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Am J Orthopsychiatry. 2016 ; 86(5): 527–539. doi:10.1037/ort0000166.**Prevalence and Correlates of Substance Use in Black, White, and Biracial Black-White Adolescents: Evidence for a Biracial Intermediate Phenomena****Trenette Clark Goings, Ph.D., Emily Butler-Bente, B.S., Tricia McGovern, M.SW., and Matthew O. Howard, Ph.D.**

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Abstract

Most substance-use prevention interventions are based on the implicit assumption that risk and protective factors for substance use are the same for biracial and monoracial youth. However, preliminary research suggests this assumption may be untrue. This study compared the prevalence and correlates of substance use among Black, White, and biracial Black-White youth. Data were derived from the National Longitudinal Study of Adolescent and Adult Health (Add Health), which is a longitudinal investigation using stratified random sampling to study health behaviors. After controlling for sociodemographic factors and using weighted Poisson and logistic regression, we found the substance-use prevalence rates of Black-White youth to be intermediate to the higher rates of Whites and lower rates of Blacks. In addition, Black-White youth's scores on most covariates were intermediate to those of the monoracial groups. Family factors were more important in explaining higher substance use than other contextual factors. School factors seem to be important in explaining lower substance use for Black-White youth. Correlates of substance use for Black-White youth were not identical to those of either Black or White youth. More research on the observed intermediate phenomena among biracial youth vis-à-vis prevalence, correlates, and causes of substance use is needed.

Recent studies have identified an increasing, large percentage of biracial adolescents involved in substance use, second only to White adolescents (Choi, Harachi, & Catalano, 2006; Clark, Nguyen, & Kropko, 2013). However, few investigations have examined correlates of substance use among biracial youth (Chavez & Sanchez, 2010; Choi, Harachi, Gillmore, & Catalano, 2006). As a result, although biracial youth are now the fastest growing racial/ethnic group of those younger than 18 in the U.S. (Deal, 2010), addiction science knows little about the growing biracial adolescent population (Choi, Harachi, Gillmore, & Catalano, 2006). High substance use prevalence rates among biracial adolescents combined with insufficient explanatory research highlights a knowledge gap in addiction science that must be closed. To close this gap, this study explored the correlates of substance use among biracial Black-White adolescents. Individuals were classified as biracial Black-White if they self-identified as both Black and White. Many studies cluster all biracial adolescents into one monolithic group (e.g., Bolland, Bryant, Lian, McCallum, Vazsonyi, & Barth, 2007; Choi, He, Herrenkohl, Catalano, & Toumbourou, 2012; Jackson & LeCroy, 2009). However, this study focuses on Black-White adolescents rather than biracial/multiracial adolescents as such aggregation ignores significant heterogeneity in substance

use trajectories and consequences (Clark, Corneille, & Coman, 2013). For example, while studies find that aggregated multiracial adolescents are at increased risk for substance use (e.g., Bolland et al., 2007; Choi et al., 2012; Jackson & LeCroy, 2009), studies that deaggregate biracial adolescents groups find that some biracial groups are at greater risk for substance use than others (e.g., Tracy & Erkut, 2010, Udry, Maria, & Henderickson-Smith, 2003). Indeed, there is no universal biracial experience, and not all groups experience biracial identity in similar ways (Harris & Thomas, 2002).

Black-White adolescents face unique identity development challenges (Rockquemore & Burnisma, 2002) with the potential to shape their substance use behavior (Jackson & LeCroy, 2009; Stock, Gibbons, Walsh, & Gerrard, 2011). For example, even with the rise of demographic diversity in the U.S., studies find that individuals are more likely to identify with the race they most closely resemble physically (Burke & Kao, 2011). The inconsonance between experienced and perceived self are theorized to increase biracial adolescents' risk for substance use (Udry, Maria, & Henderickson-Smith, 2003). In support of this assertion, extant research suggests that Black-White biracial adolescents use substances at rates intermediate to their two races (Clark, Doyle, & Clincy, 2013; Udry, Maria, & Henderickson-Smith, 2003). These findings highlight a biracial intermediate substance use phenomenon (Clark, Doyle, & Clincy, 2013).

Consequences of substance use manifest differently for adolescents in different ethnic groups. For example, although White adolescents use and "deal" drugs at higher rates than Black adolescents, Black youth are nearly twice as likely to be arrested for substance-related charges as their White peers (Kakade et al., 2012). In addition, although substance use places all adolescents at risk for school dropout (Townsend, Flisher, & King, 2007), evidence suggests that Black adolescents who use marijuana or alcohol are significantly more likely to drop out of school than White adolescents with similar histories of substance use (Ellickson, Bui, Bell, & McGuigan, 1998). Although studies find Black-White adolescents' report higher levels of substance use than their Black and White peers (Fryer, Kahn, Levitt, & Spenkuch, 2012), no known studies track substance use trajectories for Black-White individuals across the life span.

The factors linked with increased risk for adolescent substance use have been derived predominately from studies of White youth (Jackson & LeCroy, 2009; Wallace & Muroff, 2002). This focus on White youth is problematic because it has not clarified the extent to which those factors confer increased risk for substance use among biracial adolescents (Mayberry, 2009). To fill this knowledge gap, we used Hawkins, Catalano, and Miller's (1992) seminal work as a framework to examine correlates of substance use for White, Black, and Black-White biracial adolescents. We examined individual, interpersonal, and contextual variables to identify the differential effects of these risk and protective factors on adolescent substance use across White, Black, and Black-White racial groups.

Individual and Interpersonal Factors

Religious involvement and substance use

Research on the relationship between religiosity and adolescent substance use has yielded mixed results. In general, adolescents who hold religious beliefs are less likely to use substances (Ford & Hill, 2012; Wallace et al., 2007). Although Black adolescents tend to report higher rates of religiosity than their White counterparts, high religiosity has often been shown to be a stronger predictor of substance-use abstinence among White adolescents than Black adolescents (Amey, Albrecht, & Miller, 1996; Wallace, Brown, Bachman, & Laveist, 2003). The different ways in which Black, White, and Black-White adolescents attach meaning to their involvement in religious community and religiosity might account for the differential effects of religion on substance-use outcomes (Bachman et al., 2003). The relationship between religiosity and substance use among Black-White youth is unknown.

Influence of peers

Peer influence is an important predictor of adolescent substance use. The impact of peer influence on substance use is more pronounced among White adolescents than Black adolescents (Mason, Mennis, Linker, Bares & Zaharakis, 2014). Compared to White youth, Black adolescents demonstrate greater resistance to peer pressure to use substances (Brown, Miller, & Clayton, 2004), and are less likely to have friends who use drugs (Wallace & Muroff, 2002; Wang, Simons-Morton, Farhart, & Luk, 2009). Black-White adolescents appear to affiliate with deviant peers at rates intermediate to Black and White youth (Chavez & Sanchez, 2010).

Family factors

Family factors protecting adolescents against substance use include parental closeness, parental warmth, and parental monitoring (Clark, Belgrave, & Abell, 2012; Hawkins et al., 1992). Compared to White adolescents, Black adolescents report higher levels of closeness with their parents (Giordano, Cernkovich, & Demaris, 1993). This finding suggests that parental closeness may play a role in preventing substance use among Black adolescents. The relationship between parental closeness and substance use among Black-White youth is unknown.

