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Conduct disorder symptoms and illicit drug use in juvenile justice involved youth: The reciprocal relationship between positive illicit drug use attitudes and illicit drug use

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Abstract

Conduct disorder (CD) symptoms co-occur at high rates with illicit drug use in juvenile justice involved youth, which results in poorer outcomes; however, research has not identified where best to intervene in this relationship, limiting the identification of modifiable risk factors to reduce negative effects of CD symptoms. Two mediation models were examined to investigate the potential for CD symptoms to influence a reciprocal relationship between illicit drug use and positive drug attitudes, controlling for age, gender, and race. Data were examined for 245 juvenile justice involved youth (mean age=15.46, SD=1.30, range 12-18, 64.9% black, 80.4% male) who completed court-ordered psychological assessments. Findings indicate: 1) Positive attitudes toward illicit drug use significantly mediated the relationship between CD symptoms and illicit drug use (β=0.16, CI 0.09 to 0.27; Test for indirect effect z=4.17, p<.001); and 2) illicit drug use significantly mediated the relationship between CD symptoms and positive attitudes toward illicit drug use (β=0.20, CI 0.12 to 0.32; Test for indirect effect z=4.87, p<.001). Overall, the present study suggests that CD symptoms impart risk for illicit drug use both indirectly, through more positive attitudes toward illicit drug use, and directly, which further strengthens positive attitudes toward illicit drug use.

Keywords

conduct disorder; illicit drug use; youth; juvenile justice; attitudes

1. Introduction

Juvenile justice involved youth report high rates of illicit drug use, with approximately 42% meeting criteria for a cannabis use disorder and approximately 20% meeting criteria for polysubstance use disorder (Teplin et al., 2002). Further, juvenile justice involved youth that use illicit drugs are more likely to face negative outcomes, including criminal recidivism

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(Wilson et al., 2001), increased risk for violent crime (Beck and Wencel, 1998), and increased risk for substance use problems in later adolescence and adulthood (Prinz and Kerns, 2003). One risk factor for illicit drug use, particularly in this high-risk population, is conduct disorder (CD; Hopfer et al., 2013)

Research indicates approximately 53% of juvenile justice involved youth meet criteria for CD (Fazel, Doll, & Langstrom, 2008). This is particularly troubling, as a CD diagnosis is associated with a host of negative outcomes, including criminal recidivism (Boduszek, Belsher, & Dhingra, 2014), development of antisocial personality disorder (Loeber, Burke, Lahey, Winters, & Zera, 2000), and increased risk for committing violent crimes (Hodgins, Cree, Alderton, & Mak, 2008). Further, CD co-occurs with illicit drug use, which imparts additional risk for poor outcomes, such as antisocial behavior and impulsivity (Dalwani et al., 2014). Importantly, while a diagnosis of CD is associated with illicit drug use and related problems, research indicates that continuous measures of CD symptoms (e.g. delinquency, aggression) have more robust associations with higher rates of substance use disorders (SUDs), more illicit drug use and abuse (Hayatbakhsh et al., 2008), and increased risk for long-term drug use and related problems (e.g., Pedersen, Mastekaasa, & Wichstrom, 2001; Fergusson, Horwood, & Ridder, 2007). Thus, it appears that as CD symptoms increase, so does associated illicit substance use; however limited research has examined *why* or *how* CD symptoms and illicit drug use are related in juvenile justice involved youth, which makes it unclear how best to intervene to reduce risks associated with CD symptoms and illicit drug use.

On one hand, attitudes towards illicit drug use are a prime potential mediator of the relationship between CD symptoms and illicit drug use. Youth with more CD symptoms likely have more positive attitudes towards drug use, compared to youth with fewer CD symptoms. For example, the Acquired Preparedness model posits that factors, such as personality traits, predispose individuals to develop specific beliefs, attitudes, and expectancies of their environment, such as positive attitudes or expectancies of substance use, which, in turn, increase the individual's risk for substance use (Smith & Anderson, 2001). Longitudinal research supports the Acquired Preparedness model (e.g., Settles, Cyders, & Smith, 2010), by which personality leads to beliefs about substance use and, ultimately, substance use. Additionally, previous research has supported that the onset of CD symptoms occurs prior to the onset of SUDs, further supporting attitudes towards illicit drug use as a potential mediator of the relationship between CD symptoms and illicit drug use (e.g., Guldager, Linneberg, & Hesse, 2012; Stone, Vander Stoep, & McCauley, 2016). Additionally, although there is limited research in juvenile justice involved youth populations, community youth literature indicates a positive relationship between illicit drug use attitudes and illicit drug use (e.g. Miller, Chomcynova, & Beck, 2009; Como-Lesko, Primavera, & Szeszko, 1994; Danseco, Kingery, & Coggeshall, 1999). Research also indicates that positive attitudes towards drug use in childhood precede onset of drug use (e.g. Fisher, Miles, Austin, Carmargo, & Colditz, 2007; Guller, Zapolski, & Smith, 2015; Wright, Fagan, & Pinchevsky, 2016). Identifying modifiable mechanisms in the CD symptoms and illicit drug use relationship in juvenile justice involved youth may aid in increasing positive treatment outcomes. Positive drug attitudes are a modifiable risk factor that could be targeted in order to reduce the effects of CD symptoms on illicit drug use. For example, one strategy

of motivational interviewing skills, identifying pros and cons of a behavior, can be used to identify youth's positive attitudes towards drug use, which could be impeding their motivation to change. Employing skills to challenge these positive attitudes would thus improve treatment outcomes.

