via frequency distributions, means, and standard deviations. Odds ratios were computed to determine whether recent marijuana use differed based on specific school experiences and individual feelings toward school. Multivariable logistic regression analyses were computed to examine whether recent marijuana use differed based on school experiences and individual feeling toward school for males and for females. The alpha level of significance was set at 0.05.

Results

A total of 2328 African American adolescents aged 12 to 17 years completed surveys. Half of participants were female (50.5%, n = 1176) and half were male (49.5%, n = 1152). Ages were evenly distributed among 12–13 year olds (31.9%, n = 743), 14–15 year olds (32.8%, n = 763), and 16–17 year olds (35.3%, n = 822). Regarding marijuana use, 7.9% (n = 183) reported using marijuana in the past 30 days. Males (7.9%) and females (7.8%) did not significantly differ in recent marijuana use, OR 1.011 (95% CI 0.747, 1.367).

Association Between School Experiences/Individual Feelings Toward School and Recent Marijuana Use

Results indicated that specific school experiences and individual feelings toward school were associated with significantly higher odds for recent marijuana use (Table 1). Students at highest risk for recent marijuana use were those who hated/did not like going to school, never/seldom felt that the school work they were assigned was meaningful and important, thought that the things they learned in school would be very/somewhat unimportant, felt that most of their courses were very boring/somewhat boring, never/seldom felt their teachers let them know they were doing a good job with their schoolwork, earned mostly C's, D's and F's in the last semester, and felt that all/most of the students in their grade smoked cigarettes, used marijuana, drank alcohol and got drunk weekly.

Table 1 Recent Marijuana use among African American students based on school experiences and individual feelings toward school

School experiences (past 12 months)	Recent Marijuana use (past month)			
	No *n* (%)	Yes *n* (%)	OR	(95% CI)
How did you feel overall about going to school in the past 12 months				
Liked going a lot/Kind of liked going[a]	1678 (92.8)	130 (7.2)	1.000	
Hated going/Did not like going very much	238 (83.5)	47 (16.5)	2.549	(1.778, 2.654)***
During the past 12 months, how often did you feel that the school work you were assigned was meaningful and important?				
Always/Sometimes[a]	1660 (92.3)	129 (7.7)	1.000	
Never/Seldom	251 (86.9)	38 (13.1)	1.808	(1.233, 2.651)**
How important do you think the things you have learned in school during the past 12 months are going to be to you later in life?				
Very important/Somewhat important[a]	1769(92.6)	142 (7.4)	1.000	
Very unimportant/Somewhat unimportant	143 (80.3)	35 (19.7)	3.049	(2.029, 4.582)***
How interesting do you think most of your courses at school during the past 12 months have been				
Very interesting/Somewhat interesting[a]	1614 (92.5)	130 (7.5)	1.000	
Very boring/Somewhat boring	300 (86.5)	47 (13.5)	1.945	(1.363, 2.776)***
During the past 12 months, how often did your teachers at school let you know you were doing a good job with your school work?				
Always/Sometimes[a]	1634 (92.3)	137 (7.7)	1.000	
Never/Seldom	283 (87.6)	40 (12.4)	1.686	(1.160, 2.451)**
What were your grades for the last semester or grading period you completed?				
As/Bs[a]	1217 (94.2)	75 (5.8)	1.000	
Cs/Ds/Fs	603 (86.1)	97 (13.9)	2.610	(1.902, 3.583)***
How many of the students in your grade at school smoke cigarettes?				
None/A few[a]	1385 (93.9)	90 (6.1)	1.000	
All/Most	459 (84.5)	84 (15.5)	2.816	(2.816, 3.861)***
How many of the students in your grade at school use marijuana or hashish?				
None/A few[a]	1189 (97.5)	31 (2.5)	1.000	
All/Most	643(81.6)	145 (18.4)	8.649	(5.851, 12.897)***
How many of the students in your grade at school drink alcoholic beverages?				
None/A few[a]	1153 (96.9)	37 (3.1)	1.000	
All/Most	681 (83.2)	138 (16.8)	6.315	(4.340, 9.188)***
How many of the students in your grade at school get drunk at least once a week?				
None/A few[a]	1528 (93.6)	105 (6.4)	1.000	
All/Most	279 (80.2)	69 (19.8)	3.599	(2.589, 5.003)***

