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Prevalence, Subtypes, and Correlates of DSM-IV Conduct Disorder in the National Comorbidity Survey Replication

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Abstract

Background— Prior research indicates that conduct disorder (CD) is associated with a range of comorbid mental disorders. However, the actual prevalence, subtypes, and patterns of comorbidity of DSM-IV defined CD in the general U.S. population remains unknown.

Method— Retrospective assessment of CD and other DSM-IV disorders was conducted using fully structured diagnostic interviews among a nationally representative sample of respondents (n = 3,199) in the National Comorbidity Survey Replication.

Results— The estimated lifetime prevalence of CD in the U.S. is 9.5% (males = 12.0%, females = 7.1%), with a median age-of-onset of 11.6 (0.2) years. Latent class analysis identified five CD subtypes characterized by rule violations, deceit/theft, aggression, severe covert behaviors, and pervasive CD symptoms. A dose-response relationship was revealed between CD subtype severity and risk of subsequent disorders. Results also indicated that CD typically precedes mood and substance use disorders, but most often occurs after impulse control and anxiety disorders. Although both active and remitted CD is associated with increased risk of the subsequent first onset of other mental disorders, remitted CD is associated with significantly lower risk of subsequent disorders.

Conclusions— CD is prevalent and heterogeneous in the U.S. population, and more severe subtypes and the presence of active CD are associated with higher risk of comorbid disorders. Future prospective studies using general population samples will further inform the nature and course of this disorder.

Conduct disorder (CD), as defined in the DSM-IV, is characterized by a pervasive and persistent pattern of aggressive, deceptive, and destructive behavior that usually begins in childhood or adolescence. CD symptoms are the primary presenting problems for psychiatric referral among children and adolescents in the U.S. (Kazdin, 1995;Robins, 1991), and youth diagnosed with CD report higher levels of distress and impairment in virtually all domains of living than youth with other mental disorders (Lambert, Wahler, Andrade, & Bickman, 2001). Moreover, prior prospective studies have shown that conduct problems during childhood or adolescence are associated with significantly increased risk of other mental disorders, legal problems, and premature mortality (Kim-Cohen et al., 2003;Laub & Vaillant, 2000;Pajer, 1998;Robins, 1966;Simonoff et al., 2004).

Despite the significance of CD, many basic questions about the disorder remain unanswered. First and foremost, the general population prevalence of CD in the U.S. is currently unknown.

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Several prior studies have used DSM-IV criteria to evaluate the prevalence of CD in other countries (Moffitt, Caspi, Rutter, & Silva, 2001) or in selective samples within the U.S. (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003), but these data are of limited use in estimating the prevalence of CD in the general U.S. population. Based on these prior studies, the lifetime prevalence of CD has been estimated at between 6% and 16% for males and 2% and 9% for females in the U.S. (Loeber, Burke, Lahey, Winters, & Zera, 2000;Maughan, Rowe, Messer, Goodman, & Meltzer, 2004). However, in addition to limitations in the sampling procedures used these estimates are based on DSM-III and DSM-III-R criteria. Given that even minor changes in the diagnostic criteria of CD have been shown to result in major differences in prevalence (Boyle et al., 1996;Loeber, Burke et al., 2000), these estimates are unlikely to represent the prevalence of DSM-IV CD accurately.

Questions also exist about the presence of CD subtypes. A DSM-IV diagnosis of CD requires the presence of any three of 15 symptoms. This means that 32,647 distinct symptom profiles qualify for a diagnosis of CD. DSM-IV proposes subtypes based on developmental patterns of onset (i.e., “childhood onset” versus “adolescent onset” CD). There is evidence supporting this general developmental distinction (Moffitt & Caspi, 2005); however, the identification of more precise subtypes based on symptom content could be useful in bringing order to the enormous variety of symptom profiles possible, and may reveal important distinctions in etiology, course, and treatment response. Toward this end, DSM-IV also classifies symptoms according to four main clusters (i.e., “aggression to people and animals,” “destruction of property,” “deceitfulness or theft,” and “serious violations of rules”). To date, empirical justification for these classes is lacking, as is information about the relation of such classes to course of illness, comorbidity, or treatment response. Prior studies have suggested alternative classification schemes for CD symptoms, making distinctions between overt (e.g., physical assault) and covert (e.g., shoplifting) symptoms, destructive and non-destructive symptoms, proactive and reactive aggression, socialized and unsocialized subtypes, and based on the presence versus absence of callous-unemotional traits and specific comorbities (Dodge, Lochman, Harnish, Bates, & Pettit, 1997;Frick & Ellis, 1999;Frick et al., 1993;Rutter, Giller, & Hagell, 1998). The fact that empirical support exists for each of these dichotomous distinctions suggests that a more textured and multidimensional classification system is needed to characterize subtypes comprehensively.

There also are questions regarding the widely documented comorbidity of CD with other mental disorders (Kim-Cohen et al., 2003;Lahey, Loeber, Burke, Rathouz, & McBurnett, 2002;Lahey, Miller, Gordon, & Riley, 1999;Loeber, Burke et al., 2000;Maughan et al., 2004). Although it is clear that CD is associated with other disorders, little is known about whether comorbid disorders precede or follow the onset of CD, whether comorbidities differ by CD subtype, or whether CD is associated with the adult persistence of comorbid disorders. Studies addressing these questions have relied on data from relatively small, selective samples, such as those seeking treatment or those from a specific geographic location. Results from such studies may reflect idiosyncratic characteristics that are of limited generality to the larger population.