On the other hand, illicit drug use may also mediate the relationship between CD symptoms and positive drug attitudes. Drugs of abuse provide a rewarding experience via the mesolimbic dopamine system (e.g. Huibing, Rosen, Ng, Rushlow, & Laviolette, 2014; Walker, Cates, Heller, & Nestler, 2015), with dopaminergic positive reinforcement, combined with learning processes (e.g. experiences) likely strengthening positive attitudes towards drug use (e.g. "drug use makes me creative"; Miller, Renn, & Lazowski, 2001). Additionally, youth with CD symptoms appear to have an altered neurological reward system, with research indicating that these youth have a heightened reward experience (Fairchild et al. 2009), further increasing the likelihood that youth with higher CD symptoms experience reward from drugs of abuse, and thus develop positive attitudes towards drug use. Intervening on drug use, particularly the rewarding experience of drug use, is one factor that can be targeted in order to reduce the impact that CD symptoms have on positive drug use attitudes. For example, contingency management, an incentive-based treatment for substance use, can be used to reward drug abstinence, with the goal of diminishing the reward of drug use. Although the data are somewhat limited in juvenile justice involved youth, there is preliminary evidence that combined contingency management and family engagement strategies within juvenile drug courts reduce drug use and improve outcomes for juvenile justice involved youth (Henggeler, McCart, Cunningham, & Chapman, 2012). At the same time, targeting drug use as a mechanism in the relationship between CD symptoms and positive drug use attitudes may better lend itself to prevention, rather than intervention strategies. For example, research indicates that school-based prevention programs, particularly those targeting social competence and using social norms approaches, show some efficacy in preventing drug use (see Faggiano et al., 2014 for a review).

Research, to-date, has yet to examine how CD symptoms might distally influence the relationship between illicit drug use attitudes and illicit drug use in juvenile justice involved youth. Determining the direction of this relationship has clinical implications, as it would inform where best to intervene to reduce the influence of CD symptoms on illicit drug use – i.e., should we target drug attitudes, illicit drug use itself, or both? Therefore, the goal of the current study was to provide the initial test of these models. We examined two alternative, although not mutually exclusive, models: 1) The relationship between CD symptoms and illicit drug use as mediated by positive attitudes toward illicit drug use and 2) the relationship between CD symptoms and positive attitudes toward illicit drug use as mediated by illicit drug use. Although our data are cross-sectional in nature, examination can supply initial evidence to support feasibility and viability of examining these models in subsequent temporal research, which would not be warranted without first establishing relationships using cross-sectional approaches.

2. Materials and Methods

2.1 Participants

Data were taken from existing charts of 305 juvenile justice involved youth who were detained and court ordered to complete a psychological assessment between 2009 and 2016. Youth completed integrated assessments and a subset of that data are included in the current report. Data were de-identified and analysis of these archival data was approved by the Institutional Review Board.

2.2 Materials

2.2.1 Demographics—Youth self-reported their age, gender (male or female), and race.

2.2.2 Conduct Disorder Symptoms—(CD symptoms) were assessed via the Youth Self-Report Conduct Problems Scale (Achenbach & Rescorla, 2001). The Youth Self-Report (YSR) is a self-report assessment in which youth rate themselves on various behavioral and emotional problems and competencies. Response options range from 0 (not true) to 2 (very often or often true) and scale scores are then converted to t-scores with corresponding percentiles. For the Conduct Problems scale, which we used to assessed CD symptoms (e.g., “I destroy things belonging to others,” “I don’t feel guilty after doing something I shouldn’t”), t-scores < 65 are considered to fall in the “normal” range, and increases in t-scores over 65 correspond with increases in symptom severity. Scores on the Conduct Problems scale show good correspondence with CD diagnoses (r=0.85; Collins, 2016). Additionally, the YSR has shown good reliability (Ebesutani, Berstein, Martinez, & Chorpita, 2011), has been validated for use in samples of juvenile justice involved youth (Vreugdenhil et al., 2006), and correlates well with personality measures of antisocial behavior (e.g., Krischer et al., 2007). This measure of CD symptoms was used as the independent variable in study analyses.

