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Alcohol Use and Sexual Risk Behaviors among Adolescents with Psychiatric Disorders: A Systematic Review and Meta-Analysis

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Abstract

Adolescents with psychiatric disorders appear to be at increased risk for acquiring HIV and other sexually transmitted infections; however, little is known about the prevalence of behavioral risk factors in this population. This meta-analysis aimed to assess the prevalence of alcohol use and sexual risk behaviors among adolescents with psychiatric disorders. Electronic database searches identified studies sampling adolescents diagnosed with psychiatric disorders and assessing both alcohol and sexual risk behaviors. Fourteen studies sampling 3,029 adolescents with psychiatric disorders were included. The majority of adolescents with psychiatric disorders report alcohol use and sexual risk behaviors. Risk reduction interventions targeting these two behaviors are needed.

Keywords

adolescents; psychiatric disorders; alcohol; sexual behaviors; meta-analysis

Adolescents account for 50% of all newly diagnosed STIs, although they only account for 25% of the sexually active population (Centers for Disease Control and Prevention, 2016). Factors that place adolescents at greater risk of STIs include an early sexual debut, inconsistent use of condoms, and the use of alcohol or drugs before sex (Centers for Disease Control and Prevention, 2016). Although adolescents' as a whole are at risk, specific subpopulations are particularly vulnerable. Recent research has highlighted that adolescents

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living with psychiatric disorders (PD) may be a uniquely vulnerable group for engaging in sexual risk behaviors and subsequent negative consequences (Brown, Danovsky, Lourie, DiClemente, & Ponton, 1997).

Approximately one in five adolescents living in the United States will experience a PD, and the rates of PD are increasing with the majority experiencing an anxiety (e.g., generalized anxiety) or behavioral disorder (e.g., oppositional defiant), followed by a mood (e.g., major depression) or substance use disorder (e.g., alcohol dependence; Merikangas et al., 2010). Growing evidence suggests that adolescents living with a PD—specifically those with mood or behavioral disorders—are at increased risk for engaging in sexual risk behaviors including unprotected sex, having multiple sex partners, and early onset of sex (Booth & Zhang, 1997; Shrier, Walls, Lops, Kendall, & Blood, 2012). The social and cognitive vulnerabilities that result from PD may influence the uptake of sexual risk behaviors (Donenberg et al., 2012; Reyna & Farley, 2006; Scott-Sheldon & Johnson, 2013); however, other behavioral factors such as co-occurring alcohol use might also contribute to this group's increased risk.

Alcohol has been shown to be a prominent risk factor for sexual risk behaviors among several groups, including adolescents (Deas, 2006). Alcohol myopia theory—a primary theory accounting for this association—posits that alcohol use facilitates social interactions and behavioral disinhibition, thus increasing the likelihood of sexual activity and risk (Patrick, Maggs, & Lefkowitz, 2015; Steele & Josephs, 1990). Adolescents with a PD who consume alcohol appear even more likely to engage in sexual behavior. This increased likelihood of sexual activity may be due to the influence of alcohol compounding self-regulatory difficulties commonly found in individuals with PD (Brown, Danovsky, et al., 1997; Reyna & Farley, 2006; Smith, 2001). In addition, unique factors associated with treatment and severity of PD (e.g., treatment settings) and common factors (e.g., gender) may also influence prevalence and impact of these behaviors.

Taken together, the global alcohol-sexual risk behavior association is a common finding in the literature; however, subgroup differences may result in differing strength of this association (Shuper et al., 2010). Research findings suggest that adolescents living with PD are at increased risk for alcohol use, sexual risk behaviors, and STIs; however, a full examination of the prevalence of alcohol use, sexual risk behaviors, and STI/HIV among adolescents with a PD and the association among these factors has not been fully explored. Previous reviews have identified adolescents with PD as vulnerable to engaging in sexual risk behavior (Brown, Danovsky, et al., 1997; Donenberg, 2005), but these reviews have (a) broadly focused on HIV risks and (b) used narrative reviewing methods rather than meta-analytic methodology. Furthermore, these reviews are now dated and will benefit from the increase in the size and quality of the empirical literature. As such, the aims of the current review are to (1) assess the prevalence of alcohol use and sexual risk behaviors among adolescents with clinically diagnosed PD, (2) examine factors associated with the prevalence of alcohol and sexual risk behaviors across studies, and (3) evaluate the strength of the alcohol-risky sex association. In order to assess both prevalence and strength of the alcohol-sexual risk behavior association we conducted a meta-analytic review of the literature

assessing both alcohol use and sexual risk behaviors among adolescents (age 10 to 19) with clinically diagnosed PD.

METHODS

The systematic review and meta-analysis was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses ([PRISMA]; Moher, Liberati, Tetzlaff, & Altman, 2009).

