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Polysubstance Use among Minority Adolescent Males Incarcerated for Serious Offenses

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Abstract

Background—Adolescent juvenile offenders are at high risk for problems associated with drug use, including polysubstance use (i.e., use of a variety of drugs). The combination of juvenile offending and polysubstance use presents a significant public and child health concern.

Objective—This study explored polysubstance use among a sample of youth incarcerated for serious offenses. We examined several risk factors for substance use and delinquency (i.e., early and frequent substance use, prior history of arrests, school expulsion, Black ethnicity), as well as the association between aggression and polysubstance use.

Methods—Data were collected via questionnaires from 373 serious male juvenile offenders upon intake into a secure locked facility. Youth were on average 16 years old, and minority youth were overrepresented (28.1% Black, 53.1% Latino). Poisson regressions were used to assess the associations between the risk factors, aggression, and polysubstance use.

Results—Consistent with the literature, Black youth reported less polysubstance use and later age of drug use onset than White and Latino youth. Findings suggest that Latino juvenile offenders and those with an early and problematic pattern of substance use are at heightened risk for polysubstance use. Aggression was not significantly related to polysubstance use, over and above the risk factors.

Conclusions—Given that Latino youth experience low rates of treatment for substance use, the development of culturally-sensitive interventions for these youth is needed. Interventions should also be multifaceted to address the multitude of risk factors associated with polysubstance use among juvenile offenders.

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Keywords

juvenile offenders; polysubstance use; risk factors; aggression

Recent data from the Monitoring the Future Survey indicate that approximately half of U.S. youth report any lifetime use of at least one illicit substance (Johnston, O'Malley, Bachman, & Schulenberg, 2013). Estimates also suggest that 8–13% of youth in the United States engage in polysubstance use (i.e., use of a variety of drugs; Connell, Gilreath, & Hansen, 2009). These statistics are particularly concerning given that adolescent substance use is associated with a multitude of negative outcomes (e.g., continued drug use and abuse, health problems, unemployment, delinquency, violence; Conway et al., 2013; Dornbusch, Lin, Munroe, & Bianchi, 1999; Kandel, Davies, Karus, & Yamaguchi, 1986; Mason & Windle, 2002; McCormick & Smith, 1995; Moss, Chen, & Yi, 2014; White, Loeber, Stouthamer-Loeber, & Farrington, 1999; Workowski, 2003). Given these associations, serious juvenile offenders represent a population at high risk for polysubstance use and problems associated with this drug use, including recidivism and repeated incarcerations (Dembo, Pacheco, Schmeidler, Fisher, & Cooper, 1997; Tripodi & Bender, 2011). These findings, coupled with the large cost to society as a result of juvenile incarceration due to serious offenses (\$5.7 billion per year; Petteruti, Walsh, & Velázquez, 2009), suggest that polysubstance use among juvenile offenders poses a significant public health concern.

While polysubstance use is commonly defined as using multiple substances within a specified period of time (Collins, Ellickson, & Bell, 1998; Conway et al., 2013), most studies have identified polysubstance use based on the application of latent class analyses (LCAs) to determine patterns of substance use among samples of youth (e.g., Connell et al., 2009; Connell, Gilreath, Aklin, & Brex, 2010; Mitchell & Plunkett, 2000). Therefore, there is much variability in how polysubstance use is measured, and little attention has been paid to the important risk factors and outcomes associated with this construct. Furthermore, the majority of studies on polysubstance use have utilized community samples, and there is little information regarding this construct in at-risk populations. In the current study, we defined polysubstance use as the number of substances used in the youth's lifetime (Barrett, Darredeau, & Pihl, 2006; Martin, Arria, Mezzich, & Bukstein, 1993), and examined the association between polysubstance use and various risk factors for drug use (e.g., early onset of drug use, race/ethnicity) among serious juvenile offenders. We addressed an important limitation in the literature by incorporating a large number of minority youth in the sample. Because of the strong connection between substance use and behavior problems (Farrell, Kung, White, & Valois, 2000), we also examined the relation between polysubstance use and aggression in order to inform intervention approaches to address juvenile offenders' mental health needs.

