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Smoking, Substance Use, and Mental Health Correlates in Urban Adolescent Girls

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Abstract

This study examined the associations among smoking tobacco and/or cannabis with alcohol use, depression, disordered eating and healthy behaviors among adolescent girls enrolled in an HIV prevention intervention randomized trial. Baseline self-reported behaviors from 744 sexually active, low-income, urban participants were collected using an audio computer assisted self interview. Girls ranged in age from 15 to 19 years old with a mean age of 16.5. Over 16% of girls reported smoking cigarettes, 41% smoked cannabis and 12% used both substances. Girls who smoked either substance had higher scores for depression symptoms, alcohol use and disordered eating when compared to nonsmokers. Girls who used both substances were at a higher risk for alcohol use, depression symptoms and disordered eating. The association of cannabis and tobacco with the other health related issues differed depending on age, indicating that assessment and targeting of health behavior interventions may differ depending on a girl's age. Disordered eating, depressive symptoms and cannabis use were higher among these adolescent girls than previously documented in the literature, suggesting that to improve the health of this population multi-focused interventions must target girls before they have engaged in smoking.

Keywords

Adolescent girls; Cannabis; Tobacco; Sexually active; Low income; High risk and healthy behaviors

Smoking, whether it be tobacco or marijuana, remains a continued threat to the health of adolescent girls. Nearly 20% of adolescent girls use either tobacco or cannabis, or both.¹ It has been documented that tobacco use in any amount during the early adolescent years leads to high levels of use in early adulthood.² Furthermore, it has been demonstrated that cannabis use is prospectively associated with regular cigarette smoking and nicotine dependence.³ In many adolescents, it appears that the use of tobacco and cannabis occur concurrently rather than a pattern of cigarette smoking transitioning to cannabis use.³ Continued use of tobacco into adulthood is related to poorer health, lower income and less education.⁴ Cannabis use has a lesser effect on long term health outcomes than tobacco,⁴ but can lead to drug-related problems in young adulthood.² Although cannabis use is often considered benign by teen users,⁵ the use of either substance is detrimental to adolescent well-being and future adult health.

Health-related issues of depression,^{6–9} disordered eating,^{10–12} and alcohol use,^{13–14} which are commonly seen in adolescent girls who use tobacco, are interconnected. For example,

progression to daily cigarette smoking increases with cannabis and alcohol use¹⁴ and there is a higher level of depression among smokers than non-smokers.⁹ Depression is associated with alcohol, cannabis and cigarette use;⁷ tobacco and other substance use are associated with disordered eating¹¹ (especially binge eating and purging behaviors); there is a high level of nicotine dependence in individuals with eating disorders as well.¹⁵ Use of cannabis and alcohol increases the risk of daily cigarette smoking;¹⁴ and cannabis use is prospectively related to daily smoking and nicotine dependence in adulthood.³

Previously documented prevalence of these interconnected health-related issues provides a backdrop for this study. Reported statistics show that over 34% of teen girls have felt sad or hopeless most days over a two week period to such a degree that they stopped some usual activities.¹ Almost 7% of teen girls have used vomiting or laxatives for weight control in the prior 30 days, with a higher percentage of whites (6.9%) than blacks (3.5%). Nearly 45% reported current use of alcohol, with more whites (47%) than blacks (35%) reporting this behavior.¹ However, these data are documented within larger cohorts of diverse teens and these statistics may not fully account for low-income sexually active, urban adolescent girls, where prevalence of risk behaviors may be higher. Prior work reported in a meta-analysis that pooled the results of nine studies of adolescent alcohol and cannabis use (N = 219,517) reported that low-income teens ages 10–15 years old are 22% more likely to use cannabis and alcohol than higher-income teens.¹⁶

In the current study we used data that were collected at baseline from low-income, sexually active, urban adolescent girls participating in an HIV prevention intervention program. We obtained data on girls' self reports of tobacco, cannabis and alcohol use, as well as scores on depression, disordered eating, and physical activity and sleep patterns. The purpose of this study was to assess the associations among smoking tobacco and/or cannabis with alcohol use, depressive symptoms, disordered eating and healthy behaviors. The relationships among these health concerns have been studied extensively in adolescents, but not specifically in low-income, sexually active, urban adolescent girls.