The current study examines the prevalence, age-of-onset, and empirically-defined subtypes of DSM-IV CD in the National Comorbidity Survey Replication (NCS-R) (Kessler et al.). Individual-level comparisons of retrospectively reported age-of-onset of comorbid disorders are used to examine the presence and timing of these disorders in relation to CD. Although the use of retrospective reporting may introduce limitations such as under-reporting and recall bias, such methods can provide valuable data where no prospective studies exist (Schlesselman, 1982). The current study provides preliminary information on CD that is immediately beneficial to researchers, clinicians, and health care policy experts, and can inform future prospective studies in this area. Data from the NCS-R have recently shed light on the

prevalence, course, and correlates of other disorders (e.g., Kessler, Adler et al., 2005;Kessler, Berglund, Borges, Nock, & Wang, 2005;Kessler, Brandenburg et al., 2005); however, no prior studies have provided data on CD.

METHOD

Sample

Data are from the National Comorbidity Survey Replication (NCS-R), a face-to-face household survey of 9,282 English-speaking adults ages 18+ in the coterminous United States that was based on a nationally representative multi-stage clustered area probability sampling design (Kessler et al., 2004). The response rate was 70.9%. Respondents received information about the study via an advance letter and a Study Fact Brochure followed by a household informational visit before providing informed consent and carrying out the interview. Consent was obtained verbally rather than in writing in order to match the baseline NCS procedures for purposes of comparing the two surveys. These recruitment and consent procedures were approved by the Human Subjects Committees of Harvard Medical School and the University of Michigan.

The NCS-R was administered in two parts. Part I included demographic and diagnostic assessments administered to all 9,282 respondents. Part II included additional questions administered to all respondents who met criteria for at least one mental disorder during the Part I interview and a probability sub-sample of other respondents. Given concerns about recall failure among older adults in the assessment of disorders of childhood and adolescence, CD was assessed among only the 3,199 Part II respondents in the age range 18–44. This sample was weighted to adjust for the over-sampling of Part I respondents with other DSM-IV disorders as well as to correct for differential probability of selection and non-response. More details on NCS-R sampling and weighting are presented elsewhere (Kessler et al., 2004).

Assessment

Mental disorders were assessed in the NCS-R with the World Health Organization (WHO) Composite International Diagnostic Interview (CIDI) (Kessler & Ustun, 2004). The CIDI is a fully structured lay-administered diagnostic interview that generates diagnoses according to the definitions and criteria of both the DSM-IV and the ICD-10 diagnostic systems. DSM-IV criteria are used in the current report. Four classes of core disorders were assessed: mood disorders, anxiety disorders, substance use disorders, and impulse-control disorders. DSM-IV organic exclusion rules and diagnostic hierarchy rules were used in making all these diagnoses. Good concordance has been found in an NCS-R clinical reappraisal sub-sample between diagnoses of anxiety, mood, and substance use disorders based on the CIDI and diagnoses based on blinded clinical reappraisal interviews using the Structured Clinical Interview for DSM-IV (SCID) (First MB, 2002) (see Kessler, Berglund, Demler et al., 2005). Diagnoses of impulse-control disorders, including CD, were not validated because these diagnoses are not included in the SCID.

Data Analytic Plan

Latent class analysis (LCA), a data reduction method that allows for non-additive associations among variables (Heinen, 1996;McCutcheon, 1987), was used to identify CD subtypes from the 15 CD symptoms. Current socio-demographic correlates of CD and the latent classes were estimated using logistic regression analyses. The associations of CD with other mental disorders were also examined with logistic regression equations, controlling for age (in 10-year intervals), sex, and race/ethnicity. Temporal priorities in first onset of CD (i.e., age at first having symptoms of CD) compared to comorbid disorders were examined using information obtained in retrospective age-of-onset reports. The effect of CD in predicting the first onset of

subsequent disorders was examined using the same retrospective age-of-onset reported to estimate discrete-time survival models with information about the presence and absence of CD coded as time-varying predictor variables (Willett & Singer, 1993). Information about offset of CD (i.e., age at last having symptoms of CD) was used in these survival analyses to investigate whether recovery from CD is associated with a reversal of the elevated risk of secondary disorders. The comparative effects of active and remitted CD latent classes in predicting the subsequent onset and persistence of secondary disorders were examined, finally, in a more elaborate series of survival models. Coefficients from logistic regression and survival analyses were transformed to odds-ratios (ORs) by exponentiation for ease of interpretation. Similar transformations were made of the coefficients plus-minus 1.96 standard errors to generate 95% confidence intervals (95% CIs) of the ORs. All parameters were estimated using the Taylor series linearization method (Wolter, 1985), a design-based method implemented in the SUDAAN software system (SUDAAN, 2002), to adjust for the weighting and clustering of the NCS-R data. Statistical significance was evaluated using two-sided design-based .05 level tests.

RESULTS

Prevalence of CD

The lifetime prevalence of DSM-IV CD is estimated to be 9.5% (12.0% among males and 7.1% among females). The prevalence of individual CD symptoms varies substantially, from a high of 32.8% who report repeatedly staying out at night without parental permission to a low of 0.3% who report forced sexual activity (Table 1).

