HHS Public Access

Author manuscript

Psychol Med. Author manuscript; available in PMC 2018 December 28.

Published in final edited form as:

Psychol Med. 2012 May ; 42(5): 1081–1089. doi:10.1017/S003329171100198X.

Classes of conduct disorder symptoms and their life course correlates in a US national sample

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Abstract

Background.—Population data on conduct disorder (CD) symptoms can help determine whether hypothesized subtypes of CD are sufficiently disparate in their familial, psychiatric and life course correlates to distinguish separate diagnostic entities.

Method.—Latent class analysis (LCA) of CD symptoms occurring before age 15 was conducted in a national sample of adults aged 18–44 years from the National Epidemiological Study of Alcohol and Related Conditions. Associations of latent class membership with parental behavior problems, onset of psychiatric disorders and anti-social behaviors after age 15, adolescent life events (e.g. high school drop-out), and past-year life events (e.g. divorce/separation, bankruptcy) were estimated.

Results.—LCA identified a no-CD class with low prevalence of all symptoms, three intermediate classes – deceit/theft, rule violations, aggression – and a severe class. The prevalence of CD, according to DSM-IV criteria, was 0% in the no-CD class, between 13.33% and 33.69% in the intermediate classes and 62.20% in the severe class. Latent class membership is associated with all the familial, psychiatric and life course outcomes examined. Among the intermediate classes, risk for subsequent mood/anxiety disorders and anti-social behavior was higher in the deceit/theft and aggressive classes than in the rule violations class. However, risk for adolescent life events is highest in the rule violations class.

Conclusions.—CD symptoms tend to occur in a partially ordered set of classes in the general population. Prognostically meaningful distinctions can be drawn between classes, but only at low levels of symptoms.

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Supplementary material accompanies this paper on the Journal's website (http://journals.cambridge.org/psm).

Declaration of Interest

None.

Keywords

Conduct disorder; epidemiology; latent class analysis

Introduction

Conduct disorder (CD), a child onset psychiatric disorder characterized by repeated violations of the rights of others or age-appropriate social norms, is among the most commonly treated childhood psychiatric conditions (Robins, 1991; Shivram *et al.* 2009) and among the most serious in its life course implications. Children with CD are at high risk for early initiation of substance use (Zeitlin, 1999) and high school drop-out (Breslau *et al.* 2011) compared to their non-CD peers. Adults with a history of CD are more likely than adults without a history of CD to be jailed, unemployed and divorced and are at high risk for psychiatric disorders, a broad range of physical disorders and premature mortality (Laub & Vaillant, 2000; KimCohen *et al.* 2003; Fergusson *et al.* 2005; Copeland *et al.* 2007; Goldstein *et al.* 2007, 2008; Loeber *et al.* 2009).

According to DSM-IV, a diagnosis of CD requires at least three out of a list of 15 symptoms within a 12-month period and those symptoms must cause significant functional impairment. With regard to symptom criteria, this definition is polythetic, i.e. the criteria can be satisfied by multiple non-overlapping configurations of symptoms (Needham, 1975). In addition, each of the 15 symptoms makes an equivalent contribution towards the diagnostic threshold, regardless of the specific configuration of symptoms. While there is no reason in principle to reject polythetic definitions of disorder (Sokal, 1974), the existence of non-overlapping symptom profiles within a single category suggests the possibility of meaningful subtypes of the disorder, which may differ with regard to risk factors, outcomes and treatment response (Krueger & Bezdjian, 2009). In a study of twins, Eaves and colleagues found evidence of etiological heterogeneity across four latent classes of CD symptoms, but that study was based on eight polychotomous items that were not directly linked to the DSM criteria (Eaves *et al.* 1993). The DSM-IV recognizes subtypes of CD based on age at onset, i.e. childhood *versus* adolescent onset CD (Lahey *et al.* 1998; Goldstein *et al.* 2006), but no distinctions are currently made between symptom profiles.