*p < .05

**p < .01

***p < .001

[a]Indicates Referent; $N = 2328$; Missing values excluded

Association Between School Experiences/Individual Feelings Toward School and Recent Marijuana Use Based on Sex

Odds ratios were conducted to determine the relationship between school experiences/individual feelings toward school and recent marijuana use for female students and male students. Female and male students at highest risk for recent marijuana use were those who hated/did not like going to school, never/seldom felt that the school work they were assigned was meaningful and important, thought that the things they learned in school would be very/somewhat unimportant later in their life, felt that most of their courses were very boring/somewhat boring, got mostly C's, D's and F's last semester, and felt that all/most of the students in their grade smoked cigarettes, used marijuana, drank alcohol and got drunk weekly (Tables 2, 3). Frequency of teachers letting students know they were doing a good job with their schoolwork was not significantly associated with recent marijuana for female students but was for male students.

Table 2 Impact of school experiences and individual feelings toward school on recent Marijuana use among African American female students

School experiences (past 12 months)	Recent Marijuana use (past month)			
	No *n* (%)	Yes *n* (%)	OR	(95% CI)
How did you feel overall about going to school in the past 12 months				
Liked going a lot/Kind of liked going[a]	832 (93.1)	62 (6.9)		
Hated going/Did not like going very much	138 (83.1)	28 (16.9)	2.723	(1.683, 4.406)***
During the past 12 months, how often did you feel that the school work you were assigned was meaningful and important?				
Always/Sometimes[a]	821 (92.2)	69 (7.8)		
Never/Seldom	147 (87.5)	21 (12.5)	1.700	(1.012, 2.856)*
How important do you think the things you have learned in school during the past 12 months are going to be to you later in life?				
Very important/Somewhat important[a]	891 (92.4)	73 (7.6)		
Very unimportant/Somewhat unimportant	77 (81.9)	17 (18.1)	2.695	(1.513, 4.798)**
How interesting do you think most of your courses at school during the past 12 months have been				
Very interesting/Somewhat interesting[a]	813 (92.7)	64 (7.3)		
Very boring/Somewhat boring	156 (85.7)	26 (14.3)	2.117	(1.301, 3.445)**
During the past 12 months, how often did your teachers at school let you know you were doing a good job with your school work?				
Always/Sometimes[a]	818 (92.2)	69 (7.8)		
Never/Seldom	152 (87.9)	21 (12.1)	1.638	(0.975, 2.750)
What were your grades for the last semester or grading period you completed?				
As/Bs[a]	652 (93.9)	42 (6.1)		
Cs/Ds/Fs	271 (86.0)	44 (14.0)	2.520	(1.614, 3.937)***
How many of the students in your grade at school smoke cigarettes?				
None/A few[a]	659 (94.1)	41 (5.9)		
All/Most	278 (85.0)	49 (15.0)	2833	(1.828, 4.390)***
How many of the students in your grade at school use marijuana or hashish?				
None/A few[a]	547 (98.6)	8 (1.4)		
All/Most	384 (82.4)	82 (17.6)	14.601	(6.983, 30.529)***
How many of the students in your grade at school drink alcoholic beverages?				
None/A few[a]	519 (97.4)	14 (2.6)		
All/Most	49 (84.6)	76 (15.4)	6.724	(3.748, 12.062)***
How many of the students in your grade at school get drunk at least once a week?				
None/A few[a]	739 (94.0)	47 (6.0)		
All/Most	179 (80.6)	43 (19.4)	3.777	(2.421, 5.892)***

*p < .05

**p < .01

***p < .001

[a]Indicates Referent; $N = 1176$; Missing values excluded

Multivariable Regression for the Association between School Experiences/Individual Feelings Toward School and Recent Marijuana Use Based on Sex

Multivariable regression analyses were conducted to determine the final model for the association of school experiences/individual feelings toward school and recent marijuana use based on sex. Variables that were significant in the univariate logistic regression analyses were retained for the multivariable regression analyses. For females, the final model significantly predicted recent marijuana use (omnibus $X^2 = 111.489$, df = 9, $p < .001$) and accounted for 11.1–24.4% of the variance in recent marijuana use among female students (Table 4). Females who received C's, D's, or F's in the past semester and females who felt that all/most of the students in their grade used marijuana were 7.132 (95% CI 1.193, 3.157) and 8.288 (95% CI 3.526, 19.480) times more likely than their female student counterparts to have recently used marijuana.