Risk Factors for Polysubstance Use

Considerable research has focused on identifying risk factors for the initiation and perpetuation of substance use among youth. Early onset and frequent use of substances are consistently identified as risk factors for later polysubstance use, as well as serious substance abuse problems, including substance use disorders (Gordon, Kinlock, & Battjes,

2004). Furthermore, early (prior to age 16) polysubstance users report using a greater variety of drugs in young adulthood as compared to those using a single substance at an early age (Moss et al., 2014). Youth with a history of prior arrests and school problems, including expulsions, are also at high risk for problematic substance use (Chassin, Ritter, Trim, & King, 2003; Hawkins, Catalano, & Miller, 1992).

Race/ethnicity is a powerful social determinant of polysubstance use with strong implications for the juvenile justice system. Specifically, compared to White youth, Black youth have a lower likelihood of substance use and are less likely to meet criteria for substance use disorders, while Latino youth report the highest levels of drug use (Johnston et al., 2013; Wu, Woody, Yang, Pan & Blazer, 2011). While Black youth are less likely than White youth to have engaged in substance use, a representative national survey of approximately 7,000 adolescents demonstrated that Blacks are more likely to be arrested for drug-related and other delinquent behaviors (Kakade et al., 2012). This discrepancy in incarceration rates for Black youth may suggest inherent bias in juvenile justice policies (Weich & Angulo, 2000) and/or disproportionate levels of engagement in risky drug-related behaviors (i.e., involvement with drug dealing; Centers & Weist, 1998) among Black youth as compared to White youth. Of note, previous studies examining the relation between race/ethnicity and substance use have compared Black youth to predominately White youth. However, the current study advances prior work by examining the risks among Black youth as compared to Latino youth, as relatively few studies of juvenile offenders have had a large enough Latino sample to contrast these two at-risk minority groups.

This discrepancy in rates of substance use and incarceration are even more concerning given evidence that minority youth are underrepresented in and underutilize mental health services (Alegria, Carson, Goncalves, & Keefe, 2011; Garland et al., 2005; McCabe et al., 1999). Ethnic disparities in mental health service use have therefore been identified as a major public health problem (U. S. Department of Health and Human Services, 2001). There are a multitude of reasons for this discrepancy, including language barriers, limited resources, and lack of culturally-competent services (Gil, Wagner, & Tubman, 2004; Pumariega, Rogers, & Rothe, 2005). Relevant to the current study, Latinos not only have less access to substance use treatment, but are also less satisfied with the treatment they do receive (for a review, see Alvarez, Jason, Olson, Ferrari, & Davis, 2007; Cummings, Wen, & Druss, 2011). Thus, ethnic minority youth represent a population at high risk for not only problematic behaviors and incarceration, but also for continued difficulties due to a variety of barriers to effective treatment options.

Aggression and Polysubstance Use in Juvenile Offenders

In addition to these social determinants, there is growing interest in the link between substance use and behavior problems, which occur at a high rate among juvenile offenders (Teplin, Abram, McClelland, & Dulcan, 2003; Eddy, Whaley, & Chamberlain, 2004). This association can be conceptualized within the deviance-proneness model (Sher, 1991), which hypothesizes that adolescent substance use occurs within the context of overall difficulties with behavioral control. Such behavioral difficulties, including impulsivity and behavioral disinhibition, have been consistently linked to substance use and substance use problems

(Sher, Bartholow, & Wood, 2000), as well as aggressive behavior, particularly towards others (Grekin, Sher, & Larkins, 2004). Based on this theoretical model, it stands to reason that the links between drug use and behavior problems, mainly delinquency and aggression, are particularly strong among juvenile offenders. Specifically, juvenile offenders who use both drugs and alcohol have higher rates of the aggressive subtype of conduct disorder as compared to non-substance using juvenile offenders (Milin, Halikas, Meller, & Morse, 1991).