To more fully understand how these health concerns are connected within this specific group of adolescents, we hypothesized that girls participating in our RCT who smoked tobacco and/or cannabis would have 1) higher scores on a depression scale, higher levels of alcohol use and more disordered eating than non-smokers, and 2) lower levels of physical activity and poorer sleep patterns. In addition, two exploratory questions were: 1) Are depressive symptoms, disordered eating and alcohol use different depending on whether girls used no substance, tobacco only, cannabis only, or both substances, and 2) Are there age-related differences in the use of tobacco, cannabis, and alcohol, or in disordered eating and depressive symptoms, among these teens?

The findings from this study will add to our understanding of the interconnection of these behaviors in low-income, sexually active, urban girls and provide insight into how best to target interventions to the girls who use tobacco and/or cannabis. Although the association between these behaviors is reported in other adolescent subgroups (e.g. boys, low income, young) whether these behaviors are interconnected in low-income, sexually active, urban adolescent girls is not known. If low-income, sexually active, urban adolescent girls are at increased risk of cannabis and alcohol use as is reported in some adolescent groups, they may be at high risk for depression, disordered eating, and alcohol use.

Method

Participants and Setting

Urban adolescent girls were recruited into the parent study directly and by word of mouth, from primary health and reproductive care clinics and from youth development programs in Western New York. Inclusion criteria were: (1) female, (2) 15–19 years of age, and (3) sexually active with a male partner within the past three months. Exclusion criteria were: (1) married, (2) pregnant, (3) delivered a child within the past three months, (4) anticipated relocating within the next year, (5) mentally impaired, or (6) unable to read or speak English adequately to participate in the intervention.

The study was approved by the institutional review boards of the University of Rochester and Syracuse University. The protocol was reviewed and approved by the national office of Planned Parenthood. Consent was obtained from girls who were 18 years of age; girls under 18 provided assent. Parental consent was not required by the institutional review boards because the study included testing for sexually transmitted infections, which is protected health information under the reproductive rights laws in NY State. A certificate of confidentiality was obtained to protect participant privacy.

Procedures

Participants were initially screened for age, and eligible girls completed additional screening questions in a private location at the recruitment site. Recruitment occurred between December 2004 and April 2008. Of 1778 girls screened for the study, 765 (43%) were ineligible (71% because they were not sexually active, 23% because they were pregnant or had a baby recently, and 6% for other reasons). Of the 1,013 girls who were eligible 744 (73%) gave consent or assent, and provided baseline data. The majority of eligible girls who chose not to participate cited a lack of time to fully participate in the study as their reason for refusal. Immediately upon completion of the assent/consent process, girls completed an audio computer assisted self interview (ACASI).

Measures

A variety of measures were collected from all participants at baseline and for the current study we included the following data: sociodemographic characteristics, alcohol, tobacco and cannabis use, depression scores, eating behaviors reflective of disordered eating, and health behaviors such as physical activity and hours of sleep.

Sociodemographic characteristics—Information was collected on age, race, ethnicity, free lunch status (proxy for income level), and living situation.

Substance use—The girls were asked whether they had used cigarettes or any tobacco products, cannabis, or alcohol within the past three months.

Health-related behaviors—Physical activity was measured with one question asking “how many days out of the week did you get 30 or more minutes of physical activity that increased your heart rate (such as walking briskly or exercising)?” Amount of sleep was measured with one question that asked “during the past week, how many nights did you sleep 7 to 9 hours per night?”

Disordered eating—Eating behaviors were measured by asking two questions: 1) “How often have you gone on eating binges where you felt you might not be able to stop?” and 2) “How often, in the last month have you vomited, taken laxatives, or exercised to lose weight?” Responses were a 4-point Likert scale ranging from never to always.

