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Conduct disorder and adult psychiatric diagnoses: Associations and gender differences in the U.S. adult population

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Abstract

The authors' objective was to examine the presence of Axis I and II psychiatric disorders among adult males and females with a history in childhood and/or adolescence of conduct disorder (CD).

Data were derived from a large national sample of the U.S. population. Face-to-face interviews of more than 34,000 adults ages 18 years and older were conducted during 2004–2005 using the Alcohol Use Disorder and Associated Disabilities Interview Schedule –DSM-IV Version.

After adjusting for sociodemographic characteristics and psychiatric comorbidity, CD was associated with all Axis I and II disorders, particularly substance use disorders (SUD), bipolar disorder, and histrionic personality disorders. After adjusting for gender differences in the general population, men had significantly greater odds of social anxiety disorder and paranoid personality

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disorder, whereas women were more likely to have SUD. Furthermore, there was dose-response relationship between number of CD symptoms and risk for most psychiatric disorders.

From a clinical standpoint, knowledge of the gender differences in associations of CD with other psychiatric disorders in adulthood may be informative of developmental pathways of the disorder, and of possible gender-specific risk factors. Early recognition and treatment of CD may help prevent the development of adult-onset disorders.

Keywords

conduct disorder; gender; comorbidity

INTRODUCTION

Conduct disorder (CD) is highly prevalent in childhood and early adolescence, constituting one of the most common chief complaints in child mental health consultations. It is accompanied by significant impairment in most spheres of life (Kim-Cohen et al., 2005; Lambert, et al.,,2001; Maughan et al. 2004; Nock et al, 2006), high public health costs (Foster & Jones, 2005), and family burden (Sourander et al., 2007). The prevalence of CD has been estimated to range from 4–16% in males and from 2–9% in females (Cohen et al 1993; Loeber et al., 2000; Nock et al., 2006). There are some indications that its prevalence may be increasing in Western societies (Angold & Costello, 2001).

In previous studies, a history of CD has been associated with the later development of mood, anxiety, and substance use disorders (SUD), and some studies have also documented that 45–70% of individuals with CD develop antisocial personality disorder (ASPD) in early adulthood (Gelhorn et al., 2007; Kim-Cohen et al., 2003; Lahey et al., 2002; Nock et al., 2006; Zoccolillo et al.,1992). However, the relationship between CD with Axis I psychopathology and the broader spectrum of personality disorders has not been previously examined. Understanding these associations is crucial to help clinicians develop a greater awareness of the risk of future psychopathology and to design appropriate treatment and preventive interventions.

Prior research has also suggested that the association of CD with other disorders varies by gender, leading to different psychopathology in men and women in adulthood. For instance, internalizing disorders are more commonly associated with CD in adolescent girls than boys, whereas boys are more likely to develop externalizing disorders (Loeber & Keenan, 1994). However, whether gender differences in the association of CD with adult psychopathology are moderated by the presence of CD or merely reflect gender differences in the distribution of psychiatric disorders in the general population is unclear.

Finally, an important question from a developmental psychopathology perspective is whether the severity of CD influences the risk of associated psychopathology, i.e., whether there is a dose-response relationship between severity of CD and risk of psychiatric and personality disorders in adulthood. Prior studies have found dose-response relationships among different subtypes of CD and Axis I psychopathology (Nock et al., 2006). However, whether these relationships may apply to Axis II psychopathology and vary by gender is unclear.

The goal of this study was to address these gaps in the literature. To our knowledge, this is the first large epidemiological study to examine the association between CD and the broad range of Axis I and II disorders, looking at differences in men and women. We draw on data from Wave 2 of the National Epidemiologic Survey on Alcohol and Related Conditions

(NESARC), a large nationally representative sample of the US population (N=34,635) collected in 2004–2005 (Grant et al., 2007). Our findings contribute to a better understanding of the gender differences in the association between CD and a broad range of psychiatric disorders in adults.

METHODS

Sample

NESARC sample—The NESARC sample is a nationally representative sample of the adult population of the United States conducted by the Census Bureau under the direction of the National Institute on Alcohol Abuse and Alcoholism. The NESARC target population was non-institutionalized individuals aged 18 years and older in the civilian population residing in households and group living quarters; including residents of the continental United States, Columbia, Alaska and Hawaii. Blacks, Hispanics, and young adults (18–24 years old) were oversampled.