Conduct Disorder diagnosis (distinct from our measure of CD symptoms) was made by a licensed clinical psychologist conducting or supervising each youth’s assessment. Diagnoses were based on a structured clinical interview and YSR correspondence with DSM-IV-TR (American Psychiatric Association, 2000) or DSM-5 (American Psychiatric Association, 2013) Conduct Disorder diagnostic criteria (version used based on date of assessment; no changes to diagnostic criteria between versions of the DSM with the exception of the qualifier “with limited prosocial emotions”, which was not examined in the present study). CD diagnosis was used as a descriptive measure for the present study.

2.2.3 Illicit drug use and attitudes towards illicit drug use—Illicit drug use and attitudes towards illicit drug use were assessed through the Adolescent Substance Use Subtle Screening Inventory (SASSI-A2; Miller et al., 2001). The SASSI-A2 is a psychological screening questionnaire designed to help determine if an adolescent is in need of further assessment and possible treatment for having a substance use disorder (i.e., substance dependence or substance abuse). Results are provided as t-scores based on norms derived from an adolescent sample (mean age = 15, SD = 1.9) across addiction treatment centers, inpatient psychiatric hospitals, outpatient behavioral health facilities, and juvenile

corrections programs. The SASSI-A2 has demonstrated good validity, showing relationships with MMPI-A substance use scales (Choi et al., 2012), as well as good reliability (Perera-Diltz & Perry, 2011). The present study examined select scales of the SASSI-A2 relevant to the current study.

2.2.3.1 Illicit drug use: In order to investigate illicit drug use, the Face Valid Other Drugs (FVOD) scale of the SASSI-A2 was used, which assesses behaviors related to illicit drug use (e.g. "Taken drugs to improve your thinking and feeling", "Taken drugs so you could enjoy sex more"; Miller et al., 2001). The FVOD scale has shown high internal consistency (α = 0.95) and test-retest reliability (α = 0.92), and aids in correctly classifying adolescents with a drug use related disorder (Miller & Lazowski, 2001).

2.2.3.2 Illicit drug use attitudes: Illicit drug use attitudes were assessed through the SASSI-A2 Attitudes scale, which assesses youth's beliefs and attitudes towards illicit drug use (e.g. "Adults shouldn't hassle kids so much about drugs", "Drugs help people to be creative"; Miller et al., 2001). The Attitudes scale has been shown to have good reliability (α = 0.76; Miller et al., 2001; Perera-Diltz & Perry, 2011) and test-retest reliability (α = 0.92) and has been validated for use in discriminating between individuals with and without a SUD (Lewis & Mobley, 2010).

2.3 Procedure

Following involvement with the Juvenile Court (e.g. arrested, probation violation), youth in the present sample were referred to complete a court ordered psychological assessment. After referral, a licensed clinical psychologist or supervised doctoral student reported to the Juvenile Detention Center or the youth's current placement (e.g. residential facility, home) to complete the assessment. Clinicians conducted a structured clinical interview and administered an assessment battery, which included the YSR, SASSI-A2, and other measures unrelated to the present study. The clinician composed an integrated report for each youth, which was submitted to the Juvenile Court. Trained research assistants coded and de-identified the integrated reports for each youth. Institutional Review Board approval was received to analyze these de-identified data. An additional research assistant re-coded 20% of the data; there were no discrepancies found between coders.

2.4 Data Analysis Plan

First, we examined sample characteristics. Second, we examined two mediation models using Andrew Hayes' PROCESS macro (Hayes, 2013), controlling for age, gender, and race (dichotomized as "White" and "Non-White" to improve power). In the first model, CD symptoms was entered as the independent variable, illicit drug use was entered as the dependent variable, and positive attitudes toward illicit drug use was entered as the mediator. In the second model, CD symptoms was entered as the independent variable, positive attitudes toward illicit drug use was entered as the dependent variable, and illicit drug use was entered as the mediator.

3. Results

3.1 Descriptive Statistics

Of the 305 youth completing court-ordered psychological assessments, 245 were assessed for CD symptoms (using the YSR Conduct Problems scale), illicit drug use, and positive attitudes towards illicit drug use (both by using the SASSI-A2), making the final sample 245 youth (mean age = 15.46, SD = 1.30, range 12-18; 80.4% males; 22.04% White, 89.1% Black, 4.8% Hispanic or Latino, 6.06% multiracial youth). Youth that were not administered the YSR and SASSI-A2 were significantly younger ($t(303) = 2.65$, $p = .008$), more likely to be female ($\chi^2 = 4.20$, $p = .04$) and less likely to have a cannabis use disorder diagnosis ($\chi^2 = 11.39$, $p = .001$). Those that did and did not complete these measures did not differ significantly by race ($\chi^2 = 7.93$, $p = 0.24$) or other illicit drug use disorder diagnoses (e.g. stimulant use disorder; $\chi^2 = 0.02$, $p = 0.88$). The majority of the assessments were conducted at the juvenile detention center (85.3%), with others being conducted in the youth's current placement (e.g. residential treatment). Youth's had an average of 6.60 (SD = 4.12) criminal referrals to the court. Table 1 provides descriptive statistics for the final sample.