Parental monitoring

High levels of parental monitoring (Watt & Rogers, 2007) and parental warmth (Loke & Mak, 2013) are associated with lower rates of substance use. Some differences in parenting practices by race have been noted. For example, as compared to White parents, Black parents report higher levels of monitoring (Hill, Hawkins, Catalano, Abbott, & Guo, 2005; Wallace & Muroff, 2002). However, it is unclear to what extent parental monitoring and parental warmth differentially affect Black, White, and Black-White adolescents.

Parental substance use

Parental substance use is directly related to adolescents increased risk for substance use (Miller, Alberts, Hecht, Trost, & Krizek, 2009), including alcohol (Chassin & Barrera, 1993) and tobacco (Hill et al., 2005) use. The differential impact of parental substance use on adolescent substance use across races is not clear. Higher levels of monitoring by Black parents might mitigate the negative effects of parental substance use on their Black adolescents (Hill et al., 2005). The impact of parental substance use on Black-White adolescents has not been studied.

Substances in the home

Access to psychoactive substances in the home is an important factor affecting adolescents' rates of substance use (Stoolmiller et al., 2012). Overall, White adolescents report higher levels of alcohol availability in the home than adolescents of other races (Swahn, Hammig, & Ikeda, 2002). Although home availability of tobacco has been shown to increase White adolescents' risk of smoking, this finding does not hold for Black youth (Skinner, Haggerty, & Catalano, 2009). No research has examined the relationship of home availability to substance use among Black-White youth.

Contextual Factors

School attachment

Adolescents with a strong school attachment are less likely to use substances (White et al., 1999). Institutionalized racism and individual-level discrimination disproportionately affect Black school-aged youth (Skiba, Chung, Trachok, & Baker, 2014). Black adolescents who experience discrimination at school might be less likely to feel attached to school, elevating their risk for substance use. The link between school attachment, discrimination at school, and substance use is unclear for Black youth and unknown for Black-White youth.

Neighborhood factors

The connection between neighborhood factors and adolescent substance use is unclear. In general, for both Black and White adolescents, neighborhood factors have been inconsistently correlated with adolescent substance use. Lambert and colleagues (2004) theorized that, compared to neighborhood characteristics alone, a better predictor of substance use among Black adolescents was their perceptions of neighborhood disorganization as mediated by perceptions of drug harmfulness. Similarly, studies have found that a low level of neighborhood attachment was a stronger predictor of substance use among White adolescents than Black or biracial adolescents (Choi, Harachi, & Catalano, 2006).

Present Study

Previous investigations have found that biracial Black-White adolescents use substances at rates intermediate to their two constituent monoracial groups (Clark, Nguyen et al., 2013; Udry, Li, & Hendrickson-Smith, 2003). The current study extends previous work in two ways. First, we assessed a greater number of substance use outcomes than has previously

been examined including comorbid and polydrug use. Thus, we report the prevalence rates of a wide range of substance use outcomes using a nationally representative sample. Second, we examined correlates of substance use among Black, White, and biracial Black-White American adolescents and assessed gender differences. Substance-use prevention interventions implicitly assume that biracial youth and monoracial youth have identical risk and protective factors for substance use (Jackson & LeCroy, 2009; Wallace & Muroff, 2002). This assumption is widespread, although pertinent research supporting the universality of risk and protective factors is scant (Chen, Balan, & Price, 2012; Mayberry, 2009).

Method

Data

Data derive from the National Longitudinal Study of Adolescent and Adult Health (Add Health), which is a nationally representative, population-based study of the health behaviors of adolescents and young adults in the United States. The Add Health sample was drawn from 80 high schools and 52 middle schools that were selected through a stratified random sampling process that yielded a sample of U.S. schools representative of region, urbanicity, race/ethnicity, and school type and size. The Wave 1 sample consisted of data collected during 1994 and 1995, and yielded an analytic sample of 14,750 adolescents who self-identified as exclusively monoracial White, monoracial Black, or biracial Black-White.

Measures

Outcomes—*Lifetime cigarette use* was assessed with one item that asked “have you ever tried cigarette smoking, even just 1 or 2 puffs?,” where 1 indicates yes and 0 indicates no. *Lifetime alcohol use* was assessed with one item that asked “have you ever had a drink of beer, wine or liquor—not just a sip or a taste of someone else’s drink—more than 2 or 3 times in your life?,” where 1 indicates yes and 0 indicates no. *Lifetime marijuana use* was assessed with one item that asked “how old were you when you tried marijuana for the first time?” The responses were recoded as 1 to indicate the respondent first tried marijuana between ages 1 and 18 and a 0 indicates the respondent never tried marijuana. Use of multiple substances in a respondent’s lifetime was indicated by either the variable *lifetime cigarette/alcohol use* or the variable *lifetime cigarette/alcohol/marijuana use*. A value of 1 for lifetime cigarette/alcohol use indicates that the respondent had a value of 1 for “*lifetime cigarette use*” and 1 for “*lifetime alcohol use*” and a value of 0 indicates the respondent had a value of 0 for “*lifetime cigarette use*” and 0 for “*lifetime alcohol use*.” A value of 1 for lifetime cigarette/alcohol/marijuana use indicates that the respondent had a value of 1 for “*lifetime cigarette use*,” 1 for “*lifetime alcohol use*” and 1 for “*lifetime marijuana use*” and a value of 0 indicates the respondent had a value of 0 for “*lifetime cigarette use*,” 0 for “*lifetime alcohol use*,” and 0 for “*lifetime marijuana use*.” *Recent cigarette use* was assessed with one item that asked “have you ever smoked cigarettes regularly, that is, at least 1 cigarette every day for 30 days?” where 1 indicates yes and 0 indicates no. *Intensity of recent substance use* was assessed by the following three items: 1) “during the past 30 days, on the days you smoked, how many cigarettes did you smoke each day?” where the range is 0 to 95 cigarettes each day; 2) “think of all the times you had a drink during the past 12

months. How many drinks did you usually have each time? where the range of responses is 0 to 90 drinks; and 3) “during the past 30 days, how many times did you use marijuana” where the range of responses is from 0 to 900 times. The coding of “*intensity of recent substance use*” is a summation of the responses to these three questions, where higher numbers reflect greater recent substance use.

Covariates—*Peer substance* use reflected cigarette and/or alcohol use by a respondent’s best friends (range: 0 to 2 substances). *Home availability* measured which substances (i.e., cigarettes, alcohol, marijuana) were available in the home (range: 0 to 3). *Parental smoking* measured how many biological parents smoked (range: 0 to 2). *School discrimination* captured respondents’ perceptions of how fairly they were treated in school by teachers and peers: 1 = *very unfairly* to 9 = *very fairly*. *Parental warmth* assessed respondents’ perceptions of the extent of their warmth and caring relationships with their parent using a 4-point scale with *not warm* (=1) *very warm* (=4). *Parental control* measured the extent of control respondents perceived their parents had over a respondent’s personal decisions and behaviors; this variable had an 8-point scale, ranging from *very little control* (= 1) to *a lot of control* (= 8). *School attachment* measured the extent of a respondent’s attachment to his or her school using a 5-point scale, ranging from 1 = *not attached* to 5 = *very attached*. The *religiosity/spirituality* variable recorded the respondents’ perception of the extent of their own religiosity/spirituality on a 14-point scale ranging from *not religious/spiritual* (=1) to *very religious/spiritual* (=14). Similarly, *neighborhood connectedness* captured respondents’ perceptions of their feelings of connections to their neighborhood, where: 1 = *not connected* and 6 = *very connected*. The range of response options vary across the scales --- consistent with the Add Health study design.