Depressive symptoms—Depressive symptoms were measured using the CES-D short form that consists of nine questions related to depressive feelings with responses ranging from rarely to most of the time on a 4-point Likert scale. The CES-D is designed as a screening tool to measure depressive symptoms and higher scores indicate more depressive symptoms¹⁷. The maximum possible score is 27 and a score of 4 or more on this revised form is equivalent to the full scale tool in accuracy for depression¹⁷. Scores were summed to create a total score that was used for this analysis as a continuous variable.

Data Analysis

Baseline data were analyzed using descriptive statistics, including means and standard deviations, frequencies and percentages. To evaluate the relationship between variables, further analyses were conducted using Chi-Square, student's t-test, logistic regression, and simple regression. Depressive symptoms, alcohol use, behaviors indicative of eating disorders and healthy behaviors were compared in girls who used tobacco products and/or cannabis within the past three months to girls who did not use these products. Younger girls (15–16 years old) were compared with older girls (17–19 years old). SPSS version 17.0 was used for all analyses.

Results

Baseline data for the variables included in this analysis were available for 739 of the 748 girls who consented to participate in the study. The mean age was 16.5 years, with a range of 15–19 years (See Table 1). The majority self-identified racially as African-American (69%) and the remaining girls identified themselves as white, multiracial or other; 17% indicated that they were Hispanic. At least 67% reported that they participated in the free/reduced lunch government program, which indicated that they lived in poverty.

Only a minority of girls in the sample smoked cigarettes (16.4%) while almost three times as many smoked cannabis (41%) (See Table 1). We examined smoking behaviors among younger (15–16 years old) and older (17–19 years old) girls and determined smoking participation did not differ by age. Of the younger girls 16% (n = 60) smoked tobacco and 40% (n = 154) smoked cannabis. Of the older girls 17% (n = 61) used tobacco and 43% (n = 151) smoked cannabis. Twelve percent (n = 92) of all girls used both tobacco and cannabis. Of these, 46% (n = 42) were younger and the remaining 54% (n = 50) were older. Less than 1 in 5 girls, whether younger or older, smoked cigarettes while more than 2 out of 5 smoked cannabis (See Table 1).

We also examined disordered eating related to either purging behavior or binge eating in this sample. Twenty-five percent of these girls reported using vomiting, laxatives or exercise to lose weight at some point in time and 49% of the girls experienced eating binges. Of those who reported vomiting, laxatives or exercise to lose weight, 8% indicated this occurred 'most of the time' or 'always' with those who reported eating binges indicating this occurred for them 'most of the time' or 'always' in 15% of the sample.

Eating disorder symptoms, behaviors and depression scores were significantly higher in smokers when compared with non-smokers (See Table 2). Alcohol use was also significantly higher in smokers compared to non-smokers (Chi-Square < 0.001). However, physical activity and sleep patterns did not differ significantly between smokers and non-smokers. Only 15% of all of the girls engaged in regular physical activity and slightly more than 1 out of 5 had 7–9 hours of sleep each night.

Further analysis using simple regression or logistic analysis identified relationships among the study variables (See Table 3). All models for the total sample were significant.

Significant findings within regression models showed that girls who used cannabis or cannabis plus tobacco had significantly more binge eating behaviors than non-smokers. The girls who used tobacco plus cannabis had more purging behaviors than non-smokers and this varied by age. In the logistic regression model, girls who used cannabis alone or cannabis plus tobacco had significantly higher alcohol use than non-smokers, and this varied by age, but alcohol use was similar for both age groups.

We conducted separate regression analyses for younger and older girls to identify if there were differences on depression scores, binge eating, purging behaviors, and alcohol use based on age (See Table 3).

For depression scores, the overall model for both ages was significant and there was a difference between the younger and older girls; in younger girls cannabis use was not related to depression scores, but it was in older girls. The converse was the case for tobacco users— younger girls had higher depression scores if they used tobacco but the older girls did not.

