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Prenatal and Neighborhood Correlates of Oppositional Defiant Disorder (ODD)

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Abstract

This study investigates the link between prenatal exposure to alcohol and drugs, parental perceptions of neighborhood safety and support, and the diagnosis of Oppositional Defiant Disorder (ODD) among a nationally representative sample of youth. A subset of variables from a larger study, the 2001-2004 National Comorbidity Survey-Adolescent Supplement (NCS-A), as well as its supplemental parental surveys, was analyzed in this study. This study used a specific selection of 5,924 adolescents and their parents from the NCS-A. Results suggest a correlation between prenatal caffeine use and a subsequent ODD diagnosis in female adolescents. Overall correlations between neighborhood drug use/sales and minority status and a subsequent diagnosis of ODD in adolescents were also found. Social, environmental, and professional implications of these findings are also discussed.

Keywords: Adolescents, Oppositional Defiant Disorder, Prenatal exposure, Neighborhood influence

Introduction

Oppositional Defiant Disorder (ODD) is a disruptive behavior disorder in youth characterized by “a recurrent pattern of negativistic, defiant, disobedient, and hostile behavior toward authority figures” (American Psychiatric Association, 2000, p. 100). According to Lubit and Pataki (2013), the prevalence of ODD in the general population ranges from two to sixteen percent. Moreover, studies have shown a high lifetime comorbidity of ODD with other psychiatric disorders. For instance, Nock and colleagues (2007) found that 92.4% of individuals with ODD met criteria for a minimum of one other psychiatric disorder. While attempts to manage the behavior of a child with ODD may be challenging, certain risk factors that seem to influence the development of this disorder, specifically prenatal drug use and neighborhood characteristics, can be attenuated.

Awareness of risk factors that contribute to the onset of ODD is the first step toward providing insight into a disorder that affects many children. With greater insight comes greater ability for early detection and intervention. Early detection and intervention are crucial in order to buffer against the long-term impact that ODD symptoms can have on one’s functioning. For example, disruptive behaviors in the school setting interfere with one’s educational achievement, and a failure to excel academically can be damaging to future life prospects. In a broader sense, refusal to comply with the requests of authority figures (e.g., police officers, teachers, employers) may be detrimental to one’s success and safety in society.

Numerous studies elucidate the link between prenatal drug exposure and problematic behavior in children. Spears, Stein, and Koniak-Griffin (2010) highlighted that substance use

during and after pregnancy has a critical impact on the child. Bada and colleagues (2007) found that high prenatal cocaine exposure was associated with increased childhood externalizing behaviors. Furthermore, the negative effects of prenatal cocaine exposure were exacerbated by prenatal and postnatal tobacco and alcohol use (Bada et al., 2007). Other studies have found that children exposed to cocaine in utero exhibit more symptoms of ODD than non-exposed children (Linares et. al., 2006). Even cocaine-exposed children who were adopted or placed in foster care showed higher levels of aggression and externalizing behavior than their non-exposed counterparts. This suggests that the behavioral effects of prenatal cocaine exposure continue to exist despite environmental factors.

Moreover, studies on prenatal alcohol use suggest that children who were born to mothers who consumed alcohol daily had greater behavior problems (D'Onofrio et.al., 2007). Similarly, Fryer, McGee, Matt, Riley, and Mattson (2006) investigated the differences in childhood psychiatric disorders between two groups of children who were matched on several demographic variables (e.g., age, gender, socioeconomic status). One group had heavy prenatal exposure to alcohol while the other group had no exposure to alcohol. Children with heavy fetal alcohol exposure were more frequently diagnosed with ODD than non-exposed children (Fryer et al., 2006). Even with various studies emphasizing the detrimental effects of prenatal exposure to drugs, postnatal factors may also contribute to later effects/behavioral problems due to ecological factors.