Race: Add Health respondents were asked to self-identify race/ethnicity in waves I and III. Respondents were provided with the following race/ethnicity categories: “American Indian,” “Asian or Pacific Islander,” “Black,” “Hispanic,” “White,” or “Other.” Respondents were able to select multiple racial/ethnic groups. Respondents who selected both Black and White are considered biracial Black-White in the current study. Respondents who selected only Black or only White are considered monoracial Black and monoracial White, respectively. Wave III data were used as the primary race/ethnicity reference point because racial identity is more stable in emerging adulthood than adolescence (Demo, 1992). Wave I race/ethnicity data was used if wave III race/ethnicity data was missing.

Control variables—The full models controlled for *age* (interview-birthdate), *gender* (male or female), *nativity* (not born in US, born in US but mother was not, both participant and mother born in US), *maternal education* (less than high school, high school, college or beyond), and *family structure* (live with biological parents, live with biological parent and stepparent, or live with a single parent) variables.

Statistical Methods

Analyses were conducted using SAS 9.0 (SAS Institute, 2004). Results were adjusted using the longitudinal survey weights. To account for the sample weights, all analyses used weighting techniques in SUDAAN and SURVEY procedures in SAS. Cases with missing

data were excluded from analyses (Osborne, 2013). To test racial differences in substance use, weighted t-tests for differences in means were used for continuous variables and weighted chi-squared test for independence was used for categorical variables (Agresti & Kateri, 2011). A t-test tests if there is a difference in average recent substances used between Whites and Blacks (Wackerly, Mendenhall, & Scheaffer, 2007b). The reported statistic is the mean difference and a mean difference of 0 implies they are not significantly different. The chi-square test is a statistical analysis technique used to test whether there is a significant difference between the expected and observed frequencies (Wackerly, Mendenhall, & Scheaffer, 2007a). For example, this test is used if there is a significant difference between the frequencies of lifetime substance use in White respondents compared to Black respondents. The reported statistic is the odds ratio and an odds ratio of 1 implies they are not significantly different. The comparisons were conducted as post-hoc mean contrasts for Blacks vs. Whites, Blacks vs. Black-Whites, or Whites vs. Black-Whites for each variable. To control for multiple comparisons, the critical value threshold was adjusted from $\alpha=0.5$ to $\alpha=0.05/3=0.01$ (Dunn, 1961). The results have been marked in the tables if the relationship was found to be statistically significant.

Predictive models were constructed using weighted logistic regression and weighted Poisson regression. The percent change in odds and the 95% confidence interval are reported for categorical variables (logistic regression) and represent the percent change in odds of reporting the outcome for every one-unit change in the predictor (See Table 4, Table 5, and Table 6). The percent change in odds is calculated as: $(\exp(\log(\text{OR}))-1)*100$, where the $\log(\text{OR})$ is the coefficient reported from logistic regression. The percent change in incidence rate of recent substance use along with their 95% confidence intervals are reported for continuous count variables (Poisson regression) (See Table 6). The percent change in incidence rate is calculated as: $(\exp(\log(\text{IR}))-1)*100$, where $\log(\text{IR})$ is the coefficient reported from the Poisson regression. The final model was determined using backwards variable selection in which the least significant variable at each decision point is removed from the model until only significant variables are left in the model. We present only statistically significant results.

Results

Table 1 presents sample characteristics. Table 2 presents the prevalence of substance use by race. Table 3 presents the results of bivariate tests that assessed differences in substance use between racial groups.

Participants/Sample

Of the entire sample, 71.5% was White, 27.7% was Black, and 0.8% was Black-White. Half (50.9%) of the sample were female and 49.1% were male. Over 13% (13.4%) of respondents' mothers had less than a high school education, 31.6% had a high school education and 55% had more than a high school education.

Racial Difference of Substance Use

Table 2 provides the summary statistics of the outcome variables by racial group. The highest prevalence of lifetime cigarette use was reported by Whites (62.8%), followed by Black-White (57.7%) and Black youth (44.9%). The highest prevalence of lifetime alcohol use was reported by Whites (60.6%), then Black-Whites (53.1%) and Blacks (46.5%). The highest prevalence of lifetime marijuana use was reported by Black-Whites (33.3%), followed by Whites (29.6%) and Blacks (24.7%). Whites had the highest prevalence of lifetime regular smoking (27%), followed by Black-Whites (19.2%) and Blacks (6.8%). Whites reported an average of 7.4 recent substances used (cigarettes, alcohol, and marijuana), compared to 3.5 for Blacks and 4.5 for Black-Whites. Lifetime cigarette and alcohol use was most prevalent in Whites (49.3%) followed by Black-Whites (42.3%) and Blacks (30.7%). Lifetime cigarette, alcohol and marijuana use was most prevalent in Black-White youth (27.1%), followed closely by Whites (25.6%) and Blacks (16.1%)

Table 3 provides the likelihood of respondents reporting the outcomes by racial group. The odds of Whites reporting lifetime cigarette use are 1.7 times the odds of Blacks reporting lifetime cigarette use and 1.2 times the odds of Black-Whites reporting lifetime cigarette use. The odds of Blacks reporting lifetime cigarette use are 0.7 times the odds of Black-Whites reporting cigarette use. The odds of Whites reporting lifetime alcohol use are 1.6 times the odds of Blacks reporting lifetime alcohol use and 0.9 times the odds of Black-Whites reporting lifetime alcohol use. The odds of Blacks reporting lifetime alcohol use are 0.5 times the odds of Black-Whites reporting lifetime alcohol use. The odds of Whites reporting lifetime marijuana use are 1.1 times the odds of Blacks reporting lifetime marijuana use and 0.5 times the odds of Black-Whites reporting lifetime marijuana use. The odds of Blacks reporting lifetime marijuana use are 0.5 times the odds of Black-whites reporting lifetime marijuana use. The odds of Whites reporting ever being a regular smoker are 3.8 times the odds of Blacks reporting ever being a regular smoking and 1.4 times the odds of Black-Whites reporting ever being a regular smoker. The odds of Blacks reporting ever being a regular smoker are 0.4 times the odds of Black-Whites reporting ever being a regular smoker. The average number of substances recently used was 3.8 substances higher for Whites than Blacks. The average number of substances recently used was 1.4 substances higher for Whites than Black-Whites. The average number of substances recently used was 0.4 substances higher for Black-Whites than Blacks. The odds of Whites ever being a regular smoker were 3.8 times the odds for Blacks and 1.4 times the odds for Black-Whites. The odds of Blacks ever being a regular smoker were 0.4 times the odds for Black-Whites. The odds of Whites reporting lifetime cigarette and alcohol use are 1.9 times the odds of Blacks reporting lifetime cigarette and alcohol use and 1.0 times the odds of Black-Whites reporting lifetime cigarette and alcohol use. The odds of Blacks reporting lifetime cigarette and alcohol use are 0.6 times the odds of Black-Whites reporting lifetime cigarette and alcohol use. The odds of Whites reporting lifetime cigarette, alcohol and marijuana use are 1.5 times the odds of Blacks reporting lifetime cigarette and alcohol use and 0.6 times the odds of Black-Whites reporting lifetime cigarette, alcohol and marijuana use. The odds of Blacks reporting lifetime cigarette, alcohol and marijuana use are 0.4 times the odds of Black-Whites reporting lifetime cigarette, alcohol and marijuana use.