Of the 245 youth, 40.8% were diagnosed with CD, 42.9% were diagnosed with a cannabis use disorder, and 1.6% were diagnosed with another illicit drug use disorder (e.g. stimulant use disorder) by a licensed clinical psychologist. The average score on the Face Valid Other Drugs scale of the SASSI-A2 was 55.60 (SD = 12.10; range 6 – 96), the average score on the Attitudes scale of the SASSI-A2 was 51.41 (SD = 10.75; range 7 – 80), the average CD symptoms score from the YSR was 64.24 (SD = 10.01; range 50 – 97), and all scales were approximately normally distributed. Of youth scoring >70 (clinical range) on CD symptoms 54.7% were diagnosed with CD by a licensed clinical psychologist. CD symptoms (and not CD diagnosis) was used in study analyses due to its correspondence with DSM CD diagnoses and to capture variability in scores on conduct-related problems. Table 2 provides correlations among study variables.

3.2 Mediation Analyses

CD symptoms were significantly related to positive attitudes toward illicit drug use ($\beta = 0.38$, $p < .001$) and these positive attitudes were significantly related to illicit drug use ($\beta = 0.42$, $p < .001$). The indirect effect was significant ($\beta = 0.16$, CI 0.09 to 0.27; Test for indirect effect $z = 4.17$, $p < .001$; Figure 1, top). CD symptoms were significantly related to illicit drug use ($\beta = 0.56$, $p < .001$) and illicit drug use was significantly related to positive attitudes toward illicit drug use ($\beta = 0.37$, $p < .001$). The indirect effect was significant ($\beta = 0.20$, CI 0.12 to 0.32; Test for indirect effect $z = 4.87$, $p < .001$; Figure 1, bottom).

4. Discussion

Juvenile justice involved youth face a disproportionate amount of negative outcomes compared to their same age peers (e.g., Hershberger et al., 2016; Fazel et al., 2008), specifically negative outcomes related to drug use (e.g. Pedersen, Mastekaasa, & Wichstrom, 2001; Fergusson, Horwood, & Ridder, 2007), highlighting the need to better reduce and

prevent illicit drug use in this high risk group. The present study suggests that CD symptoms in juvenile justice involved youth impart risk for illicit drug in two ways: 1) indirectly, through the endorsement of more positive attitudes toward illicit drug use, and 2) directly, which then further strengthens positive attitudes toward illicit drug use. Overall, these findings suggest that in order to reduce the effect of CD symptoms in this high-risk group, interventions should target both illicit drug use itself and positive attitudes associated with such drug use. Further, given the limited financial and treatment resources of the juvenile justice system, and inconclusive evidence of the cost-effectiveness of other well-supported treatments of juvenile justice involved youth (Goorden et al., 2016), the present study suggests that providing targeted, and quite feasible, treatment aimed at changing positive attitudes and mitigating the rewarding experience of drug use could help diminish the impact of CD symptoms on substance use.

CD symptoms are related to illicit drug use symptomology in juvenile justice involved youth (Hayatbakhsh et al., 2008) and the current study is the first to suggest that this relationship is mediated by positive drug attitudes and likely contributes to positive drug attitudes. Although the present study was cross-sectional, we view these findings as a key first step in a program of research to determine how best to reduce the negative effects of CD symptoms for juvenile justice involved youth, which supports the future analysis of this work in prospective models. Current treatment options for juvenile justice involved youth are often time consuming and costly (Henggeler & Sheidow, 2012; Henggeler, 2003), and attempts to reduce illicit drug use in this high-risk sample have limited effectiveness (Watson, Greene, & Kelly, 2014; Grella, Hser, Joshi, & Rounds-Bryant, 2001). Treatments that target positive attitudes toward drug use in youth have resulted in reduced positive attitudes towards illicit drug use, alcohol use, and marijuana use (e.g., Mogro-Wilson, Letendre, Toi, & Bryan, 2015; Tebes et al., 2007). It thus seems reasonable that such treatments could be combined, adapted, and validated for use in juvenile justice involved youth in order to target both drug use and positive attitudes toward drug use. Such treatment targets should then be empirically tested to see if they reduce the negative effects of CD symptoms in this high-risk group. Given the harmful combination of CD symptoms and illicit drug use in these youth, any method that can reduce illicit drug use in this high-risk group could be of high clinical relevance.