Several proposals for distinguishing clinical subtypes of CD based on symptom profiles have been made. Behavior genetic researchers have found evidence for a distinction among CD cases based on the presence or absence of aggressive symptoms (Eley *et al.* 2003). A recent meta-analysis of twin and adoption studies supports the suggestion that aggressive and non-aggressive types of CD are etiologically dissimilar; CD cases with aggressive symptoms have higher heritability than cases without aggressive symptoms (Burt, 2009). One recent study suggests that the distinction between the behavioral traits of aggressivity and rule breaking may be preferable to the distinction between childhood and adolescent onset as a basis for subclassifying CD cases (Burt & Hopwood, 2010). There is also evidence that aggressive CD is more strongly associated with anti-social personality disorder (ASPD) in adulthood than non-aggressive CD (Moffitt, 1993). Other distinctions have been suggested between symptoms that are overt *versus* covert (Loeber & Schmaling, 1985; Tackett *et al.*

2003) or destructive *versus* non-destructive (Frick *et al*. 1993), between socialized *versus* unsocialized subtypes and between subtypes with *versus* without callousunemotional traits (Frick & Ellis, 1999).

Large population surveys provide a valuable source of information on patterns of co-occurrence of CD symptoms that can be used empirically to identify symptom profiles that might be considered distinct subtypes of CD (Robins & Guze, 1970; Robins, 2004). A recent examination of retrospectively reported CD symptoms in a US national sample of adults aged 18–44 years found evidence for five subtypes, characterized respectively by rule violations, deceit/theft, aggression, severe covert behavior and pervasive CD symptoms (Nock *et al*. 2006). Each subtype was associated with higher risk for other types of psychiatric disorder, with stronger associations found for subtypes with higher symptom counts. Those findings are in need of replication and extension to additional life course outcomes. The goal of this study is to develop subtypes of CD symptoms in a separate representative sample of the US adult population (age 18–44 years) and investigate potential variation in their association with parental behavior problems and their prognostic implications. We examine a range of adverse life course outcomes of CD, including subsequent onset of psychiatric disorders and anti-social behaviors, adolescent life events (e.g. early childbirth or high school drop-out) and life events in the 12 months prior to the interview (e.g. divorce or job loss).

Method

Sample

The National Epidemiological Survey of Alcohol and Related Conditions (NESARC) is based on a nationally representative sample of the adult (≥18 years) household population of all 50 US states (Grant *et al*. 2003b). Face-to-face interviews were conducted in respondents' homes with a fully structured diagnostic instrument loaded on a personal computer. Fieldwork was conducted by the US Bureau of the Census for the National Institute of Alcohol Abuse and Alcoholism. The response rate was 81%. Informed consent procedures were approved by the US Census Bureau and the US Office of Management and Budget. The sample design and weighting methodology are described in detail elsewhere (Grant *et al*. 2003b). The NESARC sample includes 43093 respondents. Analysis was conducted on the subsample of 21489 respondents who were age <45 years at the time of the interview to minimize the impact of age-associated failures of recall.

Assessments

Conduct disorder—Interviews were administered by non-clinician interviewers using either the English or Spanish versions of the Alcohol Use Disorder and Associated Disabilities Interview Schedule—DSM-IV version (AUDADIS) (Grant *et al*. 2003*a*). All respondents completed an assessment of 14 of the 15 CD symptoms – breaking and entering was not assessed. Respondents were asked whether each endorsed symptom occurred before they were 15 years old. Separate items assessed impairment, onset of symptoms prior to age 10 and temporal clustering of symptoms. A test–retest study of the AUDADIS did not assess the validity of the CD diagnosis, due to zero prevalence of CD without ASPD in the retest

sample. Test–retest reliability of the antisocial personality diagnosis was good (k=0.67) (Grant *et al.* 2003a).

To meet DSM-IV criteria for CD, symptoms must occur within a 12-month period (temporal clustering) and the cluster of symptoms must have caused clinically significant functional impairment. To assess temporal clustering, respondents were asked whether at least three symptoms occurring prior to age 15 occurred at the same time or within a 12-month period. Impairment was assessed by a question asking whether this cluster of symptoms caused problems with family or friends, at school or with the law.

Psychiatric and substance use disorders—DSM-IV criteria for five anxiety disorders (panic disorder, agoraphobia, social phobia, specific phobia and generalized anxiety disorder), three mood disorders (major depression, dysthymia and bipolar disorder) and four substance-use disorders (abuse and dependence for alcohol and illegal drugs) were assessed. Test–retest reliability was fair for lifetime diagnoses of anxiety disorders (k=0.42–0.48) and slightly better for dysthymia (k=0.58) and major depression (k=0.65). Test–retest reliability was slightly higher for alcohol disorder (0.70) and drug disorder (0.66). Due to low prevalence, reliability for bipolar disorder could not be examined (Grant *et al.* 2003*a*). Since CD symptoms were assessed for age ≤15, psychiatric and substance use disorders were only considered potential outcomes in this study if onset was after age 15 years.