For binge eating behaviors, the patterns were similar for both younger and older girls (See Table 3). In the overall regression model, purging behavior was not significant in the 17–19 year old girls ($p = 0.334$). However, the overall model was significant ($p = 0.008$) for the 15–16 year old girls, but only those who used cannabis plus tobacco had significantly more purging behavior than non-smokers ($b = .45$, $p = 0.001$).

There was higher usage of alcohol in smokers and non-smokers for both younger and older girls, with the overall logistic regression model being significant for each age group ($p < .001$ in both models). In the younger girls, those who used cannabis or cannabis plus tobacco were more likely to use alcohol than non-smokers ($p < .001$), but not those who used tobacco only ($p = 0.130$). Those who used cannabis only were also more likely to use alcohol than those who used tobacco only ($p = 0.038$). Similarly, the older girls who smoked cannabis or cannabis plus tobacco were more likely to use alcohol than non-smokers ($p < 0.001$), but tobacco only smokers were not ($p = 0.520$). The older girls who smoked cannabis only were no more likely to use alcohol than the girls who used tobacco only ($p = 0.156$), but this finding did not hold for the younger girls.

Discussion

As compared to the literature describing tobacco and marijuana use in mixed samples of adolescents of varying demographic characteristics, girls in our sample differed in their smoking behaviors. Although the majority of these girls did not use tobacco products, over 40% of them smoked cannabis. The girls who smoked tobacco and/or cannabis had significantly higher scores for depression symptoms, alcohol use and disordered eating than non-smokers. The interconnectedness varied depending on the age of the girls as well as what type of substance was smoked.

Cannabis use among the girls in this sample was substantially higher than the 17% reported in the literature.¹ At the same time, tobacco use was somewhat lower than the reported 19%. This finding could be relevant to clinical practice because screening urban girls for tobacco use only may not be sufficient for identifying risk behaviors that contribute to poor health and potential progression to use of additional illegal substances. If the reported progression from cannabis to tobacco use and dependence is true,³ there is a strong possibility many of these girls will go on to become tobacco users. Both tobacco and cannabis use have well documented negative long term effects on health.⁴

The higher scores for depressive symptoms that were found in the smokers compared with the non-smokers in this sample support the interconnectedness of smoking with depression.

This was not surprising as it is known that these high risk behaviors frequently occur together.^{7, 12, 14} However, 71% of these girls had scores that indicate widespread depressive symptoms. Although the CES-D is only a screening tool the pervasiveness of depressive symptoms in the smokers is extremely high. In clinical practice it is imperative that clinicians are on high alert for depression in adolescent girls who smoke and screen for depression early, rather than waiting until depression increases risk. This is especially critical for providers as depression is a widely reported mental disorder for adolescents.¹⁸ It is associated with multiple risk behaviors and suicide, and is the third leading cause for mortality in teens.

Disordered eating was also higher in the smokers compared with the non-smokers. Although the two questions used in this study were not diagnostic they were similar to those used in surveys administered to adolescent populations. As a whole, the girls in this sample had higher scores on both binge eating and purging behaviors than are reported in the literature. The smokers had significantly higher scores than the non-smokers. The onset of an eating disorder usually occurs between the ages of 12 and 30.^{19–20} Thus, these girls are at a vulnerable time for development of an actual eating disorder. The clinicians who provide health care for low-income, sexually active urban girls need to be cognizant of this risk among all urban girls and not assume that some girls may be at higher risk than others based on cultural norms.²¹

The girls who smoked were not less active, nor did they experience poorer sleep patterns than the non-smokers. This finding was surprising because the smokers had significantly higher depression scores than the non-smokers and higher depressive symptoms in adolescents is often correlated with a lower level of physical activity.⁸ Furthermore, alcohol use is associated with low levels of physical activity.²² These urban girls as a whole were not engaging in regular physical activity or meeting the recommended hours of sleep/night. Low levels of physical activity and poor sleep patterns contribute to obesity^{23–24} so the entire sample was at risk for the health risks related to obesity.

