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Original article

Prenatal Drug Exposure, Behavioral Problems, and Drug Experimentation Among African-American Urban Adolescents

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A B S T R A C T

Purpose: To examine how prenatal drug exposure (PDE) to heroin/cocaine and behavioral problems relate to adolescent drug experimentation.
Methods: The sample included African-American adolescents (mean age = 14.2 years, SD = 1.2) with PDE (n = 73) and a nonexposed community comparison (n = 61). PDE status was determined at delivery through toxicology analysis and maternal report. Internalizing/externalizing problems were assessed during adolescence with the Behavior Assessment System for Children, Second Edition. Drug experimentation was assessed by adolescent report and urine analysis. Logistic regression evaluated the likelihood of drug experimentation related to PDE and behavioral problems, adjusting for age, gender, PDE, perceived peer drug use, and caregiver drug use. Interaction terms examined gender modification.
Results: Sixty-seven subjects (50%) used drugs: 25 (19%) used tobacco/alcohol only and 42 (31%) used marijuana/illegal drugs. Ninety-four subjects (70%) perceived peer drug use. PDE significantly increased the risk of tobacco/alcohol experimentation (odds ratio = 3.07, 95% confidence interval [CI] 1.09–8.66, $p = .034$) but not after covariate adjustment (adjusted odds ratio [aOR] = 1.16, 95% CI .31–4.33, $p > .05$). PDE was not related to the overall or marijuana/illegal drug experimentation. The likelihood of overall drug experimentation was doubled per SD increase in externalizing problems (aOR = 2.28, 95% CI 1.33–3.91, $p = .003$) and, among girls, 2.82 times greater (aOR = 2.82, 95% CI 1.34–5.94, $p = .006$) per SD increase in internalizing problems. Age and perceived peer drug use were significant covariates.
Conclusions: Drug experimentation was relatively common (50%), especially in the context of externalizing problems, internalizing problems (girls only), older age, and perceived peer drug use. Findings support the Problem Behavior Theory and suggest that adolescent drug prevention addresses behavioral problems and promotes prosocial peer groups.

IMPLICATIONS AND CONTRIBUTION

Among urban African-Americans, drug experimentation is high (50%) by midadolescence, both for those with prenatal drug exposure (PDE) and for those without. Consistent with the Problem Behavior Theory (PBT), drug experimentation was associated with externalizing problems and peer drug use and, for girls only, with internalizing problems. Findings support the PBT and prevention of behavior problems to reduce drug experimentation.

PDE to heroin/cocaine is a public health problem, reported in 4.4% pregnant women and increasing to 7.7% among African-American women [1]. PDE increases the risk of behavioral problems during childhood and adolescence [2]. Studies among children without PDE [3] have found that behavioral problems during childhood increased the risk for adolescent drug

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experimentation. Thus, behavioral problems among children with PDE may be an early sign of risk for drug experimentation.

Adolescence provides a unique opportunity to examine how PDE relates to problem behaviors and drug experimentation. Not only is adolescence characterized by increasingly complex cognitive abilities and expectations but also by escalated risk-taking behaviors [4]. Young adolescents who engage in early drug experimentation are at risk for ongoing drug use and dependence in adulthood [5].

We searched the PubMed, PsycInfo, Web of Science, and CINAHL databases with terms "prenatal drug, substance, or cocaine exposure; in utero substance/drug exposure; adolescence/adolescent; and substance/drug use" in May 2013 and identified six papers published on PDE and adolescent drug experimentation (Table 1). All were published since 2006, indicating that this is a new area of investigation. Most were conducted among low-income African-American adolescents. Two studies among early adolescents (11–12.5 years) found no PDE–drug experimentation association [6,7]. One study among midadolescents (14 years) reported an association between PDE and cocaine use [8]. Two studies among late adolescents (15–16 years) found mild-to-moderate associations between PDE and drug experimentation [9,10]. One study [11] found that after controlling for neurobehavioral disinhibition during childhood, PDE was not associated with adolescent drug use, suggesting a pathway to drug use through childhood behavioral problems. However, another study [10] reported that neither late adolescent-depressive symptoms nor externalizing problems mediated the effect of PDE on adolescent drug use.