While the link between prenatal exposure to alcohol and ODD has been replicated, chemical insult to a fetus was not the only factor found to influence ODD behavior in children. Henry, Sloane, and Black-Ponde's (2007) findings suggested that experiencing a postnatal traumatic event further increased the likelihood that a child would later demonstrate oppositional

and defiant behavior. Research has also indicated that neighborhood factors such as exposure to violence, perception of neighborhood safety and support, as well as drug dealing and drug use within the neighborhood are correlated with ODD. Eiden and colleagues (2013) noted that the link between witnessing violent acts and increased behavior problems in preschool children is well established. Results indicated community violence as one of the predictors of problem behaviors in their sample (Eiden et al., 2013). Vanfossen, Brown, Kellam, Sokoloff, and Doering (2010) found neighborhood violence was a salient factor in the development of aggression in boys and girls, primarily during the transition from primary school into middle school.

In terms of perceptions of neighborhood safety and support, White and Renk (2011) found that adolescents' perceptions of their neighborhood's safety and support were related to externalizing behavior problems. Specifically, adolescents who felt safe or felt a high level of support from their community showed fewer behavior problems, suggesting that the level of safety and support felt within a community has ties to the perceived stability of the neighborhood (White & Renk, 2011). Plybon and Kliever's (2001) study on neighborhood types and externalizing behavior in children measured maternal perceptions of neighborhood safety. Researchers assessed if the mothers felt safe walking in their neighborhood at night, as well as whether their child was exposed to violence such as witnessing someone beaten up or mugged. Notably, children who lived in neighborhoods with high crime and exposure to violence (homicide, rape, robbery assault) had greater externalizing problems (Plybon & Kliever, 2001). Furthermore, researchers have found that children exhibited more behavior problems and symptoms of ODD in neighborhoods where mothers perceived communal dangers such as drug use and drug dealing (Aneshensel & Succo, 1996; Callahan, Scaramella, Laird, & Sohr-Preston,

2011). Moreover, race and ethnicity may play a significant role in the diagnoses of ODD. Specifically, minority youth may be at greater risk for being diagnosed with ODD than Caucasian youth (Bird, Canino, Davies, Zhang, Ramirez, & Lahey, 2001).

Although there have been several studies assessing children's risk for problem behaviors during childhood and adolescence, few studies on ODD have specifically assessed prenatal drug use and neighborhood correlates that could impact the onset of ODD. The present article investigates the link between parental reported prenatal exposure to alcohol and drugs and parental perceptions of neighborhood safety and cohesiveness to a diagnosis of ODD among a nationally representative sample of youth.

Method

Sample and Procedure

The present study utilized data from the National Comorbidity Survey-Adolescent Supplement (NCS-A) conducted between 2001 and 2004, which gaged 10,148 adolescents in the United States. A dual-frame design was utilized to produce the sample size by recruiting from households and schools in the same National Comorbidity Survey-Replication (NCS-R) neighborhood. The NCS-A is a nationally representative survey of adolescents in the age range of 13-17 and was designed to estimate the lifetime-to date and current prevalence, risk and protective factors, as well as the onset and persistence of various disorders. The NCS-A was administered using computer assisted personal interviewing (CAPI) on laptop computers (Kessler et al, 1998).

The sample consisted of 5,924 adolescents (2,908 males and 3,016 females). The racial composition of the sample included 2,618 racial/ethnic minority adolescents and 3,306

Caucasian adolescents. The average age was 15.2 years old (SD= 1.5) and there were no meaningful differences across the sample based on age (Table 1). Recruitment and consent procedures were approved by the Human Subjects Committees of Harvard Medical School and the University of Michigan (Kessler et al, 2009a; Kessler et al, 2009b; Kessler, 2011). Socio-demographic variables used in the NCS-A were comprised of age, race, gender, ethnicity, religion, and urbanicity. Urbanicity is related to community characteristics such as neighborhood cohesion, feeling safe in their neighborhood, and drug sales and use within the neighborhood.

Table 1

Demographic Characteristics of the Sample

	Total <i>N</i> = 5,924	Racial/Ethnic Minority* <i>n</i> = 2,618	Caucasian <i>n</i> = 3,306
Gender			
Male	2,908 (49.1%)	1,303 (49.8%)	1,605 (48.5%)
Female	3,016 (50.9%)	1,315 (50.2%)	1,701 (51.5%)
Age (years)			
Overall Mean (SD)	15.2 (1.5)	15.1 (1.5)	15.3 (1.5)
Male Mean (SD)	15.2 (1.5)	15.1 (1.6)	15.3 (1.5)
Female Mean (SD)	15.2 (1.5)	15.1 (1.5)	15.3 (1.5)

*This category includes African Americans (*n* = 1,151), Hispanics (*n* = 1,111), and “Other” (*n* = 356).