The present study is unique in highlighting the importance of positive attitudes toward illicit drug use as both a potential mechanism for the relationship between CD symptoms and illicit drug use for juvenile justice involved youth, and an important outcome of illicit drug use in this group. However, there are some limitations to discuss. First, the present study is cross-sectional in nature and thus no causal conclusions can be made; however, we view this study as a requisite step in research aimed at mitigating CD symptom risk on illicit drug use and illicit drug use attitudes in juvenile justice involved youth and our findings suggest feasibility of devoting resources to more complex and intensive longitudinal studies. Next, the majority of the participants were male, thus present findings may not generalize to females. Also, present findings used scale scores that examined multiple factors that contribute to both illicit drug use (e.g. quantity, frequency, social problems) and positive attitudes toward illicit drug use. There may be differential relationships between specific factors underlying these constructs that went undetected in the present study. Further, illicit

drug use was examined in general; differing results could be discovered if specific types of SUDs are tested, although it is important to note a majority of the sample reported a cannabis use disorder. Additionally, there are other factors that are potentially important to the relationships assessed in the present study, including age of onset of illicit drug use and peer illicit drug use. Future studies should examine these variables as potential moderating factors to detect risk indicators, for example, as earlier age of onset of drug use could be related to a stronger positive relationship between CD symptoms and illicit drug use or illicit drug use and positive attitudes towards illicit drug use. It should also be noted that both the YSR and the SASSI-A2 are subject to self-report bias, especially in the context of a court-ordered psychological assessment when youth understand their answers will have an impact on the outcome of their current charges. At the same time, present findings were detected in light of this limitation. It should be noted that those youth not administered study measures were significantly younger than those youth included in the sample, thus findings may not generalize to younger juvenile justice involved youth.

5. Conclusion

It has been unclear how best to reduce negative outcomes associated with CD symptoms in juvenile justice involved youth. Overall, the current study provides initial evidence suggesting that positive attitudes toward illicit drug use both mediate the effects of CD symptoms on illicit drug use and are reinforced by illicit drug use in juvenile justice involved youth. This suggests the importance of targeting both illicit drug use and positive attitudes toward illicit drug use to reduce negative outcomes associated with CD symptoms in this high-risk group.

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References

Achenbach, TM., Rescorla, LA. Manual for the ASEBA School-Age Forms & Profiles. Burlington, VT: University of Vermont Research Center for Children, Youth, & Families (USA); 2001.

American Psychiatric Association. Diagnostic and statistical manual of mental disorders: DSM-IV-TR. Washington, DC: American Psychiatric Association; 2000.

American Psychiatric Association. Diagnostic and statistical manual of mental disorders: DSM-5. Washington, D.C: American Psychiatric Association; 2013.

Beck, JC., Wencel, H. Violent crime and axis 1 psychopathology. In: Skodol, AE., editor. Psychopathology and Violent Crime. Washington D.C: American Psychiatric Press; 1998. p. 1-28.

Boduszek D, Belsher R, Dhingra K. Psychosocial correlated of recidivism in a sample of ex-prisoners: The role of oppositional defiant disorder and conduct disorder. The Journal of Forensic Psychiatry & Psychology. 2014; 25(1):61–76.

Choi H, Kurtz EG, Proctor TB. Concurrent evidence for validity of the MMPI-A substance abuse scaled in a school setting. The International Journal of Educational and Psychological Assessment. 2012; 11(2):108–119.

Como-Lesko N, Primavera LH, Szeszko PR. Marijuana usage in relation to harmfulness ratings, perceived likelihood of negative consequences, and defense mechanisms in high school students. The American Journal of Drug and Alcohol Abuse. 1994; 20(3):301–315. [PubMed: 7977216]

Dalwani MS, Tregellas JR, Andrews-Hanna JR, Mikulich-Gilbertson SK, Raymond KM, Banich MT, Crowley TJ, Sakai JT. Default mode network activity in male adolescents with conduct and substance use disorder. Drug and Alcohol Dependence. 2014; 134:242–250. [PubMed: 24210423]

Danseco ER, Kingery PM, Coggeshall MB. Perceived risk of harm from marijuana use among youth in the USA. School Psychology International. 1999; 1999:20, 39–56.

Ebesutani C, Bernstein A, Martinez JI, Chorpita BF. The youth self report: Applicability and validity across younger and older youths. Journal of Clinical Child & Adolescent Psychology. 2011; 40(2): 338–346. [PubMed: 21391029]

Fairchild G, van Goozen SHM, Stollery SJ, Aitken MRF, Savage J, Moore SC, Goodyer IM. Decision making and executive functioning in male adolescents with early-onset or adolescence-onset conduct disorder and control subjects. Biological Psychiatry. 2009; 66(2):162–168. [PubMed: 19362293]

Faggiano F, Minozzi S, Versino E, Buscemi D. Universal school-based prevention for illicit drug use. The Cochrane Library. 2014

Fazel S, Doll H, Langstrom N. Mental disorders among adolescents in juvenile detention and correctional facilities: A systematic review and metaregression analysis of 25 surveys. Journal of the American Academy of Child & Adolescent Psychiatry. 2008; 47(9):1010–1019. [PubMed: 18664994]

Fergusson DM, Horwood JL, Ridder EM. Conduct and attentional problems in childhood and adolescence and later substance use, abuse and dependence: Results of a 25-year longitudinal study. Drug and Alcohol Dependence. 2007; 88(1):S14–S26.