Information Sources and Search Strategy

Studies were retrieved from electronic bibliographic databases (*PsycINFO*, *PubMed*, *ERIC*, *The Cochrane Library*, *CINAHL*, *Web of Science*, *Global Health*, *ProQuest Dissertation & Theses*, and *CORK*) using a Boolean search strategy. The search string was developed with the assistance of a medical librarian. The searches consisted of these broad search terms: alcohol use, sex, HIV, STI, and PD. Search terms were modified using guidelines specified for each database searched. For example, the following search terms were used in *PubMed*: (binge drinking OR (binge AND (alcohol OR ethanol)) OR alcohol drinking OR alcohol abuse OR alcoholic OR alcohol OR “alcohol-related disorders”[MeSH] OR alcoholism OR intoxicat* OR drunk*) AND (“sexually transmitted diseases”[Mesh] OR “sexually transmitted” [tiab] OR STI OR STD OR AIDS[sb] OR condom OR unsafe sex OR sexual behavior OR (risk OR risk taking OR risk factor*) AND (sex OR sexu* OR sexual behavior)) AND (“mental illness” or “severe mental illness” or “mentally ill” or “psychiatric disorders” or “severely mentally ill”). No age or language restrictions were imposed. Relevant studies were also located by reviewing reference sections of relevant reviews and included studies. The search was finalized in February 2015 to ensure the inclusion of all studies available through December 2014.

Eligibility Criteria and Selection of Studies

Studies were included if the study sampled (a) adolescents (ages 10 to 19) diagnosed with a PD, defined as a mental health problem that has a substantial impact on an individual’s ability to function socially, academically, and emotionally (Heger et al., 2014; Merikangas et al., 2010), (b) assessed alcohol use, and (c) assessed sexual risk behaviors (e.g., sexual activity, condom use, number of partners). Our search identified 2,540 reports. Records (2,303) were excluded because they did not meet the inclusion criteria and, in one case, because we did not have the expertise to translate the study (Tabrizi, Vatankehah, & Tabrizi, 2009). Of the remaining 237 studies, 188 were excluded because they sampled adults. The remaining 14 studies (and 35 supplemental manuscripts) sampled adolescents with PD and were included in this meta-analysis (Figure 1).

Coding and Reliability

Two trained coders extracted study information (e.g., publication year), sample characteristics (e.g., sex, ethnicity, age), risk characteristics (e.g., age at sexual debut, alcohol use), and mental health information (e.g., clinically diagnosed disorders, treatment setting). Methodological quality of the individual studies was assessed using items (e.g., appropriateness of study design, sampling method) adapted from validated measures (Downs

& Black, 1998; Fowkes & Fulton, 1991; Miller et al., 1995). The mean percent agreement between coders was 76% (mean kappa = 0.48) for categorical variables and for continuous variables, the mean interclass correlation was 0.85, signifying moderate coding agreement. Coding discrepancies between the two independent coders were resolved through discussion and, due to the moderate reliability; a further review of the manuscript content was conducted with a code reviewer and the principal investigator of the project.

Study Outcomes

Outcomes included the prevalence of alcohol use, sexual activity, and sexual risk behaviors. *Alcohol use* included lifetime and current (i.e., prior 6 months) alcohol use and alcohol abuse and/or dependence. *Sexual activity* included ever or recently (i.e. prior 6 months) sexually active. *Sexual risk behaviors* included (a) multiple partners (e.g., 2 partners), (b) ever used a condom use, (c) consistent condom use, (d) condom use during the last sexual encounter, and (e) history of a STI.

Effect Size Calculations

Prevalence estimates (proportions) for alcohol use, sexual activity, and sexual risk behaviors were extracted from each study by two independent coders. Proportions represent the number of study participants out of the total number of study participants or the total number of sexually active participants for sexual risk behaviors who engaged in alcohol use, sexual activity, and sexual risk-taking. For studies with longitudinal or intervention designs, the prevalence was estimated from the baseline data. The analyses used were conducted using logits.

Data Analyses

The overall weighted mean (logits) effect size (and 95% confidence intervals), using random-effects assumptions, were calculated for each outcome. The homogeneity statistic, Q , was also computed to determine whether the effect sizes (logits) estimated a common population mean. We quantified the inconsistency across studies using the I^2 index and 95% confidence interval (Higgins & Thompson, 2002; Huedo-Medina, Sanchez-Meca, Marin-Martinez, & Botella, 2006). The I^2 index is the proportion of variability in the weighted mean (logits) effect sizes due to heterogeneity vs. sampling error. The weighted mean (logits) effect sizes were transformed back to prevalence estimates (proportions) to ease interpretation of the findings.

Predictor Analyses—Meta-regression analyses, using random-effects assumptions, were conducted to assess the effects of the hypothesized predictors of alcohol use, sexual risk behaviors, and STIs. Given the variability in the specificity of diagnoses reported across studies, broader diagnostic categories (e.g., mood disorders) were used in analyses. Predictors included the proportion of participants out of the total number diagnosed with a mood disorder and attention-deficit and disruptive disorders (e.g., ADHD, conduct disorder). Additional predictors included gender, mean age, ethnicity and setting. Analyses for continuous predictors (i.e., proportion female, mean age, proportion White, proportion diagnosed with a mood disorder or attention-deficit and disruptive disorders) and categorical moderators (setting: 1 = inpatient, 0 = outpatient) were conducted using published macros

(Harbord & Higgins, 2008; Lipsey & Wilson, 2001). Meta-regression was also used to test the association between alcohol use, sexual risk behaviors and STIs. Meta-regression analyses were only completed using outcomes with sufficient studies (i.e., > 5).

RESULTS

Table 1 provides a description of the 14 studies. Details regarding the study characteristics, methodological quality, and sample are summarized below.