Anti-social behaviors—Five symptoms of ASPD – impulsivity, deceitfulness, disregard for the rights of others, unlawful behavior and aggressivity – were defined using items not included in the definition of CD symptoms. In order to establish the temporal precedence of CD symptoms, ASPD symptoms were only coded as present if their first occurrence was after age 15 years.

Adolescent life events—Respondents were asked the age they first married, the age at which their first child was born, their educational attainment and the age at which they completed their highest level of education. Three adolescent outcomes were defined using these items: (1) marriage prior to age 18; (2) childbirth prior to age 19; (3) failure to complete high school by age 18.

Past-year life events—Information on life events in the 12 months preceding the interview was used to define two past-year adverse life events: (1) serious financial or employment problem (being fired or laid off, having a serious financial crisis or declaring personal bankruptcy); (2) serious interpersonal problem (ending a marriage or serious romantic relationship).

Parental behavior problems—Respondents were asked whether their father or mother ever had behavior problems, characterized by the following definition: ‘By behavior problems I mean being cruel to people or animals, fighting or destroying property, trouble keeping a job or paying bills, being impulsive, reckless or not planning ahead, lying or conning people or getting arrested. These people also do not seem to care if they hurt others and often have problems at an early age, such as truancy, staying out all night or running

away'. In this study, parental behavior problems were counted as present if the respondent reported either parent as having had behavior problems.

Analysis

Analyses were conducted on the 14 CD symptoms assessed in the AUDADIS. DSM-IV criteria were applied to estimate the population prevalence of CD. Subtypes of CD symptom configurations were developed using latent class analysis (LCA) with Mplus software. LCA assumes that the covariation between the observed CD symptoms is due to existence of two or more underlying (unobserved) classes (or groups) of individuals and that the CD symptoms are independent from one another within each class. The forced sex item was not included in the LCA due to low prevalence. The model can be used to estimate the probability that each individual in the sample belongs to each class given their symptom configuration. Individuals can be sorted into classes on the basis of these probabilities.

Associations of the CD symptom classes identified by the LCA with parental, psychiatric and life course correlates were estimated in logistic regression models with statistical adjustment for age and sex. Additional adjustment for educational attainment was included in models for past-year life events. Differences in risk across the classes imply prognostic differences across CD subtypes. Logistic regression analyses were conducted using the SUDAAN statistical analysis software packages to adjust statistical inferences for the complex survey design. Statistical significance was assessed at the p=0.05 level.

Results

The 14 CD symptoms range in prevalence from 0.04% (forced sex) to 14.58% (stealing without confrontation) (Table 1).

LCA models assuming two to six classes were estimated and compared with regard to fit using the Bayes and Akaike Information Criteria (BIC and AIC) (Hens *et al.* 2006; Nylund *et al.* 2007). These indices assess model fit while correcting for the total number of model parameters. Among the LCA models, fit was best for the five-class model according to the BIC for the six-class model according to the AIC. The fiveclass model was selected for presentation in this report for parsimony and interpretability and because simulation studies suggest the BIC performs better than the AIC for determining the number of latent classes (Nylund *et al.* 2007). All of the latent class models with four or more classes fit better than the best fitting dimensional [item response theory (IRT)] model. (Complete information on the fit indices for IRT and latent class models are presented in Supplementary Table 1.)

The entropy, a measure of the utility of the LCA results for classifying respondents into classes, was 0.88. Methodological studies support use of LCA results to examine associations between class membership and variables not included in the model when entropy exceeds 0.80 (Clark & Muthen, 2009). The certainty of the classification is demonstrated in the probability of assignment of individuals to specific classes; 95% of the sample was assigned to a class based on a probability of class memberships of o0.72. The certainty of the classification can also be gauged by the difference between the first and second highest class membership probabilities. A large difference indicates that the class to

which a person is assigned is much preferable than the next best choice, while a small difference indicates roughly equal probability of membership in both classes. The difference in probability of class membership between the most and second most likely class was ≥0.5 for 95% of respondents.