Correlates of Substance Use

The regression models were built using backwards selection, so only variables that have a statistically significant relationship with the outcome ($p < 0.05$) are included in the model. Hence, only significant predictors of the outcomes are included in the model and reported below. Percent changes that were greater than 1000% were truncated to 1000% for interpretability. All interpretations are understood to be while holding all other variables constant. For variables with a significant interaction term, the interpretation of the covariates only represents the effect for females. The interpretation of interaction term represents the difference in effect for males versus females, since gender is coded as 1 for males and 0 for females. The reported main effect (ex: percent change of lifetime cigarette use by peer substance use=146%) represents the percent change in odds for females. Because the reported interaction effect (e.g., percent change of lifetime cigarette use by peer substance use*gender=-18.1) represents the difference in the percent change of odds for males versus females, the percent change in odds for males is calculated as:

$$\begin{aligned} & \left(\left(\frac{\text{main effect}}{100} + 1 \right) * \left(\frac{\text{interaction effect}}{100} + 1 \right) - 1 \right) * 100 = \left(\left(\frac{146}{100} + 1 \right) * \left(\frac{-18.1}{100} + 1 \right) - 1 \right) * 100 \\ & = 101.4\% \left(\left(\frac{\text{main effect}}{100} + 1 \right) * \left(\frac{\text{interaction effect}}{100} + 1 \right) - 1 \right) * 100 \\ & = \left(\left(\frac{146}{100} + 1 \right) * \left(\frac{-18.1}{100} + 1 \right) - 1 \right) * 100 \end{aligned}$$

We also note that this calculation is impossible for the percent’s that are capped at 1000% because of lack of complete information. In these instances, the interpretation for males was made using the raw data. See Tables 4, 5, and 6 for regression results.

Peer Substance Use—For every one unit increase in peer substance use: the odds of reporting lifetime cigarette use by White females increases by 146%, by White males increases by 101.4%, by Blacks increases by 49.2%, by Black-White females decreases by 100% and by Black-White males increases by over 1000%; the odds of reporting lifetime alcohol use by Whites increases by 122.6%, by Blacks increases by 64.9%, by a Black-White females decreases by 100% and increases by over 1000% for Black-White males; the odds of reporting lifetime marijuana use by Whites increases by 232%, by Blacks increases by 146%, by Black-White females decreases by 55.1% and by Black-White males increases by over 1000%; the odds of reporting lifetime cigarette and alcohol use by Whites increases by 122.6%, by Blacks increases by 101.4% and by Black-Whites increases by over 1000% regardless of gender; the odds of reporting lifetime cigarette, alcohol and marijuana use by Whites increases by 232%, by Blacks increases by 146%, by Black-White females increases by over 1000% regardless of gender; the odds of ever reporting regular cigarette use by Whites increases by 171.8%, by Blacks increases by 122.6%, and by Black-Whites increases by 1000%; the incidence of reporting recent substance use by Whites increases by 122.6%, by Blacks increases by 146%, by Black-White females increase by 0.1% and by Black-White males increases by over 1000%.

Home Availability—For every one unit increase in home availability: the odds of ever reporting lifetime cigarette use by Blacks increases by 64.9% and by Black-Whites decreases by 98.1%; the odds of ever reporting lifetime alcohol use by Whites increases by

49.2%, by Blacks increases by 49.2%, by Black-Whites decreases by 100% regardless of gender; the odds of reporting lifetime marijuana use by Blacks increases by 49.2% and by Black-White females increases by over 1000% and by Black-White males decreases by 100%; the odds of reporting lifetime cigarette and alcohol use by Whites increases by 22.1%, by Blacks increases by 49.2%, by Black-White females increases by over 1000% and by Black-White males decreases by 100%; the odds of reporting lifetime cigarette, alcohol, and marijuana use by Blacks increases by 35%, by Black-Whites females increases by over 1000% and by Black-White males decreases by 100%; the odds of reporting ever being a regular smoker by Black-Whites decreases by 100% regardless of gender; the incidence of reporting recent substance use by Blacks increases by 64.9%, by Black-White females increase by 200.4% and by Black-White males decreases by 9.6%.

Parental Smoking—For every one unit increase in parental smoking: the odds of reporting lifetime cigarette use by Whites increases by 22.1%, by Blacks increase by 22.1% and by Black-Whites increase by 1000%; the odds of reporting lifetime alcohol use by Black-White females decreases by 100% and by Black-White males increases by over 1000%; the odds of reporting lifetime marijuana use by Whites increases by 10.5%, by Black-Whites females decreases by 100% and by Black-White males increases by over 1000%; the odds of reporting lifetime cigarette and alcohol use by Whites increases by 11.6%, by Black-White females increases by 1000% and by Black-White males increases by 136.3%; the odds of reporting lifetime cigarette, alcohol and marijuana use by Black-Whites increases by over 1000% regardless of gender; the odds of reporting ever being a regular smoker by Whites increases by 22.1% and by Black-Whites females decreases by 100% and by Black-White males increases by 1000%; the incidence of reporting recent substance use by Whites increase by 10.5%.

School Discrimination—For every one unit increase in school discrimination: the odds of reporting lifetime cigarette use by Whites increases by 10.5%, by Blacks increases by 10.5%, by Black-White females decreases by 83% and by Black-White females increases by over 1000%; the odds of reporting lifetime alcohol use by Whites and Blacks increases by 10.5% and by Black-Whites increases by over 1000% regardless of gender; the odds of reporting lifetime marijuana use by Black-Whites increases by over 1000%; the odds of reporting lifetime cigarette and alcohol use by Whites and Blacks increases by 10.5%, by Black-White females decreases by 100% and by Black-White males increases by over 1000%; the odds of reporting lifetime cigarette, alcohol and marijuana use by Black-Whites increases by over 1000% regardless of gender; the odds of reporting ever being a regular smoking by Whites increases by 10.5% and by Black-White increases by more than 1000% regardless of gender; the incidence of reporting recent substance use by Whites increases by 10.5%, by Blacks increases by 22.1% and by Black-Whites increases by 101.4%.