As previously mentioned, the NCS-A household survey was conducted as a supplement to the NCS-R. The NCS-R households that included adolescents were included in the NCS-A. The sample included adolescents who were not currently enrolled in school. Additionally, parents completed self-administered questionnaires (PSAQ) examining topics related to their child's mental health, specifically regarding diagnoses of Attention-Deficit/Hyperactivity Disorder, Conduct Disorder, Oppositional Defiant Disorder, Major Depressive Episode, and Dysthymic Disorder. Within the PSAQ, parents were asked to identify prenatal substance use

and neighborhood factors such as drug sale or use, feeling safe at night, neighbors willing to help each other, or people being mugged or assaulted. This survey generated a conditional response rate of 58.0%.

The diagnostic sections of the interviews were based on a modification of The World Health Organization's Composite International Diagnostic Interview (CIDI) (Kessler et al, 1998). The CIDI is a structured clinical interview used for the assessment of mental disorder according to the DSM-IV; amendments were made for use with adolescents. Additional information, statistics, weighting procedures, design and measures can be found in greater detail elsewhere (Merikangas, Avenevoli, Costello, Koretz, & Kessler, 2009; Kessler et al., 2009a, Kessler et al., 2009b).

Measures

Oppositional Defiant Disorder. Adolescents were administered the CIDI, a structured interview to determine DSM-IV diagnoses, which was modified for administration to adolescents. Lifetime diagnosis of Oppositional Defiant Disorder (ODD) was assessed based on lifetime DSM-IV criteria and exclusion rules.

Prenatal Drug Use. The parents in this sample reported on the mothers' (1) caffeine use, (2) alcohol use, (3) drug use, and (4) cigarette smoking patterns during pregnancy. Each of the four categories is represented by a response to a single item on the PSAQ.

Caffeine. One question from the PSAQ asked about the mother's caffeine use during pregnancy. This item was coded as a dichotomous indicator to reflect the mother's use of caffeinated coffee or tea as "None to less than one cup per day" or "One or more cups per day."

Alcohol. One question from the PSAQ was used to assess how often mothers consumed alcohol during their pregnancies. Parents selected their response from six options to indicate the frequency range that best described the mothers' drinking habits during pregnancy: "Everyday," "3 to 5 times per week," "1 to 2 times per week," "1 to 3 times per month," "Less than once per month," and "Never."

Drug Use. One question from the PSAQ was used to assess how often mothers consumed non-prescription drugs (e.g., marijuana, cocaine, and heroin) during their pregnancies. The six frequency options available were identical to the options presented for mothers' alcohol use (see above).

Cigarette Smoking. One question from the PSAQ asked parents about the mothers' cigarette-smoking habits during pregnancy, specifically inquiring about the number of cigarettes per day mothers smoked while pregnant. The five response options available included: "More than 20 cigarettes per day," "11 to 20 cigarettes per day," "1 to 10 cigarettes per day," "Fewer than 1 cigarette per day," and "None."

Neighborhood Correlates. Parents were provided with five statements on the PSAQ related to the safety, cohesion, camaraderie, and prevalence of crime (e.g., robbery, assault, drug sale and use) in their neighborhoods. Parents indicated how true they perceived each of the following statements to be: "I feel safe being out alone in this neighborhood at night," "People around here are willing to help their neighbors," "People in this neighborhood look out for each other," "People often get mugged or attacked in this neighborhood," and "People sell or use drugs in this neighborhood." Parents responded to the statements by selecting one answer from a

four-point Likert scale (1 = Very True, 2 = Somewhat True, 3 = Not Very True, 4 = Not At All True).