Animal research suggests that the effect of PDE on nigrostriatal dopamine neuronal function is stronger for males than for females [12], raising the possibility of gender variation in PDE–drug experimentation. Only one of the six studies of adolescent drug experimentation examined gender differences and found no gender variation [7]. In summary, drug experimentation among adolescents with a PDE history increases with age. The one study conducted in midadolescents reported a relatively high prevalence of adolescent cocaine experimentation (29%) [8], compared with the studies conducted among older adolescents [11]. In addition, several studies relied exclusively on self-reports, with limited attention to mechanisms or gender variation.

This study examines how PDE relates to drug experimentation during midadolescence using self-report and physiologic measures, while focusing on mechanisms and gender variation, guided by PBT [13]. PBT is a psychosocial model that explains behavioral outcomes such as drug use in adolescence. It describes three independent but related systems of psychosocial components: (1) the personality system including motivation, personal beliefs, and personal controls; (2) the perceived environmental system, such as perceived support or influence from parents and friends; and (3) the behavior system consisting of a problem behavior structure and a conventional behavioral structure. PBT suggests that the connection between externalizing behavior problems and adolescent drug use may be manifestations of an underlying construct of unconventionality. We tested three hypotheses: (1) PDE increases the likelihood of drug experimentation; (2) adolescents with problem behaviors are at increased risk for drug experimentation, particularly among the PDE group; and (3) the relationship among PDE, problem behaviors, and drug experimentation varies by gender and age. Perceived peer and caregiver drug use represents the perceived environment of PBT. Sociodemographic characteristics, peer drug use, prenatal tobacco exposure (PTE), and prenatal alcohol exposure (PAE) have been associated with adolescent drug experimentation [14–17]. All were included as covariates.

Methods

Participants

Data are from a prospective study of adolescents. The PDE sample was recruited at birth. Eligibility included gestational age ≥32 weeks, birth weight ≥1,750 g, no neonatal intensive care unit admission, and cocaine and/or heroin exposure based on maternal and/or infant urine toxicology, and/or maternal self-report of cocaine and/or heroin use during pregnancy. All adolescents in the PDE group were prenatally exposed to cocaine and/or heroin, and 86% were also prenatally exposed to tobacco and/or alcohol. Families were randomized to an intervention group that received developmentally oriented home visits or a control group that received monthly tracking visits for 1 year [18]. The nonexposed (NE) community comparison group was recruited during midchildhood and adolescence from a primary care clinic. Medical records were reviewed to identify children born at the same hospital and during the same years as the PDE group. Eligibility included negative maternal and infant toxicology screens for cocaine/heroin, no maternal report of substance use, no medical chart indication of cocaine/heroin use, and residence in the same community as the PDE group. Groups were matched for maternal education, age of first pregnancy, child age, gender, and race. The University's Institutional Review Board approved the study. All caregivers and youth provided written consent or assent. Participants were followed up through midadolescence. Adolescents and caregivers were evaluated in a laboratory setting using audio computer-assisted self-interview. Evaluators were unaware of exposure history. Except for PDE, all variables were assessed during adolescence.

Adolescents were 50% boys, 99% African-American, 14.2 years of age (SD = 1.2), and 54% were PDE (Table 2).

Measures

Dependent variable

Drug experimentation: Adolescents provided a urine sample and completed the Adolescent Health Behavior Survey, adapted from the Youth Risk Behavior Surveillance System, containing questions about tobacco, alcohol, marijuana, glue, inhalants, steroids, prescription drugs, cocaine, heroin, "club drugs," amphetamines, and injection drugs [19]. The urine sample was tested for amphetamines/methamphetamines, barbiturates, benzodiazepines, cocaine, marijuana, methadone, opiates, phencyclidine, propoxyphene, and tricyclic antidepressants using the Fischer Scientific Triage Drugs of Abuse Panel. Participants were defined as "experimenters" if they indicated any drug use or their urine test was positive. Adolescents who denied drug use and had a negative urine test were defined as "abstainers." Two subtype variables were created: (1) experimentation with tobacco and/or alcohol only but no marijuana or other illegal drugs and (2) experimentation with marijuana and/or other illegal drugs, regardless of tobacco/alcohol use. Both groups were compared with abstainers.