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Differential typologies of current substance use among Black and White high-school adolescents: A latent class analysis

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Abstract

Black and White adolescents demonstrate different prototypical profiles (i.e., typologies) of substance use, with Blacks demonstrating lower risk for concurrent use of two or more substances. Despite knowledge of these differences, typologies of adolescent substance use identified by person-centered methods, such as latent class analysis, have not characterized profiles by racial group. The current study examined typologies of substance use among Black and White youth separately using person-centered methods to identify common patterns of substance use among subjects. Data were drawn from a 5-year parent study examining adolescent health outcomes. The current study examined high-school aged White ($n = 7,271$, 45.4% male) and Black youth ($n = 1,301$, 40.1% male) who reported past-30-day frequency of cigarette, alcohol, marijuana, inhalant, and other drug use. Latent class analysis was used to examine substance use typologies among each group adjusting for grade and sex. Black and White youth demonstrated different typologies such that four typologies emerged among Blacks: Non-Use (87.8%), Alcohol and Marijuana Use (6.3%), Alcohol, Marijuana, and Cigarette Use (3.8%), and Frequent Polysubstance Use (2.0%). Conversely, five typologies emerged among Whites: Non-Use (73.4%), Predominant Alcohol Use (13.9%), Alcohol, Marijuana, and Cigarette Use (9.4%), Moderate Polysubstance Use (1.6%), and Frequent Polysubstance Use (1.7%). Findings suggest that Black and White youth engage in similar rates of concurrent substance use. Given that Black youth face greater risk for adverse consequences from substance use, prevention efforts are needed to prevent related health disparities related to concurrent substance use.

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Author Statement

JBN designed the current study and wrote the protocol. DB analyzed and interpreted the data. QC conducted literature searches and provided summaries of previous research studies. DB wrote the first draft of the manuscript with assistance from MB. AL and TZ significantly revised subsequent versions of the manuscript. All authors contributed to and approved the final manuscript.

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Conflict of Interest Statement

Conflicts of interest: none.

Keywords

Adolescent; Substance use; Concurrent substance use; Polysubstance use; Latent class analysis; Health disparities

Introduction

Black Americans face disproportionate problems related to substance use, including higher risk for tobacco, opioid, and cannabis use disorders (Sartor et al., 2013; Vasilenko, Evans-Polce, & Lanza, 2017) and higher rates of morbidity, mortality and social problems related to alcohol use relative to Whites (Caetano, 2003; Chartier & Caetano, 2010). Although the origins of substance use problems typically occur during adolescence, Black youth have historically demonstrated lower prevalence rates of most substance use than their White peers (Bachman, O'Malley, Johnston, Schulenberg, & Wallace, 2011; Miech et al., 2019). For example, in 2018, the prevalence past 30-day use of alcohol, cigarettes, and illicit drugs (other than marijuana) among Black 10th graders was 10.2%, 1.8%, and 2.6%, respectively, compared to 21.9%, 5.8%, and 4.4% among Whites (Miech et al., 2019). Despite lower use, Blacks adolescents who do use substances are more likely to progress to SUD than their White peers (Finlay, White, Mun, Cronley, & Lee, 2012; Swendsen et al., 2012) due to racial discrimination, greater alcohol and drug availability in Black neighborhoods, within-group social sanctions, and lower treatment accessibility and utilization (Godette, Headen, & Ford, 2006; Zapolski, Pederson, McCarthy, & Smith, 2014).

Conclusions based on between-group comparisons of substance use prevalence assume that racial groups are homogenous and mask the within-group heterogeneity of substance use among Black youth (Godette et al., 2006). It is possible that although the raw prevalence of substance use is lower among Black youth than other groups, there may be lower prevalence patterns of substance use typical to Black youth that warrant attention. Given the heterogenous nature of adolescent substance use (e.g., Conway et al., 2013; Moss, Chen, & Yi, 2010), Finite Mixture Models (FMM), such as latent class analysis (LCA), have emerged as a modern and popular person-centered (versus variable-centered) approach to identify prototypical configurations—or typologies—of adolescent substance use (e.g., Tomczyk, Isensee, & Hanewinkel, 2016). These methods divide a population into mutually exclusive classes based on common responses to a set of observed variables (Lanza & Rhoades, 2013). Among studies using such methods to characterize adolescent substance, a majority have found that predominant alcohol users comprise the largest class, making up 15–80% of samples, followed by concurrent use of alcohol, marijuana, and cigarettes, making up 6–29% (Tomczyk et al., 2016). Most of these studies have been conducted with predominantly White samples and few have examined between- or within- group racial differences (Tomczyk et al., 2016). An examination of typologies, their relative prevalence among Black adolescents, and whether they are comparable to those of Whites could illuminate the origin of observed disparities in substance-related problems.