The 2004–2005 Wave 2 NESARC is the second Wave longitudinal follow-up of the Wave 1 NESARC, conducted in 2001–2002. The first wave included face-to-face interviews with 43,093 respondents, yielding and overall response rate of 81.0% as described in detail elsewhere (Grant et al., 2007; Grant et al., 2003a). The Wave 2 interview was conducted approximately 3 years later (mean interval: 36.6 (s.e. 2.6) months). Excluding individuals who were ineligible (e.g., deceased), the response rate in wave 2 was 86.7%, reflecting 34,653 completed interviews. The cumulative response rate of Wave 2 was equal to the product of Wave 1 and Wave 2 response rates, or 70.2% (Grant et al., 2007). Wave 2 NESARC data were adjusted for non-response based on socio-demographic characteristics and presence of any lifetime Wave 1 NESARC SUD or other psychiatric disorder. The adjusted data are representative of the civilian population of the United States based on the 2000 Decennial Census (Grant et al., 2007). The research protocol, including informed consent procedures, received full ethical review and approval from the U.S. Census Bureau and the U.S. Office of Management and Budget.

Assessment

Sociodemographic Characteristics—Sociodemographic characteristics included sex, race-ethnicity, nativity, age, education, marital status, place of residence, employment status, and personal and family income.

Psychiatric diagnoses—All psychiatric diagnoses were made according to DSM-IV-TR criteria(2000) using the Alcohol Use Disorder and Associated Disabilities Interview Schedule-DSM-IV Version (AUDADIS-IV), Wave 2 version (Grant et al., 2004b), a reliable and valid diagnostic interview designed to be used by trained interviewers.(Grant et al., 2001) Conduct disorder was assessed retrospectively through 20 items that yielded a Cronbach's alpha of 0.72. All questions included in the AUDADIS-IV reflected CD DSM-IV conduct disorder criteria and the 4 dimensions of the disorder(aggression to people and animals, destruction of property, deceitfulness or theft and serious violations of rules), (*e.g. "Have you often cut class, not go to class, or go but then leave without permission?: Has there been a time when you bullied or pushed people around or tried to make them afraid of you?"; Has there been a time of your life when you lied a lot, not counting any times to lied to keep from being hurt?*…) All criteria had to be endorsed before age 15.

Extensive AUDADIS-IV questions covered DSM-IV criteria for alcohol and drug-specific abuse and dependence for 10 classes of substances. The good to excellent (κ =0.70–0.91) test-retest reliability of AUDADIS-IV substance use diagnoses is documented in clinical and

general population samples (Grant et al., 2003b; Hasin et al.,1997). Convergent, discriminant, and construct validity of AUDADIS-IV substance use disorder criteria and diagnoses were good to excellent (Hasin et al.,1990; Hasin et al., 2003).

Mood disorders included DSM-IV major depressive disorder (MDD), bipolar I and II, and dysthymia. Diagnoses of MDD ruled out bereavement. Anxiety disorders included DSM-IV panic disorder, social anxiety disorder, specific phobias, generalized anxiety disorder (GAD), and posttraumatic stress disorder (PTSD). AUDADIS-IV methods to diagnose these disorders are described in detail elsewhere (Grant et al., 2004a; Grant et al., 2005; Grant et al., 2006). Attention-deficit/hyperactivity disorder (ADHD) was assessed in the Wave 2 NESARC. Suicide attempts were assessed only in individuals who reported having been sad, blue depressed or having a period that they did not care about things that they usually enjoyed for at least 2 weeks. In those cases, suicide attempt was assessed and computed for those who reported having attempted suicide during that period.

Personality disorders assessed on a lifetime basis at Wave 1 and described in detail elsewhere (Compton et al., 2005; Grant et al., 2005) included avoidant, dependent, obsessive-compulsive, paranoid, schizoid, histrionic, and antisocial personality disorders. Borderline, schizotypal, and narcissistic personality disorders were measured at Wave 2.

Test-retest reliabilities for AUDADIS-IV mood, anxiety, personality disorders, and ADHD diagnoses in the general population and clinical settings were fair to good (=0.40–0.77) (Canino et al., 1999; Ruan et al., 2008). Test-retest reliabilities of AUDADIS-IV personality disorders compare favorably with those obtained in patient samples using semi structured personality interviews (Zimmerman, 1994). Convergent validity was good to excellent for all affective, anxiety, and personality disorders diagnoses (Grant et al., 2005; Grant et al., 2006), and selected diagnoses showed good agreement (κ =0.64–0.68) with psychiatrist reappraisals (Canino et al., 1999).