While the links between delinquency, aggression and substance use are well-established in community samples, less is known about these associations in highly at-risk, incarcerated samples of adolescents. Understanding patterns of polysubstance use among juvenile offenders who have increased levels of aggression may inform interventions for this population that is at-risk for substance use disorders, violent behavior, and repeat offending. For instance, it may be important for polysubstance-using juvenile offenders to participate in multifaceted evidence-based treatment programs aimed at reducing substance use and aggression. Such programs may lead to reductions in not only problem behaviors (i.e., substance use, aggression) but also in rates of recidivism and repeated incarcerations.

The need for this intervention-relevant research is further evinced by a lack of studies examining the efficacy of treatments for polysubstance-using youth, as well as the small effect these treatments typically have on substance-using juvenile offenders (Tripodi & Bender, 2011). For example, a recent meta-analytic review of psychosocial treatments for substance use disorders identified 13 studies examining the treatment of polysubstance use, all of which assessed either contingency management (i.e., offering monetary rewards or incentives for abstinence) or cognitive behavioral therapeutic interventions. However, this review found a small average effect size for these treatments ($d = .24$), and further established that treatments for polysubstance use were the least efficacious when compared to treatments for single-drug use (Dutra et al., 2008). The modest effectiveness of treatments for polysubstance use may be due to the high level of risk and use associated with this type of drug use. In fact, in a review of substance use treatments among adolescents, low pre-treatment substance use was consistently linked to successful treatment outcomes (Williams, Chang, & Addiction Centre Adolescent Research Group, 2000). Furthermore, there may be a multitude of risk factors associated with polysubstance use, and therefore multifaceted treatments (e.g., Multisystemic Therapy [MST]; Henggeler, Pickrel, & Brondino, 1999) may be necessary to effectively address this high-risk form of substance use, particularly among youth who are engaged in multiple problematic behaviors (e.g., polysubstance using juvenile offenders). Consideration of the risk factors associated with polysubstance use may suggest some targets for intervention efforts addressing this problematic and highly risky form of substance use.

Goals of the Current Study

The current study aimed to address several gaps in the literature, first by examining risk factors associated with polysubstance use among incarcerated serious male juvenile offenders, as there is limited literature on this high-risk population. Based on the research reviewed above, we expected that early and frequent substance use and prior histories of

arrests and school expulsion would be associated with greater levels of polysubstance use. We also hypothesized that being Black, as compared to being Latino or White, would be related to lower levels of polysubstance use while being Latino would be linked to higher levels of polysubstance use, as compared to being Black or White. The second objective was to explore the association between aggression and polysubstance use in this sample of serious juvenile offenders. Based on the established relations between behavior problems and polysubstance use, we hypothesized that higher levels of aggression would be associated with higher levels of polysubstance use. This study has important implications for addressing the co-occurrence of substance use and behavioral health concerns displayed by youth incarcerated for serious offenses.

Method

Participants

Participants included 373 males incarcerated in a secure locked juvenile justice facility in California, designed to house “California’s youthful offenders up to the age of 25 who have the most serious criminal backgrounds and most intense treatment needs” (California Department of Corrections and Rehabilitation, 2015). Youth were 16 years old (on average) at the time of incarceration. According to official court records, approximately 70% of the sample was adjudicated on a violent offense (e.g., robbery, aggravated assault, battery, attempted murder), 12% for a property offense, 7% for a public order offense, 3.5% for either a weapon or drug charge, and 5% for an unclassified crime. Consistent with prior research (Snyder & Sickmund, 2006), minority youth were overrepresented in the sample; specifically, 28.1% of the sample was Black and 53.1% was Latino while only 6.2% was White. As seen in Table 1, the sample also had high rates of school expulsions and recidivism, and the majority reported early, frequent, and varied substance use.