Table 3 Impact of school experiences and individual feelings toward school on recent Marijuana use among African American male students

School experiences (past 12 months)	Recent Marijuana use (past month)			
	No *n* (%)	Yes *n* (%)	OR	(95% CI)
How did you feel overall about going to school in the past 12 months				
Liked going a lot/Kind of liked going[a]	846 (92.6)	68 (7.4)		
Hated going/Did not like going very much	100 (84.0)	19 (16.0)	2.364	(1.365, 4.094)**
During the past 12 months, how often did you feel that the school work you were assigned was meaningful and important?				
Always/Sometimes[a]	839 (92.3)	70 (7.7)		
Never/Seldom	104 (86.0)	17 (14.0)	1.959	(1.110, 3.457)**
How important do you think the things you have learned in school during the past 12 months are going to be to you later in life?				
Very important/Somewhat important[a]	878 (92.7)	69 (7.3)		
Very unimportant/Somewhat unimportant	66 (78.6)	18 (21.4)	3.470	(1.951, 6.173)***
How interesting do you think most of your courses at school during the past 12 months have been				
Very interesting/Somewhat interesting[a]	801 (92.4)	66 (7.6)		
Very boring/Somewhat boring	144 (87.3)	21 (12.7)	1.770	(1.050, 2.983)*
During the past 12 months, how often did your teachers at school let you know you were doing a good job with your school work?				
Always/Sometimes[a]	816 (92.3)	68 (7.7)		
Never/Seldom	131 (87.3)	19 (12.7)	1.740	(1.013, 2.990)*
What were your grades for the last semester or grading period you completed?				
As/Bs[a]	565 (94.5)	33 (5.5)		
Cs/Ds/Fs	332 (86.2)	53 (13.8)	2.733	(1.734, 4.309)***
How many of the students in your grade at school smoke cigarettes?				
None/A few[a]	726 (93.7)	49 (6.3)		
All/Most	181 (83.8)	35 (16.2)	2.865	(1.803, 4.554)***
How many of the students in your grade at school use marijuana or hashish?				
None/A few[a]	642 (96.5)	23 (3.5)		
All/Most	259 (80.4)	63 (19.5)	6.790	(4.123, 11.181)***
How many of the students in your grade at school drink alcoholic beverages?				
None/A few[a]	634 (96.5)	23 (3.5)		
All/Most	262 (80.9)	62 (19.1)	6.523	(3.958, 10.751)***
How many of the students in your grade at school get drunk at least once a week?				
None/A few[a]	789 (93.2)	58 (6.8)		
All/Most	100 (79.4)	26 (20.6)	3.537	(2.130, 5.874)***

*p < .05

**p < .01

***p < .001

[a]Indicates Referent; $N = 1152$; Missing values excluded

For males, the final model significantly predicted recent marijuana use among male students (omnibus $X^2 = 100.453$, df = 10, $p < .001$) and accounted for 10.4–23.1% of the variance in recent marijuana use among male students (Table 5). Males at highest risk for recent marijuana use were those who thought that the things they learned in school would be very/somewhat unimportant later in their life, received mostly C's, D's and F's in the last semester, and felt that all/most of the students in their grade used marijuana and drank alcohol.

Discussion

The present study found that 7.9% of African American adolescents reported using marijuana in the past 30 days. Such use is alarming since adolescent marijuana involvement has continued to increase [2] and is associated with a myriad of physiological, mental, emotional, academic and social problems [8, 9] that are disproportionately experienced among this population [29–31].

Interestingly, male and female adolescents did not significantly differ in recent marijuana use in the present study.

Table 4 Final multivariable regression for recent Marijuana use among African American female students

School experiences (past 12 months)	Recent Marijuana Use (past month)				
	B	SE	Wald	OR	95% CI
How did you feel overall about going to school in the past 12 months					
Hated going/Did not like going very much	0.523	0.304	2.969	1.687	(0.931, 3.059)
During the past 12 months, how often did you feel that the school work you were assigned was meaningful and important?					
Never/Seldom	0.024	0.332	0.005	0.976	(0.509, 1.873)
How important do you think the things you have learned in school during the past 12 months are going to be to you later in life?					
Very unimportant/Somewhat unimportant	0.052	0.384	0.018	1.053	(0.496, 2.234)
How interesting do you think most of your courses at school during the past 12 months have been					
Very boring/Somewhat boring	0.145	0.319	..207	1.156	(0.619, 2.160)
What were your grades for the last semester or grading period you completed?					
Cs/Ds/Fs	0.663	0.248	7.132	1.941	(1.193, 3.157)**
How many of the students in your grade at school smoke cigarettes?					
All/Most	0.049	0.259	0.635	1.050	(0.632, 1.745)
How many of the students in your grade at school use marijuana or hashish?					
All/Most	2.115	0.436	23.527	8.288	(3.526, 19.480)***
How many of the students in your grade at school drink alcoholic beverages?					
All/Most	0.671	0.369	3.308	1.957	(0.949, 4.033)
How many of the students in your grade at school get drunk at least once a week?					
All/Most	0.395	0.274	2.079	1.484	(0.868, 2.539)