Racial/Ethnic Minority. Based on the literature, a child's racial/ethnic background was also used as an independent variable. To create this variable, the racial/ethnic composition of the sample was broken down into two categories: (1) racial/ethnic minorities; and (2) Caucasian.

Results

First, a logistic regression was used to examine, among the entire sample ($n=5,924$), the extent to which prenatal substance use and parent's perception about their neighborhood predicted their child being diagnosed with ODD during their lifetime. All predictors were entered into the regression equation collectively to calculate the regression coefficients and odds ratios found in Table 2.

Table 2

Logistic regression model predicting lifetime diagnosis of Oppositional Defiant Disorder (ODD)^a, controlled for age

Variable ^b	B	Wald χ^2	OR [95% CI]
Prenatal Caffeine Use	-.154	2.59	0.86 [0.7, 1.0]
Prenatal Alcohol Use	-.579	2.51	0.56 [0.3, 1.1]
Prenatal Drug Use	-.019	0.01	1.00 [0.6, 1.6]
Prenatal Smoking	.053	0.22	1.06 [0.8, 1.3]
Feel Safe Alone in Neighborhood	.273	1.70	1.31 [0.8, 2.0]
People Help Others in Neighborhood	-.202	0.77	0.82 [0.5, 1.3]
People Look Out for Each Other in Neighborhood	.196	0.86	1.22 [0.8, 1.8]
People Often Mugged/Attacked in Neighborhood	.126	0.37	1.13 [0.8, 1.7]
People Sell/Use Drugs in Neighborhood	.243	4.03	1.28 [1.0, 1.6]*
Race/Ethnic Minority	.285	10.35	1.33 [1.1, 1.6]*

^aThe diagnosis is based on lifetime prevalence; ^bBased on the total sample ($n = 5,924$); * $p \leq .05$

The results revealed that adolescents were significantly more likely to have a diagnosis of ODD if their parents indicated that people sold/used drugs in their neighborhood ($OR = 1.28$;

95% *CI* = 1.0, 1.6). Also, racial/ethnic minority youth were significantly more likely to receive a lifetime diagnosis of ODD than their Caucasian counterparts (*OR* = 1.33; 95% *CI* = 1.1, 1.6).

None of the other variables significantly predicted a lifetime diagnosis of ODD. Racial/minority status was a more significant predictor of ODD than prenatal drug use, as well as other neighborhood factors, with the exception of drug use within the neighborhood.

To identify the differential gender effects of prenatal substance use and the parent's neighborhood perceptions as a predictor of a lifetime diagnosis of ODD, a logistic regression was conducted on the male (*n* = 2,908) and female (*n* = 3,016) subsamples. Within the male sample, none of these variables predicted a lifetime diagnosis of ODD (Table 3).

Table 3

Logistic regression model predicting lifetime diagnosis of ODD^a (Males), controlled for age

Variable ^b	β	Wald χ^2	OR [95% CI]
Prenatal Caffeine Use	-.024	0.03	0.98 [0.8, 1.3]
Prenatal Alcohol Use	-.581	1.39	0.56 [0.2, 1.5]
Prenatal Drug Use	-.106	0.92	0.90 [0.5, 1.8]
Prenatal Smoking	-.005	.001	1.00 [0.7, 1.4]
Feel Safe Alone in Neighborhood	.232	0.65	1.26 [0.7, 2.2]
People Help Others in Neighborhood	-.157	0.26	0.86 [0.5, 1.6]
People Look Out for Each Other in Neighborhood	-.151	0.28	0.86 [0.5, 1.5]
People Often Mugged/Attacked in Neighborhood	.288	1.05	1.34 [0.8, 2.3]
People Sell/Use Drugs in Neighborhood	-.003	0.00	1.00 [0.8, 1.3]
Race/Ethnic Minority	.173	1.98	1.19 [0.9, 1.5]

^aThe diagnosis is based on lifetime prevalence; ^bBased on male subsample (*n* = 2,908); **p* ≤ .05

Table 4

Logistic regression model predicting lifetime diagnosis of ODD^a (Females), controlled for age