Procedure

Data were collected between 2005 and 2007 and all newly admitted youth and their parents were eligible to participate in the study. Of youth approached, 95% provided assent to participate. Parents of the youth who assented were then contacted via telephone to obtain their consent. Of parents contacted, 97% provided consent. Spanish interpreters were available for parents when necessary. Baseline data were collected during a 2-hour interview conducted within the first 48 hours of the youths’ incarceration. Interviews were also conducted during the second, third and fourth weeks of incarceration; however, for the purposes of the current study, we only utilized the baseline data. Interviews were completed in a private room by trained research assistants and all questions were read aloud and clarified to participants to control for varying reading comprehension levels. Institutional Review Board approval was obtained for all study procedures (see Shulman & Cauffman, 2011 for additional information regarding study procedures). A Certificate of Confidentiality was also obtained from the Department of Health and Human Services to ensure confidentiality of the information disclosed by the youth.

Measures

Risk factors—We examined several potential risk factors, including race/ethnicity, onset and frequency of substance use, and history of school expulsion and prior arrest. Self-reported race/ethnicity was coded into five categories: White, Black, Latino, Asian/Pacific Islander and bi-/multi-racial. Given that few youth were Asian/Pacific Islander ($n = 5$), and to maintain a focus on underrepresented minority groups with disproportionate incarceration rates, for the purpose of this study we only examined White, Black and Latino youth. We also excluded bi-/multi-racial youth ($n = 33$) in order to prevent any misclassifications in analyses. Onset of substance use was defined as a continuous variable representing self-reported age at first drug use. Given that a large proportion of the sample reported using substances at least daily, frequency of drug use was dichotomized into two categories: at least daily drug use and less than daily drug use. History of prior arrest and school expulsion were dichotomous variables based on whether or not the participant reported that he had experienced these events in the past.

Aggression—Aggression was assessed using the raw score of the aggression subscale of the Child Behavior Checklist-Youth Self Report (CBCL-YSR; Achenbach & Rescorla, 2001). The CBCL-YSR is a validated and widely used self-report measure of emotional and behavioral problems in children. It also has been validated among youth in juvenile justice populations (Glaser, Calhoun, Bradshaw, Bates, & Socherman, 2001). The aggression subscale of the CBCL-YSR contains 20 items ($\alpha = .84$) and participants rate the statements on a 3 point scale ranging from 0 = “not true,” 1 = “somewhat/sometimes true,” and 2 = “very true or often true.” Examples of statements from the aggression subscale include: “I destroy my own things”; “I destroy things belonging to others”; “I get in many fights”; and “I physically attack people.”

Polysubstance use—The dependent variable in the current study was a self-reported retrospective count of the variety of substances used over the course of the juvenile offender’s lifetime. The information was obtained through a 22-item drug use scale based on items used in previous studies to assess adolescent substance use behaviors (e.g., Stice, Barrera, & Chassin, 1993). Interview questions from this measure included: “How often have you used this substance?”; “How old were you when you first tried this substance?”; “How often have you used in the past 6 months?” These questions were asked regarding alcohol, marijuana, inhalants and “any other drugs.” The current sample of incarcerated youth reported using alcohol, marijuana, inhalants, cocaine, ecstasy, methamphetamines, mushrooms, PCP, opiates, and non-opiate prescription drugs. The polysubstance use variable was created by counting the number of substances each participant endorsed using in his lifetime, with higher scores indicative of polysubstance use.

Analysis Plan

Since the outcome variable in the current study (polysubstance use) was a count variable, we used Poisson regressions to calculate incident rate ratios (IRRs) and assess the associations between the risk factor covariates, aggression, and polysubstance use. Model 1 included the covariates to examine their associations with polysubstance use in this sample of incarcerated adolescent males. Model 2 examined the association between aggression and

polysubstance use, over and above the covariates. Pearson chi-square goodness of fit tests indicated that the assumptions for a Poisson regression were met in the current study; $\chi^2_{\text{Model 1}} (286, N = 293) = 132.96, p = .47$; $\chi^2_{\text{Model 2}} (274, N = 282) = 126.59, p = .46$.