Overall we found that it was cannabis use, either in conjunction with tobacco or alone, that accounted for the differences between smokers and non-smokers in their use of alcohol, binge eating, or purging. When girls used tobacco alone there was no relationship with these other health-related issues, with the exception of depressive symptoms in the younger girls. Girls who used both cannabis and tobacco were significantly different from non-smokers in terms of depression scores, purging behaviors, binge eating, and alcohol use. This finding is different than the interconnectedness reported in the literature, indicating that urban low-income girls have unique risk compared to the general population of adolescent girls.

The differences between the younger and older girls are important findings that expand what is known about adolescent tobacco and cannabis use. The impact of using tobacco and/or cannabis is not the same for all adolescent girls. Younger girls who used only cannabis were more prone to alcohol use than non-smokers, but the older girls were prone to all of the health-related problems except purging. Younger girls who used tobacco were more prone to depressive symptoms than non-smokers, but the older girls who used tobacco were similar to the non-smokers. Girls of all ages who used both cannabis and tobacco were at most risk and differed from the non-smokers across all health-related issues, with the exception of purging in the older girls.

It is difficult to sort out the complexities of these interconnected health issues in order to apply the information to practice and to interventions to decrease risk and improve quality of life in low income minority urban girls. Recognition that there is variation depending on age gives guidance for how and when interventions should take place. Girls of any age may not

report their high risk behaviors beyond tobacco use, but nonetheless, the interconnectedness of these behaviors can guide both research and practice. The findings from this study suggest that when dealing with middle adolescent girls (15–16 years old), the use of tobacco indicates a need to assess for depression, and the use of cannabis and tobacco suggest risk for binge eating, purging behaviors and alcohol use. On the other hand, use of cannabis alone may not be indicative of other high risk behaviors. When dealing with the older adolescent (17–19), tobacco use is not reflective of other high risk behaviors, unless it is used in conjunction with cannabis. In these older teens, use of cannabis alone increases the chance of other high risk behaviors. Understanding these differences in urban girls who use tobacco and/or cannabis enables targeting of interventions both at the practice and research level.

Limitations

There are several limitations to this study. First, the study was conducted in one northeastern city, and some findings may not generalize to other regions of the country. Second, the data are based on self-report, which is liable to response bias. However, the use of ACASI has been reported to increase the validity of self-reports of risk behaviors, because it is completed in privacy and participants generally feel anonymous.²⁵ Third, the study uses cross-sectional data only, which cannot be used to draw any cause and effect conclusions. Fourth, the measures of depression and disordered eating used in this study are not diagnostic. However, as screening tools they provide useful information, but may overestimate the prevalence of these problems. Finally, the sample includes girls who report recent sexual activity, thus they are a group that is not representative of those girls who are not sexually active. Despite these limitations, the sample provides a unique opportunity to examine the reported behaviors of a large number of low-income, urban girls and identify risks that merit further study to design needed interventions.

Conclusions

Low-income, sexually active, urban girls who smoke tobacco and/or cannabis are at higher risk for other high risk health-related issues than those who do not smoke. We identified higher depression scores, more alcohol use, and more binge eating and purging behaviors in smokers than girls who are non-smokers. To improve the health of low income, sexually active urban girls, multi-focused interventions must target girls at any age before they have engaged in smoking. Screening health-related behaviors early and often may be required to ascertain what risks they face. We identified disordered eating, cannabis use, and depressive symptoms in this population of urban girls to a greater extent than previously documented. Recognizing the impact of smoking, either cigarettes or cannabis, and identifying potential impact on other risk behaviors is critical to holistic care for adolescent girls and may allow scientists to develop interventions specific to this at risk group.