CD Subtypes

Latent class analysis (LCA) was used to identify discrete subtypes of CD. The best-fitting LCA solution produced six latent classes (Table 1). Class 1 is characterized by a low probability of each symptom and by the presence of an average of less than one CD symptom per respondent. We refer to this class as “No CD.” Class 2 is characterized by a symptom profile consistent with the “rule violations” grouping in DSM-IV, including items related to: staying out late, skipping school, and running away overnight. Respondents in the Rule Violations class report an average of 3.1 CD symptoms and compose 25.7% of those who met lifetime criteria for CD. Class 3 is characterized by a symptom profile consistent with the “deceit/theft” grouping in DSM-IV. Respondents in the Deceit/Theft class report an average of 3.0 CD symptoms and compose 13.4% of those with lifetime CD. Class 4 is characterized by endorsement of symptoms consistent with the “aggression to people and animals” grouping in DSM-IV. Respondents in this Aggressive class, like those in the Deceit/Theft class, report an average of approximately three CD symptoms, but the Aggressive class is less prevalent, comprising only 3.2% of those with a lifetime diagnosis of CD. Also, individuals in the Aggressive class who meet criteria for CD have an earlier median age-of-onset of CD (7.0 years) than individuals in the other classes (12.0 to 14.0 years). Class 5 is characterized by endorsement of the symptoms common in both the Rule Violations and Deceit/Theft classes, as well as with more severe symptoms not endorsed in the earlier classes, such as breaking into cars and buildings and damaging property. Respondents in this class report an average of 6.4 CD symptoms and make up 28.6% of those with a lifetime diagnosis of CD. We term this class “severe covert.” Finally, Class 6 is characterized by increased probability of each CD symptom. Respondents in this class report an average of 8.2 CD symptoms and compose 29.1% of those with CD. We term this class “pervasive CD.” In summary, six latent classes were identified characterizing five CD subtypes. The first three subtypes showed quite distinct symptom patterns and the last two subtypes showed some overlap of symptoms and increased symptom number and severity.

Sociodemographic Correlates of CD and CD Subtypes

Lifetime diagnosis of CD is associated with young age, male gender, low educational attainment, being separated or divorced, residing in the Western U.S., and residing in urban settings. Those identifying as Hispanic have a significantly lower rate of CD than those identifying as Non-Hispanic White (Table 2).

Sociodemographic correlates of each CD subtype were identified by comparing membership in Class 2 (Rule Violations) with each subsequent class. Overall, the subtypes are composed of an increasing percentage of males. Membership in the Theft/Deceit subtype is associated with a higher educational level, but lower likelihood of being currently employed. Membership in the Aggressive subtype is associated with younger age cohort, Black ethnicity, lower likelihood of being married, lower income, greater likelihood of being from the Midwest, and lower likelihood of residing in the suburbs. Membership in both the Severe Covert and Pervasive CD subtypes is associated with being previously married (i.e., divorced, separated, or widowed), and the Pervasive CD subtype is associated with a lower likelihood of living in the suburbs (i.e., greater likelihood of living in the city).

Mental Disorders Associated with CD

Lifetime diagnosis of CD is associated with significantly elevated risk of all other mental disorders assessed, with the exception of agoraphobia (Table 3). The presence of CD is associated with an especially elevated risk for substance use disorders (OR = 5.9) and impulse-control disorders (OR = 7.7). The temporal relationship between CD and other lifetime disorders differs substantially across disorders. CD is much more likely to occur before comorbid mood disorders (CD is first 70.2% of the time) and substance use disorders (CD is first 88.5% of the time). In comparison, CD is more likely to occur after comorbid impulse-control disorders (CD is first 23.2% of the time). The temporal order between CD and comorbid anxiety disorders is mixed, with CD primarily occurring after specific and social phobia, but before all the other anxiety disorders assessed (CD is first 32.1% of the time).

In addition to knowing that CD is associated with increased risk of subsequent secondary disorders, it would be useful to know if this increased risk is present only during the time CD is active or if it continues even after CD has remitted. This question was examined using discrete-time survival analyses to predict the first onset of other disorders from temporally primary CD, distinguishing between active and remitted CD based on reported age-of-offset (Table 4). Results show that both active (OR's = 2.8 – 7.2) and remitted CD (OR's = 1.6 – 2.9), relative to non-cases, are associated with significantly increased risk of all later disorders. However, the risk of other mental disorders is significantly higher for active compared to remitted CD (OR's = 1.6 – 2.5).

CD Subtypes as Predictors of Other Mental Disorders

In order to determine whether the CD subtypes identified in the LCA provide information about subsequent risk of other mental disorders, we tested the extent to which CD class membership (i.e., subtype) predicts first onset of later mental disorders in discrete-time survival models statistically controlling for age, sex, and race-ethnicity (Table 5). Results show that risk of comorbid mental disorders varies among respondents with active CD as a function of CD class, with higher classes consistently associated with greater risk of subsequent mental disorders. This dose-response relation is evident across all diagnostic groups. A weaker and less consistent association between CD class and risk of subsequent onset of mental disorders is present for remitted CD.