The prevalence of the 14 symptoms across the five classes derived from the LCA is shown in Table 2. Class 1 is characterized by very low prevalence of all symptoms and is labeled 'No-CD'. Class 5, on the other hand, is characterized by relatively high prevalence of all the symptoms. This class has the highest prevalence for all but two of the symptoms (stays out late and truancy). For those two exceptions it has the second highest prevalence. Classes 2–4 have relatively high prevalence of distinct sets of symptoms. Class 2 is characterized by symptoms in the DSM-IV 'rule violations' group: staying out late; running away from home; truancy. Class 3 is characterized by symptoms in the 'deceit/theft' subgroup of the DSM-IV: stealing without confrontation; (moderately) lying. Note that breaking and entering, one of the symptoms in this group in the DSM-IV, was not assessed in this survey. Class 4, 'aggression', is characterized by DSM-IV aggression symptoms: bullying; starting fights; using a weapon in a fight; cruelty to people. Class 4 is also characterized by moderately high prevalence relative to classes 2 and 3 of cruelty to animals, lying and stealing without confrontation.

The 'No-CD' class includes about 90% of the population, none of whom met criteria for CD. The prevalence of the other four classes ranges from 0.97 (severe) to 5.39 (deceit/theft). The prevalence of CD is high in all four of these classes, but ranges widely among them from 13.33% in the deceit/theft class to 66.39% in the severe class. The median age of onset of CD is similar across classes 2–4.

Nearly all (99.9%) respondents in class 1 endorsed zero or one CD symptom (Table 3). There is substantial overlap in symptom count across classes 2–4, with a large majority endorsing between two and four symptoms. For classes 2 and 3, >50% endorsed only two symptoms, below the diagnostic threshold as specified by the DSM-IV. Close to 40% of people in class 4 endorsed only two symptoms. By contrast, only one person in class 5 endorsed two symptoms and the vast majority endorsed five or more (95%).

Membership in the five LCA classes is associated with sex, age and race-ethnicity (Table 4). Men make up less than half of the No-CD class (47.6%) but between 59.9% and 70.6% of classes 2–5. People in the No-CD class are older than those in classes 2–5. People in classes 2–5 are more likely to be American Indian than people in the No-CD class.

Associations of class membership with parental behavior problems, subsequent onset of psychiatric in Table 5. Three important patterns appear in the table. First, there is a strong consistent pattern of positive association between membership in any of the CD classes (classes 2–5) and all of the correlates examined. Only one of the odds ratios (ORs) is <1 and all but two are statistically significant. Second, for a majority of the outcomes, the magnitude of elevated risk associated with membership in one of the CDs relative to the No-CD class is similar across the three intermediate classes (classes 2–4) and highest in the severe class (class 5). For instance, the ORs relating class membership with parental

behavior problems range from 4.0 [95% confidence intervals (CI) 3.0–5.3] to 5.2 (95% CI 3.8–7.2) across the three intermediate classes while the OR associated with the severe class is 11.8 (95% CI 8.0–17.2).

Third, there is an important exception to the above pattern. With regard to adolescent life events, the ORs associated with the rule violations class are larger than either of the intermediate classes, indicating that there is a distinctive relationship between this class and this domain of events. For instance, with regard to high school drop-out, the OR associated with the rule violations class is 4.5 (95% CI 3.5–5.8) while those associated with the deceit/theft and aggressive classes are 1.4 (95% CI 1.2–1.7) and 2.3 (95% CI 1.7–3.0) respectively. Although risk for most of the outcomes assessed here is lower for the rule violations class than any of the other CD classes, for the adolescent life events risk among this group is on par with risk among the most severe class.

Statistically significant interactions were found between sex and CD symptom profile in models predicting impulsivity [$\chi^2_{(4)} = 13.28$, $p = 0.01$], aggressivity [$\chi^2_{(4)} = 35.87$, $p < 0.001$] and high school drop-out [$\chi^2_{(4)} = 12.41$, $p = 0.015$]. Associations with these outcomes were statistically significant and in the same direction for both men and women, but the associations were somewhat stronger for women (detailed results available on request).

Discussion

The model described here, which assumes latent classes, provides a perspective on the co-occurrence of CD symptoms in the general population, which is complementary to the more common dimensional approach. The categorical approach is particularly important for addressing the epidemiological implications of diagnostic classifications, which are of necessity categorical in nature (Kessler, 2002). The best fitting LCA model was one with five partially ordered classes: one class with zero or very few symptoms; three intermediate classes characterized by high prevalence of distinct sets of symptoms; one severe class characterized by multiple symptoms drawn from all three intermediate classes.