Statistical Analyses

Weighted means, frequencies and odds ratios (ORs) of socio-demographic correlates, prevalence of lifetime and current DSM-IV psychiatric disorders were computed. Adjusted odds ratios were derived from multiple logistic regressions with CD as the predictor variable and presence of each psychiatric disorder as the outcome, adjusting for sociodemographic characteristics and other psychiatric comorbidity. Gender differences in psychiatric comorbidity among individuals with CD, adjusting for gender differences in the prevalence of psychiatric disorders in the general population, were examined using logistic regression models with each psychiatric disorder as the outcome and using as predictors gender, CD and their interaction. One logistic regression model was used for each disorder. All models used female gender and absence of CD as the reference categories, and adjusted for the sociodemographic characteristics of the sample.

Dose-response relationships between the number of CD symptoms and risk of psychiatric disorders were computed by grouping the number of CD symptoms into 3 categories: 0 (used as reference), 1–2 and 3 or more symptoms. As in previous research with other samples, (Blanco et al., 2011), the cut-offs were chosen to represent as full a spread of scores as possible but avoid categories with few members. We consider significant odds ratios those with confidence intervals that do not include 1. All standard errors and 95% CIs were estimated using SUDAAN (Research Triangle Institute., 2007) to adjust for the design effects of the NESARC.

RESULTS

Prevalence of CD and Sociodemographic Characteristics

The retrospective prevalence of CD was 3.39% (CI: 95%CI: 3.10–3.17) in males and 1.28% (CI: 1.15–1.43) in females. For both males and females, being Native American, having less than a high school degree, having been never married and having public or no insurance increased the risk of CD, whereas being foreign-born decreased the risk of CD. Among females, being Black increased the risk of CD, whereas being Asian decreased it (See Supplementary Tables 1 and 2).

Disorders Associated with CD

After adjusting for sociodemographic characteristics, men with previous history of CD were significantly more likely to have all Axis I and II diagnoses than those without CD, with the exception of alcohol abuse. After further adjustment for psychiatric comorbidity, men with history of CD were still more likely to have any Axis I psychiatric disorder, any Axis II diagnosis, any drug use disorder, any alcohol use disorder, bipolar disorder, ADHD, and less likely to have GAD that those without CD. Among Axis II disorders, men with history of CD were more likely to have obsessive compulsive, paranoid and histrionic personality disorder, but less likely to be diagnosed with borderline personality disorder (Table 1).

Women with history of CD were more likely than women without CD to have all Axis I and II diagnoses, even when sociodemographic factors were taken into account. After further adjusting for comorbidity, women with previous history of CD were still more likely to have any psychiatric, any Axis I diagnosis, any alcohol use disorder and any drug disorder. In this adjusted model, women with prior CD also had higher odds of having bipolar disorder and a history of suicide attempts, but had lower odds of social anxiety disorder. Among Axis II disorders, women with history of CD had higher odds of histrionic personality disorder and lower odds of borderline personality disorder (Table 2).

There was a statistically significant interaction between gender and CD for SUD, indicating that after adjusting for gender differences in the general population, the prevalence of SUD was lower in men than in women. The opposite was true for social anxiety and paranoid personality disorder (Table 3).

Number of symptoms and rates of comorbidity

There was a dose-response relationship between number of CD symptoms and risk for psychiatric disorders. Subjects endorsing between 1–2 symptoms of CD had significantly increased odds of having any other psychiatric disorder. These odds were greater when subjects presented 3 or more symptoms. (Supplementary Table 3).

DISCUSSION

In a large, nationally representative sample of US adults, a history of CD in childhood and adolescence was associated with increased odds of a broad range of Axis I and II disorders, even after adjusting for sociodemographic characteristics and psychiatric comorbidity. There were gender differences in patterns of comorbidity, and some of those differences were moderated by a history of CD. Furthermore, there was a dose-response relationship between number of CD criteria and risk of psychiatric disorders.