CD as a Predictor of the Persistence of Mental Disorders

The extent to which CD is associated with the persistence of comorbid disorders, defined as 12-month prevalence among lifetime cases, was examined by estimating logistic regression equations to predict 12-month disorders among lifetime cases, controlling for age-of-onset and time since onset. Broad classes of comorbid disorders (i.e., any anxiety, mood, impulse-control, and substance use disorder) were examined here due to restricted statistical power in studying persistence of individual disorders. CD predicted higher persistence of comorbid anxiety disorders (OR = 1.5, p = .038) but not other broad classes of comorbid disorders (OR's = 1.1 – 1.5, p = .765 – .155). The significant effect of CD in predicting persistence of anxiety disorders did not differ significantly by CD class (χ^2_{24} = 2.5, p = .644).

DISCUSSION

This study provides new information about the prevalence, subtypes, and correlates of DSM-IV CD in the U.S. The estimated lifetime prevalence of 9.5% is in the middle of the range of previous estimates based on DSM-III and DSM-III-R criteria (Lahey et al., 1999;Loeber, Burke et al., 2000;Maughan et al., 2004). The prevalence of individual CD symptoms varies widely and the median age-of-onset for CD is 11.6 (0.2). Consistent with prior reports, CD is significantly more prevalent among boys (12.0%) than girls (7.1%), and is associated with low education, marital disruption, and urban residence (Lahey et al., 2002;Lambert et al., 2001;Loeber & Keenen, 1994). In addition, CD is estimated to be significantly more prevalent in the West than in other regions of the country. We are unaware of any prior studies demonstrating a higher prevalence of CD in the Western U.S. Notably though, the baseline NCS revealed a significantly increased risk of anti-social personality disorder in the Western U.S. relative to other parts of the country (OR = 2.40) (Kessler et al., 1994). The reason for this higher rate of such behavior in the Western U.S. is unclear and should be examined further in subsequent studies.

The current study used latent class analysis (LCA) to identify empirically-derived CD subtypes. Prior attempts to elucidate subtypes of CD have relied largely on factor analyses of items from child behavior rating scales (Dodge et al., 1997;Frick & Ellis, 1999;Frick et al., 1993). We chose to use LCA rather than factor analysis because the latter, unlike factor analysis, allows for the examination of complex non-additive multivariate profiles among symptoms (Heinen, 1996;McCutcheon, 1987). The LCA of DSM-IV symptoms generated a much more complex characterization of CD subtypes than prior studies and revealed five subtypes of CD: three specialized (Rule Violations, Deceit/Theft, and Aggressive) and two more general and more severe (Severe Covert and Pervasive CD). This five-category system bears important similarities to dichotomous schemes proposed in prior studies, but synthesizes the earlier schemes in a way that documents greater complexity and variation in severity than in any of the dichotomous classifications. Two similarities of this sort are especially noteworthy. First, the Aggressive and Severe Covert classes are composed of "destructive" symptoms, while the Rule Violations and Deceit/Theft classes are composed of "non-destructive" symptoms, replicating the distinction between destructive and non-destructive symptoms found in some prior studies (Frick & Ellis, 1999;Frick et al., 1993). Second, the Rule Violations, Deceit/Theft, and Severe Covert classes consist of "covert" symptoms, while the Aggressive and Pervasive CD classes contain "overt" symptoms, replicating the overt-covert distinction found in other prior studies (Achenbach, Conners, Quay, Verhulst, & Howell, 1989;Frick & Ellis, 1999;Frick et al., 1993). In addition to capturing these previously documented distinctions, the five-category scheme includes a severity distinction in which two subtypes (Severe Covert and Pervasive CD) are composed of combinations of narrower subtypes.

Several additional features of the current subtyping system warrant brief comment. Although CD is often thought of as being characterized by aggressive behavior, it is interesting that pure

aggression is only one subtype of CD. Although the Aggressive subtype has the earliest age-of-onset it is the least prevalent subtype overall. Instead, the most common symptoms are those involving Rule Violations (e.g., staying out late, skipping school) and Deceit/Theft (e.g., lying, stealing), highlighting the prominence of non-aggressive behaviors in the diagnosis of CD.

The finding that CD is associated with increased risk of other mental disorders is consistent with prior studies (Lahey et al., 2002;Lambert et al., 2001;Loeber & Keenen, 1994), but the current study advances research on this topic in several ways. First, whereas most studies have focused on treatment-seeking samples of children (e.g., Lahey et al., 2002;Lambert et al., 2001), the current study examined comorbid mental disorders in a nationally representative sample, providing greater generality to the general population. Second, this study assessed comorbid disorders that occur into adulthood, and perhaps more importantly examined the timing of CD in relation to these other disorders. The current study revealed that CD is temporally primary to most other disorders with the notable exception of impulse control disorders and specific and social phobias. The temporal precedence of these disorders to CD fits with previous work suggesting an early age-of-onset for impulse-control disorders and phobias (Dadds & Barrett, 2001;Lahey & Loeber, 1994;Loeber, Green, Lahey, Frick, & McBurnett, 2000;Schneier, Johnson, Hornig, Liebowitz, & Weissman, 1992).

