Original Article

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Journal of Psychiatry Research and Treatment

2019
Vol.1 No.1:3

Investigating the Link between Perinatal Factors and Psychopathic Traits on a Greek Sample of Adolescents with and without Conduct Disorder

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Received date: December 17, 2018; **Accepted date:** January 21, 2019; **Published date:** January 28, 2019

Abstract

Title: Investigating the link between perinatal factors and psychopathic traits on a Greek sample of adolescents with and without conduct disorder

Background: Conduct disorder (CD) is a common psychiatric disorder of childhood and adolescence, characterized by a persistent and repetitive pattern of destructive behavior that violates social rules and involves significant impairment in social and/or academic functioning. Children and adolescents with CD have a higher risk of developing a number of dysfunction characteristics, i.e. emotional and behavioral problems, aggression, and psychopathic traits. This study aimed to investigate the relationship between these characteristics, perinatal factors and CD.

Methods: The sample consisted of 121 Greek children and adolescents, who participated in the "FemNAT-CD" European study. Fifty-five (45.5%) of the participants had the diagnosis of CD, and 61 (54.5%) were healthy (control group). Basic demographic and perinatal information were collected by using parents'-reported Medical History questionnaire. Participants' mental health issues, aggression and psychopathic traits were assessed using the Massachusetts Youth Screening Instrument II (MAYSI-II), the Reactive-Proactive Aggression Questionnaire (RPQ), and the Youth Psychopathic Traits Inventory (YPI), respectively.

Results: Mothers of participants with CD reported significantly more frequently the occurrence of partner violent behavior during pregnancy vs. the mothers of controls. Mother's substance-alcohol use during pregnancy, gestational duration, perinatal health problems and birth weight were not significantly related to participants' behavioral needs, aggression and psychopathic traits based on the whole study population. Within participants with CD, maternal smoking during pregnancy was significantly associated with participant higher scores in anger-irritability (proactive, reactive, and whole), aggression and psychopathic traits; for this group partner violence during pregnancy was associated with higher participants' psychopathic traits.

Conclusions: There is evidence for a link between maternal smoking and violence against the mother during pregnancy and CD in the offspring. Further research on larger samples is necessary in order to gain a deeper understanding of how multiple factors contribute to the development of CD and to its severity.

Keywords: Conduct disorder; Perinatal factors; Behavioral problems; Aggression and Psychopathic traits

Abbreviations

CD: Conduct Disorder; K-SADS-PL: Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime version; MAYSI-II: Massachusetts Youth Screening Instrument II; RPQ: Reactive- Proactive Aggression Questionnaire; YPI: Youth Psychopathic Traits Inventory

Introduction

Conduct Disorder (CD) is characterized by a persistent and repetitive pattern of aggressive and destructive behavior that violates the basic rights of others, social norms, and rules [1]. The disorder is considered as childhood- or adolescence-onset depending on whether the diagnosis was met before or after the age of 10 years old. Childhood-onset CD constitutes a prognostic marker for its maintenance [2]. The clinical picture of CD varies among children and adolescents, depending upon factors such as age, individual characteristics and social environment, and it involve significant impairments in social and/or academic functioning.

Children and adolescents with CD and conduct problems have a higher risk of developing a number of emotional and behavioral disorders, such as attention deficit hyperactivity disorder, anxiety disorders, depression, substance abuse, and disorders related to school abilities [3,4]. Previous research has also shown that approximately 40.0% of children and adolescents with CD present personality disorders in adulthood. CD seems to have a strong correlation with criminal behavior,

impulsiveness and legal as well as social problems (poor job performance, poor marital adjustment) [5-7].

Frick et al. found that elements of a psychopathic personality such as narcissistic, impulsive and anesthesia-hardness are significantly related to CD in psychopathic measurement scales [8]. It has been demonstrated that 80.0% of people with psychopathic traits are diagnosed with antisocial personality disorder, and that the proportion of people with this diagnosis reached 1.0% of the general population and 20.0% and 2.0% of the prisoners in United States of America and Great Britain, respectively [9]. Overall, the main characteristics of people with psychopathic traits are the lack of inhibition for their actions, impulsivity and shallow emotions, which make them prone to delinquent acts [10,11].

It has been proposed to distinguish psychopathic traits in three categories that apply to children: a) interpersonal, characterized by narcissistic elements, manipulative tactics, egocentrism and superficial charm, b) emotional, with hard and unemotional features, lack of empathy and guilt, where feelings are instantaneous, and c) behavioral, with audacious and impulsive behaviors, irresponsibility, tendency towards boredom and antisocial manifestations [12,13].