The implications of these findings for the subclassification of CD are mixed. On the one hand, the results support the definition of distinct subtypes, particularly at relatively low levels of severity, where individuals with the same number of symptoms may fall into one of three classes. Distinctions between these classes are important in identifying patterns of co-occurring behavior and in predicting later outcomes, particularly with regard to adolescent outcomes, which shape the entire adult life course, such as high school drop-out and early childbearing. The importance of distinguishing between classes at a relatively low level of severity should not be minimized since the majority of cases that met DSM-IV criteria for CD in this study, 73%, fell into one of these categories. On the other hand, the symptoms that characterize distinct classes at relatively low levels of severity are all elevated among cases at a high level of severity. In addition, all of the CD classes are associated with significant elevations in parental behavior problems and nearly all of the psychiatric and life course events examined in this study. Together, these results suggest that the current polythetic definition of the disorder may be an appropriate model for this disorder.

The LCA results confirm key findings of Nock and colleagues in their analysis of the National Comorbidity Survey Replication, a different national sample of adults in the same age range as this study, who were assessed using the World Mental Health Version of the Composite International Diagnostic Interview (Kessler & Merikangas, 2004; Nock *et al.* 2006). Although that study reported a six-class LCA solution, in contrast with the five-class solution reported here, the classes were similarly defined, partially with regard to the distinct symptom configuration and partially with regard to overall symptom severity. In addition, the three intermediate classes identified in this study, classes 2–4, correspond closely in content to the three intermediate classes reported by Nock and colleagues, suggesting that at relatively low levels of severity these symptoms cluster in a similar way in both studies. The difference between the fiveclass model reported here and the six-class model reported by Nock and colleagues hinges on the inclusion of a distinct class of 'severe covert' CD, characterized by high prevalence of most symptoms with the exception of overt interpersonal aggression. The identification of similar latent classes despite differences in question wording, questionnaire structure, survey auspices and samples is a strong indication that these classes are robust with regard to methodological variations.

Two implications of the three intermediate classes identified in the LCA should be emphasized. First, the distinct profiles of symptoms among people with relatively low numbers of symptoms suggests that it is improper and perhaps hazardous to infer a pervasive context-independent pattern of impulsive or disruptive behavior for children on the basis of two or three CD symptoms, as the current definition of CD appears to imply. Expectations of misbehavior may be damaging to children whose problematic behaviors may remain limited to a narrow range of behaviors throughout childhood and early adolescence.

Second, the existence of heterogeneity in CD suggests that further examination of heterogeneity in etiology across subtypes might be beneficial. Existing studies suggest that CD that includes aggressive behavior may be more highly heritable, with a stronger contribution from genetic factors, than CD that does not include aggressive behavior (Eley *et al.* 2003; Monuteaux *et al.* 2005). The LCA findings suggest that additional distinctions should be examined between aggressive behavior in the context of other CD symptoms (i.e. the severe class) *versus* aggressive behavior occurring in isolation (the aggressive class). For instance, it is possible that aggressive behavior in the context of other CD symptoms, as in the severe class, is driven by selection into social contexts in which aggressive or violent behavior is more common, e.g. social networks in which rule-breaking is normative. Differences in the correlates of the aggressive *versus* severe classes are unlikely to be identified in studies using purely dimensional assessments.

It is important to emphasize that the statistical model used in this study assumes the existence of latent classes, within which there is no residual correlation among items. While this model performed better statistically in this dataset than models that assume underlying dimensional factors, this does not imply that the LCA model is superior in all respects. In particular, the latent class model used here is limited in its ability to address variation in severity within or across classes, which is implied by the existence of a diagnostic threshold that incorporates information on symptom count, symptom clustering and impairment. Dimensional models, such as those reported by Gelhorn *et al.* (2009), address variation in

severity more directly, but are limited in distinguishing subtypes. Future research is needed on more complex models that incorporate both categorical and dimensional components and can be applied to population data on CD symptoms.