Results

Descriptive Statistics

Means, standard deviations (for the continuous variables), and intercorrelations of the variables included in the current study are presented in Table 2. Only 5.1% ($n = 19$) of the juvenile offenders reported not using any drugs in their lifetime. On average, youth reported using approximately three different substances and the majority indicated using these substances at least daily. Types of substances used by the juvenile offenders in the current sample were split into four categories: alcohol, marijuana, inhalants, and other drugs (i.e., cocaine, ecstasy, methamphetamines, mushrooms, PCP, opiates, and non-opiate prescription drugs). A high level of substance use was reported by the participants, with marijuana (92.2%; $n = 344$) and alcohol (87.7%, $n = 327$) being the most commonly used substances. Approximately half of the sample (55.5%; $n = 207$) reported using other drugs, with a smaller percentage reporting inhalant use (19.3%; $n = 72$). Of the participants who used other drugs, most reported using one drug (31.9%; $n = 119$), with 23.6% ($n = 88$) reporting that they used two or more other drugs. The most commonly used other drugs were cocaine (23.9%; $n = 89$) and methamphetamines (36.5%; $n = 136$). When youth used more than one type of other drug, they most commonly used cocaine and methamphetamines in combination, either alone or with additional drugs.

To describe the pattern of substance use observed in this sample, Table 3 presents the frequencies and type of substance(s) used by the juvenile offenders. Most participants reported using more than one substance, with the majority indicating use of alcohol and marijuana or alcohol, marijuana, and other drugs. In fact, only 6.7% ($n = 25$) of the juvenile offenders in this sample reported using only one substance. As seen in Table 3, youth who reported using multiple substances also appeared to use them more frequently. Indeed, frequency of use and number of substances used was significantly correlated ($r = .36, p < .001$), indicating that use of multiple substances was associated with more frequent use. Overall, it appears that juvenile offenders in this sample engaged in a high level of risky, varied, and frequent substance use.

Pearson (for continuous variables) and Spearman (for categorical variables) correlation coefficients were also examined (see Table 2). The correlations revealed associations between higher levels of polysubstance use and earlier age of onset of drug use, more frequent drug use, higher levels of aggression, and positive histories of prior school expulsions and arrests. Aggression was associated with more frequent drug use and positive histories of prior school expulsions and arrests. For correlations including the three-category race/ethnicity variable, two contrast codes were created: one comparing White youth and minority youth (Blacks and Latinos) and the other comparing Black and Latino youth. Being Latino, as compared to being Black, was associated with more polysubstance use and younger age of drug use onset. We also compared the means of polysubstance use and age of onset of drug use between the three race/ethnicity groups with a series of one-way

ANOVAs. The results indicated that there was a difference between group means in both polysubstance use, $F(2, 325) = 34.28, p < .001$, and age of onset of drug use, $F(2, 310) = 7.07, p < .01$. Post hoc tests indicated that Black participants reported significantly less polysubstance use ($M = 2.04, SD = 0.94$) as compared to White ($M = 3.04, SD = 1.26$) and Latino ($M = 3.48, SD = 1.69$) participants. Additionally, Black participants reported significantly later age of onset of drug use ($M = 12.21, SD = 2.60$) than White ($M = 11.36, SD = 2.82$) and Latino ($M = 11.02, SD = 2.53$) youth. We also tested for race/ethnicity differences in the type of substances used through a series of generalized linear models. Specifically, Black participants used significantly less alcohol ($b = -1.12, SE = .36, p < .01$), fewer inhalants ($b = -3.71, SE = 1.02, p < .001$), and fewer other drugs ($b = -1.64, SE = .26, p < .001$) as compared to Latinos. No significant differences by type of substance used were observed between White and Latino participants.

Risk Factors for Polysubstance Use

We conducted a Poisson regression model to examine the associations between the covariates (i.e., race/ethnicity, age of onset and frequency of drug use, and history of school expulsions and prior arrests) and polysubstance use in this sample of primarily minority incarcerated male juvenile offenders (Model 1). The overall model was significant, $\chi^2(6, N = 293) = 74.19, p < .001$. Table 4 reports the coefficients, standard errors, IRRs and 95% IRR confidence intervals, holding all other variables constant. In terms of race/ethnicity, as compared to Latino youth, being Black was associated with less polysubstance use. That is, the rate of polysubstance use decreased by 37.3% for Black youth as compared to Latino youth. However, there was no difference in rates of polysubstance use between White and Latino youth. Younger age of onset was also associated with more polysubstance use. Specifically, each unit increase in age of substance use onset reduced the rate of polysubstance use by 3.2%, such that later initiation of substance use was related to less polysubstance use. The rate of polysubstance use also decreased by 24.8% for those youth who reported less than daily use, as compared to those who reported at least daily use of substance use. History of school expulsions and prior arrests were not associated with polysubstance use in this sample.