In addition to psychopathic traits, aggression is also prevailing in CD. Aggression is divided into reactive and proactive, which have different characteristics amongst younger and older children and adolescents. In particular, proactive aggression in children starts with the presentation of quarrels, delinquency, poor school performance and psychosocial difficulties and extends, later in adolescence, with the development of psychopathic elements and violent delinquency. On the other hand, reactive aggression first appears mainly during adolescence with the occurrence of impulsivity, hostility, lack of close friends, unusual perceptual experiences, and self-referral ideas [14].

The development of CD along with aggressive and psychopathic traits is a complex phenomenon that results from the interaction of multiple genetic, temperamental and environmental factors at different points in time. Researchers have generated a great amount of research to disentangle this multidimensional interaction and have focused in different periods of life starting as early as prenatally.

In particular, it has been found that the more a woman smokes during pregnancy, the higher are the chances to give birth to a child with CD and oppositional defiant disorder [15,16], while patterns of aggressive and impulsive behavior in children with CD are more frequent as a result of maternal smoking during pregnancy [17]. Moreover, maternal excessive alcohol consumption and substance abuse are associated with CD the offspring [18,19].

Pharoah et al. identified a correlation between the birth weight and CD [20]. In particular, they reported that low birth weight is associated with high scores at emotional and behavioral problems. Similarly, Tibbets et al. found a link between offending adults and low-fat/weight infants, showing that low birth weight was a predictor of their later illegal behavior [21].

Furthermore, maternal stress plays a crucial role in the development of CD and related behavioral difficulties [22]. Prenatal stress has been shown to be mediated by maternal and fetal cortisol levels, which change the programming of fetal neurons and predispose the child to develop externalizing problems including antisocial behavior, conduct and impulse control problems, expressed by hyperactivity, delinquency, aggressive and defiant behavior [23,24]. One proven stressful event during pregnancy, with adverse effects on children's emotional and behavioral development, is partner violence [25-27].

Although the literature has showed many psychosocial and parental factors as strong predictors of CD, this study focused on relevant to pregnancy factors. Thus, the aim of this study is to examine the association of perinatal factors and CD in the offspring, focusing on behavioral problems, aggression, and psychopathic traits, on the Greek sample of children and adolescents participating in the European "FemNAT-CD" study. The "FemNAT-CD" study aimed to identify the causes of CD and examine potential gender differences by mainly focusing on girls with CD [28].

Methods

Participants

Out of 125 Greek children and adolescents who participated in the "FemNAT-CD" study, 121 the final sample consisted of 121 after the study's exclusion criteria (age outside of the 9 to 18 years old range, IQ<70, clinical diagnosis of autism spectrum disorder, schizophrenia, bipolar disorder or mania, genetic syndrome, any chronic or acute neurological disorder, and history of moderate to severe traumatic brain injury) were applied. Seventy-nine (65.9%) were girls and 42 (34.7%) boys, aged between nine to 17 years old (M=13.43, SD=2.63). Fifty-five (45.5%) of the participants had a diagnosis of CD and 61 (54.5%) were healthy (control group). Basic demographics and information about the medical history were collected through the use of a self-reported questionnaire [28].

Measures

Conduct disorder diagnosis was made using the Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children- Present and Lifetime version (K-SADS-PL) [29]. K-SADS-PL is a valid (with well supported concurrent validity, high interrater reliability, and good to excellent test-retest reliability) semi-structured diagnostic interview, administered independently to the participants and their caregivers, in order to assess the (history and/or current) presence of any psychiatric disorder. K-SADS-PL is translated into Greek, with acceptable reliability and internal consistency [30].

Psychopathic traits were assessed using the Youth Psychopathic Traits Inventory (YPI) [31]. YPI is a self-reported questionnaire, with high internal consistency, which assesses ten core psychopathic traits (dishonest charm, grandiosity, manipulation, pathological lying, lack of remorse, emotion and guilt, hardness, impulsiveness, irresponsibility and risky

behavior) through ten subscales (with five items each). Furthermore, the Massachusetts Youth Screening Instrument II (MAYSI-II) was used in order to identify potential mental health needs of participants [32]. The MAYSI-II too, is a self-reported tool, with considerable internal consistency and adequate relations to other validated tools measuring similar constructs [33]. It consists of 52 items designed to assess the youth alcohol use, anger-irritability, depression-anxiety, body symptoms, suicidal ideation, thought disturbance and traumatic experiences. Finally, participants' aggressive traits were measured by the Reactive-Proactive Aggression Questionnaire (RPQ) [14]. This 23-item scale is a brief but reliable and valid (with well-established construct, convergent and criterion validity and internal consistency) self-report instrument that provides a total aggression score, of which 12 items measure reactive aggression and the rest 11 items measure proactive aggression. For the YPI, MAYSI-II and RPQ scales the procedure of translation, included initial and back-translation process, as per standard scientific requirements [34].