Disorders associated with CD

Consistent with previous studies (Krueger & Tackett, 2003; Regier et al., 1990; Swendsen et al., 2010), prior history of CD was strongly associated to ASPD (Gelhorn et al., 2007;

Zoccolillo et al., 1992) and SUD in adulthood. Our study extends previous research by documenting that CD in childhood and adolescence is also associated with internalizing psychopathology and all personality disorders, even after adjusting for sociodemographic characteristics. Previous studies have found that disruptive behavior disorders can predict the onset of other psychiatric disorders (Costello et al., 2003; Kim-Cohen et al., 2003). For example, the Dunedin study, which examined individuals from childhood until age 32, found that oppositional defiant disorder (ODD) and CD were part of the developmental history of several Axis I diagnoses and ASPD (Kim-Cohen et al., 2003). Our data suggest that these associations can still be detected when a broader age range is considered.

The reasons why CD may increase the risk of all psychiatric disorders are unknown, but may involve biological factors such as genetic (Cadoret et al 1995, Eley et al.,1999, Kendler 2011), hormonal (Ramirez, 2003) and temperamental factors (Caspi et al., 1995), as well as developmental and psychosocial ones (Dodge & Petit, 2003). Recent studies have shown that while the continuity for externalizing problems may be rooted mainly in genes, shared environmental risks factors among psychiatric disorders play an important role in the association of externalizing and internalizing disorders (Kendler et al 2011). Therefore, one possibility is that many of the risk factors for CD, such as neighborhood characteristics, parent-child conflict or family functioning, may be also risk factors for other disorders (Copeland et al.,2009). CD may also increase the risk of future psychiatric disorders by contributing to a negative outcome, such as school failure, family distress or impairment in social relationships that in turn increase the risk for other disorders (Capaldi, 1992).

After further adjusting for other psychiatric comorbidity, a common pattern of association of disorders arose in women and men. Consistent with previous studies, both men and women with history of CD had higher prevalence of SUD in adulthood (Boyle et al., 1992; Nock et al., 2006), ASPD (Eppright et al., 1993; Gelhorn et al., 2007), bipolar disorder (Kovacs & Pollock, 1995; Wozniak et al., 1995) and histrionic personality disorder, suggesting a general vulnerability for externalizing disorders (Grove et al., 1990; Kendler et al., 1997; Kendler et al., 2003; Krueger et al., 1998). It is possible that this vulnerability is expressed as one or more disorders depending on the individual level of liability to externalizing disorders and the level of exposure to external risk factors (Neale & Kendler, 1995). By contrast, we found that associations between CD and internalizing disorders were no longer significant, suggesting that the association between CD and internalizing disorders is generally not direct, but rather mediated by the presence of externalizing disorders. Nevertheless, it is possible that in some cases, the presence of internalizing disorders may be mediated by externalizing disorders. For example, SUD may increase the risk of mood and anxiety disorders (Brady & Sinha, 2005).

Overall, our study provides some insight on the current perspective of developmental psychopathology. In contrast with previous categorical conceptualizations of the nosology of disorders, ample evidence from longitudinal studies has shown that there is a continuity in psychiatric disorders that, initiated in childhood, persist throughout the life span, not only in a homotypic pattern (persistence of the same disorder), but also in heterotypic forms (different disorders predicting each other over time) (Copeland et al 2009). In particular, specific heterotypic patterns of prediction have been described for anxiety-depression (Kim-Cohen et al 2003, Pine et al., 1998), and for conduct disorder (predicting mood disorders, anxiety, SUD and ASPD) (Burke, J. D. et al.,2005; Kim-Cohen et al., 2003; Zoccolillo et al., 1992). In the broader range of Axis II disorders, our results also confirm CD as one of the most persistent forms of psychopathology over time.

Gender specific patterns

The prevalence of certain comorbid disorders also varied by gender, as indicated by the main effects of our logistic regression models. CD was associated with a significantly higher prevalence of ADHD, and paranoid and obsessive-compulsive personality disorder in men, whereas in women CD was associated with higher prevalence of suicide attempts. Our results may partially reflect gender differences in the prevalence of disorders in the general population. In the general population men are more prone to develop externalizing disorders, whereas women seem to have higher vulnerability for internalizing disorders (Fontenelle & Hasler, 2008; Goodman, 2009; Mellos et al., 2010).