Although little research has examined racial differences in typologies of substance use, studies using mixture modeling among primarily Black adolescents found that 25% of youth

engaged in a typology characterized by concurrent use of alcohol and marijuana (Green et al., 2016; Green et al., 2017). Those studies controlling for race have found that Black adolescents are less likely than White adolescents to regularly engage in use of three or more substances (i.e., polysubstance use) (Connell, Gilreath, & Hansen, 2009; Gilreath, Astor, Estrada, Benbenishty, & Unger, 2014; Lanza, Patrick, & Maggs, 2010; Tomczyk et al., 2016). Although this suggests that Black adolescents are at lower risk for concurrent use than their White peers, a limitation of previous studies using mixture modeling is that they did not examine whether prototypical profiles among Black and White youth are comparable. To our knowledge, only one study using FMM has stratified by race to illuminate the heterogeneity of substance use within Black youth. This study found that although Black and White girls demonstrated the same typologies of past year use of alcohol, marijuana and cigarettes, their profiles were not comparable because probabilities of substance use in each typology differed by race: use among Blacks was characterized by more frequent marijuana use (Chung, Kim, Hipwell, & Stepp, 2013).

The current study aims to expand upon the work by Chung et al. (2013) by using multiple group LCA to determine whether such typologies are comparable among Black and White adolescents and identify current (i.e., past 30-day) typologies of substance use—including inhalants and other drugs—among each group. Current substance use was chosen to characterize those youth at highest risk for proximal problems related to substance use. Based on the work detailed above, we hypothesize that Black and White youth will demonstrate different typologies of substance use, precluding direct comparison of the groups with multiple group analysis. We also hypothesize that White adolescents will demonstrate greater membership in classes characterized by polysubstance use (i.e., concurrent use of more than two substances), whereas Black adolescents will demonstrate greater membership in categories in concurrent use of alcohol and marijuana.

Methods

Participants & Procedures

Participants were drawn from a 5-wave parent study examining health among students between 4th and 12th grade. Participants were drawn from 159 schools (21 school districts) in a large Midwestern state from 2005–2010. Informed consent forms were sent home to parents of potential participants and were returned by 50% of parents (approximately 12,000 per year). Retention rates for waves 2 through 5 were poor with approximately half of the participants (45.3%) completing more than one wave of data (see Barnes, Almerigi, & Hsu, 2009, for further information about the parent study). Thus, the amount of missing data in the parent study across waves precluded longitudinal analysis. To examine the current questions, this study examined all participants who provided substance use data at a minimum of one data point during 9th to 12th grade and who identified as Black or White. Given inconsistent participation across waves and participants, data was examined for each participant at the wave during which they were in the highest grade in an attempt to increase variability in substance use (except for race and sex, which were assessed at the first wave for all participants). Although the sample was not selected to be representative of youth across the United States, it was drawn from a large number of schools and range of districts

across a midwestern state. Thus, these data provided the opportunity to examine a diverse set of youth with differing experiences with substance use.

Measures

Participants were asked questions related to their demographic profile, including sex, date of birth, and race/ethnicity. For race/ethnicity students indicated to select the race(s) or ethnicity(ies) that best described them. Those who selected “African American/Black” or “White” only were included in the current study.