Although CD appears to precede most comorbid disorders, future studies are needed to further elucidate the nature of these relations. One possibility is that CD and these other disorders have common causes. For example, a predisposition to engage in risky or potentially destructive behaviors may promote both CD and substance use disorders, suggesting homotypic continuity over time. Another possibility is that CD may play a causal role in the development of subsequent disorders. For example, CD might cause life stressors that predispose an individual to secondary major depression, which could explain the heterotypic continuity that was also observed. We shed some light on these issues by examining the relationships between CD persistence and the onset of secondary disorders. If CD is a causal risk factor for comorbid disorders, its effect in predicting the onset and persistence of other disorders should diminish when CD is remitted. However, if CD is a risk marker for more fundamental causes that remain active after its remission, it should still be related to the onset and persistence of other disorders whether it was active or remitted (Kazdin, Kraemer, Kessler, Kupfer, & Offord, 1997;Kraemer et al., 1997). Our finding that respondents with a history of CD remain at elevated risk of other disorders even after CD has remitted raises the possibility that CD is a risk marker for unmeasured common causes of subsequent mental disorders. However, it is also possible that CD has lasting negative consequences that persist even after the disorder has remitted (e.g., a criminal record), or that once remitted, CD may have been replaced with symptoms of related adult disorders such as antisocial personality disorder. We also found that active CD is associated with much greater risk of later disorders than is remitted CD, raising the possibility that CD might be not only a risk marker but also a causal risk factor for later disorders. Overall, the findings that onset of CD is associated with a significant increase in risk and that remission of CD is associated with a significant decrease in risk of later disorders cannot be used to make legitimate causal inferences. These results highlight the potential importance of increasing the proportion of youth with CD who receive effective treatment (e.g., Nock, 2003). Indeed, the provision of these interventions may not only decrease the symptoms and immediate consequences of CD, but also may decrease the risk of subsequent disorders.

Importantly, respondents with more severe subtypes of active CD were at increasingly higher risk for other mental disorders. This dose-response relationship was present across all classes of mental disorders, but was especially strong in predicting the first onset of comorbid impulse-control and substance use disorders, even after statistically controlling for age, sex, and ethnicity. Prior research has demonstrated the importance of age-of-onset of antisocial behaviors in predicting comorbid mental disorders (Moffitt & Caspi, 2005;Moffitt, Caspi,

Harrington, & Milne, 2002). The current subtyping system provides additional information about aspects of CD symptoms that predict subsequent disorders. Indeed, the dose-response relationship between severe CD subtypes and risk of other disorders cannot be explained solely by CD age-of-onset, as age-of-onset was not earlier in severe subtypes. Moreover, an advantage of the current subtyping system is that it considers CD symptom content, rather than timing and course of symptoms, and therefore can be used to classify individuals at the time of assessment, rather than requiring time to determine if symptoms are limited to childhood or adolescence. Future research should examine whether these subtypes are useful in predicting treatment response. It is possible that the limited effectiveness of some intervention and prevention programs is due to the application of uniform programs to a heterogeneous group of individuals. Tailoring treatment to CD subtype may prove useful in increasing treatment effectiveness.

The most important limitation of the current study is the use of retrospective self-report to examine CD and other disorders. Respondents may have forgotten events, made errors regarding the timing of events, or may have been biased by current mood states. The use of retrospective self-report is likely to have resulted in an under-estimate of the prevalence of CD and to have introduced inaccuracies in the reported age-of-onset of CD and other disorders. Specifically, prior work has shown that age-of-onsets reported retrospectively tend to be higher than those reported prospectively and that retrospective recall may be less accurate in the reporting of minor offenses (Kazemian & Farrington, 2005). The current findings should be interpreted with each of these limitations in mind. On balance, several systematic reviews have concluded that despite such problems, adults recall childhood experiences with sufficient accuracy to provide useful information in retrospective studies (Brewin, Andrews, & Gotlib, 1993;Hardt & Rutter, 2004;Maughan & Rutter, 1997). The fact that estimates of lifetime prevalence and age-of-onset of CD obtained in the current study are consistent with figures obtained in prior prospective studies (Lahey et al., 1999;Maughan et al., 2004) provides support for the reliability of the current findings.

A related concern is that we did not obtain information to validate respondents' report of CD and other mental disorders, such as reports by third-party informants or the use of a clinical reappraisal interview. Some individuals may have been reluctant to report symptoms such as forced sexual activity and cruelty to animals given the illegality of these behaviors. In studies of CD among children and adolescents, these concerns are assuaged by obtaining information from adults familiar with the child. However, informant reports are much more difficult to obtain for adults, and such informants are unlikely to be able to provide accurate information about the respondents' history of CD and other disorders. Another limitation of the current study is that we evaluated a relatively narrow range of potential outcomes associated with CD. For instance, the effect of CD diagnosis and specific CD subtypes on role impairment, criminality, and physical injury were not examined. These outcomes have been linked to CD diagnoses in previous reports, and future studies should examine these relations in greater detail.

The current retrospective study provides important new information about the epidemiology of CD. Several ongoing prospective studies of CD exist; however, such studies focus on relatively small and selective samples and take many years to complete, especially those that follow youth into adulthood. Given the significant personal and societal costs of CD, multiple methodologies are warranted and needed, including the use of both prospective and retrospective studies. The continued use of these multiple approaches, and the convergence of findings across approaches, will ensure ongoing progress in the study of this important behavior problem.