Association between Polysubstance Use and Aggression

Given the high rate of comorbidity between substance use and behavior problems (Chassin et al., 2003), as well as the delinquent history of the incarcerated youth in this sample, we assessed the association between polysubstance use and aggression. Specifically, Model 2 examined the relation between polysubstance use and aggression, holding the covariates described above constant. The overall model was significant, $\chi^2(7, N = 291) = 75.33, p < .001$; however, aggression was not associated with polysubstance use ($b = .01, SE = .01, p = .07$), over and above the covariates.

Discussion

This study examined the associations between polysubstance use and various risk factors for substance use (i.e., race/ethnicity, age of onset and frequency of drug use, and history of school expulsions and prior arrests) in a primarily minority sample of incarcerated male

juvenile offenders. Given the increased vulnerability to problem drug use among this population (Teplin, Abram, McClelland, Dulcan, & Mericle, 2002), it is important to understand risk factors for their polysubstance use. We were particularly interested in the role of aggression, over and above common demographic risk factors documented in the general population, and we aimed to explore these associations among a sample of serious male adolescent offenders. It is first important to note a high level of varied drug use in our sample, as the vast majority of participants endorsed polysubstance use. Our findings also indicated that early and frequent substance use and Latino ethnicity were significantly associated with more polysubstance use, controlling for the other risk factors included in the model. The results regarding early and frequent substance use as a risk factor for more problematic drug use are consistent with the broader literature (Hawkins et al., 1992). It is also important to note that previous studies have suggested that an accumulation of risk factors is typically more important than any single factor for risk behaviors (Stoddard et al., 2013). Future studies should, therefore, continue to incorporate multiple risk factors into models of polysubstance use, and to determine if perhaps certain risk factors are more predictive of polysubstance use than others (e.g., early and frequent drug use may be particularly important risk factors for later problematic substance use).

Consistent with previous research (Johnston et al., 2013; Kakade et al., 2012; Wu et al., 2011), we also found that while Black youths engaged in less problematic substance use than their non-Black peers, they remain overrepresented in incarcerated populations. In fact, being a Black adolescent was associated with less polysubstance use as compared to being a White adolescent. Latino youth also reported more polysubstance use as compared to Black youth. These findings are consistent with rates from the general population, where Latino youth report higher rates of use across all drug categories as compared to both White and Black youth (Centers for Disease Control and Prevention, 2006). Taken together, our findings, along with those in the previous literature, suggest that Latino juvenile offenders are at heightened risk for problematic substance use and should therefore be targeted with preventive behavioral health interventions.

Due to the widely documented disparities in mental health treatment for substance use disorders among ethnic minority youth (Alegria et al., 2011; Alvarez et al., 2007; Garland et al., 2005; Gil et al., 2004; McCabe et al., 1999; Pumariega et al., 2005; U. S. Department of Health and Human Services, 2001), our findings regarding race/ethnicity have significant clinical implications. Given that Latino youth experience low rates of treatment for substance use disorders (Cummings et al., 2011), the development of drug use interventions for these youth is of paramount importance. Specifically, and given the importance of family in Latino culture (Santisteban, Muir-Malcolm, Mitrani, & Szapocznik, 2002), family-based interventions for substance use may be particularly promising (Santisteban et al., 2003). For example, results from a randomized controlled trial of Familias Unidas + Parent-Preadolescent Training for HIV Prevention (PATH), a parent-centered intervention for Latino youth aimed at preventing adolescent substance use and risky sexual behavior, indicated that the treatment was efficacious in reducing illicit drug use among a community-based sample of 266 Latino adolescents (Prado et al., 2007). Preventive interventions for Latinos should therefore be family-based, and efforts should be made to incorporate the families of incarcerated Latino youth into any treatment programs. In fact, research suggests