An important, novel finding of our study was that, after adjusting for gender differences in the general population, SUD were more common in women that among men, whereas the opposite was true for social anxiety disorder and paranoid personality disorder, as indicated by the statistical significance of the interaction terms. Because of greater social pressure against the development of aggressive, exploitative, and criminal behavior, women may require a larger genetic load than men to manifest CD behaviors, and this genetic load may simultaneously increase the risk of SUD among women (Costello et al., 2003; Sung et al., 2004, Loeber et al., 2010). Alternatively, women who engage in the deviant behaviors characteristic of CD may tend to be less sensitive to social pressures, and thus more likely to engage in substance use or to be more susceptible to transition from substance use to SUD, which is in line with the “gender paradox”(Costello et al.,1999). Similar mechanisms may explain the significant interactions for social anxiety disorder and paranoid personality disorder. In the general population women are more likely than men to suffer from disorders characterized by a heightened sense of social inadequacy or personal vulnerability, as indicated by the significance of the main effect terms for social anxiety disorder and paranoid personality disorder. However, the traits associated with CD may help counteract those liabilities more strongly in women than men, resulting in a less marked gender difference in the prevalence of those disorders among individuals with CD.

A greater knowledge of the gender differences in prevalence, clinical course and associations of CD in adulthood may be relevant to inform on developmental pathways of the disorder, future classification systems, and on possible gender-specific risk and protective factors that can be integrated in prevention programs.

Dose-Response Relationship

Higher severity of CD, measured as number of symptoms endorsed by the respondent, increased risk of all psychiatric disorders in men and women. Furthermore, the dose-response relationship was present even among those subjects endorsing sub threshold symptoms (between 1–2 symptoms) of CD. The number of symptoms may be a severity indicator for a latent variable that, in interaction with the environment, could lead to more severe outcomes (Dodge, 2009). It is also possible that children with greater number of CD symptoms expose themselves to a more harmful environment by associating with deviant peers, engaging in substance use or criminal behavior, which would then amplify the effect of the subject’s preexisting vulnerability to psychiatric disorders (Lyons et al., 1995). Alternatively, early exposure to negative environmental factors or events may lead to the activation of genes that may increase the risk of most adult psychiatric disorders (Beach et al., 2010; Dodge, 2009).

Our findings highlight the need to develop more effective interventions to address antisocial behaviors and their comorbid conditions. Current prevention programs’ focus on family and school (Hutchings et al., 2007; Poduska et al., 2008) are especially designed for younger children, but much less is known about the efficacy of interventions for older children or

adolescents with CD. In other areas of medicine, the application of aggressive treatment of current disorders (e.g. HIV), appears to be highly effective in preventing new ones (Montaner et al., 2010). The treatment of CD may constitute a very efficient preventive strategy for adult psychiatric disorders.

Strengths and limitations

Main strengths of our study are the use of large, nationally representative sample, which makes the results generalizable to the US population, and the assessment of a wide range of psychiatric disorders. The study also has some limitations. First, the diagnosis of CD was assessed retrospectively, which introduces the possibility of recall bias, according to which, there is a risk that participants with psychiatric disorders may be more likely to remember past conflictive and difficult events. However, there is evidence indicating that adult informants are a reliable source when reporting childhood experiences (Brewin et al., 1993; Hardt & Rutter, 2004). Second, our results are based on general population and may underestimate the rates of comorbid disorders that could be found in clinical samples, or among incarcerated subjects. (Compton et al., 2003). Third, the current DSM-IV diagnostic system may not fully reflect existing gender differences in the expression of aggression, leading to an underestimation of aggression in women. (Crick, 1996; Crapanzano et al, 2010). Fourth, comorbidity between previous history of CD and other disorders may be linked to a history of CD in the family. However, this piece of information was not collected in the NESARC. Fifth, our study has a cross-sectional design. Further longitudinal studies that confirm the continuity of psychiatric disorders from childhood to adulthood are needed.

Despite the limitations, these findings carry important clinical implications for pediatricians, child psychiatrists and psychologists. Our findings suggest that CD has strong associations with all psychiatric disorders examined, with a greater predisposition among the externalizing group. Moreover, there seems to be differences in the patterns of comorbidity across genders, and dose response relationship between severity of CD and later risk for all psychiatric disorders. The treatment of CD in childhood and adolescence may help decrease the suffering of individuals with CD and their families. It may also constitute an important strategy to decrease the burden of psychiatric disorders in adulthood.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Prevalence of Psychiatry Disorders among individuals with versus without Conduct Disorder in Men