These results add to existing evidence suggesting that the symptoms by which CD is currently defined tend to co-occur in a limited number of patterns, which are partially ordered with regard to symptom count and strength of association with a broad range of adverse psychiatric and social outcomes. Consistent identification of subtypes among people with relatively low levels of symptoms suggests the potential value of further delineating subtypes of CD. However, strong associations of all CD subtypes with psychiatric co-morbidity and adverse life events and the existence of a severe class incorporating symptoms characteristic of all three intermediate classes suggest the value of including these diverse cases within a common diagnostic entity.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Conduct disorder symptoms in the NESARC, prevalence, item difficulties and discriminations

Symptoms[a]	*n*	Prevalence[b] (%)	S.E.[c]
Bullying	1128	5.5	0.23
Initiates physical fights	441	2.1	0.13
Uses a weapon in a fight	257	1.1	0.09
Cruel to people	597	3.1	0.16
Cruel to animals	325	1.6	0.11
Steals with confrontation	35	0.2	0.03
Forced sex	7	0.0	0.02
Fire setting	214	1.1	0.1
Damages property	447	2.5	0.15
Stays out late	621	2.9	0.16
Runs away from home	718	3.2	0.16
Truancy	801	3.6	0.17
Lying	906	4.4	0.18
Steals without confrontation	2954	14.6	0.52
Three or more symptoms	1023	5.1	0.21
DSM-IV defined CD	452	2.2	0.14

NESARC, National Epidemiological Survey of Alcohol and Related Conditions; CD, conduct disorder.

[a] Symptoms were counted as present if they occurred prior to age 15.

[b] Prevalence estimates are weighted to account for the sampling design.

[c] Design-adjusted S.E.

Table 2.

Latent class model for conduct disorder (CD) symptoms with five classes

Symptom	Class 1: No CD	Class 2: Rule violations	Class 3: Deceit/theft	Class 4: Aggressive	Class 5: Severe
Bullying	0.017	0.223	0.192	0.537	0.616
Initiates physical fights	0.001	0.081	0.001	0.474	0.522
Uses a weapon in a fight	0.002	0.021	0.022	0.151	0.347
Cruel to people	0.008	0.042	0.137	0.294	0.466
Cruel to animals	0.004	0.013	0.102	0.099	0.185
Steals with confrontation	0	0.006	0.001	0.003	0.091
Forced sex[a]	5/19297 = 0.0003	0	0	0	2/207 = 0.0097
Fire setting	0.001	0.009	0.088	0.034	0.263
Damages property	0.003	0.026	0.173	0.1	0.572
Stays out late	0.006	0.564	0.023	0.038	0.549
Runs away from home	0.009	0.347	0.102	0.104	0.41
Truancy	0.014	0.533	0.049	0.032	0.529
Lying	0.009	0.188	0.237	0.245	0.647
Steals without confrontation	0.07	0.273	0.749	0.467	0.907
Prevalence of class[b], *n* (%)	19369 (89.75)	458 (1.99)	1156 (5.87)	298 (1.47)	208 (0.92)
Prevalence of CD in class, *n* (%)	0(0)	89 (19.14)	140 (12.98)	92 (34.24)	121 (56.96)
Median (IQR) age of onset of CD	N.A.	12.13	12.07	11.83	11.77
		(10.11–12.72)	(9.35–12.70)	(9.52–12.90)	(8.62–12.83)

IQR, Interquartile range.

[a]Forced sex had very low prevalence and was not used to estimate the latent class analysis model. Table shows the prevalence of forced sex among people classified into each class according to responses on the remaining symptoms.

[b]Prevalence based on classification by posterior probability of class membership.

Table 3.

Number of conduct disorder (CD) symptoms across five classes identified in latent class analysis

	Class 1: No CD		Class 2: Rule violations		Class 3: Deceit/theft		Class 4: Aggressive		Class 5: Severe	
Number of symptoms	***N***	**%**	***n***	**%**	***n***	**%**	***n***	**%**	***n***	**%**
0	16323	84.27	0	0	0	0	0	0	0	0
1	3038	15.68	1	0.22	0	0	1	0.34	0	0
2	8	0.04	235	51.31	744	64.36	115	38.59	1	0.48
3	0	0	122	26.64	285	24.65	83	27.85	1	0.48
4	0	0	70	15.28	107	9.26	63	21.14	8	3.85
5	0	0	26	5.68	17	1.47	30	10.07	55	26.44
6	0	0	4	0.87	3	0.26	6	2.01	60	28.85
7	0	0	0	0	0	0	0	0	42	20.19
8 +	0	0	0	0	0	0	0	0	41	19.71
Total	19369	100	458	100	1156	100	298	100	208	100

Table 4.