that incorporating the family and addressing family dynamics is an effective approach to treating substance use problems in all youth, not just minority populations (Austin, Macgowan, & Wagner, 2005; Winters, 1999). Multisystemic Therapy (MST; Henggeler et al., 1986), an intervention which elicits change in delinquency by targeting multiple aspects of the youth's social context (i.e., family, peers, community), may also be a promising treatment option for Latino juvenile offenders. This treatment has been found to be effective with Latino and Black families (Henggeler, Schoenwald, Borduin, Rowland, & Cunningham, 2009) and with serious juvenile offenders (Borduin et al., 1995).

Taken together, the findings from the current study identified important risk factors for polysubstance use in this vulnerable, high-risk population. However, baseline aggression was not related to polysubstance use, after accounting for the risk factors included as covariates in the models. This finding is in contrast to previous literature highlighting strong relations between drug use and behavior problems (Fergusson, Horwood, & Lynskey, 1994; Jessor & Jessor, 1977). Since drug use and aggressive behavior share many of the same risk factors (e.g., minority status, early engagement in problematic behavior), it could be that the lack of association in this study is due to adjustment for the covariates common to both of these problematic behaviors. As such, it may be that these shared risk factors are driving the association between aggression and drug use. Alternatively, the association between aggression and drug use may not be present in such a high-risk population, as youth are engaging in high levels of both drug use and aggressive behavior. Due to these high rates of problematic behavior, there may be little variance remaining to establish an association between polysubstance use and aggression after accounting for their shared risk factors. There is great variability among juvenile offenders in terms of the seriousness of their offenses, and therefore interventions need to be targeted appropriately to the level of risk exhibited by the incarcerated youth.

Strengths and Limitations

Strengths of the current study include the focus on a high-risk, vulnerable population for whom there is limited information in the extant literature. An additional strength is the inclusion of a large proportion of minority youth in the sample, including Latino youth. These features of the study design allowed us to examine risk factors for substance use behaviors among a population of youth at extremely high risk for continued problematic behavior and negative life outcomes (Laub & Sampson, 1994; Shepherd, Farrington, & Potts, 2004). Despite these strengths, there are also several limitations to consider when interpreting these findings. First, we used self-reported measures of participants' substance use and aggression. While self-report measures are the most common and optimal way to assess problematic behaviors in adolescents (Hser, 1993; Johnson & Richter, 2004), it may have been helpful to have additional sources of information to either corroborate or expand upon the patterns of polysubstance use and aggression observed in the current sample. Additionally, our decision to focus on underrepresented minority groups with disproportionate incarceration rates meant that we had to exclude Asian/Pacific Islander and bi-/multi-racial youth from analyses. The population of Asian/Pacific Islander and mixed race youth is growing in the United States (U. S. Census Bureau, 2013); this decision therefore limits our ability to speak to the potential risks facing this population of

incarcerated youth. It will be important to include these racial/ethnic groups in future studies of delinquency and polysubstance use, as these subgroups may face unique risk factors not discussed in the current paper. Furthermore, the youth in this sample were incarcerated in a secure locked facility for serious offenders; this population is highly skewed in its risk taking behaviors and delinquency history, and therefore is not representative of all incarcerated populations. This limitation is also a strength of our study as the levels of risk and associations among problem behaviors have not been widely examined in a population of serious juvenile offenders. Lastly, given that this sample focused on adolescent male offenders, it is unclear if the associations found in this study would hold in a sample of female offenders. Additional work with more diverse incarcerated populations is warranted.

Conclusion

Substance use and delinquency are interconnected issues among incarcerated youth. Exploring the details of these adolescents' substance use histories, including age of drug use onset, frequency of use, and variety of substances used may help guide the development of prevention and intervention strategies and services for this vulnerable population. It is particularly important to target youth incarcerated for serious offenses, and specifically Latino juvenile offenders, as they appear to be at especially high risk for polysubstance use. Given that a constellation of risk factors are associated with polysubstance use, intervention strategies should be multifaceted (e.g., MST; Henggeler et al., 1986) in order to target the broad range of factors associated with problematic and risky drug use among serious adolescent male offenders.