Parental Warmth—For every one unit increase in parental warmth, the odds of reporting lifetime cigarette use by Whites decreases by 25.9%, by Blacks decreases by 33%, by Black-Whites females decreases by 100% and by Black-White males increases by over 1000%; the odds of reporting lifetime alcohol use by Whites decreases by 18.1%, by Blacks decreases by 45.1%, by Black-Whites females decreases by 100% and by Black-White males increases

by over 1000%; the odds of lifetime marijuana use by Whites decreases by 45.1%, by Blacks decreases by 39.3%, by Black-White females decreases by 100% and by Black-White males increases by over 1000%; the odds of reporting lifetime cigarette and alcohol use by Whites decreases by 25.9% and by Black-Whites increases by more than 1000% regardless of gender; the odds of reporting lifetime cigarette, alcohol, and marijuana use by Whites decreases by 45.1%, by Black-Whites females decreases by 100% and by Black-White males decreases by 95.6%; the odds of reporting ever being a regular smoker by Whites decreases by 33%, by Black-Whites females decreases by 100% and Black-White males increases by over 1000%; the incidence of reporting recent substance use by Whites decreases by 25.9%, by Black-White females increases by 171.8% and by Black-White males decreases by 87.8%.

Parental Control—For every one unit increase in parental control, the odds of reporting lifetime cigarette use by Black-White females decreases by 100% and by Black-White males decreases by 95.4%; the odds of reporting lifetime alcohol use by Whites decreases by 9.5%, by Blacks decreases by 18.1%, by Black-White females increases by over 1000% and by Black-White males decreases by 97%; the odds of reporting lifetime marijuana use by Black-White females decreases by 42.9% and by Black-White males decreases by 99.8%; the odds of reporting lifetime cigarette and alcohol use by Whites decreases by 9.5%, by Black females decreases by 25.9%, by Black males decreases by 9% and by Black-Whites decreases by 93.9%; the odds of reporting lifetime cigarette, alcohol and marijuana use by Blacks decreases by 9.5%, by Black-White females decreases by 100% and by Black-White males decreases by 75.3%; the odds of reporting ever being a regular smoker by Blacks decreases by 9.5%, by Black-White females increases by 1000% and by Black-White males decreases by 12.2%; the incidence of reporting recent substance use by Black-White females decreases by 63.2% and by Black-White males decreases by 25.9%.

School Attachment—For every one unit increase in school attachment: the odds of reporting lifetime cigarette use by Whites decreases by 9.5%, by Black-White females decreases by 100% and by Black-White males increases by over 1000%; the odds of reporting lifetime alcohol use by Black-Whites increases by over 1000% regardless of gender; the odds of reporting lifetime marijuana use by Whites decreases by 18.1%, by Blacks decreases by 25.9%, by Black-White females decreases by 100% and Black-white males increase by over 1000%; the odds of reporting lifetime cigarette and alcohol use by Black-White females increases by 410.4% and by Black-White males increases by over 1000%; the odds of reporting lifetime cigarette, alcohol and marijuana use by Blacks decreases by 33%, by Black-Whites females decreases by 100% and by Black-White males increases by over 1000%; the odds of reporting ever being a regular smoker by Whites decreases by 25.9%, by Blacks decreases by 33% and by Black-Whites increases over 1000% regardless of gender; the incidence of reporting recent substance use by Whites decreases by 9.5%, by Black females decreases by 18.1% and by Black males increases by 35.1%.

Religiosity—For every one unit increase in religiosity: the odds of reporting lifetime cigarette use by White females decreases by 9.5%, by White males increases by less than

0.1%, by Black-White females decreases by 93.4% and by Black-White males increases by over 1000%; the odds of reporting lifetime alcohol use by Whites decreases by 0.1%, by Black-Whites females decreases by 100% and by Black-White males decreases by 97.7%; the odds of reporting lifetime marijuana use by Whites decrease by 9.5%, by Blacks decreases by 9.5%, and by Black-Whites increases by 266.9%; the odds of reporting lifetime cigarette and alcohol use by Black-White females decreases by 90.6% and by Black-White males decreases by 64.7%; the odds of reporting lifetime cigarette, alcohol and marijuana use by Whites decreases by 0.1%, by Blacks decreases by 0.1%, by Black-White females decreases by 97.2% and by Black-White males increases by over 1000%; the odds of reporting ever being a regular smoker by Black-Whites decreases by 17.3%; the incidence of reporting recent substance use by Whites decreases by 3.9%, by Black-White females increases by 49.2% and by Black-White males decreases by 45.1%.

Neighborhood Connectedness—For every one unit increase in neighborhood connectedness: the odds of reporting lifetime cigarette use by Whites increases 10.5% and by Black-Whites increases by more than 1000% regardless of gender; the odds of reporting lifetime alcohol use by Whites increases 22.1%, by Black-White females increases by more than 1000% and by Black-White males decreases by 99.4%; the odds of reporting lifetime marijuana use by Black-White females increases by more than 1000% and by Black-White males decreases by 100%; the odds of reporting lifetime cigarette and alcohol use by Whites increases 10.5%, by Black-Whites females decreases by 100% and by Black-White males increases by over 1000% ; the odds of reporting lifetime cigarette, alcohol and marijuana use by Whites decreases 9.5%, by Black-White females increases by more than 1000%, and by Black-White males decreases by 97%; the odds of reporting ever being a regular smoker by Black-White females increases by over 1000% and by Black-White males increases by 7.3%; the incidence of reporting recent substance use by Black-White females decreases by 45.1% and by Black-White males increases by 447.6%.

Discussion

This study examined the prevalence of substance use among Black, White, and biracial Black-White youth. In general, substance-use rates differed significantly between White and Black youth but not between Black-White youth and either monoracial group. Indeed, the results showed an intermediate biracial substance-use phenomenon existed for 5 of 7 substance-use outcomes examined. In these instances, the substance-use rates of biracial Black-White youth fell between the higher rates of White youth and lower rates of Black youth. The intermediate biracial phenomena persisted even after analyses accounted for control variables, suggesting that standard sociodemographic variables might not be causes of the phenomena. Moreover, this observed pattern was consistent across substance-use outcomes. Notably, the two instances in which this intermediate phenomenon was not found were also the two instances in which Black-White youth had the highest prevalence rates of use of those substances (i.e., lifetime marijuana and lifetime polydrug use of cigarettes, alcohol, and marijuana). This finding is consistent with other studies that have reported the highest or second highest prevalence rates of use of select drugs as occurring among multiracial youth, especially when racial subgroups are aggregated (e.g., Substance Abuse

and Mental Health Services Administration, 2014). Taken together, our findings suggest that the prevalence of substance use among biracial youth likely differs by specific substance and biracial group (e.g., Black-White, Black-Asian), with much of the evidence pointing toward an intermediate biracial substance use phenomenon. More studies are needed to examine the prevalence and incidence of substance use among de-aggregated biracial youth to better understand the reasons for the intermediate phenomenon. Future studies may seek to explore whether this phenomena changes across contexts (e.g., racial makeup of neighborhoods and schools, race of close peers) to better understand the lived experience of biracial youth.

We were surprised to find evidence of an intermediate biracial psychosocial covariate phenomenon for 6 of 9 covariates. Specifically, the scores of Black-White youth were intermediate to the scores of Black and White youth on measures of religiosity, home availability of substances, peer substance use, parental smoking, perceived school discrimination, and parental control. We did not find evidence of an intermediate covariate phenomenon for parental warmth, neighborhood connectedness, or school attachment. These findings may offer evidence of a biracial cultural experience that influences context- and individual-level behavior for Black-White youth.