Study Characteristics

Thirteen of the 14 studies were published in peer-reviewed journals (93%) between 1994 and 2014; data collection occurred between 1989 and 2008. Most studies (79%) were supported by a federal grant. All studies were conducted in the U. S.: northeast (4), south (4), midwest (2), west (1), and multiple regions (3). Samples were primarily recruited through clinical settings (86%; 43% inpatient, 36% outpatient, 7% both). One study recruited from community and juvenile and social agencies and another recruited from a juvenile detention facility. Psychiatric diagnoses were based on the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV; American Psychiatric Association, 1994, [8 studies]) or the DSM-III Revised (American Psychiatric Association, 1987, [2 studies]); four studies did not report this information. An intervention was evaluated in five of the 14 studies; three assessed a behavioral risk reduction intervention compared to a control condition, one included a single-group pilot behavioral intervention, and one assessed the effects of fluoxetine hydrochloride with or without cognitive behavioral therapy for major depressive, conduct, and substance use disorders. Only the baseline data from these studies were used in the analysis.

Methodological Quality

The methodological quality for the studies was assessed using 8 items derived from validated methodological quality rating scales (Downs & Black, 1998; Fowkes & Fulton, 1991; Miller et al., 1995). Studies satisfied an average of 66% ($SD = 0.11$) of the methodological quality criteria, indicating moderate to strong methodological quality. All studies described the objective of the study and used a design (e.g., cross-sectional surveys, randomized controlled trial) that was appropriate for the stated objective. We were unable to determine if the samples recruited for the study were representative of the population in 12 of the 14 studies or if a random sample of participants was selected in 13 of the 14 studies. Objective measures were used in four of the 14 studies; all studies used accurate (i.e., reliable and valid) self-report measures. All studies used statistical methods that were appropriate for their design.

Sample Characteristics

Only adolescents ($N = 3,029$) with a diagnosed PD were included in the analyses. Study samples were on average 53% female with a mean age of 15 years ($SD = 0.75$; range = 14 to 17); predominately White (56%) or non-African Black (41%; $k = 11$) with 8% identified as Latino/Latina ($k = 10$). The remaining participants were Asian (2%), Pacific Islander (2%), and American Indian (1%). Most adolescents were sexually active (69%), and of the four

studies reporting age at sexual debut, adolescents were on average 14 years of age (SD = 0.42) at the time of their first sexual encounter. Of the two studies reporting sexual orientation, 92% and 3% of adolescents self-identified as heterosexual and bisexual, respectively.

Psychiatric Diagnoses of the Samples

Of the samples for which psychiatric diagnosis data were provided, 21% had some type of anxiety disorder (e.g., 10% PTSD), 55% had some type of mood disorder (e.g., 52% major depressive disorder; 2% bipolar disorder), 40% had some type of attention deficit or disruptive behavior disorder (e.g., 32% conduct disorder, 26% ADHD), and 3% had some type of psychotic disorder. A single study reported that 22% of their sample was diagnosed with a personality disorder (Cropsey, Weaver, & Dupre, 2008). Three studies reported that 100% of their samples had emotional and behavioral problems (Aruffo, Gottlieb, Webb, & Neville, 1994), severe emotional disturbance (Bryant, Garrison, Valois, Rivard, & Hinkle, 1995), or mood and/or psychotic disorders (Teplin et al., 2005). For studies that allowed participants to carry multiple diagnoses, each diagnosis was counted separately in totals.

Prevalence of Alcohol Use, Sexual Risk Behaviors, and STIs

The weighted mean prevalence estimates of alcohol use, sexual risk behaviors, and STIs among adolescents with a PD are found in Table 2. Most adolescents reported lifetime alcohol use (78%; 95% CI = 35, 96), and many were current users (36%; 95% CI = 19, 58). On average, 24% also met criteria for alcohol abuse and/or dependence (95% CI = 7, 58). Most adolescents reported ever being sexual active (70%; 95% CI = 44, 88) and 49% (95% CI = 17, 82) reported current sexual activity. Regarding sexual risk behaviors, 41% reported two or more recent sexual partners (41%; 95% CI = 17, 70), 21% reported four or more recent sexual partners (95% CI = 4, 66), and 23% reported four or more lifetime sexual partners (95% CI = 3, 75). On average, approximately half of the sexually active adolescents reported ever using a condom (51%; 95% CI = 20, 81) and 43% (95% CI = 12, 81) reported consistent condom use. For studies assessing condom use at last sex event ($k=7$), 60% (95% CI = 23, 78) reported condom use at their last sexual encounter. Of the five studies assessing STIs, 15% (95% CI = 3, 50) of the patients self-reported a lifetime STI. A single study ($k=2$) tested adolescents for STIs; 9% of those sub-samples were diagnosed with a STI (95% CI = 1, 72).

Predictors of Alcohol Use, Sexual Activity, and Sexual Risk Behavior

Meta-regression was used to examine whether sample characteristics (i.e., proportion women, age [continuous and categorical (14 years vs. 15 years)], proportion White, proportion with mood disorders, proportion with attention-deficit and disruptive behavior, and study setting [inpatient vs. outpatient]) was associated to the variability in prevalence estimates. Due to the limited number of studies, meta-regression analyses were conducted only for alcohol use (current, lifetime), alcohol abuse/dependence, lifetime sexual activity, proportion condom use, multiple sexual partners, and self-reported STIs (see Table 3).

Alcohol use—Lifetime alcohol use was more prevalent among studies conducted in outpatient (73%; 95% CI = 69, 77; $k=3$) compared to inpatient settings (55%; 95% CI = 51,

59, $k = 1$), $Q_B(1) = 36.45$, $p < .001$. Current alcohol use was more prevalent in studies conducted in inpatient (40%; 95% CI = 29, 52; $k = 5$) compared to outpatient settings (25%, 95% CI = 17, 36; $k = 4$), $Q_B(1) = 3.86$, $p = .005$. None of the other potential moderators explained variability in prevalence estimates for lifetime or current alcohol use ($ps > .05$).