Statistical Analysis

Data for continuous variables were presented as means (and standard deviations), and data for categorical variables as frequencies. Chi-square tests discriminated group differences in categorical variables. Because continuous variables of interest (total scores in YPI, MAYSI-II, and RPQ scales) for the group of CD participants did not fail in Kolmogorov- Smirnov normality test, parametric tests (independent t-tests) were applied in order to compare differences between the levels of each categorical variable. All analyses were conducted using IBM SPSS version 20.0, at 5% level of significance.

Results

Among the examined perinatal factors (substance-alcohol use/smoking/verbal-physical violence from mother's partner during pregnancy, gestational duration, perinatal health problems and birth weight) only the occurrence of partner behavior was found to be significantly associated with the diagnosis of CD ($\chi2(1)=10.85$, phi=0.30, p=0.001), since mothers of children with CD reported more frequently (N=22, 42.3%) the occurrence of partner violence, compared to mothers of children without CD (N=10, 15.2%) **(Table 1).**

Table 1: Descriptive statistics (frequency, mean, standard deviation) of the examined perinatal factors, for participants with and without CD.

	Cases (CD)		Controls				
	N (%)	M (SD)	N (%)	M (SD)	χ2	t	p
Substance use during Pregnancy					-	-	-
Yes	0 (0.0)		0 (0.0)				
No	52 (100.0)		66 (100.0)				
Alcohol during Pregnancy							
Yes	2 (3.8)		1 (1.5)		0.62	-	.433
No	50 (96.2)		64 (98.5)				
Smoking during Pregnancy							
Yes	19 (36.5)		21 (31.8)		0.29		.591
No	33 (63.5)		45 (68.2)				
Violence during Pregnancy							
Yes	22 (42.3)		10 (15.2)		10.85		.001
No	30 (5707)		56 (84.8)				
Duration of Pregnancy							
Early birth	9 (16.7)		8 (12.1)		0.5		.477
Full-Term Pregnancy	45 (83.3)		58 (87.9)				
Perinatal problems							
Yes	14 (27.5)		13 (21.0)		0.65		.421
No	37 (72.5)		49 (79.0)				
Birth weight		3031.89		3202.42		1.54	.127

		(692.58)		(516.4)			

Among participants with CD, as **(Table 2)** shows, maternal smoking during pregnancy appeared to be significantly associated with participants (higher scores in) anger-irritability (MAYSI-II) (Cohen's d=0.67, t=-2.28, df=49, p=0.027); proactive (Cohen's d=0.91, t=-3.09, df=49, p=.003), reactive (Cohen's d=0.64, t=-2.20, df=49, p=0.032) and whole aggression (Cohen's d=0.85, t=-2.91, df=49, p=0.005) (RPQ); and psychopathic traits (YPI) (Cohen's d=0.99, t=-3.45, df=49, p=0.001). Furthermore, maternal exposure to verbal- physical violence by her partner during pregnancy was associated with (higher total scores in) psychopathic traits (YPI) in participants' with CD (Cohen's d=0.78, t=-2.76, df=49, p=0.008) **(Table 3)**.

Table 2: Participants' with CD Mean (Standard Deviation) scores in delinquency (MAYSI-II), aggression (RPQ) and psychopathic traits (YPI) scales, based on maternal smoking during pregnancy.

	M (SD)			
	Smoking during Pregnancy		**t**	**p**
MAYSI-II (Total)	YES (N=19)	No (N=32)		
Alcohol use from child/adolescent	0.68 (1.56)	1.16 (1.95)	4.89	.375
Anger/irritability	6.95 (2.48)	5.16 (2.83)	-2.28	.027
Depression/Anxiety	2.00 (1.37)	2.63 (1.97)	1.2	.235
Body Symptoms	1.58 (1.35)	2.44 (1.64)	1.92	.060
Suicidal ideation	0.42 (0.90)	0.53 (1.19)	0.35	.729
Thought disturbance	0.47 (0.77)	0.56 (0.95)	0.34	.731
Traumatic experiences	2.89 (1.29)	3.25 (1.90)	0.72	.474
RPQ				
Proactive aggression	7.79 (3.52)	4.31 (4.07)	-3.1	.003
Reactive aggression	13.79 (3.94)	11.16 (4.23)	-2.2	.032
Aggression total	21.58 (6.73)	15.47 (7.53)	-2.91	.005
YPI				
Psycopathy	129.05 (21.89)	107.47 (21.42)	-3.45	.001

Table 3: Participants' with CD Mean (Standard Deviation) scores in delinquency (MAYSI-II), aggression (RPQ) and psychopathic traits (YPI) scales, based on maternal exposure to verbal/ physical abuse during pregnancy.