The biracial intermediate phenomenon for both substance use and psychosocial factors is intriguing. It may be that there are many protective mechanisms in the Black community (e.g., greater church involvement, more parental oversight) that are present in lesser amounts or less often in Black-White youth and present in even lesser amounts or less often in White youth, which may help explain the intermediate biracial experience. Additional research is critical to understand the causes of the intermediate biracial phenomenon.

As hypothesized, we also found the correlates of substance use for Black-White youth were not identical to those for Black or White youth. Notably, the factors most strongly and consistently associated with Black-White youth's substance use were parental control and perceived school discrimination, suggesting these factors might be especially important in preventing substance use among Black-White youth. Other factors associated with Black-White youth's substance use included religiosity, parental warmth, parental smoking, and home availability of substances. The influence of these family factors appeared to be associated with higher substance use more than did external factors (i.e., peer substance use, perceived school discrimination, school attachment, and neighborhood connectedness). These findings suggest that proximal parental factors are more important in explaining the higher substance use rates we observed for Black-White youth, whereas distal school factors might be associated with lower substance use for Black-White youth. It is possible that though some biracial youth might feel strain or isolation within their families stemming from their biracial status (Johnston & Nadal, 2010), these youth find acceptance at school among the larger body of students and teachers. Therefore, parents of biracial youth should seek to facilitate their children's attachment to school and other positive community organizations that may help foster healthy child development. In addition, parents should be aware of how their parenting practices may negatively affect their children's behavior. In particular, parents should assess and confront their own potentially discriminatory attitudes and behaviors toward their children. Similarly, parents should identify and confront family members who implicitly or explicitly discriminate against their children. Parents should

recognize that their children may face a greater number of stressors, some of which are likely unique to having a biracial identity. As such, parents should teach their children how to cope with difficult situations. In addition, parents should inform their biracial children of their racial/ethnic heritages in an effort to foster positive racial identities, which may help to buffer against risk factors and contribute to positive social and behavioral outcomes. Parents may wish to reach out to school social workers and other clinicians who can help both parents and children prepare for and manage potential challenges related to having a biracial identity in the U.S.

In addition, as hypothesized, we found gender differences within and across racial groups. In general, we found that the relationship between covariates and substance-use outcomes differed by gender for Black-White youth but rarely differed by gender for Black and White youth. Thus, the pathways to substance use of Black-White boys and girls may be very different. As Black-White boys and girls negotiate their biracial identity in the context of their family, they may attach different meanings to their lived experiences. For example, our findings suggest that high levels of parental control can be a protective factor for Black-White boys but a risk factor for Black-White girls. Conversely, high levels of parental warmth appear to be a protective factor for Black-White girls but a risk factor for Black-White boys. Studies have demonstrated that youths' perceptions of permissive parenting were associated with higher levels of substance use (Leeman et al., 2014), whereas lower rates of substance use were found among families with high levels of parent-child engagement (Xiao et al., 2011). It is possible that parental warmth is perceived by Black-White boys as a form of permissive parenting, and parental control is perceived as engagement. Conversely, Black-White adolescent girls might perceive parental control as a form of rejection or invalidation whereas parental warmth is perceived as acceptance. Etiological studies are needed to better understand the lived experience of biracial youth and the pathways to substance use for these boys and girls. Such studies are necessary to inform the development and implementation of effective substance-use prevention interventions for the growing population of biracial youth.

Strengths and Limitations

The findings presented here must be considered in light of the study's limitations and strengths. First, we measured race based exclusively on youth self-report. However, other studies have relied on parent report to determine youth racial heritages and have found minimal differences between parent and youth reports of race (Quillian & Campbell, 2003; Quillian & Redd, 2009). A second limitation is posed by the potential for residual confounding of measured and unmeasured variables. This study selected key risk and protective factors consistently associated with substance use among White, Black, and Black-White adolescents. Other variables that might help explain substance use among Black-White youth (e.g., social isolation, physical features) were unavailable in the Add Health dataset. Future research should consider assessing how these additional factors can elucidate substance use among biracial youth.

Despite these limitations, the study has notable strengths. Whereas most research on correlates of substance use among youth has focused on monoracial groups, our study used

the Add Health database to examine correlates among biracial Black-White youth. Indeed, Add Health is one of the few national databases large enough to allow researchers to assess correlates of substance use in Black-White youth. Another of the study's strengths is the contribution of our findings to research on substance use among Black-White youth. The current study contributes to the literature in at least 4 ways: 1) offering additional evidence of a biracial substance use phenomenon; 2) examining gender differences in the relationship between psychosocial factors and substance use among biracial Black-White youth; 3) finding evidence of an intermediate phenomenon as it relates to our covariates; we believe we may be one of the first to show this biracial intermediate pattern for independent variables; and 4) revealing findings that suggest the correlates of substance use for Black-White youth may not be identical to the correlates of substance use for Black youth and White youth.

Conclusion

Black-White youth generally engage in substance use at rates intermediate to the higher rates of Whites and lower rates of Blacks, though not significantly different from either monoracial group. Black-White youth are likely to experience contextual and individual factors similar to those experienced by Black and White youth, but at levels intermediate to those of these racial groups. However, we found that the correlates of substance use for Black-White youth are not identical to the correlates of substance use for Black and White youth. Future research should examine promotive, protective, and risk factors for Black-White youth, and how these factors differ by gender. Such findings have the potential to help tailor prevention programs to the specific needs of biracial youth.

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Table 1

Descriptive Statistics

	White (Mean, SD)	Black (Mean, SD)	Black-White (Mean, SD)
Peer Substance Use	1.5 (1.2)	1.2 (1.1)	1.3 (1.1)
Home Availability	0.7 (0.7)	0.5 (0.7)	0.6 (0.7)
Parental Smoking	1.1 (0.8)	0.9 (0.8)	1.0 (0.8)
Discrimination	4.8 (1.8)	4.3 (1.8)	4.6 (1.6)
Parental Warmth	3.6 (0.4)	3.5 (0.5)	3.5 (0.5)
Parental Control	2.7 (1.5)	3.0 (1.6)	2.8 (1.5)
School Attachment	3.8 (0.8)	3.7 (0.8)	3.8 (0.7)
Religiosity	7.8 (4.3)	9.6 (4.1)	8.3 (4.3)
Neighborhood	4.4 (1.1)	4.4 (1.1)	4.3 (1.3)

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Table 2

Summary Statistics of Lifetime and Recent Substance Use by Racial Group (N = 12919)

	White	Black	Black-White
	<i>Count (%)</i>		
Lifetime Cigarette Use	6487 (62.8)	1927 (44.9)	75 (57.7)
Lifetime Alcohol Use	6255 (60.6)	1989 (46.5)	69 (53.1)
Lifetime Marijuana Use	3048 (29.6)	1048 (24.7)	43 (33.3)
Lifetime Cigarette and Alcohol use	5079 (49.3)	1309 (30.7)	55 (42.3)
Lifetime Cigarette, Alcohol and Marijuana Use	2624 (25.6)	677 (16.1)	35 (27.1)
Ever been a Regular Smoker	2808 (27.0)	294 (6.8)	25 (19.2)
	<i>Mean(SD)</i>		
Recent Substance Use	7.4 (19.5)	3.4 (20.4)	4.5 (11.7)

Note. White, $n = 9231$. Black, $n = 3577$. Black-White, $n = 111$.