Alcohol abuse and/or dependence—A diagnosis of alcohol abuse and/or dependence was more prevalent among studies that sampled a greater proportion of Whites ($B = 4.64$, $p = .003$, $k = 5$). Alcohol abuse and/or dependence was more prevalent among adolescents aged 15 years (33%; 95% CI = 21, 48; $k = 3$) compared to adolescents aged 14 years (15%; 95% CI = 8, 26, $k = 2$), $Q_B(1) = 4.57$, $p < .05$. Proportion women, mean age, proportion with mood disorder, proportion with attention-deficit and disruptive behaviors, and setting did not moderate the variability in prevalence estimates for alcohol abuse/dependence ($ps > .05$).

Sexual activity—Lifetime sexual activity was more prevalent in studies that sampled older adolescents ($B = 0.76$, $p = .003$, $k = 13$) and among adolescents aged 15 years (79%; 95% CI = 66, 88; $k = 5$) compared to adolescents aged 14 years (64%; 95% CI = 53, 73, $k = 9$), $Q_B(1) = 3.78$, $p = .05$. Lifetime sexual activity was also more prevalent when studies included a higher proportion of adolescents with mood disorders ($B = 2.02$, $p = .03$, $k = 10$). Proportion women, proportion White, proportion with attention-deficit and disruptive behaviors, and setting did not moderate the variability in prevalence estimates for lifetime sexual activity ($ps > .05$).

Condom use—The proportion of adolescents using condoms was higher in studies conducted in outpatient (80%; 95% CI = 75, 84; $k = 1$) compared to those conducted in inpatient settings (41%, 95% CI = 52, 86; $k = 4$), $Q_B(1) = 58.49$, $p < .001$. Condom use at the last sexual event was more prevalent among adolescents aged 14 years (66%; 95% CI = 49, 80; $k = 4$) compared to adolescents aged 15 years (34%; 95% CI = 18, 53, $k = 3$), $Q_B(1) = 5.42$, $p < .05$. Proportion women, mean age, proportion White, proportion with mood disorder, and proportion with attention-deficit and disruptive behaviors was not a significant moderator of the proportion of participants who used condoms or condom use at the last sex event ($ps > .05$).

Multiple partners—The proportion women, mean age, proportion White, proportion with mood disorder, and proportion with attention-deficit and disruptive behaviors did not moderate the number of sexual partners ($ps > .05$). There were no differences in the proportion of participants with multiple sexual partners by setting or age group (15 vs. 14 years of age).

Self-reported STIs—Self-reported STIs were more prevalent in studies that sampled more women ($B = 3.16$, $p = .05$, $k = 5$) and fewer Whites ($B = -3.16$, $p = .01$, $k = 5$). Age, proportion with mood disorder, proportion with attention-deficit and disruptive behaviors, and setting was not a significant moderator of self-reported STIs ($ps > .05$).

Association between Alcohol, Sex, and HIV/STI

Only a single study assessed the association between alcohol consumption (yes, no) and sexual behaviors/STIs ([yes/no]; Brown et al., 2010). Alcohol use was associated with sexual activity (OR = 4.39; 95% CI = 2.99, 6.45) and unprotected sex at the last sex event (OR= 1.66, 95% CI = 1.09, 2.52), but not STIs (OR = 0.62; 95% CI = 0.33, 1.15).

DISCUSSION

This is the first meta-analysis to assess the prevalence of alcohol use, sexual risk behaviors, STIs, and their association among adolescents with a PD. Our meta-analysis shows that (a) adolescents with a PD report high rates of alcohol use, sexual activity, and sexual risk-taking and (b) these prevalence rates differ as a function of sex, age, racial/ethnic minority status, and treatment setting.

The prevalence of lifetime alcohol use (78%) among adolescents with a PD was found to be higher than rates found in other representative national sample of U.S. adolescents (45%-63%); however, the prevalence of current alcohol use was similar to national estimates (22%-33%) (Kann et al., 2016; Johnston, Miech, O'Malley, Bachman, & Schulenberg, 2016). Moderator tests indicate that lifetime use was more prevalent in studies that sampled adolescents in outpatient settings, but current alcohol use was more prevalent in studies that sampled adolescents in inpatient settings. These setting differences may reflect differences in the severity of illness; including comorbidity (cf. Berkson's bias; Berkson, 1946; Du Fort, Newman, & Bland, 1993). Motivations for drinking (e.g., social vs. coping) may also differ among adolescents being seen in an outpatient (vs. inpatient) setting (cf. Kuntsche, Knibbe, Engels, & Gmel, 2010). Because the available studies did not consistently assess (or report) on drinking motives or severity of PD, future research to investigate these hypotheses is encouraged.

The prevalence of alcohol abuse and/or dependence (24%) was high among adolescents with PD. Results from a national sample of U.S. adolescents aged 12-17 suggests a prevalence of approximately 5% for alcohol or illicit drug dependence/abuse in the past year (Substance Abuse and Mental Health Services Administration, 2014); however, direct comparisons cannot be made given the current study's slightly older sample. Diagnoses of alcohol abuse and/or dependence were more common when studies sampled a higher proportion of White and older adolescents (> 15 years of age). Relative to other racial or ethnic groups, White youth report higher levels of alcohol use during mid- and late-adolescence making them more likely to meet criteria for abuse or dependence (Chen & Jacobson, 2012). Additionally, typical age of onset for substance use disorders is 15 years old (Merikangas et al., 2010). Our findings reflect these overall patterns.