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Table 1

Latent Class Analysis of CD Symptom Profiles (N weighted = 2980)

	%	(se)	Class 1: No CD	Class 2: Rule Violations	Class 3: Deceit/ Theft	Class 4: Aggressive	Class 5: Severe Covert	Class 6: Pervasive CD
Symptoms								
Stay out late	32.8	(1.3)	.070	.830	.490	.070	.840	.830
Skip school without permission	26.6	(1.4)	.030	.760	.280	.030	.860	.790
Runaway overnight	12.7	(0.9)	.006	.330	.100	.020	.560	.500
Lie or con others	21.9	(1.2)	.040	.300	.460	.150	.730	.650
Steal from family	14.9	(0.7)	.010	.100	.400	.100	.650	.520
Steal/shoplift from others	16.1	(0.9)	.009	.160	.340	.020	.770	.680
Bully others	8.0	(1.1)	.008	.080	.080	.490	.100	.530
Physical fights with others	10.6	(0.9)	.020	.130	.070	.490	.210	.700
Physically cruel to others	7.5	(0.7)	.004	.060	.060	.420	.000	.780
Break into locked car/building	6.6	(0.6)	.002	.000	.120	.010	.410	.440
Damage property	10.4	(0.7)	.008	.009	.220	.150	.460	.640
Used a weapon	3.4	(0.3)	.003	.030	.010	.130	.070	.340
Physically cruel to animal	4.2	(0.4)	.010	.020	.070	.130	.140	.190
Steal with confrontation	1.5	(0.2)	.002	.010	.009	.020	.001	.190
Set a fire to cause serious damage	1.8	(0.2)	.000	.005	.010	.007	.140	.140
Forced sexual activity	0.3	(0.1)	.000	.000	.003	.005	.010	.020
Prevalence of class	--	--	60.7	14.1	12.5	2.1	5.6	5.0
Prevalence of CD in class	9.5	(0.8)	0.0	17.3	10.2	14.9	48.1	55.2
Prevalence of class among those w/CD	--	--	0.0	25.7	13.4	3.2	28.6	29.1
Prevalence of class among those w/o CD	--	--	67.0	12.9	12.4	1.9	3.2	2.5
Average number of symptoms	--	--	.3	3.1	3.0	2.8	6.4	8.2
Mean age of onset (se) of CD				12.7 (0.4)	11.1 (0.6)	8.5 (1.9)	11.7 (0.3)	11.2 (0.4)
Median age of onset (iqr) of CD				14.0 (11–15)	12.0 (8–13)	7.0 (4–13)	13.0 (8–14)	12.0 (8–14)

% and (se) refer to percentage and standard error of the weighted sample endorsing each symptom and meeting criteria for CD Values in the columns for Classes 1–6 represent the probability of symptom endorsement for respondents in each Class