For the categorical variables, the count and percentage of participants who responded affirmatively to each respective substance use question are reported as stratified by race. For continuous variables, the mean and standard deviation of the frequency of substance use are reported as stratified by race.

Table 3

Significant Differences in Substance Use Between Racial Groups

	Lifetime cigarette use	Lifetime alcohol use	Lifetime marijuana use	
	OR [95% CI]	OR [95% CI]	OR [95% CI]	
White vs. Black	1.7 [1.6, 1.9]**	1.6 [1.5, 1.8]**	1.6 [1.5, 1.8]**	
White vs. Black-White	1.2 [0.7, 2.0]	0.9 [0.5, 1.5]	0.9 [0.5, 1.5]	
Black-White	0.7 [0.7, 1.2]	0.6 [0.3, 0.9]*	0.6 [0.3, 0.9]*	
	Regular smoker	Recent substance use	Cigarette & alcohol	Cigarette-alcohol & marijuana
	OR [95% CI]	Mean difference [95% CI]	OR [95% CI]	OR [95% CI]
White vs. Black	3.8 [3.2, 4.5]**	3.6 [2.3, 4.8]**	1.9 [1.7, 2.1]**	1.5 [1.3, 1.8]**
White vs. Black-White	1.4 [0.7, 2.7]	2.2 [-1.6, 6.0]	1.0 [0.6, 1.8]	0.6 [0.4, 1.1]
Black vs. Black-White	0.4 [0.2, 0.7]*	-1.4 [-5.1, 2.3]	0.6 [0.3, 1.0]*	0.4 [0.2, 0.7]*

Note. White, $n = 9231$. Black, $n = 3577$. Black-White, $n = 111$. OR = odds ratio. CI = confidence interval.

For the categorical variables, the odds ratio is presented with the respective 95% CI. Weighted chi-square test for independence were performed for binary variables. Weighted t-test were performed for continuous variables.

* $p < .05$;

** $p < .0001$.

Table 4

Predictive Logistic Regression Models of Prevalence of Substance Use (Percent Change in Odds) (N = 12919)

	White n= 9231	Black n= 3577	Black-White n= 111
Lifetime cigarette use	% Change [CI]	% Change [CI]	% Change [CI]
Peer substance use	146 [101.4,171.8] *	49.2 [22.1,64.9] *	-100 [-100,-100] *
Home availability	--	64.9 [35,101.4] *	-98.1 [-99.2,-95.6] *
Parental smoking	22.1 [10.5,35] *	22.1 [10.5,49.2] *	1000 [163.8,1000] *†
School discrimination	10.5 [10.5,10.5] *	10.5 [10.5,22.1] *	-83 [-94,-51.8] *
Parental warmth	-25.9 [-39.3,-18.1] *	-33 [-50.3,0] *	-100 [-100,-100] *
Parental control	--	--	-100 [-100,-100] *
School attachment	-9.5 [-18.1,0] *	--	-100 [-100,-100] *
Religiosity/spirituality	-9.5 [-9.5,0] *	--	-93.4 [-95,-91.4] *
Neighborhood connectedness	10.5 [0,22.1] *	--	1000 [1000, 1000] *†
Home availability * gender	-18.1 [-33,0] *	--	1000 [1000, 1000] *†
School discrimination X gender	--	--	1000 [1000, 1000] *†
Parental warmth X gender	--	--	1000 [1000, 1000] *†
Parental control X gender	--	--	1000 [1000, 1000] *†
School attachment X gender	--	--	1000 [1000, 1000] *†
Religiosity X gender	10.5 [0,10.52] *	--	1000 [1000, 1000] *†
Neighborhood X gender	--	--	-100 [-100,-100] *
Lifetime alcohol use	White	Black	Black-White
Peer substance use	122.6 [101.4,146] *	64.9 [35,82.2] *	-100 [-100,-99.9] *
Home availability	49.2 [35,64.9] *	49.2 [22.1,82.2] *	-100 [-100,-100] *
Parental smoking	--	--	-100 [-100,-100] *
School discrimination	10.5 [10.5,22.1] *	10.5 [10.5,22.1] *	1000 [1000, 1000] *†
Parental warmth	-18.1 [-33,0] *	-45.1 [-59.3,-25.9] *	-100 [-100,-100] *
Parental control	-9.5 [-9.5,0] *	-18.1 [-25.9,-9.5] *	1000 [1000, 1000] *†
School attachment	--	--	1000 [1000, 1000] *†
Religiosity/spirituality	-0.1 [-4.1,1] *	--	-100 [-100,-100] *
Neighborhood connectedness	22.1 [10.5,22.1] *	--	1000 [1000, 1000] *†
Home availability X gender	--	--	1000 [1000, 1000] *†
Peer substance use X gender	--	--	1000 [1000, 1000] *†
Parental smoking X gender	--	--	1000 [1000, 1000] *†
School discrimination X gender	--	--	-100 [-100,-100] *
Parental warmth X gender	--	--	1000 [1000, 1000] *†

	White n= 9231	Black n= 3577	Black-White n= 111
Parental control X gender	--	--	-100 [-100,-100] [*]
School attachment X gender	--	--	-100 [-100,-100] [*]
Religiosity X gender	--	--	1000 [1000, 1000] ^{*†}
Neighborhood X gender	--	--	-100 [-100,-100] [*]
Lifetime marijuana use	White	Black	Black-White
Peer substance use	232 [200.4,266.9] [*]	146 [101.4,200.4] [*]	-55.1 [-80.2,2]
Home availability	--	49.2 [10.5,101.4] [*]	1000 [1000, 1000] ^{*†}
Parental smoking	10.5 [0,35] [*]	--	-100 [-100,-100] [*]
School discrimination	--	--	1000 [1000, 1000] ^{*†}
Parental warmth	-45.1 [-55.1,-33] [*]	-39.3 [-59.3,-9.5] [*]	-100 [-100,-100] [*]
Parental control	--	--	-42.9 [-76.5,39.1]
School attachment	-18.1 [-25.9,0] [*]	-25.9 [-45.1,-9.5] [*]	-100 [-100,-100] [*]
Religiosity/spirituality	-9.5 [-9.5,0] [*]	-9.5 [-18.1,0] [*]	266.9 [194.5,357.2] [*]
Neighborhood connectedness	--	--	1000 [1000, 1000] ^{*†}
Home availability X gender	--	--	1000 [1000, 1000] ^{*†}
Peer substance use X gender	--	--	-100 [-100,-100] [*]
Parental smoking X gender	--	--	1000 [1000, 1000] ^{*†}
Parental warmth X gender	--	--	1000 [1000, 1000] ^{*†}
Parental control X gender	--	--	-99.6 [-99.9,-98.9] [*]
School attachment X gender	--	--	1000 [1000, 1000] ^{*†}
Neighborhood X gender	--	--	-100 [-100,-100] [*]

Note. Separate models per column. Relationships that were not significant for across racial groups are not presented. The control variables included in the full model are age, gender, nativity, maternal education and family structure.