Variable ^b	β	Wald χ^2	OR [95% CI]
Prenatal Caffeine Use	-.289	4.31	0.75 [0.6, 1.0]*
Prenatal Alcohol Use	-.659	1.44	0.52 [0.2, 1.5]
Prenatal Drug Use	.073	0.45	1.08 [0.5, 2.1]
Prenatal Smoking	.108	0.45	1.11 [0.8, 1.5]
Feel Safe Alone in Neighborhood	.315	1.05	1.37 [0.8, 2.5]
People Help Others in Neighborhood	-.198	0.31	0.82 [.04, 1.6]

People Look Out for Each Other in Neighborhood	.577	3.19	1.78 [0.9, 3.4]
People Often Mugged/Attacked in Neighborhood	-.078	0.06	0.93 [0.5, 1.7]
People Sell/Use Drugs in Neighborhood	.489	8.62	1.63 [1.2, 2.3]*
Race/Ethnic Minority	.399	9.66	1.49 [1.2, 1.9]*

^aThe diagnosis is based on lifetime prevalence; ^bBased on female subsample ($n = 3,016$); * $p \leq .05$

However, a different pattern emerged among the females. Three of the variables significantly predicted a lifetime diagnosis of ODD for an adolescent female (Table 4). A lifetime diagnosis of ODD was significantly more likely to occur among mothers who consumed caffeine daily during their pregnancy than those who did not consume caffeine daily ($OR = 0.75$; 95% $CI = 0.6, 1.0$). In comparison to parents who did report such neighborhood activity, female adolescents were significantly more likely to have a diagnosis of ODD when her parents reported that people in their neighborhood sold/used drugs ($OR = 1.63$; 95% $CI = 1.2, 2.3$). Also, racial/ethnic minority adolescents were more likely to have a lifetime diagnosis of ODD than their Caucasian counterparts ($OR = 1.49$, 95% $CI = 1.2, 1.9$). Intriguingly, within the female sample, three neighborhood factors predicted a lifetime diagnosis of ODD, while their male counterparts did not have any predicting factors.

Discussion

The primary purpose of the study was to examine relations between prenatal drug exposure and neighborhood correlates among the diagnosis of ODD in children and adolescents. We concentrated on prenatal drug use and multiple neighborhood correlates because their influence has received little empirical attention as factors that contribute to ODD. When the sample was analyzed in its entirety, the results did not confirm previous literature findings of a link between prenatal drug use and an ODD diagnosis (Bada et al., 2007; D'Onofrio et al., 2007; Fryer et al., 2006; Linares et al., 2006). Minnes, Lang, and Singer (2011) found that the adverse

effects may be contingent upon the timing and amount of prenatal drug exposure. Other research has found that children exposed to alcohol within the first trimester were found to more exhibit internalizing behaviors, whereas children exposed to alcohol in the second and third trimesters presented externalizing behaviors such as aggression and delinquency (O'Leary et al., 2010). Furthermore, how the substances were ingested and whether the mother sustained a healthy diet and other maternal practices may affect the level of potency in utero. This could be important to consider in future studies.

It is important to note that among the substances investigated by the PSAQ for prenatal drug use, caffeine consumed on a daily basis was the only drug that significantly predicted a diagnosis of ODD, but only for female adolescents. In other words, female youth appear to be more impacted by high prenatal caffeine exposure than their male counterparts. This may suggest that substances may impact genders differently in utero and that females are more vulnerable to such effects, which manifest behaviorally in adolescence via an ODD diagnosis. Prenatal drug exposure may alter specific hormonal processes throughout prenatal development. Interestingly, studies on neuroimaging found prenatal tobacco exposure to curtail the size of the corpus callosum and produced a thinner orbito-frontal cortex solely in females (Derauf, Kekatpure, Neyzi, Lester, & Kosofsky, 2009). In this regard, regions of the brain associated with social interaction and behavior may account for behavior problems later in adolescence differentially based on gender (Derauf et al., 2009).