A significantly high proportion (69%) of adolescents reported ever having sex, with a sizeable subset reporting having had multiple sexual partners in their lifetime (2 or more: 39% and 4 or more: 22%). All of these rates are higher than those observed in the general adolescent population (41% report ever having sex and, of these, only 11% report > 4 sexual partners in their lifetime; Kann et al., 2016). Adolescents with mood disorders were more likely to report lifetime sexual activity and having had four or more sexual partners. This is

consistent with the evidence suggesting that adolescents with mood disorders tend to engage in more sexual risk behaviors (e.g., early initiation) compared to adolescents without a mood disorder (Nijjar, Ellenbogen, & Hodgins, 2014), perhaps in an effort to cope with negative emotions (Cooper, Agocha, & Sheldon, 2000; Langer & Tubman, 1997; Tubman, Gil, Wagner, & Artigues, 2003).

Prevalence of reported condom use varied across studies depending on its measurement. For studies that assessed lifetime condom use, approximately 50% of these study participants reported using condoms and 43% reporting consistent condom use. When studies asked about condom use at last sex, approximately 60% of adolescents reported using a condom at their last sexual encounter. Unlike the previously reported risk behaviors, condom use during the last sex event was similar to the national average of 57% (Kann et al., 2016); however, this prevalence varied depending on contextual factors. More participants reported using condoms in studies that sampled from outpatient (80%) vs. inpatient (41%) settings. Again, treatment setting may reflect differences in symptom severity. Adolescents in outpatient settings may have more resources (e.g., cognitive capacity) that enable them to use condoms during sex (DiClemente & Ponton, 1993). Condoms may also be more readily accessible to adolescents in outpatient (vs. inpatient) settings. Finally, studies that sampled younger adolescents (aged < 14 years) had higher prevalence rates of condom use during the last sex event (66% vs. 33%). Younger adolescents (who are often less sexually experienced) generally report more consistent condom use compared to older adolescents (Bonar et al., 2015).

Few studies reported on STIs, and only two studies used laboratory tests to document the prevalence of STIs. Self-reported STIs were more prevalent in studies that sampled more females and studies that sampled fewer Whites. These findings corroborate prior research showing that females report more STIs and Whites have lower prevalence of STIs compared to non-Whites (Bonar et al., 2015; Bonar et al., 2014). More research is needed to establish the prevalence of STIs in adolescents with a PD and to confirm self-reported rates biologically. Nonetheless, our meta-analysis provides evidence that adolescents with a PD engage in high-risk behaviors that put them at risk for STIs, including HIV.

Only a single study examined the association between alcohol use and sexual risk behaviors or HIV/STIs (Brown et al., 2010). They found that adolescents with PD who endorsed recent alcohol use (i.e. last 30 days) were also more likely to endorse sexual activity and unprotected last sex. This pattern did not hold for the presence of a current STI. Additional research assessing alcohol use, sexual risk behaviors, and STIs among adolescents living with a PD is needed to better elucidate this association.

Limitations

There are five limitations of this meta-analysis. First, studies were primarily identified using electronic databases. Thus, manuscripts that did not contain indicated keywords could have been omitted from the meta-analysis. Second, we identified a small number of studies, which may limit the generalizability of the findings. The limited number of studies also significantly limited our ability to evaluate associations between variables of interest. Additional research on the association between alcohol and sexual risk behaviors is needed

within this population. Third, our analyses were limited due to the non-assessment and/or inconsistent reporting of alcohol, sexual, STIs, and PD information across studies. Primary level studies should assess and report specific alcohol use and sexual risk behaviors, including alcohol use prior to sex. Fourth, many samples were recruited from clinical settings; prevalence may differ among non-treatment seeking adolescents with PD. Finally, greater specificity regarding diagnosis and severity (e.g., using structured clinical interviews) would allow for better understanding of the risks associated with specific disorders.

CONCLUSION

Our findings highlight that adolescents with PD are a group whose behavior place them at risk for HIV and other STIs. Higher prevalence of specific alcohol and sexual risk behaviors among these adolescents indicate the need for interventions to reduce *both* sexual and alcohol risk behaviors. Clinicians should incorporate empirically validated assessments for alcohol and sexual risk as well as use evidence-based practices when targeting these behaviors in conjunction with the primary presenting diagnosis. The careful use of evidence-based assessments and practice in clinical settings will enable further research examining the association of alcohol and sexual risk in this important population. Differences in prevalence of alcohol and sexual risk behaviors according to treatment setting also suggests a need to provide interventions that are targeted to the unique needs of hospitalized adolescents and those treated in outpatient settings.