$N = 1176$; Missing values excluded

The model significantly predicted recent marijuana use among female students (omnibus $X^2 = 111.489$, df = 9, $p < .001$) and accounted for 11.1–24.4% of the variance in recent marijuana use among female students

*p < .05

**p < .01

***p < .001

Previous studies have indicated that African American male high school students are most vulnerable to marijuana [17, 32] and African American males are at higher risk for early marijuana use (before age 13) than African American females [6]. However, data from the most recent YRBS found that 25.0% of African American females currently used marijuana, compared to 17.2% of African American males [6]. Ongoing research is warranted to continue monitoring use rates and potential sex differences. Nevertheless, prevention programs are needed to help reduce risk factors contributing to marijuana use among minority youth.

Regarding school experiences and individual feelings toward school, adolescents at increased risk for recent marijuana use were those who had negative feelings toward school, felt schoolwork was not meaningful or important and that courses were not interesting. Previous studies have shown that students who feel negatively toward school are also at higher risk for alcohol use [33]. Much research has stressed the importance of building positive feelings toward school as a means of protecting youth from substance abuse [34]. Helping students to feel positively supported and cared for within the school environment can serve as a protective factor against adolescent marijuana use [20, 21].

In addition, it remains essential for youth to understand the connection between the content and skills learned in their courses and their potential career and occupational trajectory. Assisting students to comprehend the importance and meaning of their courses is essential to helping them to succeed occupationally long-term. Real-world applications of class lessons should continue to be shared with students to assist them in establishing the link between schoolwork and their career path.

Interestingly, the final multivariable regression models did not show a significant association between feelings toward school and recent marijuana use for both females and males, with one exception. Males who thought that the things they learned in school would be very/somewhat unimportant later in their life were 2.4 times more likely to use marijuana in the past 30 days. This finding again underscores the need to ensure that schools continue to focus on helping students to grasp the connection between what they learn

Table 5 Final multivariable regression for recent Marijuana use among African American male students

School experiences (past 12 months)	Recent Marijuana Use (past month)				
	B	SE	Wald	OR	95% CI
How did you feel overall about going to school in the past 12 months					
Hated going/Did not like going very much	0.206	0.370	0.311	1.229	(0.595, 2.537)
During the past 12 months, how often did you feel that the school work you were assigned was meaningful and important?					
Never/Seldom	0.056	0.400	0.019	0.946	(0.432, 2.0711)
How important do you think the things you have learned in school during the past 12 months are going to be to you later in life?					
Very unimportant/Somewhat unimportant	0.888	0.388	5.231	2.429	(1.135, 5.198)*
How interesting do you think most of your courses at school during the past 12 months have been					
Very boring/Somewhat boring	0.120	0.369	0.105	0.887	(0.430, 1.830)
During the past 12 months, how often did your teachers at school let you kow you were doing a good job with your school work?					
Never/Seldom	0.202	0.334	0.367	0.817	(0.424, 1.572)
What were your grades for the last semester or grading period you completed?					
Cs/Ds/Fs	0.858	0.260	10.889	2.357	(1.417, 3.921)***
How many of the students in your grade at school smoke cigarettes?					
None/A few[a]	0.000	0.287	0.000	1.000	(0.570, 1.756)
How many of the students in your grade at school use marijuana or hashish?					
All/Most	1.229	0.344	12.742	3.418	(1.741, 6.711)***
How many of the students in your grade at school drink alcoholic beverages?					
All/Most	1.151	0.339	11.520	3.160	(1.626, 6.141)***
How many of the students in your grade at school get drunk at least once a week?					
All/Most	0.037	0.313	0.014	1.038	(0.562, 1.917)

$N = 1152$; Missing values excluded

The model significantly predicted recent marijuana use among male students (omnibus $X^2 = 100.453$, df = 10, $p < .001$) and accounted for 10.4–23.1% of the variance in recent marijuana use among male students

*p < .05

**p < .01

***p < .001

in school and how it relates to their future occupational and financial success.