* Significant at the .05 level

Table 2

Sociodemographic Correlates of CD and CD Classes

		CD		Class 3 vs. 2		Class 4 vs. 2		Class 5 vs. 2		Class 6 vs. 2	
	%	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Age											
18–24	11.20	1.6*	(1.2–2.2)	0.8	(0.2–3.4)	0.0*	(0.1–0.1)	0.4	(0.1–1.2)	0.9	(0.3–2.8)
25–34	10.02	1.5*	(1.1–1.9)	1.3	(0.3–5.7)	0.1	(0.1–34.1)	0.7	(0.2–2.2)	0.7	(0.2–3.2)
35–44	7.85	1.0	--	1.0	--	1.0	--	1.0	--	1.0	--
χ^2 (p-value)	13.6*	(.001)		0.5	(.765)	17.8*	(<.001)	2.9	(.232)	0.2	(.911)
Sex											
Male	12.03	1.0	--	1.0	--	1.0	--	1.0	--	1.0	--
Female	7.11	0.5*	(0.4-.8)	0.2*	(0.0–0.7)	0.0	(0.0–23.3)	0.1*	(0.0–0.2)	0.1*	(0.0–0.2)
χ^2 (p-value)	13.4*	(.000)		6.6	(.010)*	2.5	(.116)	44.4*	(.000)	22.0*	(.000)
Race-ethnicity											
Hispanic	9.09	0.5*	(0.3–0.8)	1.3	(0.4–4.5)			0.5	(0.2–1.6)	1.1	(0.4–3.3)
Non-Hispanic Black	8.18	0.7	(0.4–1.2)	2.8	(0.7–11.6)	50.1*	(1.0-)~	0.8	(0.1–4.7)	1.6	(0.5–5.7)
Non-Hispanic Other	9.11	0.7	(0.4–1.2)	1.5	(0.2–13.1)			0.4	(0.1–2.3)	2.1	(0.5–9.3)
Non-Hispanic White	9.91	1.0	--	1.0	--	1.0	--	1.0	--	1.0	--
χ^2 (p-value)	9.4*	(.025)		2.8	(.429)	4.1*	(.043)*	2.0	(.561)	1.5	(.689)
Education											
0–11	17.03	4.6*	(2.7–7.)	0.1*	(0.0–0.5)	0.0	(0.0-)~	1.5	(0.2–9.8)	0.7	(0.2–2.5)
12	10.86	2.7*	(1.7–4.3)	0.3	(0.1–1.5)	18.9	(0.0-)~	1.3	(0.2–7.8)	1.5	(0.4–5.4)
13–15	8.26	1.9*	(1.2–3.1)	1.9	(0.3–13.5)	0.1	(0.0-)~	2.9	(0.5–18.0)	2.5	(1.0–6.4)
16+	4.51	1.0	--	1.0	--	1.0	--	1.0	--	1.0	--
χ^2 (p-value)	43.1*	(.000)		10.8*	(.013)	36.9*	(.000)	2.6	(.449)	6.3	(.097)
Marital status											
Married	8.54	1.3	(0.9–1.8)	0.4	(0.1–1.2)	0.0*	(0.0–0.0)	0.4	(0.1–1.9)	0.6	(0.2–2.1)
Previously married	12.96	1.9*	(1.0–3.6)	0.3	(0.1–1.4)	0.0*	(0.0–0.0)	0.2*	(0.1–0.8)	0.2*	(0.1–0.7)
Never married	9.73	1.0	--	1.0	--	1.0	--	1.0	--	1.0	--
χ^2 (p-value)	4.4	(.113)		4.0	(.136)	30.4*	(<.001)	6.6*	(.038)	8.2*	(.017)
Employment											
Working	8.75	0.7	(0.4–1.1)	0.2*	(0.0–0.9)	~	(- ~~	0.6	(0.2–1.6)	0.6	(0.2–1.7)
Student	11.57	0.8	(0.4–1.9)	0.0	(0.0–1.5)	~	(- ~~	0.8	(0.1–5.4)	0.2	(0.0–1.1)
Homemaker	7.85	0.7	(0.3–1.8)	0.7	(0.0–13.9)			5.6*	(1.1–28.5)	1.7	(0.5–6.1)
Retired	47.70										
Other	14.72	1.0	--	1.0	--	1.0^^^	--	1.0	--	1.0	--
χ^2 (p-value)	3.2	(.358)		5.3	(.154)	240.7*	(<.001)	8.5*	(.036)	5.9	(.116)
Income											
Low	11.46	1.1	(0.7–1.6)	0.7	(0.1–4.5)	477.5*	(2.7-)~	0.9	(0.2–5.6)	1.3	(0.2–10.0)
Low-average	8.02	0.9	(0.6–1.4)	0.3	(0.1–1.9)	2795.2*	(1.5-)~	0.3	(0.1–1.7)	0.4	(0.1–1.9)
High-average	9.67	1.1	(0.7–1.7)	0.2	(0.0–1.2)	3.9	(0.2–72.5)	0.2	(0.1–1.0)	0.2*	(0.0–0.9)
High	8.49	1.0	--	1.0	--	1.0	--	1.0	--	1.0	
χ^2 (p-value)	2.2	(.535)		4.4	(.223)	9.2*	(.026)	10.7*	(.013)	16.0*	(.001)
Region											
NE	9.54	0.6*	(0.4–0.9)	1.8	(0.4–8.8)	9.4	(0.0-)~	0.2	(0.1–0.7)	0.9	(0.4–2.2)
Midwest	9.57	0.6*	(0.4–0.8)	1.9	(0.2–15.6)	~*	(1.0-)~	0.9	(0.4–2.2)	1.9	(0.6–6.0)
South	6.69	0.4*	(0.3–0.7)	1.5	(0.2–11.9)	0.1	(0.0–36.4)	0.9	(0.3–2.1)	0.9	(0.3–2.7)
West	13.63	1.0	--	1.0	--			1.0	--	1.0	--
χ^2 (p-value)	17.1*	(.000)		0.8	(.852)	37.4*	(<.001)	8.2*	(.042)	2.4	(.493)
Urbanicity											
Cities > 2M	11.98	7.1*	(4.2–12.0)	1.1	(0.2–6.9)			0.4	(0.1–1.3)	0.4	(0.1–1.1)

		CD		Class 3 vs. 2		Class 4 vs. 2		Class 5 vs. 2		Class 6 vs. 2	
	%	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Cities < 2M	11.25	6.9*	(3.7–12.6)	0.5	(0.1–3.4)	11.0	(0.0-)~	0.2	(0.1–0.6)	0.2*	(0.1–0.8)
Suburbs > 2M	9.37	5.3*	(3.0–9.4)	0.3	(0.1–1.3)	0.0*^^	(0.0- .3)	0.3	(0.1–1.2)	0.3*	(0.1–0.8)
Suburbs < 2M	8.24	5.3*	(2.7–103.3)	0.7	(0.1–3.6)	1.6	(0.0–389.2)	0.4	(0.1–1.3)	0.2*	(0.1–0.5)
Adjacent areas	8.76	5.0*	(3.2–7.8)								
Outlying area	1.69	1.0	--	1.0^	--	1.0^	--	1.0^	--	1.0^	--
χ^2 (p-value)	86.3*	(.000)		5.6	(.228)	9.2	(.026)	11.3*	(.024)	19.2*	(.001)

^OR and 95% CI were estimated in a multivariate model.

Retired and other categories (employment) were collapsed. The χ^2 values refer to the logistic regression models.

~Very high OR/upper limit of CI because of instability

^Adjacent areas and outlying areas (urbanicity) were collapsed.

^^Categories Cities >2M and Suburbs > 2M (urbanicity) were collapsed.

^^^Homemaker, retired and other categories (employment) were collapsed.