The items used to measure substance use were derived from those used in annual national surveys of adolescents (e.g., Monitoring the Future). Participants were asked on how many days in the past 30 they used the following: cigarettes, alcohol (at least one drink), marijuana, inhalants, and “other drugs (e.g., cocaine, ecstasy, LSD, and crank)”. For the current study, participant responses were divided into four categories (0 days, 1–2 days, 3–9 days, and 10–30 days) for each substance for use in LCA, which requires categorical variables. These response values were chosen to be consistent with previous studies using LCA to characterize past 30-day use (Gilreath et al., 2014; Tomczyk et al., 2016).

Data Analysis

PROC LCA (version 1.3.2; Lanza, Dziak, et al., 2015) was used to estimate three parameters based on substance use frequency: latent class membership probabilities, item-response probabilities based on each latent class, and logistic regression coefficients for covariates predicting class membership. First, the fit of 2–6 classes were tested for the entire sample. The best-fitting model was determined by considering G^2 (a distributed goodness of fit test statistic, which when significant, indicates an implausible model), adjusted Bayesian Information Criterion (BIC), and Akaike Information Criteria (AIC). Then, a multiple group approach was examined to determine if it was acceptable for directly comparing Black and White subsamples using the best fitting number of latent classes. Specifically, measurement invariance across groups was examined by estimating 1) a model with free estimation of item response probabilities and 2) a model that imposed equal item response probabilities across groups. The difference in G^2 between these models was compared to a chi-square distribution with degrees of freedom equal to the difference in degrees of freedom between the two models. A significant p value for the difference in G^2 implies there is not measurement invariance between the groups and the structure of latent classes differ between groups (Lanza, Collins, Lemmon, & Schafer, 2007). If there was not measurement invariance between groups, 2–6 classes were tested for Black and White participants separately for each group to determine group-specific model fit. These models examining fit and measurement invariance were unadjusted for covariates (Lanza, Dziak, Huang, Wagner, & Collins, 2015).

After determining the best latent structure, conditional probabilities of substance use were generated for each group of adolescents based on that structure (i.e., the determined number of latent classes), adjusting for sex, grade, and wave from which participant data was derived. Models including covariates use multinomial logistic regression to estimate the odds of class membership as a function of a one-unit increase in the covariate. In all models,

a data-derived prior of 1 was applied to conditional item-response probabilities to help avoid estimates on values of 0 and 1. In models including covariates, a data-derived prior of 1 was applied to regression coefficients for covariates to help stabilize the regression models, particularly when one or more of the latent classes had a small class membership probability.

Results

Preliminary Results

A total of 7,271 White (45.4% male) and 1,301 Black adolescents (40.1% male) in grades 9–12 were retained for the current sample. Most students were in 9th or 10th grade (Median = 10, IQR = 2). The prevalence of past 30-day use was 14.74% for cigarettes, 34.59% for alcohol, 17.74% for marijuana, 4.00% for inhalants, and 4.58% for other drugs. Despite the low prevalence of inhalant use relative to other substances assessed, its prevalence was high relative to national estimates (i.e., 30-day prevalence of 1% among U.S. 10th graders [Miech et al., 2019]) and similar to that of other drugs in our sample. Thus, frequency of inhalants and other drugs remained separate indicators in the following models. See Table 1 for all demographic and substance use frequencies by group.

Multiple Group LCA

To test the feasibility of directly comparing Black and White subsamples, we used a multiple group approach using the best fitting LCA model in the sample as a whole. Among the entire sample, AIC favored a 6-class model whereas adjusted BIC favored a 5-class model. The 5-class model was chosen as it demonstrated the best latent class separation (i.e., the degree to which the latent classes can clearly be distinguished from each other based on conditional probabilities) and had no latent classes with less than 1% membership. Analyses suggested data were MCAR, $G^2(2748) = 249.11, p = 1.00$.

Using multiple group LCA among the entire sample, the 5-class model without measurement invariance imposed (freely estimate model) was compared to that with measurement invariance imposed (constrained model). The G^2 statistic was 977.86 ($df = 1889$) in the freely estimated model and 1313.28 ($df = 1964$) in the constrained model. Results indicated a significant difference in conditional probabilities between the two models ($G^2 = 335.42, df = 75, p < .001$), providing evidence in favor of the model without measurement invariance. This suggests that direct comparison of Black and White adolescents was not feasible and that separate analyses of the groups should be considered (Lanza et al., 2007) so no further analyses of the total sample were conducted. Separate analyses by race were conducted and are described below.