The final regression models also reveals that both females and males who received C's, D's or F's in the last semester were twice as likely as those who earned A's or B's to have recently used marijuana. This finding is consistent with existing research which indicates an inverse relationship between academic achievement and substance use [22]. Students who receive poor grades are more likely to use marijuana and other substances [17, 35, 36]. Moreover, struggles with academic achievement are also directly related to truancy, absenteeism, and school drop out, all of which are predictive of substance use [25]. It is plausible that some youth who struggle academically use marijuana as a means to cope with class difficulties. Thus, schools and school professionals should be cognizant of the connection between academic achievement and marijuana use. Implementing tutoring, mentoring and academic assistance programs may serve to not only enhance grades but also to protect youth from substance use. Programs aimed at decreasing absenteeism and truancy should also include substance abuse components, such as marijuana prevention messages.

Not surprisingly, the present study found that both female and male students at highest risk for recent marijuana use were those who felt that all/most of the students in their grade used marijuana. Research has shown that adolescents who use marijuana tend to feel that their siblings and peers are involved in increased use of marijuana [24]. The present study indicated that this finding held true for African American adolescents. Having peers who use substances is a strong predictor of substance abuse among adolescents [23]. Based on the current study, simply perceiving that peers use may also strongly contribute to increased individual marijuana use. African American adolescents at high risk for marijuana use are those who have friends who use marijuana, alcohol and/or tobacco [17].

In the present study, it is most noteworthy that while males who felt all/most of the students in their grade used

marijuana were 3 ½ times more likely to recently use marijuana, females who felt all/most of the students in their grade used marijuana were 8 times more likely to recently use marijuana. A comprehensive review of the literature failed to produce any study which offered explanations for such a difference. It quite plausibly could be that African American female adolescents are more strongly influenced by their peers in regards to marijuana use. However, it could also be the case that African American female adolescents who use marijuana tend to associate with greater numbers of adolescents who also use, thus potentially inflating their perceptions of peer use. Still, the question remains as to why females had such a more profound impact of perceived peer use and individual use, as compared to males. Research is needed to more thoroughly understand sex differences in the influence of perceptions of peer use on marijuana use among this population.

Limitations

The following study limitations should be noted. First, the study was cross-sectional in design and therefore cannot ascertain cause-and-effect relationships. Second, the study requested participants to self-report on survey items. Thus, some students may have responded in socially desirable manners. Third, since the survey was self-report, responses are dependent on the accuracy and honesty of participants. Fourth, the participants of the analyses of this study were delimited to African American adolescents aged 12–17 years and therefore may not necessarily generalize to individuals of other races/ethnicities and age groups.

Conclusions

The present study found that male and female African American adolescents at highest risk for recent marijuana use were those who held negative feelings toward school, felt schoolwork was not meaningful or important, felt courses were not interesting, received mostly C's, D's and F's in the last semester, and felt that all/most of the students in their grade used marijuana. Of those who felt that most or all students in their grade used marijuana, males were 3 ½ times and females were 8 times more likely to have recently used marijuana.

Such findings can be used by prevention specialists and health educators to develop and implement marijuana prevention programs and interventions specifically tailored to African American adolescents. The present study helps to demonstrate the association of school experiences and marijuana use among African American adolescents. Culturally competent prevention programs which address school experiences and school connections are needed to help in preventing marijuana use among vulnerable populations. Future research is needed to explain sex differences in the relationship between perceived peer use of marijuana and individual use.

Compliance with Ethical Standards

Conflict of interest The authors declare they have no conflict of interest.

Ethical Approval All study procedures were performed in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent This study is a secondary data analysis of a de-identified data set.