	Men with CD(n=929)		Men without CD (n=13,595)					
	%	SE	%	SE	OR[a]	95% CI[a]	AOR[b]	95% CI[b]
Any Psychiatric Diagnosis	95.96	0.70	66.52	0.81	**11.15**	7.92, 15.70	**11.15**	7.92, 15.70
Any Axis I Disorder	93.99	0.85	63.87	0.85	**8.24**	6.18, 10.99	**5.98**	4.45, 8.04
Any Substance Disorder	85.94	1.22	54.36	0.94	**4.80**	3.95, 5.84	**3.54**	2.91, 4.31
Nicotine Dependence	52.69	2.19	24.31	0.63	**3.23**	2.72, 3.84	**1.76**	1.48, 2.10
Any Alcohol Use Disorder	77.80	1.48	45.43	0.95	**4.00**	3.34, 4.79	**2.34**	1.93, 2.84
Alcohol Abuse	28.39	1.73	26.57	0.72	1.07	0.89, 1.28	**1.42**	1.16, 1.73
Alcohol Dependence	49.41	1.86	18.87	0.53	**3.90**	3.30, 4.60	**2.30**	1.89, 2.80
Any Drug Use Disorder	48.35	2.19	13.54	0.45	**5.51**	4.57, 6.64	**3.00**	2.44, 3.68
Drug Abuse	39.93	2.04	11.88	0.42	**4.55**	3.77, 5.49	**2.54**	2.06, 3.13
Drug Dependence	21.46	1.72	3.07	0.20	**7.55**	6.04, 9.44	**3.02**	2.26, 4.03
Any Mood Disorder	44.33	1.84	16.14	0.41	**3.93**	3.37, 4.57	**1.45**	1.18, 1.77
Major Depressive Disorder	19.33	1.41	10.64	0.34	**1.87**	1.54, 2.28	0.95	0.74, 1.22
Dysthymia	5.36	0.88	2.12	0.15	**2.46**	1.70, 3.55	0.93	0.56, 1.55
Bipolar Disorder	23.57	1.54	4.96	0.21	**5.59**	4.55, 6.86	**2.04**	1.62, 2.57
Any Anxiety Disorder	44.36	2.04	20.08	0.45	**3.02**	2.56, 3.57	1.09	0.89, 1.34
Panic Disorder	13.97	1.42	4.21	0.21	**3.45**	2.70, 4.41	1.03	0.75, 1.41
Social Anxiety Disorder	15.99	1.45	5.21	0.23	**3.23**	2.58, 4.04	0.99	0.74, 1.31
Specific Phobia	21.34	1.79	9.39	0.30	**2.49**	2.00, 3.10	1.01	0.77, 1.32
Generalized Anxiety Disorder	12.00	1.42	4.46	0.23	**2.71**	2.06, 3.57	0.59	0.41, 0.84
Posttraumatic Stress Disorder	12.99	1.40	5.43	0.23	**2.47**	1.90, 3.20	0.73	0.53, 1.01
Pathological Gambling	2.30	0.61	0.51	0.08	4.56	2.38, 8.71	2.01	0.85, 4.89
ADHD	11.22	1.21	2.45	0.18	4.42	3.33, 5.87	**1.89**	1.33, 2.67
Suicide Attempts	8.88	1.20	1.78	0.13	4.79	3.40, 6.74	1.37	0.86, 2.19
Any Axis II Disorder	49.45	2.10	18.36	0.45	4.14	3.48, 4.93	**1.89**	1.55, 2.32
Avoidant	7.70	1.30	1.47	0.12	4.96	3.29, 7.49	0.99	0.56, 1.77
Dependant	2.35	0.70	0.16	0.05	12.23	6.27, 23.87	1.22	0.42, 3.54
Obsessive-Compulsive	24.39	1.87	6.90	0.25	4.40	3.54, 5.47	**1.97**	1.53, 2.55

	Men with CD(n=929)		Men without CD (n=13,595)					
	%	SE	%	SE	OR[a]	95% CI[a]	AOR[b]	95% CI[b]
Paranoid	17.17	1.72	2.67	0.16	6.90	5.19, 9.18	**2.38**	1.69, 3.34
Schizoid	10.59	1.24	2.54	0.17	4.24	3.21, 5.59	1.34	0.94, 1.91
Schizotypal	14.04	1.38	3.49	0.21	4.15	3.26, 5.28	1.12	0.79, 1.60
Narcissistic	16.50	1.38	7.02	0.31	2.53	2.01, 3.19	0.91	0.69, 1.20
Borderline	16.06	1.43	4.79	0.22	3.35	2.65, 4.22	0.67	0.47, 0.96
Histrionic	9.47	1.30	1.27	0.11	7.42	5.29, 10.42	**2.28**	1.52, 3.42
Antisocial	83.82	1.46	0.00	0.00	N/A	N/A, N/A	N/A	N/A, N/A