	M (SD)			
	Verbal/physical violence during pregnancy		t	p
MAYSI-II (Total)	Yes (N=22)	No (N=30)		
Alcohol use from child/adolescent	0.82 (1.76)	1.10 (1.88)	0.55	.584
Anger/irritability	6.59 (2.26)	5.24 (3.09)	-1.73	.091
Depression/anxiety	2.36 (1.71)	2.41 (1.90)	0.1	.923
Body Symptoms	1.68 (1.43)	2.45 (1.64)	1.75	.087
Suicidal ideation	0.55 (1.10)	0.45 (1.09)	-0.31	.755
Thought disturbance	0.41 (0.73)	0.62 (0.98)	0.85	.400
Traumatic experiences	3.50 (1.53)	2.83 (1.77)	-1.42	.162
RPQ				
Proactive aggression	6.05 (3.71)	5.28 (4.57)	-0.64	.522

Reactive aggression	13.32 (4.03)	11.24 (4.31)	-1.75	.086
Aggression total	19.36 (7.26)	16.52 (8.04)	-1.3	.198
YPI				
Psychopathy	125.45 (20.57)	107.97 (23.67)	-2.76	.008

Discussion

Regarding the research question examining the effect of perinatal factors on the development of CD, it was found that there was a significant association between CD and violent behavior by the partner towards the mother during pregnancy. These findings agree with previous research showing the association between intimate partner violence and the development of behavioral and conduct problems [24-27].

As far as mother's smoking is concerned it was not found to be related to the development of CD. This finding contradicts previous research that found that mothers who smoked during pregnancy were more likely to give birth to children with CD, especially those who smoked more than one pack a day [15]. Additionally, other studies showed that alcohol consumption, in particular excessive consumption (known as binge drinking), and substance use during pregnancy is associated with childhood-onset CD [18,19].

Similarly, the finding that child's birth weight was not associated with CD, contradicts previous research. Particularly, researchers have identified a link between the birth weight of the child and CD, indicating that low birth weight is associated with high scores on emotional, behavioral, and delinquent problems [20,21]. The lack of a significant association between mother's smoking and child's birth weight with CD in this study might be attributed to the relatively small sample size since the trend that we observed was in the expected direction not reaching statistical significance.

The second research question of this study focused on the relation of perinatal factors with aggressive behavior, psychopathic traits and delinquency within the group of participants with CD. Psychopathic traits and aggression in participants with CD appeared to have a statistically significant relationship with maternal smoking in pregnancy, while psychopathic traits alone were also associated with partner violence towards the mother during pregnancy. Specifically, maternal smoking during pregnancy was strongly associated with high scores on both scales of psychopathy (YPI) and aggression overall score as well as both sub-scores/or proactive and reactive aggression (RPQ), while partner violence during pregnancy was associated with higher scores on the scale of psychopathy (YPI).

These results agree with other studies that found that aggression, impulsivity and psychopathy of children with CD are higher for those whose mother had a smoking history [7,17].

A number of limitations of this study need to be outlined. The sample size was relatively small and recruited with the use of incentives, thus, increasing the possibility of sampling bias. Similarly, the findings of the current study, being a cross-sectional one, do not allow us to infer any conclusions about the mechanisms that may underlie the association between prenatal factors and the development of CD. Finally, the diagnostic instrument used (K-SADS-PL) is based on the DSM-IV and not on the newer DSM-V; however, there are no differences in DSM-IV and DSM-V regarding diagnostic criteria for CD. Nevertheless, the strengths of this study were the inclusion of females and a control group, as well as the stringent inclusion and exclusion criteria.

The results of this study contribute to the understanding of CD and the identification of possible risk factors. Continuing these research efforts and conducting future research is of high importance for the prevention of CD. In particular, by targeting perinatal potentially modifiable factors it is possible to prevent the development of CD and its severe consequences on mental and physical health. Longitudinal studies should examine the effect of multiple risk factors on the development of CD in order to shed light on the underlying mechanisms that account for this association and provide appropriate guidance to preventative interventions.

Conclusion

Among several factors that were investigated in this study, only partner violent behavior towards the mother during pregnancy was found to be associated at a significant level with the occurrence of CD in the offspring. In children with CD, maternal smoking during pregnancy was related to psychopathic traits and aggression of the offspring, while partner violent behavior had a significant correlation with psychopathic traits only. Future longitudinal research with large sample sizes is necessary in order to gain a deeper understanding of how multiple factors contribute to the onset of CD.

Acknowledgment

The authors would like to thank Prof. Dr. Christine M. Freitag and all "FemNAT-CD" colleagues, for giving them the opportunity and the pleasure to be part and work for this study.

Funding sources

This study, as part of the «FemNAT-CD» consortium, was funded by the European Commission under the 7th Framework Health Program (Grant Agreement no. 602407). The authors did not receive any financial reward for participation to the research, authorship and/or publication of this article.

Conflict of Interest

The author declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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