Results revealed a significant relationship between parent's perception of their neighborhoods and an ODD diagnosis for their adolescents. Specifically, the sale and use of drugs within a neighborhood predicted a diagnosis of ODD. Moreover, minority youth were more likely to receive an ODD diagnosis than Caucasian youth. Also, when the sample was

analyzed by gender, correlates that did not previously indicate an ODD diagnosis became significant predictors for female adolescents only. With reference to the entire sample, a parent's report of neighborhood drug sale and use continued to predict an ODD diagnosis for female adolescents; this finding was more pronounced for minority female adolescents.

The finding that the sale and use of drugs in one's neighborhood significantly predicts an ODD diagnosis underscores the impact that neighborhood factors have on individual-level functioning. Defying authority is a hallmark feature of ODD, and exposure to criminal activity may produce a community environment in which the defiance of authorities (e.g., the police) becomes normalized. Furthermore, disruptive behaviors in the school setting interferes with one's educational achievement, and a failure to excel academically can be damaging to future life prospects. In a broader sense, refusal to comply with the requests of authority figures (e.g., police officers, teachers, employers) may be detrimental to one's success and safety within society. Also, race and ethnicity was found to be predictive of an ODD diagnosis, as minorities in the sample were more likely to receive an ODD diagnosis than Caucasians. Given the strict law enforcement presence in inner city impoverished communities, particularly with respect to detecting illegal drug activity, it is possible that the connection between drug activity and racial/ethnic minority status is linked and might collectively contribute to an ODD diagnosis.

This study also underscores recent research that suggests direct comorbidity between ODD and distress-related disorders, as well as indirect comorbidity between ODD and depression, in girls (Burke, Hipwell, & Loeber, 2010; Copeland, Shanahan, Erkanli, Costello, & Andgold, 2013). The current study highlights some environmental elements that are predictive of ODD in females that can be simultaneously related to predictive elements of distress disorders, neighborhood violence in particular. Furthermore, research has correlated the negative affective

dimension of ODD symptoms with later development of depression, irritability in particular (Burke, Hipwell, & Loeber, 2010). When understanding internalizing and externalizing psychopathology, it is important to consider the connection between ODD symptoms and correlated distressing variables. This study, in conjunction with other research, warrants further investigation into how these variables are all connected.

An important limitation is that all of the dependent variables were based on the parent's perception of neighborhood effects. It would be vital to replicate the findings using other sources of information. Additionally, research is also needed to highlight the influences of youth living in disadvantaged communities. The gender differences between prenatal drug exposures were notable within this study and warrant further research and clinical attention.

Finally, this study's logistical regressions controlled for age, and analyzed data by gender and race/ethnicity. Though race/ethnicity was found to be a significant predictor in the present study, there may be some limitation in considering this as a universally explanatory variable because it may diminish focus from other relevant environmental factors. As noted by McGee and Williams (1999), differences among ethnic groups in prior research (Lillie-Blanton, Anthony and Schuster, 1993) became subtle or disappeared altogether when results controlled for shared environmental conditions at the community level. Furthermore, a meta-analysis conducted by Canino and colleagues (2010) examining the prevalence of ODD across cultures found that geographic location (as a broad index of different cultures and contexts) was not associated with significant variability in prevalence estimates of ODD. These elements combined with the findings of the present study suggest more research is needed in solidifying how race/ethnicity is correlated with ODD diagnosis in youth who share the dependent variables presently examined.

Implications

Awareness of risk factors that contribute to the onset of ODD is the first step towards providing insight into a disorder that affects many children. With greater insight comes greater ability for early detection and intervention, which is crucial in buffering against the long-term impact that ODD symptoms can have on one's functioning. As stated, ODD impairs and impacts one's functioning. Thus, it is important to use research, such as this study, to identify risk factors with the aim that implications for practice and application to intervention strategies can be created. Case management services should focus their support in areas of high use and distribution of drugs, as well as in communities of minorities. Early intervention may help youth foster better attachments with figures of authority. Intervention does not need to be solely based on an individual family level, such as home visits (Steiner, Remsing, & Work Group on Quality Issues, 2007). It can also be conducted in a cost-effective group setting, such as a school or community group (Cunningham, Bremner, & Boyle, 1995). These intervention strategies should focus particularly on young females who are living in areas of high drug use and distribution, and incorporate information about the increased risks of ODD including the risk of using caffeine prenatally.

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