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Table 1

Sample Demographic Information (N = 373)

	Mean (SD)
Age in years	
At time of incarceration	16.4 (0.8)
At first arrest	12.8 (2.0)
Number of times arrested	6.2 (8.4)
	N (%)
Race/ethnicity ^a	
Latino	198 (53.1%)
Black	108 (28.1%)
Bi-/multi-racial	33 (8.8%)
White	23 (6.2%)
Asian/Pacific Islander	5 (1.3%)
History of school expulsion	246 (66%)
History of prior arrest	295 (79.1%)
History of drug use	354 (94.9%)
Drug use other than marijuana, alcohol or inhalants	208 (55.8%)
Use of >2 types of substances	213 (57.3%)
First drug use before age 13	162 (45.6%)
Frequency of drug use	
At least daily	266 (71.3%)
Less than daily	106 (28.4%)

^aNumbers do not sum to 100% due to missing data.

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Table 2

Means, Standard Deviations and Correlations of Study Variables

Variable	1	2	3	4	5	6	7	8
1. Polysub use	--							
2. White vs. minority ^a	-.05	--						
3. Black vs. Latino ^a	.44***	.15**	--					
4. Age of onset	-.35***	.01	-.22***	--				
5. Frequency of drug use ^a	.41***	-.01	.05	-.27***	--			
6. Hx of school expulsion ^a	.27***	.04	.11	-.21**	.22***	--		
7. Hx of prior arrest ^a	.21***	.04	.01	-.17**	.25***	.24***	--	
8. Aggression	.21***	.08	.07	-.18**	.16**	.24***	.17**	--
Mean (SD) ^a	2.98 (1.57)	--	--	11.32 (2.66)	--	--	--	9.29 (6.08)

Note. Polysub = polysubstance; minority = Black and Latino; age of onset = age of onset of drug use; Hx = history.

^a Spearman's rho reported for correlations with categorical variables. Means and standard deviations presented for continuous variables only.

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Table 3
 Frequency and Type of Substances Used by the Incarcerated Adolescent Males in the Current Sample

Substance(s)	Frequency							Total
	Once every few months	Once a month	Once every 2 weeks	Once a week	Several times a week	Daily	Several times a day	
Alcohol only	1	1	1	1	1	0	1	6
Marijuana only	5	1	0	1	0	7	5	19
Alcohol and marijuana	13	2	5	6	18	48	20	112
Alcohol and other drugs	0	0	0	1	0	2	0	3
Marijuana and other drugs	0	0	0	0	0	2	4	6
Alcohol, marijuana, and inhalants	0	0	0	0	2	5	3	10
Alcohol, marijuana, and other drugs	2	1	1	3	13	76	39	135
Marijuana, inhalants, and other drugs	0	0	0	0	0	1	0	1
Alcohol, marijuana, inhalants, and other drugs	1	0	1	0	6	37	16	61
<i>Total</i>	22	5	8	12	40	178	88	372

Table 4

Associations between Risk Factors and Polysubstance Use in Incarcerated Adolescent Males

	<i>b</i>	<i>SE</i>	IRR	95% IRR CI
White ^a	-.12	.08	.89	0.75 – 1.05
Black ^a	-.47***	.05	.63	0.57 – 0.69
Age of onset	-.03**	.01	.97	0.95 – 0.99
Use < daily ^b	-.29***	.06	.75	0.66 – 0.85
Hx of school expulsion	-.12	.06	.89	0.79 – 1.01
Hx of prior arrest	-.01	.08	.92	0.85 – 1.16

Note. Age of onset = age of onset of drug use; Use < daily = less than daily drug use; Hx = history; *SE* = standard error; **IRR** = incidence rate ratio; **CI** = confidence interval.

^aCompared to Latinos.

^bCompared to using at least daily.

**
p < .01,

p < .001.