LCA among Black Adolescents

Fit statistics did not agree in the LCA predicting classes of substance use among Black adolescents, with adjusted BIC indicating that a 3-class model best fit the data and AIC indicating that a 5-class model best fit the data. Thus, the three-, four-, and five-class models were examined. A four-class model was chosen because the difference in adjusted BIC between the 3- and 4-class model—and the difference in AIC between the 4- and 5-class model—were insubstantial (i.e., less than 10), suggesting less support for one model

over the other (Burnham & Anderson, 2004; Raftery, 1995). Additionally, of the three models, the 4-class model demonstrated the best latent class separation.

Conditional probabilities for each substance are depicted in Table 3 based on the model adjusted for sex, grade, and wave. The four classes represented adolescents with low probabilities of any substance use in the past 30 days (Non-Use), adolescents with high probabilities of marijuana and alcohol use only (Alcohol and Marijuana Use), adolescents who had a high probability of alcohol, marijuana and cigarette use only (Alcohol, Marijuana and Cigarette Use), and adolescents who had a high probability use of all substances (called Frequent Polysubstance Use to represent concurrent use of more than two substances).

Non-Use comprised most of the subsample (87.8%). Members of this class had negligible probabilities of cigarette and drug use and had a 10.4% probability of using alcohol use 1–2 times in the past month. Alcohol and Marijuana Use comprised 6.3% of the subsample; adolescents in this class had a 95.1% probability of past-month marijuana use and an 98.2% probability of past-month alcohol use. However, these adolescents were less likely to use cigarettes (14.2%) and unlikely to use other drugs. Alcohol, Marijuana and Cigarette Use comprised 3.8% of the sample and was characterized by high probabilities of alcohol (68.7%), marijuana (76.6%), and cigarette (71.9%) use only. Finally, Polysubstance Use comprised 2.0% of the sample, with high probabilities of alcohol, cigarettes, marijuana, inhalants and other illicit drugs in the past month (see Table 3).

The classes characterized by use were also distinguished by frequency of substance use. Among Black adolescents in the Alcohol and Marijuana Use class, marijuana use was more frequent than alcohol use. This class was characterized by approximately a 35% probability of 10–30-day marijuana use compared to a 10% probability of alcohol use at that level. In the Alcohol, Marijuana and Cigarette Use class, marijuana use was again more frequent with a 34% probability of 10–30-day use whereas alcohol and cigarette use was more moderate (see Table 3). Large proportions (85–94%) of Black adolescents in the Frequent Polysubstance Use class used alcohol, marijuana, inhalants and other drugs 10–30 days per month. Cigarette use was less frequent in this class, with 55.1% using at that frequency.

Multinomial logistic regression analyses indicated that grade and sex influenced class membership. Relative to the reference group, Non-Use, Black 12th graders had higher odds of membership in the Frequent Polysubstance Use class than 9th graders ($OR = 3.41$, 95% $CI: 1.44–8.11$). Relative to Non-Use, female adolescents had lower odds of membership in the Alcohol, Marijuana, and Cigarette Use class ($OR = 0.16$, 95% $CI: 0.06–0.45$). No other significant differences in class membership were found based on the covariates.

LCA among White Adolescents

Among White adolescents, AIC favored a 6-class model, but adjusted BIC favored a 5-class model. The 5-class model was selected based on adjusted BIC and validity of the latent classes, as under the 6-class solution, two latent classes comprised less than 1% of the sample. Conditional probabilities for each substance, adjusted for sex and grade, are depicted in Table 4. Three of the five classes represented 1) adolescents with low probabilities of any use (Non-Use; 73.4%), 2) high probabilities of alcohol use only

(Predominant Alcohol Use; 13.9%), and 3) high probabilities of cigarette, alcohol and marijuana use (Alcohol, Marijuana, and Cigarette Use; 9.4%). The other two classes represented adolescents who had a high probability of using all substances in the past 30 days: Moderate Polysubstance Use (1.6%) and Frequent Polysubstance Use (1.7%).