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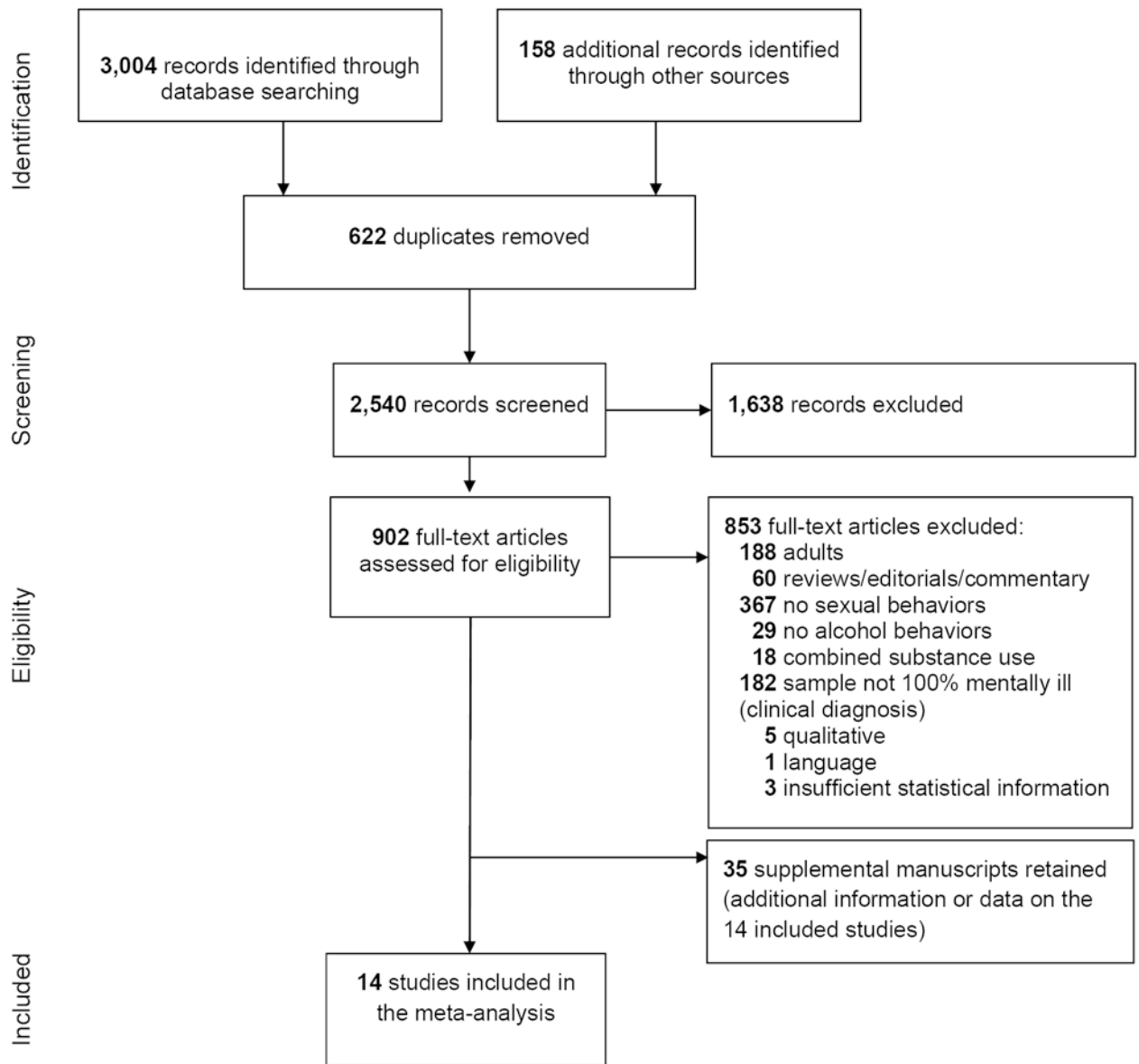


Figure 1.
Selection Process for Study Inclusion in the Meta-Analysis

Table 1
Description of the 14 Studies Included in the Systematic Review and Meta-Analysis

Citation	Sample	Setting	Alcohol Use	Sexual Behaviors	Diagnostic Tool and Psychiatric Diagnosis
Abrantes et al. (2006) [†]	N = 239; 61% F; 94% White; $M_{age} = 15$	Inpatient psychiatric hospital; Providence, RI	50% CD 42% AA/D	67% sexually active (lifetime) 52% sexually active (recent) 50% condom use (last event) 45% multiple partners (past 3M) 29% 4 partners (lifetime)	C-DJISC: 54% anxiety disorders; 45% mood disorders; 44% attention-deficit and disruptive behavior disorders
Aruffo et al. (1994) [†]	N = 100; 44% F; 71% White; $M_{age} = 15$	Inpatient psychiatric hospital; Little Rock, AR	64% CD	79% sexually active (lifetime) 44% condom use (lifetime) 47% condom use (last event)	Medical Chart/Record: 100% emotional and behavioral problems (unspecified)
Bodison (1998) <i>Psychiatric disorder subsample only (n = 89)</i>	N = 170 [89]; 30% F; 69% White, $M_{age} = 15$	Partial hospital day treatment programs; PA and MD	72% LD	58% sexually active (recent) 30% 2 partners (past 6M)	Medical Chart/Record: 3% anxiety disorders; 48% mood disorders; 32% attention-deficit and disruptive behavior disorders; 1% psychotic disorders
Brawner et al. (2012) <i>Clinically depressed subsample only (n = 64)</i>	N = 131 [64]; 100% F; 100% Black, American; $M_{age} = 16$	Outpatient mental health treatment programs; USA	16% CD 73% LD	78% sexually active (lifetime) 50% condom use (last event)	PHQ-9: 100% mood disorders
Brown et al. (2014) [†]	N = 893; 56% F; 67% Black, non-African; $M_{age} = 15$	Outpatient mental health treatment; Atlanta, GA; Chicago, IL; Providence, RI	22% CD	55% sexually active (lifetime) 31% sexually active (recent) 71% condom use (last event) 42% 2 partners (past 90 days) 15% 4 partners (past 90 days)	DISC: 34% anxiety disorders; 32% mood disorders; 66% attention-deficit and disruptive behavior disorders
Brown et al. (1997)	N = 102; 63% F; 93% White; $M_{age} = 15$	Inpatient psychiatric unit; Providence, RI	29% CD	71% sexually active (lifetime) 55% sexually active (recent) 33% condom use (past 6M)	Medical Chart/Record: 51% mood disorders; 13% attention-deficit and disruptive behavior disorders