Fisher LB, Miles IW, Austin B, Carmargo JCA, Colditz GA. Predictors of initiation of alcohol use among U.S. adolescents: Findings from a prospective cohort study. Archives of Pediatrics and Adolescent Medicine. 2007; 161:959–966. [PubMed: 17909139]

Goorden M, Schawo SJ, Bouwmans-Frijters CA, van der Schee E, Hendriks VM, Hakkaart-van Roijen L. The cost-effectiveness of family/family-based therapy for treatment of externalizing disorders, substance use disorders and delinquency: a systematic review. BMC psychiatry. 2016; 16(1):237. [PubMed: 27412612]

Grella CE, Hser YI, Joshi V, Rounds-Bryant J. Drug treatment outcomes for adolescents with comorbid mental and substance use disorders. Journal of Nervous and Mental Disease. 2001; 189(6):384–392. [PubMed: 11434639]

Guldager S, Linneberg IH, Hesse M. Order of age at onset for substance use, substance use disorder, conduct disorder and psychiatric illness. Mental Health and Substance Use. 2012; 5(2):73–84.

Guller L, Zapolski TCB, Smith G. Longitudinal test of a reciprocal model of smoking expectancies and smoking experience in youth. Psychology of Addictive Behaviors. 2015; 29(1):201–210. [PubMed: 25180556]

Hayatbakhsh MR, Najman JM, Jamrozik K, Al Mamun A, Bor W, Alati R. Adolescent problem behaviours predicting DSM-IV diagnoses of multiple substance use disorder, findings of a prospective birth cohort study. Social Psychiatry and Psychiatric Epidemiology. 2008; 43(5):356–363. [PubMed: 18301851]

Hayes, AF. Introduction to mediation, moderation, and conditional process analysis: A regression-based approach. Guilford Press; 2013.

Henggeler SW. Advantages and disadvantages of Multisystemic Therapy and other evidence-based practices for treating juvenile offenders. Journal of Forensic Psychology Practice. 2003; 3(4):53–59.

Henggeler SW, Sheidow AJ. Empirically supported family-based treatments for conduct disorder and delinquency in adolescents. Journal of Marital and Family Therapy. 2012; 38(1):30–58. [PubMed: 22283380]

Henggeler SW, McCart MR, Cunningham PB, Chapman JE. Enhancing the effectiveness of juvenile drug courts by integrating evidence-based practices. Journal of Consulting and Clinical Psychology. 2012; 80(2):264–275. [PubMed: 22309470]

Hershberger A, Zapolski T, Aalsma MC. Social support as a buffer between discrimination and cigarette use in juvenile offenders. Addictive Behaviors. 2016; 59:7–11. [PubMed: 27010849]

Hodgins S, Cree A, Alderton J, Mak T. From conduct disorder to severe mental illness: associations with aggressive behaviour, crime and victimization. Psychological Medicine. 2008; 38(7):975–987. [PubMed: 17988416]

Hopfer C, Salomonsen-Sautel S, Min S, McQueen M, Crowley T, Young S, Hewitt J. Conduct disorder and initiation of substance use: A prospective longitudinal study. Journal of the American Academy of Child and Adolescent Psychiatry. 2013; 52(5):511–518. [PubMed: 23622852]

Huibing T, Rosen LG, Ng GA, Rushlow WJ, Laviolette SR. NMDA receptor blockade in the prelimbic cortex activates the mesolimbic system and dopamine-dependent opiate reward signaling. Psychopharmacology. 2014; 231(24):4669–4679. [PubMed: 24871699]

Krischer MK, Sevecke K, Lehmkuhl G, Pukrop R. Dimensional assessment of personality pathology in female and male juvenile delinquents. Journal of Personality Disorders. 2007; 21(6):675–689. [PubMed: 18072868]

Lewis TF, Mobley AK. Substance abuse and dependency risk: the role of peer perceptions, marijuana involvement, and attitudes toward substance use among college students. Journal of drug education. 2010; 40(3):299–314. [PubMed: 21313988]

Loeber R, Burke JD, Lahey BB, Winters A, Zera M. Oppositional defiant and conduct disorder: A review of the past 10 years, part I. Journal of the American Academy of Child & Adolescent Psychiatry. 2000; 39(12):1468–1484. [PubMed: 11128323]

Miller, FG., Renn, WR., Lazowski, LE. Adolescent SASSI-A2 user's guide. Bloomington, IN: Baugh Enterprises; 2001.

Miller, FG., Lazowski, LE. The adolescent SASSI-A2 manual: Identifying substance use disorders. Springville, IN: The SASSI Institute; 2001.

Miller P, Chomcynoca P, Beck F. Predicting teenage beliefs concerning the harm alcohol and cannabis use may do in eight European countries. Journal of Substance Use. 2009; 14(6):364–374.

Mogro-Wilson C, Letendre J, Toi H, Bryan J. Utilizing mutual aid in reducing adolescent substance use and developing group engagement. Research on Social Work Practice. 2015; 25(1):129–138.