References

1. Wu, L. T., Woody, G. E., Yang, C., Pan, J. J., & Blazer, D. G. (2011). Racial/ethnic variations in substance-related disorders among adolescents in the United States. *Archives of General Psychiatry, 68*(11), 1176–1185.
2. Johnston, L. D., O'Malley, P. M., Miech, R. A., Bachman, J. S., & Schulenberg, J. E. (2016). Monitoring the Future national survey results on drug use, 1977–2015: *Overview, key findings on adolescent drug use*. Ann Arbor: Institute for Social Research. The University of Michigan. Retrieved from https://www.drugabuse.gov/related-topics/trends-statistics/monitoring-future/monitoring-future-survey-overview-findings-2015.
3. Reboussin, B. A., Green, K. M., Milam, A. J., Furr-Holden, C. D., & Ialongo, N. S. (2014). Neighborhood environment and urban African American marijuana use during high school. *Journal of Urban Health, 91*(6), 1189–1201.
4. Substance Abuse and Mental Health Services Administration (SAMHSA). (2012). *Comparing and evaluating youth substance use estimates from the National Survey on Drug Use and Health and other surveys*, (HHS Publication No. SMA 12-4727, Methodology Series M-9). Rockville: Substance Abuse and Mental Health Services Administration. .
5. Substance Abuse and Mental Health Services Administration (SAMHSA). (2015). *Behavioral Health Barometer United States, 2015 (HHS Publication No*. SMA-16-Baro-2015). Rockville: Substance Abuse and Mental Health Services Administration.
6. Kann, L., McManus, T., Harris, W. A., Shanklin, S. L., Flint, K. H., Queen, B., Lowry, R., Chyen, D., Whittle, L., Thornton, J., Lim, C., Bradford, D., Yamakawa, Y., Leon, M., Brener, N., & Ethier, K. A. (2018). Youth risk behavior surveillance – United States 2017. *Morbidity and Mortality Weekly Report Surveillance Summaries, 67*(8), 1–144.
7. Brook, J. S., Lee, J. Y., Brown, E. N., & Finch, S. J. (2012). Comorbid trajectories of tobacco and marijuana use as related to psychological outcomes. *Substance Abuse, 33*(2), 156–157. https://doi.org/10.1080/08897077.2011.640202.
8. Hall, W. (2015). What has research over the past two decades revealed about the adverse health effects of recreational cannabis use? *Addiction, 110*(1), 19–35. https://doi.org/10.1111/add.12703.