Abbreviations: CD= conduct disorder; ADHD= attention deficit hyperactive disorder

[a]Adjusted for sociodemographic characteristics

[b]Adjusted for sociodemographic characteristics and psychiatry comorbidity

Table 2

Prevalence of Psychiatry Disorders among individuals with versus without Conduct Disorder in Women

	Women with CD (n=509)		Women without CD (n=13.580)					
	%	SE	%	SE	OR[a]	95% CI[a]	AOR[b]	95% CI[b]
Any Psychiatric Diagnosis	96.01	1.07	61.95	0.65	**13.82**	7.82, 24.41	**13.82**	7.82, 24.41
Any Axis I Disorder	95.03	1.13	59.41	0.72	**12.23**	7.43, 20.13	**7.47**	4.47, 12.48
Any Substance Disorder	81.81	2.07	33.39	0.77	**8.69**	6.53, 11.55	**5.27**	3.86, 7.19
Nicotine Dependence	58.57	2.89	19.21	0.53	**5.50**	4.29, 7.04	**2.53**	1.89, 3.40
Any Alcohol Use Disorder	64.53	2.75	21.36	0.67	**7.03**	5.41, 9.15	**3.43**	2.56, 4.60
Alcohol Abuse	26.28	2.48	12.14	0.46	**2.62**	1.99, 3.45	**2.27**	1.69, 3.05
Alcohol Dependence	38.25	2.80	9.22	0.35	**5.77**	4.51, 7.40	**2.25**	1.69, 3.01
Any Drug Use Disorder	46.34	2.78	7.36	0.31	**10.60**	8.34, 13.46	**4.72**	3.45, 6.45
Drug Abuse	31.63	2.44	6.12	0.28	**6.87**	5.34, 8.82	**2.8**	2.10, 3.98
Drug Dependence	26.57	2.45	1.85	0.13	**18.23**	13.59, 24.45	**6.09**	4.20, 8.84
Any Mood Disorder	69.17	2.38	28.52	0.50	**5.42**	4.31, 6.83	**1.53**	1.15, 2.03
Major Depressive Disorder	33.89	2.82	20.86	0.43	**1.95**	1.49, 2.54	0.90	0.65, 1.24
Dysthymia	10.93	1.82	4.26	0.17	**2.72**	1.83, 4.03	0.83	0.50, 1.37
Bipolar Disorder	33.79	2.53	6.84	0.26	**6.15**	4.88, 7.73	**1.72**	1.23, 2.41
Any Anxiety Disorder	69.00	2.54	35.66	0.65	**3.84**	2.99, 4.92	0.96	0.68, 1.35
Panic Disorder	29.58	2.50	9.19	0.31	**3.92**	3.03, 5.07	0.93	0.66, 1.31
Social Anxiety Disorder	20.71	2.09	7.67	0.28	**2.93**	2.23, 3.85	0.48	0.35, 0.67
Specific Phobia	41.80	2.92	19.09	0.53	**2.90**	2.27, 3.70	0.90	0.67, 1.20
Generalized Anxiety Disorder	29.46	2.51	9.62	0.31	**3.90**	3.01, 5.04	0.77	0.55, 1.08
Posttraumatic Stress Disorder	30.75	2.45	12.26	0.34	**3.01**	2.41, 3.77	0.74	0.53, 1.05
Pathological Gambling	1.38	0.37	0.18	0.03	**7.15**	3.47, 14.75	1.39	0.54, 3.56
ADHD	9.88	1.73	1.79	0.11	**5.59**	3.76, 8.32	1.35	0.79, 2.29
Suicide Attempt	22.23	2.43	3.96	0.18	**6.53**	4.77, 8.94	**1.52**	1.03, 2.27
Any Axis II Disorder	57.30	2.69	18.23	0.39	**5.67**	4.52, 7.11	**1.75**	1.33, 2.31
Avoidant	12.95	2.09	2.45	0.15	**5.30**	3.57, 7.86	0.76	0.45, 1.28
Dependant	4.83	1.15	0.42	0.06	**12.63**	7.25, 22.00	1.57	0.78, 3.18