*Significant at the .05 level

Table 3

Temporal Relations between CD and Other Mental Disorders

	OR	(95% CI)	CD first %	CD first (se)	CD second %	CD second (se)	Same year %	Same year (se)
Bipolar disorder	5.0*	(3.6–7.0)	78.0	(4.5)	16.7	(3.2)	5.3	(2.9)
Major depressive disorder	1.6*	(1.2–2.1)	72.2	(5.3)	19.1	(4.4)	8.8	(3.2)
Dysthymia	3.2*	(2.2–4.9)	65.2	(8.3)	31.3	(8.2)	3.5	(3.4)
Panic disorder	3.5*	(2.4–5.0)	78.9	(5.2)	14.9	(5.0)	6.3	(2.6)
Generalized anxiety disorder	3.0*	(2.2–3.6)	80.6	(5.7)	15.8	(5.1)	3.6	(2.1)
Specific phobia	2.4*	(1.9–3.1)	18.4	(3.1)	78.5	(3.2)	3.1	(1.5)
Social phobia	2.8*	(2.2–3.6)	36.0	(4.5)	52.2	(6.0)	11.8	(5.1)
Agoraphobia	1.4	(0.7–2.1)	59.7	(18.6)	40.3	(18.6)	0.0	--
Post-traumatic stress disorder	4.2*	(3.0–5.6)	56.3	(5.7)	35.3	(5.2)	8.4	(3.4)
Obsessive-compulsive disorder	2.8*	(1.3–6.0)	83.2	(11.3)	8.0	(7.9)	8.7	(8.5)
Intermittent explosive disorder	3.8*	(2.9–2.1)	41.9	(5.2)	46.1	(5.1)	12.0	(2.7)
Attention deficit/hyperactivity disorder	4.9*	(3.7–6.5)	17.1	(5.4)	75.3	(6.6)	7.6	(2.5)
Oppositional defiant disorder	12.1*	(9.3–15.8)	24.4	(4.2)	46.3	(5.8)	29.3	(3.9)
Alcohol abuse or dependence	5.3*	(3.9–7.2)	93.8	(1.9)	1.7	(1.0)	4.5	(2.0)
Alcohol dependence	5.9*	(3.7–9.6)	96.0	(2.2)	0.0	--	4.0	(2.2)
Drug abuse or dependence	6.4*	(4.7–8.7)	88.4	(3.5)	3.0	(1.3)	8.6	(3.3)
Drug dependence	8.4*	(5.6–12.6)	94.0	(2.9)	0.0	--	6.0	(2.9)
Any mood disorder	2.7*	(2.1–3.5)	70.2	(4.5)	21.8	(3.9)	8.0	(2.2)
Any anxiety disorder	3.0*	(2.3–3.8)	32.1	(3.8)	61.3	(3.5)	6.6	(2.4)
Any impulse-control disorder	7.7*	(5.9–10.0)	23.2	(3.2)	57.5	(4.4)	19.3	(2.3)
Any substance disorder	5.9*	(4.3–8.2)	88.5	(2.6)	3.2	(1.2)	8.3	(2.5)

*Significant at the .05 level

Table 4

Active and Remitted CD as Predictors of Other Mental Disorders

	Any anxiety disorder		Any mood disorder		Any impulse-control disorder		Any substance disorder	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Conduct disorder								
Active conduct disorders	2.8*	(2.0–4.0)	2.9*	(2.2–3.8)	7.2*	(5.3–9.7)	7.2*	(5.3–9.8)
Remitted conduct disorders	1.6	(1.0–2.5)	1.8*	(1.3–2.6)	2.9*	(1.4–6.0)	2.2*	(1.4–3.5)
Active/remitted	1.6*	(1.0–2.5)	1.8*	(1.0–3.1)	2.5*	(1.3–4.8)	3.2*	(2.0–5.6)
Active classes χ^2_4 (p value)	6.0	(.202)	6.3	(.177)	7.1	(.132)	29.2*	(.000)
Remitted classes χ^2_4 (p value)	7.4	(.114)	11.4*	(.022)	4.6	(.208)	0.5	(.926)

* Significant at the .05 level

Table 5

Active and Remitted CD Classes as Predictors of Other Mental Disorders

	Any anxiety disorder		Any mood disorder		Any impulse-control disorder		Any substance disorder	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Active classes								
Class 2	1.8	(1.0–3.3)	1.4	(0.6–2.9)	4.6*	(2.0–10.3)	3.7*	(1.8–7.7)
Class 3	3.0*	(1.3–6.9)	2.3*	(1.0–5.3)	4.4*	(2.0–10.0)	2.2	(1.0–5.2)
Class 4	0.5	(0.1–4.9)	3.1	(0.6–16.0)	7.8*	(3.7–16.3)	5.6*	(1.8–17.0)
Class 5	4.3*	(2.0–9.4)	3.5*	(2.0–6.0)	8.0*	(5.0–12.7)	9.1*	(5.8–14.4)
Class 6	3.0*	(2.0–4.8)	4.2*	(2.7–6.6)	11.0*	(7.2–16.9)	12.7*	(8.9–18.2)
Remitted classes								
Class 2	0.9	(0.4–2.4)	1.6	(0.9–2.9)	1.6	(0.4–6.8)	2.6*	(1.5–4.6)
Class 3	0.4	(0.0–2.9)	1.4	(0.6–3.4)	2.5	(0.5–12.4)	1.7	(0.5–5.8)
Class 4	3.2	(0.5–20.5)	3.8	(0.8–17.3)	--	--	--	
Class 5	3.0*	(1.6–5.7)	1.0	(0.4–2.0)	2.0	(0.4–8.8)	2.3	(1.0–5.4)
Class 6	1.9	(1.0–3.7)	4.0*	(2.3–6.9)	7.1*	(2.4–21.2)	2.0	(0.8–5.0)

* Significant at the .05 level