There were also variations in frequency among the classes characterized by use among White adolescents. Although 86.9% of adolescents in the Predominant Alcohol Use class used alcohol, frequency of use was moderate with 48.0% of adolescents using 1–2 days and 33.7% using 3–9 days. Adolescents in this class also used cigarettes (38.8%) and marijuana (44.3%) at low frequencies (see Table 4). In the Alcohol, Marijuana and Cigarette class, although probabilities of use were high for all three substances, cigarette and marijuana use were particularly frequent, with probabilities of 10–30-day use of 52.5% and 52.3%, respectively, compared to 24.0% for alcohol use. The Moderate Polysubstance Use class was characterized by larger conditional probabilities (40–51%) of 3–9-day use of all substances, except for cigarette use, which had varying frequency among this class. Conversely, the Frequent Polysubstance Use class was characterized by high probabilities (over 79%) of 10–30-day use for each substance.

Multinomial logistic regression analyses indicated that for White adolescents, both grade and sex influenced class membership. Relative to the Non Use group, female adolescents had higher odds of membership in the Predominant Alcohol Use class ($OR = 1.44$, 95% CI : 1.16–1.749) but lower odds of membership in the Alcohol, Marijuana and Cigarette Use class ($OR = .63$, 95% CI : .51–.78) and Frequent Polysubstance Use class ($OR = .32$, 95% CI : .21–.48). Regarding grade, relative to 9th grade adolescents in 10th, 11th and 12th grade had higher odds of membership in the Predominant Alcohol Use class (12th grade $OR = 2.71$, 95% CI : 1.86–3.94) and the Alcohol, Marijuana and Cigarette Use class compared to the Non-Use class (12th grade $OR = 4.36$, 95% CI : 3.13–6.08). Wave was also related to class membership such that adolescents in waves 3 (2008) and 5 (2010) were more likely to belong to the Alcohol, Marijuana, and Cigarette Use class than the Non-Use class relative to adolescents in wave one ($OR = 2.13$, 95% CI : 1.54–2.94 and $OR = 1.43$, 95% CI : 1.01–2.02, respectively).

Discussion

As hypothesized, results indicated that Black and White adolescents demonstrate differential typologies of substance use; four classes emerged among Black adolescents and five classes among White adolescents. Results also indicated differences in the characterization of each group's typologies such that they were not directly comparable across groups. Black adolescents demonstrated lower proportions of membership in categories characterized by polysubstance use (i.e., use of more than two substances) as hypothesized, with only 2.0% of the Black subsample comprising this pattern. Conversely, 12.7% of the White sample comprised categories characterized by polysubstance use (Frequent Polysubstance Use, Moderate Polysubstance Use, and Alcohol, Marijuana, and Cigarette Use). However, Blacks had a similar proportion (12.1%) of membership in typologies characterized by any concurrent substance use (Polysubstance Use, Alcohol and Marijuana Use, and Alcohol,

Marijuana and Cigarette Use), indicating that both groups of adolescents are at risk for concurrent substance use and its consequences.

Previous research suggests that even at comparable rates, engagement in concurrent substance use may have greater implications for Black adolescents than their White peers. Specifically, Blacks that use substances during adolescence have been found more likely to progress from adolescent substance use to SUD than Whites (Finlay et al., 2012; Swendsen et al., 2012). However, to date, limited research has examined consequences of concurrent use among Black adolescents, only demonstrating its risk for sexual health consequences (Dir et al., 2018; Green et al., 2017). To our knowledge, no study has examined whether patterns of concurrent substance use differentially predict consequences by race/ethnicity among adolescents.

Although the current study was one of the first to stratify latent typologies of substance use by race, findings among each racial group are supported by previous research. Among White adolescents, the largest category of use was Predominant Alcohol Use, followed by Alcohol, Marijuana and Cigarette Use. These findings are consistent with the majority of previous person-centered methods among predominantly-White samples (Tomczyk et al., 2016). The consistency of our findings with previous ones among White adolescents highlights the contrasting typologies of our White and Black subsamples.