	Women with CD (n=509)		Women without CD (n=13.580)					
	%	SE	%	SE	OR[a]	95% CI[a]	AOR[b]	95% CI[b]
Obsessive-Compulsive	26.22	2.46	7.55	0.26	**4.45**	3.44, 5.76	1.32	0.94, 1.85
Paranoid	24.79	2.46	4.42	0.20	**6.32**	4.79, 8.36	1.27	0.88, 1.82
Schizoid	14.98	1.63	2.72	0.14	**5.90**	4.40, 7.89	1.22	0.84, 1.76
Schizotypal	14.74	1.85	3.37	0.17	**4.52**	3.34, 6.11	0.68	0.44, 1.05
Narcissistic	16.70	1.94	4.50	0.22	**4.07**	2.99, 5.56	1.17	0.82, 1.68
Borderline	23.92	2.25	5.71	0.24	**4.53**	3.51, 5.85	0.63	0.43, 0.91
Histrionic	12.11	1.68	1.49	0.10	**8.62**	6.08, 12.24	**2.07**	1.37, 3.12
Antisocial	78.18	2.18	0.00	0.00	N/A	N/A, N/A	N/A	N/A, N/A

Abbreviations: CD= conduct disorder; ADHD= attention deficit hyperactive disorder

[a] Adjusted for sociodemographic characteristics

[b] Adjusted for sociodemographic characteristics and psychiatry comorbidity

Table 3

Interaction of Conduct Disorder and Gender with Lifetime Psychiatric Disorders as output variable

	Main Effect of Gender		Interaction of Gender and Conduct Disorder	
	AOR	**95% CI**	**AOR**	**95% CI**
Any Psychiatric Diagnoses	1.27	1.20–1.35	0.78	0.39–1.58
Any Axis I Disorder	1.28	1.20–1.37	0.77	0.42–1.41
Any Substance Disorder	2.92	2.73–3.12	**0.67**	0.47–0.96
Nicotine Dependence	1.50	1.40–1.62	0.72	0.52–1.00
Any Alcohol Use Disorder	3.83	3.57–4.12	0.78	0.55–1.11
Alcohol Abuse	2.69	2.49–2.90	**0.40**	0.29–0.54
Alcohol Dependence	2.62	2.38–2.88	0.97	0.66–1.42
Any Drug Use Disorder	2.34	2.11–2.60	0.73	0.49–1.07
Drug Abuse	2.31	2.08–2.57	0.97	0.68–1.40
Drug Dependence	2.10	1.70–2.59	**0.57**	0.35–0.93
Any Mood Disorder	0.40	0.37–0.43	0.85	0.61–1.20
Major Depressive disorder	0.46	0.42–0.49	1.20	0.79–1.82
Dysthymia	0.54	0.46–0.64	1.15	0.60–2.21
Bipolar Disorder	0.74	0.65–0.84	1.19	0.77–1.82
Any Anxiety Disorder	0.35	0.33–0.38	0.99	0.68–1.45
Panic Disorder	0.42	0.37–0.48	1.08	0.70–1.68
Social Anxiety Disorder	0.68	0.61–0.76	**1.72**	1.12–2.64
Specific Phobia	0.40	0.37–0.44	1.04	0.70–1.55
Generalized Anxiety Disorder	0.43	0.37–0.49	0.82	0.54–1.27
Posttraumatic Stress Disorder	0.45	0.40–0.51	1.12	0.66–1.91
Pathological Gambling	3.41	2.03–5.73	0.87	0.33–2.33
ADHD	1.51	1.25–1.83	1.22	0.68–2.19
Suicide Attempts	0.48	3.39–0.57	0.90	0.52–1.53
Any Axis II Disorders	1.09	1.00–1.18	1.02	0.72–1.44
Avoidant	0.64	0.51–0.80	1.24	0.59–2.61
Dependant	0.47	0.25–0.90	1.37	0.52–3.60
Obsessive-Compulsive	0.97	0.88–1.07	1.45	0.99–2.14
Paranoid	0.62	0.53–0.73	1.69	1.04–2.77
Schizoid	1.08	0.90–1.29	1.03	0.64–1.66
Schizotypal	1.30	1.10–1.53	1.63	0.94–2.85
Narcissistic	1.91	1.67–2.18	0.92	0.61–1.39
Borderline	0.97	0.85–1.12	1.15	0.70–1.87
Histrionic	0.95	0.74–1.21	1.30	0.77–2.19

Abbreviations: CD= conduct disorder; ADHD= attention deficit hyperactive disorder

For all models, reference group is female gender and absence of diagnosis of CD.

Model: disorder=sex+CD+sex*CD+all sociodemographic variables+psychiatric comorbidity