9. National Institute on Drug Abuse [NIDA]. (2016). *Research Report Series Marijuana*. Retrieved from https://www.drugabuse.gov/publications/research-reports/marijuana/letter-director.
10. Reboussin, B. A., Hubbard, S., & Ialongo, N. S. (2007). Marijuana use patterns among African American middle-school students: A longitudinal latent class regression analysis. *Drug and Alcohol Dependence, 90*(1), 12–24.
11. Horwood, L., Fergusson, D., Hayatbakhsh, M., Najman, J., Coffey, C., Patton, G., Silins, E., & Hutchinson, D. M. (2010). Cannabis use and educational achievement: Findings from three Australian cohort studies. *Drug Alcohol Dependence, 110*, 247–253.
12. Lynskey, M. T., Coffey, C., Degenhardt, L., Carlin, J. E., & Patton, G. (2003). A longitudinal study of the effects of adolescent cannabis use on high school completion. *Addiction, 98*, 685–692.
13. Wagner, F., & Anthony, J. (2002). Into the world of illegal drug use: Exposure opportunity and other mechanisms linking the use of alcohol, tobacco, marijuana, and cocaine. *American Journal of Epidemiology, 155*, 918–925.
14. Ferguson, D. M., Boden, J. M., & Horwood, L. J. (2008). The developmental antecedents of illicit drug use: Evidence from a 25-year longitudinal study. *Drug and Alcohol Dependence, 96*(1), 165–177. https://doi.org/10.1016/j.drugalcodep.2008.03.003.
15. Clark, T. T., Belgrave, F. Z., & Abell, M. (2012). The mediating and moderating effects of parent and peer influences upon drug use among African American adolescents. *Journal of Black Psychology, 38*(1), 52–80.
16. Emshoff, J., Avery, E., Raduka, D., & Anderson, D. (1996). Findings from Super Stars: A health promotion program for families to enhance multiple protective factors. *Journal of Adolescent Research, 11*, 68–96. https://doi.org/10.1177/0743554896111005.
17. Vidourek, R. A., King, K. A., & Montgomery, L. (2015). Psychosocial determinants of marijuana use among African American youth. *Journal of Ethnicity in Substance Abuse, 11*, 1–23.
18. Hawkins, J. D., Catalano, R. F., & Miller, J. Y. (1992). Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance abuse prevention. *Psychological Bulletin, 112*, 64–105. https://doi.org/10.1037/0033-2909.112.1.64.
19. Mandara, J., Rogers, S. Y., & Zinbarg, R. E. (2011). The effects of family structure on African American adolescents' marijuana use. *Journal of Marriage and Family, 73*(3), 557–569. https://doi.org/10.1111/j.1741-3737.2011.00832.x.
20. Catalano, R. F., Haggerty, K. P., Oesterle, S., Fleming, C. B., & Hawkins, J. D. (2004). The importance of bonding to school for healthy development: Findings from the social development research group. *Journal of School Health, 74*, 252–261.
21. Resnick, M. D., Bearman, P. S., Blum, R. W., Bauman, K. E., Harris, K. M., Jones, J., et al. (1997). Protecting adolescents from harm: Findings from the National Longitudinal Study on Adolescent Health. *Journal of the American Medical Association, 278*, 823–832.
22. Wright, D. R., & Fitzpatrick, K. M. (2004). Psychosocial correlates of substance use behaviors among African American youth. *Adolescence, 39*(156), 653–667.
23. Myers, L. (2013). Substance use among rural African American adolescents: Identifying risk and protective factors. *Child Adolescent Social Work Journal, 30*, 79–93.
24. Roditis, M. L., Delucchi, K., Chang, A., & Halpern-Felsher, B. (2016). Perceptions of social norms and exposure to pro-marijuana messages are associated with adolescent marijuana use. *Preventive Medicine, 93*, 171–176. https://doi.org/10.1016/j.yped.2016.10.013.
25. Hill, D., & Mrug, S. (2015). School-level correlates of adolescent tobacco, alcohol and marijuana use. *Substance Use & Misuse, 50*, 1518–1528.
26. Chromy, J. R., Feder, M., Gfroerer, J., Hirsch, E., Kennet, J., Morton, K. B., et al. (2009). *Reliability of key measures in the National Survey on Drug Use and Health*. Rockville: Substance Abuse and Mental Health Services Administration, Office of Applied Studies.
27. Fendrich, M. I., Johnson, T. P., Sudman, S., Wislar, J. S., & Spiehler, V. (1999). Validity of drug use reporting in a high-risk community sample: A comparison of cocain and heroin survey reports with hair tests. *American Journal of Epidemiology, 149*(10), 955–962.
28. Gfroerer, J., Eyerman, J., & Chromy, J. (Eds.). (2002). *Redesigning an ongoing national household survey: Methodological issues (DHHS Publication No. SMA 03-3768)*. Rockville: Substance Abuse and Mental Health Services Administration, Office of Applied Studies.
29. Brown, T. L., Flory, K., Lyam, D. R., Leukefield, C., & Clayton, R. R. (2004). Comparing the developmental trajectories of marijuana and use of African American and Caucasian adolescents: Patterns, antecedents, and consequences. *Experimental and Clinical Psychopharmacology, 12*(1), 47–56.
30. Juon, H. S., Fothergill, K. E., Green, K. M., Doherty, E. E., & Ensminger, M. E. (2011). Antecedens and consequences of marijuana use trajectories over the life course in an African American population. *Drug and Alcohol Dependence, 118*(2–3), 216–223.
31. Shillington, A. M., & Clapp, J. D. (2003). Adolescents in public substance abuse treatment programs: The impacts of sex and race on referrals and outcomes. *Journal of Child and Adolescent Substance Abuse, 12*, 69–91.
32. Chen, P., & Jacobson, K. (2012). Developmental trajectories of substance use from early adolescence to young adulthood: Gender and racial/ethnic differences. *Journal of Adolescent Health, 50*(2), 154–163.
33. Browning, S. (2012). Neighborhood, school, and family effects on the frequency of alcohol use among Toronto youth. *Substance Use and Misuse, 47*(1), 31–43.
34. Centers for Disease Control and Prevention. (2009). *School connectedness: Strategies for increasing protective factors among youth*. Atlanta: U.S. Department of Health and Human Services.
35. Vaughan, E., Kratz, L., & d'Argent, J. (2011). Academics and substance use among Latino adolescents: Results from a national study. *Journal of Ethnicity and Substance Abuse, 10*(2), 147–161.
36. Cox, R. G., Zhang, L., Johnson, W. D., & Bender, D. R. (2007). Academic performance and substance use: Findings from a state survey of public high school students. *Journal of School Health, 77*(3), 109–115.