Pedersen W, Mastekaasa A, Wichstrom L. Conduct problems and early cannabis initiation: a longitudinal study of gender differences. Addiction. 2001; 96(3):415–431. [PubMed: 11255582]

Perera-Diltz DM, Perry JC. Screening for adolescent substance-related disorders using the SASSI-A2: Implications for nonreporting youth. Journal of Addictions & Offender Counseling. 2011; 31(2): 66–79.

Prinz RJ, Kerns SEU. Early substance use by juvenile offenders. Child Psychiatry and Human Development. 2003; 33(4):263–277. [PubMed: 12723900]

Settles RF, Cyders M, Smith GT. Longitudinal validation of the acquired preparedness model of drinking risk. Psychology of Addictive Behaviors. 2010; 24(2):198–208. [PubMed: 20565146]

Smith, GT., Anderson, KG. Adolescent risk for alcohol problems as acquired preparedness: A model and suggestions for intervention. In: Monti, PM.Colby, SM., O'Leary, TA., editors. Adolescents, alcohol, and substance abuse: Reaching teens through brief interventions. New York, NY: Guilford Press; 2001. p. 109-141.

Stone AL, Vander Stoep A, McCauley E. Early onset substance use in adolescents with depressive, conduct, and comorbid symptoms. The Journal of Early Adolescence. 2016; 36(6):729–753.

Tebes JK, Feinn R, Vanderploeg JJ, Chinman MJ, Shepard J, Brabham T, Genovese M, Connell C. Impact of a positive youth development program in urban after-school settings on the prevention of adolescent substance use. Journal of Adolescent Health. 2007; 41(3):2239–247.

Teplin LA, Abram KM, McClelland GM, Dulcan MK, Mericle AA. Psychiatric disorders in youth in juvenile detention. Archives of General Psychiatry. 2002; 59(12):1133–1143. [PubMed: 12470130]

Vreugdenhil C, van den Brink W, Ferdinand R, Wouters L, Doreleijeres T. The ability of YSR scales to predict DSM/DISC-C psychiatric disorders among incarcerated male adolescents. European Child & Adolescent Psychiatry. 2006; 15(2):88–96. [PubMed: 16463011]

Walker DM, Cates HM, Heller EA, Nestler EJ. Regulation of chromatin states by drugs of abuse. Current Opinion in Neurobiology. 2015; 30:112–121. [PubMed: 25486626]

Watson JA, Greene MC, Kelly JF. Outpatient alcohol and drug treatment for adolescents with co-occuring conduct disorder. Alcoholism Treatment Quarterly. 2014; 32(4):393–415.

Wilson JJ, Rojas N, Haapanen R, Duxbury E, Steiner H. Substance abuse and criminal recidivism: A prospective study of adolescents. Child Psychiatry and Human Development. 2001; 31(4):297–312. [PubMed: 11227989]

Wright EM, Fagan AA, Pinchevsky GM. Penny for your thoughts? The protective effect of youths' attitudes against drug use in high-risk communities. Youth Violence and Juvenile Justice. 2016; 14(2):110–129.