In contrast to Whites, among Black adolescents, the largest typology of substance use was Alcohol and Marijuana Use. This finding aligns with previous person-centered research demonstrating high rates of this typology among Black youth when examining only alcohol and marijuana use (Green et al., 2017), as well as previous research demonstrating a higher national prevalence of current alcohol and marijuana use among Blacks than Whites (Banks, Rowe, Mpofu, & Zapolski, 2017; Lanza, Vasilenko, Dziak, & Butera, 2015) and increasing rates of concurrent alcohol and marijuana use among Blacks (Lanza, Vasilenko, et al., 2015). Given that a typology characterized by predominant alcohol use was not found among the Black subsample, these findings suggest that Black adolescents who use alcohol regularly are more likely to use concurrently with other substances than use in isolation compared to their White peers. Concurrent use of alcohol and marijuana among Black youth is especially concerning given that most adolescents who use alcohol and marijuana concurrently have been found to use them simultaneously (Midanik, Tam, & Weisner, 2007; Patrick et al., 2018). Simultaneous concurrent use of alcohol and marijuana during adolescence is associated with continued use during adulthood (Patrick, Terry-McElrath, Lee, & Schulenberg, 2019) and greater consequences relative to concurrent substance use, including dangerous driving, heavy use, and dependence (Patrick, Veliz, & Terry-McElrath, 2017; Terry-McElrath, O'Malley, & Johnston, 2013, 2014). Given that Blacks bear the burden of such consequences at disproportionate rates, future research should examine the mechanisms of this typology among Black adolescents to better inform prevention efforts.

Results from this study have important implications for such prevention efforts. Despite the heterogeneous nature of substance use, most prevention programs and early interventions aimed at adolescent substance use target alcohol and tobacco use with a smaller proportion including programming for any substance (Das, Salam, Arshad, Finkelstein, & Bhutta,

2016). No recent, empirically based prevention programs have reported targeting concurrent substance use among adolescents. Results from this study suggest that alcohol- and tobacco-focused prevention should be supplemented by programming for concurrent substance use, particularly for Black youth, who may be unlikely to use alcohol predominantly. Regarding screening and identification, school-based and primary care settings may need to assess not only individual substance use, but also concurrent substance use and susceptibility to future substance use. (e.g., Pbert et al., 2015). For example, among a sample of largely Hispanic adolescents in primary care settings, those who met high risk for alcohol use based on a screener on were more likely to report smoking 6 months later; further, this smoking behavior was explained by smoking intentions at the time of the screening (Shadel, Seelam, Parast, Meredith, & D'Amico, 2019). Among Black adolescents, who are more likely to initiate marijuana before other substances (e.g., Sartor et al., 2013), providers in these settings may similarly assess for smoking and alcohol intentions among those adolescents who report marijuana use. Finally, although national data continue to demonstrate that Black adolescents “have the lowest levels of use of many of the licit and illicit drugs” (Miech et al., 2019, p. 172), results of this study suggest that both clinicians and researchers should no longer consider this group “low risk,” but instead, consider their unique patterns of concurrent substance use relative to those of the White majority.

The findings of this study must be interpreted with consideration of its limitations. The current study used cross-sectional data; work using longitudinal data or examining transitions of concurrent use overtime in specific racial/ethnic groups is critical to understanding both the mechanisms and consequences of such use. Although the study included data from diverse high schools across several years, results may not generalize to adolescents at higher risk for substance use, such as youth who have left school, truant and suspended students, homeless youth, and incarcerated youth. Other concerns about generalization include that the data used was collected approximately a decade ago and only in the Midwest. Further, although this study may clarify differences in substance use typologies between Black and White adolescents, other racial/ethnic minorities with documented variations in substance use were excluded, including Hispanics/Latino, American Indian, and multiracial adolescents (Banks et al., 2017; Choi, Harachi, Gillmore, & Caralano, 2006; Connell et al., 2009; Gilreath et al., 2014; Whitesell et al., 2006). Future research should consider typologies of adolescent substance use among these groups relative to Whites given the current findings.