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Table 1

Demographic characteristics, behavioral characteristics and depression scores of adolescent girls (N = 739)

Characteristics	M (SD)
Age	16.52 ($\pm$ 1.27)
– 15–16 (n = 385)	15.46 ($\pm$.5)
– 17–19 (n = 354)	17.67 ($\pm$.76)
	N (%)
Race	
– Black	511 (69%)
– Mixed/multiracial	79(11%)
– White	67 (9%)
– Other	82 (11%)
Ethnicity	
– Hispanic	125 (17%)
Living situation	
– Family apartment/home	617 (84%)
– Own apartment	52 (7%)
– Other	70 (9%)
Poverty—reduced/free lunch participation	514 (67%)
Smoked cigarettes or used other tobacco products	121 (16.4%)
Smoked cannabis	305 (41%)
Used alcohol	227 (30.7%)
Purging behavior	188 (25%)
Binge eating	366 (49%)
Physical activity ($\geq$ 30 minutes/day)	111(15%)
Sleep (7–9 hours/night)	161 (22%)
Depression scores (short CES-D) 4	576 (71%)

Table 2

Comparison of Tobacco and/or Cannabis Smokers vs. Non-smokers

	Non-smokers	Smokers	p-value
	Mean (SD)	Mean (SD)	
Binge eating	.57(.78)	.83 (.87)	< 0.001
Purging, laxatives	.29 (.66)	.43 (.69)	0.008
Depression score	7.58 (5.44)	9.54 (6.27)	< 0.001
Physical activity	3.07 (2.43)	2.99 (2.41)	ns
Sleep patterns	4 (2.38)	3.83 (2.4)	ns
15–16 year olds			
Binge eating	.59 (.86)	.87 (.86)	0.002
Purging, laxatives	.33 (.69)	.49 (.73)	0.028
Depression score	9.82 (6.15)	7.86 (5.75)	0.001
Physical activity	3.14 (2.47)	3.12 (2.37)	ns
Sleep patterns	3.86 (2.41)	3.88 (2.44)	ns
17–19 year olds			
Binge eating	.55 (.69)	.78 (.88)	0.025
Purging, laxatives	.24 (.62)	.35 (.65)	0.018
Depression score	7.26 (5.3)	9.25 (6.39)	0.003
Physical activity	2.98 (2.4)	2.86 (.244)	ns
Sleep patterns	4.16 (2.33)	3.78 (2.37)	ns

Table 3

Summary of regression analysis of smokers compared to non-smokers on depression scores, binge eating, purging behaviors, and alcohol use

Variables	Total sample (N = 739)			15–16 year olds (n = 385)			17–19 year olds (n = 354)		
	b	P		b	P		b	P	
CES-D	-	<0.001		-	<0.001		-	0.007	
– Tobacco users	3.3	0.004		4.2	0.004		-	0.362	
– Cannabis users	1.7	0.02		-	0.236		1.54	0.032	
– Tobacco and cannabis users	3.4	<0.001		4.1	<0.001		2.96	0.001	
Binge eating	-	<0.001		-	0.003		-	0.021	
– Tobacco users	-	0.175		-	0.052		-	0.687	
– Cannabis users	0.216	0.002		-	0.078		0.260	0.007	
– Tobacco and cannabis users	0.351	<0.001		0.48	0.001		0.248	0.046	
Purging behaviors (vomiting and/or laxative use)	-	0.001		-	0.008		-	0.334	
– Tobacco users	-	0.257		0.167	0.333		-	-	
– Cannabis users	-	0.215		-	0.403		-	-	
– Tobacco and cannabis users	0.282	<0.001		0.405	0.001		-	-	
Alcohol use (comparison = non-smokers)	-	<0.001		-	<0.001		-	<0.001	
– Tobacco users	-	0.84		-	.85		-	.52	
– Cannabis users	1.44	<0.001		1.46	.001		1.45	<0.001	
– Tobacco and cannabis users	2.5	<0.001		2.85	<0.001		2.19	<0.001	
Alcohol use (comparison = cannabis users)	-	<0.001		-	<0.001		-	<0.001	
– Non-smokers	1.44	<0.001		1.46	<0.001		1.45	<0.001	
– Tobacco users	1.33	0.009		1.61	0.038		-	0.156	
– Tobacco and cannabis users	-1.06	<0.001		-1.39	<0.001		-0.73	0.043	