Citation	Sample	Setting	Alcohol Use	Sexual Behaviors	Diagnostic Tool and Psychiatric Diagnosis
Brown et al. (2000) [†]	N = 307; 40% F; 83% White; M _{age} = 15	Psychiatric day schools and residential programs; Providence, RI	74% LD	27% 5 partners (past 12M) 68% sexually active (lifetime) 80% condom use (12M) 43% consistent condom use 59% 2 partners (past 12M)	Admission intake record: 8% anxiety disorders 33% mood disorders 7% attention-deficit and disruptive behavior disorders 3% psychotic disorders
Brown & Reynolds (1997)	N = 24; 54% F; 89% White; M _{age} = 14	Inpatient psychiatric unit; Providence, RI	23% CD	75% sexually active (lifetime) 45% condom use (lifetime)	Medical Chart/Record: 9% anxiety disorder 51% mood disorders 9% attention-deficit and disruptive behavior disorders
Bryant et al. (1995) [†]	N = 83; 30% F; 58% White; M _{age} = 16	State continuum of care program; Columbia, SC	30% CD	79% sexually active (lifetime) 7% condom use (last event) 18% 4 partners (lifetime)	Medical Chart/Record: 100% severely emotionally disturbed (i.e., anxiety, mood, attention-deficit and disruptive behavior, or psychotic disorders)
Cropsey et al. (2008) [†]	N = 636; 51% F; 58% White; M _{age} = 15	Inpatient psychiatric units; VA	55% LD 12% AA/D	46% sexually active (lifetime)	Medical Chart/Record: 26% anxiety disorders; 73% mood disorders; 40% attention-deficit and disruptive behavior disorders; 4% psychotic disorders; 22% personality disorders
Deas et al. (2000)	N = 51; 33% F; 75% White; M _{age} = 16	Inpatient substance abuse program; Charleston, SC	27% AD 25% AA	sexual risk composite: mean intervention = 25 mean control = 24.5	KSADS: 27% anxiety disorders; 68% mood disorders; 79% attention-deficit and disruptive behavior disorders
Donenberg et al. (2011) [†]	N = 218; 100% F; 100% Black, American; M _{age} = 14	Outpatient mental health clinics ^a ; Chicago, IL	33% CD	32% sexually active (lifetime) 65% condom use (last event) 57% consistent condom use 24% 2 partners (past 6M)	DISC: 5% anxiety disorders; 4% mood disorders; 11% attention-deficit and disruptive behavior disorders

Citation	Sample	Setting	Alcohol Use	Sexual Behaviors	Diagnostic Tool and Psychiatric Diagnosis
Riggs et al. (2007) [†]	N = 106; 33% F; 48% White, $M_{age} = 17$	Community and juvenile and social agencies; Denver, CO	53% LD 53% AD ^b 13% AA ^b	94% sexually active (lifetime) 30% consistent condom use	Semi-structured diagnostic interview administered by study physician; 100% mood disorders; 100% attention-deficit and disruptive behavior disorders
Teplin et al. (2005) [†] <i>Psychiatric disorder subsamples only with or without a substance use disorder (n = 117)</i>	N = 1,829 [117]; 36% F; 55% Black, American; $M_{age} = 15$	Juvenile detention center; Chicago, IL	57% CD ^c 89% LD ^c 29% AA/D ^{b/c}	88% sexually active (lifetime) 46% condom use (past 1M) 51% 2 partners (past 3M) 23% 4 partners (past 3M)	DISC; 100% mood or psychotic disorders

Note. If studies included clinical and non-clinical populations, only the clinical samples are reported in this meta-analysis. F, female; CD, current drinkers; LD, lifetime drinkers; AA, alcohol abuse; AD, alcohol dependence; AA/D, alcohol abuse/dependence; M, month; NR, not reported; C-DISC, Columbia-Diagnostic Interview Schedule for Children (Costello, Edelbrock, Dulcan, Kalas, & Klaric, 1984); PHQ-9, The Patient Health Questionnaire (Kroenke & Spitzer, 2002); DISC, Diagnostic Interview Schedule for Children (Schwab-Stone et al., 1996); KSADS, Child Schedule for Affective Disorders and Schizophrenia (Kaufman et al., 1997).

^aParticipants were recruited from inpatient and outpatient mental health clinics but were outpatients at the time of the study.

^bParticipants were selected if they had a substance use disorder; excluded from AA/AD analyses.

^cInformation drawn from the sample who received the HIV/AIDS survey (N = 689) because this information was not reported separately for the subsample who had a psychiatric disorder (n = 117).

[†]Details of the study were obtained from the primary paper and linked papers (see References).