Additionally, the results should be interpreted considering the following points. First, some of the latent classes of substance use among both groups had low probabilities of membership, indicating that the item response probabilities among these classes should be interpreted with caution. This may have also contributed to a lack of power to detect effects in the analyses of covariates. Second, the fit statistics in all of the analyses did not agree. Although we selected classes based on strong methodological theory, this suggests alternative conclusions to the ones reported here. Third, although analyses suggested data were MCAR, the missing data we observed across waves may have reduced the representativeness of the sample. Finally, the study was limited in the substances that were measured in the parent study; illicit substances commonly used among adolescents (e.g., hallucinogens, amphetamines, synthetic marijuana, and prescription opioids) were

aggregated into one category whereas others, such as electronic cigarettes (e-cigarettes) and smokeless tobacco products, were excluded. Although illicit substance use other than marijuana has decreased significantly among adolescents since the current data was collected, e-cigarette use has increased sharply (Miech et al., 2019). Although this may limit the current utility of the latent classes observed with regard to tobacco, recent evidence suggests that prototypical patterns of tobacco use are either characterized by polytobacco product use or no tobacco use (Cho et al., 2018) suggesting that our results regarding cigarette use may represent general tobacco use.

5. Conclusions

Using person-centered methods, the current study found differential typologies of substance use among Black and White adolescents. Although typologies among White adolescents were characterized by use of more substances, White and Black adolescents demonstrated similar proportions of concurrent substance use. Given research demonstrating that even at similar rates of concurrent use, Black youth face greater risk for adverse consequences from substance use, further research is needed to demonstrate potential differential consequences associated with these divergent patterns of use. Given high rates of concurrent use substance use, results suggest that alcohol-focused prevention efforts for adolescent substance use should be supplemented or replaced by programming targeting concurrent substance use, particularly for Black youth.

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- African American and White youth demonstrated different profiles of substance use
- Marijuana and alcohol co-use was the most common type of use for African Americans
- Predominant alcohol use was the most common type of use for White adolescents
- African American and White youth used two or more substances at similar rates

Table 1.

Demographic and substance use characteristics of the sample by race

	Black (n = 1301)		White (n = 7271)		Total (n = 8572)	
	n	%	n	%	N	%
Female *	781	59.89%	3971	54.61%	4752	55.42%
Grade *						
9th *	511	39.19%	2618	36.00%	3129	36.49%
10th *	416	31.90%	2653	36.48%	3069	35.79%
11 th	235	18.02%	1340	18.43%	1575	18.37%
12 th	142	10.89%	661	9.09%	803	9.36%
Cigarettes *						
0 days *	1219	93.70%	6080	83.75%	7299	85.26%
1–2 days *	33	2.54%	364	5.01%	397	4.64%
3–9 days	23	1.77%	193	2.66%	216	2.52%
10–30 days *	26	2.00%	623	8.58%	649	7.58%
Alcohol *						
0 days *	1022	79.04%	4567	62.98%	5589	65.41%
1–2 days *	173	13.38%	1432	19.75%	1605	18.78%
3–9 days *	58	4.49%	890	12.27%	948	11.09%
10–30 days *	40	3.09%	363	5.01%	403	4.72%
Marijuana						
0 days	1073	82.86%	5958	82.16%	7031	82.26%
1–2 days	84	6.49%	455	6.27%	539	6.31%
3–9 days	53	4.09%	312	4.30%	365	4.27%
10–30 days	85	6.56%	527	7.27%	612	7.16%
Inhalants						
0 days	1254	96.68%	6962	95.88%	8216	96.00%
1–2 days	11	.85%	108	1.49%	119	1.39%
3–9 days	65	.69%	65	0.90%	74	0.86%
10–30 days	126	1.77%	126	1.74%	149	1.74%
Other Drugs *						
0 days *	6906	96.76%	6906	95.18%	8160	95.42%
1–2 days *	108	0.77%	108	1.49%	118	1.38%
3–9 days	89	0.62%	89	1.23%	97	1.13%
10–30 days	153	1.85%	153	2.11%	177	2.07%

* Significant difference between groups at $p < .05$

Table 2

Fit statistic comparisons of latent class analysis in the total sample and subsamples