^{*} $p < .05$

[†] Percent changes that were greater than 1000% were truncated to 1000% for interpretability

Table 5

Predictive Logistic Regression Models of Prevalence of Substance Use (Percent Change in Odds) (N = 12919)

	White n= 9231	Black n= 3577	Black-White n= 111
Cigarette/alcohol	% Change [CI]	% Change [CI]	% Change [CI]
Peer substance use	122.6 [101.4,146]*	101.4 [64.9,122.6]*	1000 [1000, 1000]*†
Home availability	22.1 [10.5,35]*	49.2 [35,64.9]*	1000 [1000, 1000]*†
Parental smoking	11.6 [3,22.1]*	--	1000 [1000, 1000]*†
School discrimination	10.5 [10.5,22.1]*	10.5 [10.5,22.1]*	-100 [-100,-100]*
Parental warmth	-25.9 [-39.3, -9.5]*	--	1000 [1000, 1000]*†
Parental control	-9.5 [-9.5,0]*	-25.9 [-33, -9.5]*	-93.9 [-97.4,-85.9]*
School attachment	--	--	410.4 [131.6,1000]*†
Religiosity/spirituality	--	--	-90.6 [-93.3,-86.6]*
Neighborhood connectedness	10.5 [10.5,22.1]*	--	-100 [-100,-100]*
Home availability X gender	--	--	1000 [1000, 1000]*†
Peer substance use X gender	--	--	-100 [-100,-100]*
Parental smoking X gender	--	--	-100 [-100,-100]*
School discrimination X gender	--	--	1000 [1000, 1000]*†
Parental warmth X gender	--	--	-100 [-100,-100]*
Parental control X gender	--	22.1 [0,35]*	--
School attachment X gender	--	--	1000 [1000, 1000]*†
Religiosity X gender	--	--	274.3 [143.5,475.5]*
Neighborhood X gender	--	--	1000 [1000, 1000]*†
Cigarette/alcohol/marijuana	White	Black	Black-White
Peer substance use	232 [200.4,266.9]*	146 [122.6,200.4]*	1000 [1000, 1000]*†
Home availability	--	35 [10.5,64.9]*	1000 [1000, 1000]*†
Parental smoking	--	--	1000 [1000, 1000]*†
School discrimination	--	--	1000 [676.8,1000]*†
Parental warmth	-45.1 [-55.1,-33]*	--	-100 [-100,-100]*
Parental control	--	-9.5 [-18.1,0]*	-100 [-100,-100]*
School attachment	--	-33 [-39.3,-18.1]*	-100 [-100,-100]*
Religiosity/spirituality	-0.1 [-9.5,0]*	-0.1 [-6.8,-1]*	-97.2 [-97.9,-96.1]*
Neighborhood connectedness	-9.5 [-18.1,0]	--	1000 [1000, 1000]*†
Home availability X gender	--	--	-100 [-100,-100]*
Peer substance use X gender	--	--	-100 [-100,-100]*
Parental smoking X gender	--	--	-99.3 [-99.9,-93.3]*

	White n= 9231	Black n= 3577	Black-White n= 111
School discrimination X gender	--	--	1000 [1000, 1000] ^{*†}
Parental warmth X gender	--	--	1000 [1000, 1000] ^{*†}
Parental control X gender	--	--	1000 [1000, 1000] ^{*†}
School attachment X gender	--	--	1000 [1000, 1000] ^{*†}
Religiosity X gender	--	--	1000 [1000, 1000] ^{*†}
Neighborhood X gender	22.1 [0,49.2] [*]	--	-100 [-100,-100] [*]

Note. Separate models per column. Relationships that were not significant for across racial groups are not presented. The control variables included in the full model are age, gender, nativity, maternal education and family structure.

^{*} $p < .05$

[†] Percent changes that were greater than 1000% were truncated to 1000% for interpretability

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Table 6

Predictive Logistic (Percent Change in Odds) and Poisson Regression (Average Change) Models of Prevalence of Substance Use (N = 12919)

	White n= 9231	Black n= 3577	Black-White n= 111
Regular cigarette use	% Change [CI]	% Change [CI]	% Change [CI]
Peer substance use	171.8 [146, 171.8] [*]	122.6 [101.4,171.8] [*]	1000 [1000, 1000] ^{*†}
Home availability	--	--	-100 [-100,-99.9] [*]
Parental smoking	22.1 [10.5,35] [*]	--	-100 [-100,-100] [*]
School discrimination	10.5 [0,10.5] [*]	--	1000 [1000, 1000] ^{*†}
Parental warmth	-33 [-45.1,-18.1] [*]	--	-100 [-100,-100] [*]
Parental control	--	-9.5 [-25.9,0] [*]	1000 [1000, 1000] ^{*†}
School attachment	-25.9 [-33,-18.1] [*]	-33 [-45.1,-18.1] [*]	1000 [1000, 1000] ^{*†}
Religiosity/spirituality	--	--	-17.3 [-25.9,-7.7] [*]
Neighborhood connectedness	--	--	1000 [1000, 1000] ^{*†}
Peer substance use X gender	--	--	1000 [385.5,1000] ^{*†}
Parental smoking X gender	--	--	1000 [1000, 1000] ^{*†}
School discrimination X gender	--	--	-100 [-100,-100] [*]
Parental warmth X gender	--	--	1000 [1000, 1000] ^{*†}
Parental control X gender	--	--	-100 [-100,-100] [*]
School attachment X gender	--	--	1000 [767.1,1000] ^{*†}
Neighborhood X gender	--	--	-99.2 [-99.8,-97] [*]
Recent substance use	White	Black	Black-White
Peer substance use	122.6 [101.4,122.6] [*]	146 [122.6,200.4] [*]	0.1 [-55.1,122.6]
Home availability	--	64.9 [35,101.4] [*]	200.4 [22.1,638.9] [*]
Parental smoking	10.5 [10.5,22.1] [*]	--	--
School discrimination	10.5 [0,22.1] [*]	22.1 [10.5,35] [*]	101.4 [64.9,171.8] [*]
Parental warmth	-25.9 [-45.1,0] [*]	--	171.8 [-39.3,1002.3]
Parental control	--	--	-63.2 [-75.3, -39.3] [*]
School attachment	-9.5 [-18.1,0] [*]	-18.1 [-45.1,35]	--
Religiosity/spirituality	-3.9 [-9.5,0] [*]	--	49.2 [22.1,82.2] [*]
Neighborhood connectedness	--	--	-45.1 [-66.7,-18.1] [*]
Home availability X gender	--	--	1000 [767.1,1000] ^{*†}
Peer substance use X gender	--	--	-69.9 [-90.9,-9.5] [*]
Parental warmth X gender	--	--	-95.5 [-98.8,-83.5] [*]
Parental control X gender	--	--	101.4 [22.1,232] [*]

	White n= 9231	Black n= 3577	Black-White n= 111
School attachment X gender	--	64.9 [0,146] [*]	--
Religiosity X gender	--	--	-63.2 [-69.9,-50.3] [*]
Neighborhood X gender	--	--	897.4 [505,1388] [*]

Note. Separate models per column. Relationships that were not significant for across racial groups are not presented. The control variables included in the full model are age, gender, nativity, maternal education and family structure.

^{*} $p < .05$

[†] Percent changes that were greater than 1000% were truncated to 1000% for interpretability

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