Table 2

Prevalence estimates for alcohol, sexual behaviors, and sexually transmitted diseases among adolescents with a psychiatric disorder

Outcome	k	Prevalence Estimate (95% CI)	Q (p-value)	I ² (95% CI)
Alcohol use				
Alcohol use (lifetime)	6	78% (35, 96)	189.77***	97 (96, 98)
Alcohol use (current)	11	36% (19, 58)	238.84***	96 (94, 97)
Alcohol abuse/dependence	5	24% (7, 58)	90.06	96 (92, 97)
Sexual activity				
Sexual activity (lifetime)	13	70% (44, 88)	227.22***	95 (93, 96)
Sexual activity (recent)	4	49% (17, 82)	50.90***	94 (88, 97)
Sexual risk behaviors				
Condom Use, % of participants	5	51% (20, 81)	71.10***	94 (90, 97)
Condom Use, consistent	4	43% (14, 77)	82.91***	93 (88, 96)
Condom Use, last sex event	7	60% (23, 78)	9.07*	67 (3, 89)
Multiple Partners, 2 or more (recent)	6	41% (17, 70)	38.06***	87 (74, 93)
Multiple Partners, 4 or more (recent)	3	21% (4, 66)	6.77*	70 (0, 90)
Multiple Partners, 4 or more (lifetime)	2	23% (3, 75)	2.45	59 (0, 90)
Sexually transmitted infections (STIs)				
Any STI, self-reported	5	15 (3, 50)	69.70***	94 (89, 97)
Any STI, diagnosed	2	09 (1, 72)	21.24***	95 (86, 98)

Note. Prevalence values were estimated using random-effects assumptions.

* p .05;

** p .01;

*** p .001

Continuous predictors of alcohol, sexual behaviors, and sexually transmitted diseases among adolescents with a psychiatric disorder

Table 3

Outcome	Predictor	k	β (SE)	95% CI	p
Alcohol use (lifetime)	Female	6	-0.23 (0.97)	-2.92, 2.46	.83
	Age	6	-0.34 (0.83)	-2.65, 1.98	.71
	White	6	-1.26 (0.95)	-3.91, 1.39	.26
	Mood Disorders	6	-0.37 (1.03)	-4.79, 4.05	.75
	ADDB	3	-2.17 (1.58)	-22.31, 17.97	.40
	Female	11	-0.51 (0.62)	-1.91, 0.88	.43
Alcohol use (current)	Age	11	-0.23 (0.47)	-1.28, 0.83	.64
	White	11	0.11 (0.63)	-1.33, 1.54	.87
	Mood Disorders	7	-0.88 (0.80)	-2.94, 1.17	.32
	ADDB	6	-0.03 (1.03)	-2.88, 2.82	.98
	Female	5	3.02 (4.36)	-10.85, 16.88	.54
	Age	5	1.10 (1.01)	-2.11, 4.30	.36
Alcohol Abuse/Dependence	White	5	4.64 (0.49)	3.07, 6.21	<.01
	Mood Disorders	5	-2.11 (1.94)	-8.28, 4.04	.35
	ADDB	5	0.36 (1.37)	-4.01, 4.72	.81
	Female	13	-1.79 (1.03)	-3.98, 0.40	.10
	Age	13	0.76 (0.31)	0.08, 1.41	.03
	White	13	0.43 (0.77)	-1.27, 2.14	.59
Sexual activity (lifetime)	Mood Disorders	10	2.02 (0.74)	0.32, 3.73	.03
	ADDB	9	1.04 (1.05)	-1.44, 3.52	.35
	Female	5	-4.14 (3.68)	-15.86, 7.59	.34
	Age	5	1.03 (1.68)	-4.32, 6.39	.58
	White	5	0.22 (1.49)	-4.53, 4.97	.89
	Mood Disorders	3	-10.44 (1.66)	-31.55, 10.67	.10
Condom use, % of participants	ADDB	3	-33.60 (18.52)	-268.92, 201.73	.32
	Female	7	2.04 (1.65)	-2.21, 6.29	.27
	Age	7	-1.17 (0.84)	-3.33, 1.00	.22
	White	7	-1.20 (1.46)	-4.95, 2.54	.45

Outcome	Predictor	k	β (SE)	95% CI	p
Multiple Partners, 2 (recent)	Mood Disorders	5	-0.93 (0.97)	-4.03, 2.17	.41
	ADDB	4	0.96 (1.74)	-6.54, 8.45	.64
	Female	6	-0.84 (0.76)	-2.95, 1.27	.33
	Age	6	0.44 (0.57)	-1.13, 2.02	.48
	White	6	0.16 (0.55)	-1.35, 1.68	.78
	Mood Disorders	5	1.35 (1.08)	-2.08, 4.78	.30
Any STI, self-reported	ADDB	5	0.84 (0.63)	-1.17, 2.86	.28
	Female	5	3.16 (1.01)	-0.05, 6.37	.05
	Age	5	0.08 (0.69)	-2.12, 2.29	.91
	White	5	-3.16 (0.56)	-4.95, -1.37	.01
	Mood Disorders	4	0.69 (1.86)	-7.31, 8.69	.75
	ADDB	3	0.27 (2.24)	-28.15, 28.68	.92

Note. Female, proportion of sample female. Age, mean age of sample. White, proportion sample white. Mood, proportion of sample with mood disorder. ADDB, proportion of sample with Attention Deficit or Disruptive Behavior disorder. STI, proportion of sample reporting a sexually transmitted infection.