Classes	Black				White				Total			
	G ²	ABIC	AIC	Entropy	G ²	ABIC	AIC	Entropy	G ²	ABIC	AIC	Entropy
2	493.26	617.16	555.26	.93	2216.38	2393.51	2278.38	.89	2704.08	3068.57	2828.08	.89
3	<i>314.79</i>	<i>502.64</i>	<i>408.79</i>	<i>.90</i>	1183.87	1452.43	1277.87	.90	1496.83	2049.45	1684.83	.90
4	258.25	510.04	384.25	.90	934.31	1294.29	1060.31	.83	1191.66	1932.4	1443.66	.84
5	<i>221.62</i>	<i>537.35</i>	<i>379.62</i>	<i>.90</i>	741.67	1193.07	899.67	.85	964.94	1893.81	1280.94	.86
6	199.93	579.61	389.93	.88	<i>672.43</i>	<i>1215.26</i>	<i>862.43</i>	<i>.86</i>	<i>876.24</i>	<i>1993.23</i>	<i>1256.24</i>	<i>.86</i>

Note: Bold text indicates the best fitting model. Italicized text indicates other potentially acceptable models based on fit statistics. Fit statistics were calculated unadjusted for covariates.

Table 3

Conditional probabilities of substance use among Black adolescents

Class Prevalence	Frequent Polysubstance Use (2.0%)	Alcohol, Marijuana & Cigarette Use (3.8%)	Alcohol and Marijuana Use (6.3%)	Non-Use (87.8%)
Cigarettes				
- 0 days	.223	.281	.858	.987
- 1–2 days	.141	.320	.047	.009
- 3–9 days	.083	.260	.047	.004
- 10–30 days	.553	.139	.049	.001
Alcohol				
- 0 days	.009	.313	.018	.881
- 1–2 days	.046	.265	.460	.106
- 3–9 days	.092	.231	.422	.010
- 10–30 days	.853	.191	.100	.003
Marijuana				
- 0 days	.010	.234	.049	.924
- 1–2 days	.045	.157	.387	.040
- 3–9 days	.000	.266	.207	.020
- 10–30 days	.945	.343	.358	.016
Inhalants				
- 0 days	.056	.676	.989	.997
- 1–2 days	.000	.150	.000	.003
- 3–9 days	.069	.150	.000	.000
- 10–30 days	.875	.024	.011	.000
Other Use				
- 0 days	.056	.656	.972	.999
- 1–2 days	.000	.136	.028	.001
- 3–9 days	.000	.163	.000	.000
- 10–30 days	.942	.045	.000	.000

Table 4

Conditional probabilities of substance use among White adolescents

Class Prevalence	Frequent Polysubstance Use (1.7%)	Moderate Polysubstance Use (1.6%)	Alcohol, Marijuana & Cigarette Use (9.4%)	Predominant Alcohol Use (13.9%)	Non-Use (73.4%)
Cigarettes					
- 0 days	.082	.240	.283	.612	.981
- 1–2 days	.013	.293	.092	.205	.011
- 3–9 days	.108	.216	.099	.084	.000
- 10–30 days	.798	.251	.525	.100	.008
Alcohol					
- 0 days	.001	.098	.116	.131	.816
- 1–2 days	.022	.214	.222	.480	.145
- 3–9 days	.137	.507	.422	.337	.036
- 10–30 days	.839	.181	.240	.053	.004
Marijuana					
- 0 days	.002	.099	.167	.557	.990
- 1–2 days	.000	.167	.110	.324	.005
- 3–9 days	.000	.395	.200	.119	.002
- 10–30 days	.997	.339	.523	.000	.002
Inhalants					
- 0 days	.096	.022	.977	.955	.998
- 1–2 days	.014	.394	.021	.036	.002
- 3–9 days	.024	.451	.003	.008	.000
- 10–30 days	.866	.134	.000	.001	.001
Other Use					
- 0 days	.039	.257	.856	.962	.998
- 1–2 days	.010	.204	.078	.029	.000
- 3–9 days	.040	.400	.047	.002	.001
- 10–30 days	.912	.139	.020	.006	.001