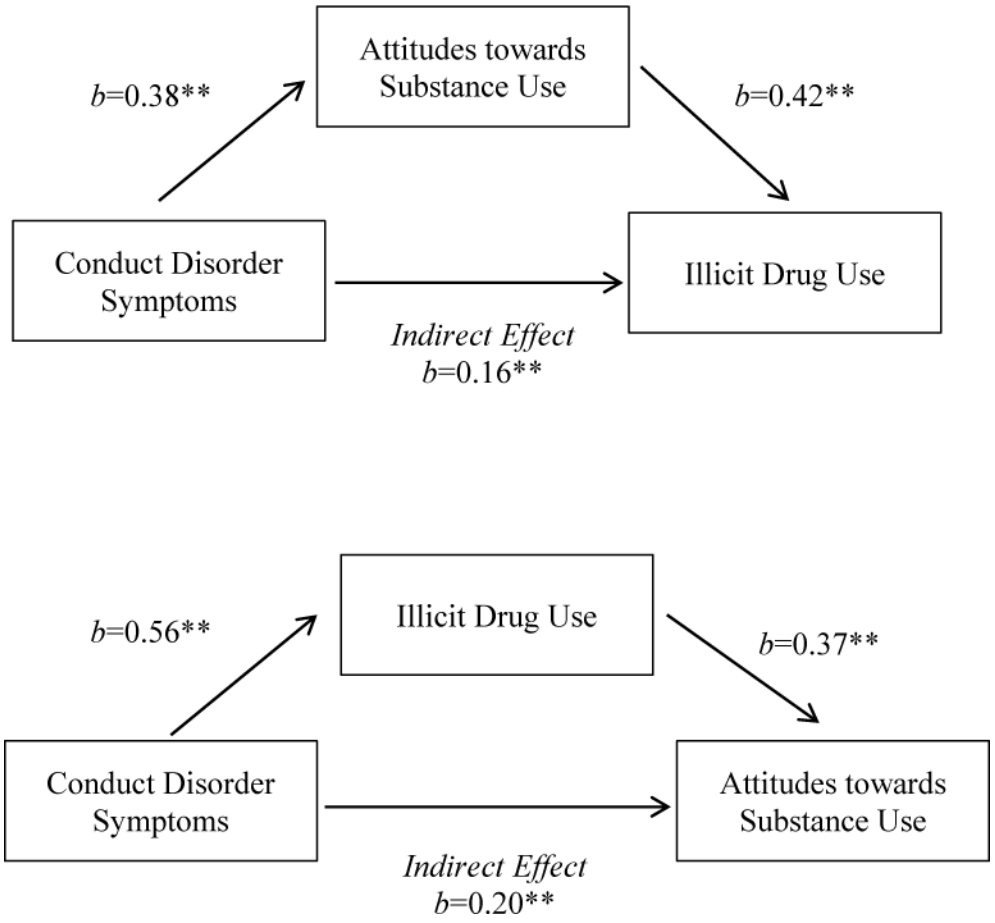

Figure 1.

Results of mediation models run using Andrew Hayes process macro (Hayes, 2013), controlling for age, gender, and race. Top: Results indicated that the indirect effect of CD symptoms on illicit drug use through positive attitudes toward illicit drug use was significant ($\beta = 0.16$, CI 0.09 to 0.27; Test for indirect effect $z = 4.17$, $p < .001$). Bottom: Results indicated that the indirect effect of CD symptoms on positive attitudes toward illicit drug use through illicit drug use was significant ($\beta = 0.20$, CI 0.12 to 0.32; Test for indirect effect $z = 4.87$, $p < .001$).

Table 1

Sample descriptives

For mean age, scores on the SASSI-A2 Face Valid Other Drug scale (illicit drug use scale), attitudes scale (illicit drug use attitude scale), and CD Symptoms (assessed using the Youth Self-Report (YSR) CP scale), independent t-tests were conducted to examine differences by gender and race. For cannabis use disorder diagnosis, other illicit drug use disorder (e.g. stimulant use disorder), and conduct disorder diagnosis, chi-square tests of independence were conducted to examine diagnoses by gender and race. Racial make-up of non-white group: 89.1% Black, 4.8% Hispanic or Latino, 6.06% Multiracial; *p*'s interpreted at the $p < .05$ level (significant values bolded).

	Total sample (N=245)	Boys (N=197)	Girls (N=48)	Test statistic	*p*	White (N=54)	Non-White (N=178)	Test statistic	*p*
Age mean (SD)	15.46 (1.29)	15.58 (1.23)	14.98 (1.42)	2.92	**.004**	15.83 (1.15	15.38 (1.33)	2.28	**.02**
Illicit drug use scale	55.60 (12.10)	55.93 (12.45)	54.25 (10.58)	0.86	.39	57.89 (13.05)	54.98 (11.89)	1.54	.13
Illicit drug use attitudes scale	51.41 (10.75)	50.93 (10.52)	53.40 (11.55)	−1.43	.15	50.15 (10.12)	51.74 (11.05)	−0.94	.35
CD Symptoms	64.24 (10.01)	63.86 (9.76)	65.81 (10.93)	−1.22	.23	63.15 (9.72)	64.56 (10.29)	−0.90	.37
Cannabis Use Disorder % (N)	42.9 (105)	45.18 (89)	33.33 (16)	2.21	.14	40.74 (22)	42.27 (76)	0.07	.80
Other illicit drug use disorder % (N)	1.6 (4)	2.03 (4)	–	0.99	.32	3.7 (2)	1.12 (2)	1.63	.20
Conduct Disorder % (N) Diagnosis	40.8 (100)	43.65 (86)	29.17 (14)	3.35	.07	29.63 (16)	46.07 (82)	4.59	**.03**

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Table 2

Correlations between study variables

Correlations between scores on the Illicit drug use (SASSI-A2 Face Valid Other Drug scale), Illicit drug use attitudes (SASSI-A2 Attitudes scale), CD Symptoms (assessed using the Youth Self-Report Conduct Problems scale), Conduct Disorder diagnosis, Cannabis Use Disorder diagnosis.

	Other illicit drug use disorder[a]	Conduct Disorder diagnosis	Illicit drug use	Illicit drug use attitudes	Conduct Disorder symptoms
Cannabis use disorder[a]	0.02	0.20*	0.30***	0.19**	0.15*
Other illicit drug use disorder[a]		0.09	0.18**	0.07	0.06
Conduct disorder diagnosis			0.12	0.13*	0.21**
Illicit drug use				0.45***	0.40***
Illicit drug use attitudes					0.36***

[a]point bi-serial correlations reported;

*$p < .05$;

**$p < .01$;

***$p < .001$