Demographic characteristics of five conduct disorder (CD) classes[a]

	Class 1: No CD		Class 2: Rule violations		Class 3: Deceit/theft		Class 4: Aggressive		Class 5: Severe	
Demographic characteristic	***n***	**%**	***n***	**%**	***n***	**%**	***n***	**%**	***n***	**%**
Sex										
Male	8149	47.6	255	59.9	695	64.7	176	66.5	140	70.6
Female	11220	52.4	203	40.1	461	35.3	122	33.5	68	29.4
χ^2, p value[b] Age (years)				$\chi^2_{(4)} = 96.07$, $p < 0.001$						
18–25	4391	23.9	131	27.9	355	31.2	110	38.2	85	37.6
26–35	6870	35.3	151	33.9	379	34.0	103	34.0	63	32.0
36–44	8108	40.8	176	38.3	422	35.0	85	27.8	60	30.3
χ^2, p value Ethnicity				$\chi^2_{(8)} = 42.23$, $p < 0.001$						
Hispanic	4865	15.5	172	27.0	205	11.2	64	12.6	51	15.5
NH-Black	3737	12.4	68	12.3	194	10.4	71	17.2	41	14.6
NH-Asian	794	5.5	10	2.5	36	3.2	2	1.1	3	2.8
NH-White	9702	64.8	197	54.9	679	70.2	156	67.0	100	61.5
NH-AI/AN	271	1.8	11	3.3	42	5.0	5	2.2	13	5.7
χ^2, p value				$\chi^2_{(16)} = 58.25$, $p < 0.001$						

NH, Non-Hispanic; AI, American Indian; AN, Alaska Native.

[a]Respondents classified according to their posterior probability of class membership.

[b]$x2$ test reported for association between demographic characteristic and class membership

Table 5.

Associations of latent CD symptom class with parental behavioral problems, onset of psychiatric disorder and anti-social behaviors after age 15, adolescent (age 16–18) life events and past-year life events

N	Class 1: No CD 19369	Class 2: Rule violations 458	Class 3: Deceit/theft 1156	Class 4: Aggressive 298	Class 5: Severe 208
Parental behavioral problem					
Either parent	1	4 (3.0–5.3)	4.9 (3.9–6.0)	5.2 (3.8–7.2)	11.8 (8.0–17.2)
Psychiatric disorders					
Mood or anxiety isorder	1	2.4 (2.0–3.0)	3.4 (3.0–3.9)	4 (3.2–5.0)	5.8 (4.6–7.2)
Substance disorder	1	3.4 (2.7–4.4)	4.5 (3.9–5.1)	4.3 (3.2–5.6)	13 (9.5–17.9)
Anti-social behaviors					
Impulsivity	1	4.1 (3.4–5.0)	4.3 (3.8–4.9)	4.6 (3.7–5.6)	10.5 (8.5–12.8)
Deceitfulness	1	5.5 (3.0–9.9)	7.3 (5.3–10.0)	7.3 (4.5–11.8)	10.3 (5.7–18.7)
Disregard	1	2.5 (2.0–3.1)	3.4 (3.0–3.9)	3 (2.4–3.7)	4.8 (3.7–6.3)
Unlawful behavior	1	2.3 (1.7–3.1)	5.8 (4.9–6.9)	5.1 (3.7–7.0)	13.0 (7.7–22.0)
Aggression	1	4.5 (3.4–5.8)	4.8 (4.0–5.6)	6.2 (4.7–8.2)	9.3 (6.9–12.4)
Adolescent life events					
Child before age 18 years	1	6.5 (4.5–9.3)	1.4 (1.1–2.0)	2.4 (1.4–4.1)	5.2 (3.2–8.4)
Marriage before age 17 years	1	7.4 (4.1–13.7)	0.7 (0.4–1.4)	2.2 (0.9–5.7)	3.2 (1.1–9.0)
High school drop-out	1	4.5 (3.5–5.8)	1.4 (1.2–1.7)	2.3 (1.7–3.0)	3.7 (2.7–5.1)
Past-year events					
Fired/laid off	1	1.8 (1.3–2.4)	1.6 (1.3–1.9)	2.1 (1.5–3.1)	2.9 (2.0–4.2)
Bankrupt	1	2.8 (2.0–3.7)	2.7 (2.3–3.2)	3.7 (2.7–4.9)	5.1 (3.5–7.5)
Interpersonal conflict	1	2 (1.5–2.6)	2.9 (2.5–3.4)	3.6 (2.7–4.7)	5.8 (4.1–8.1)
Ended relationship or marriage	1	2.5 (1.8–3.5)	1.9 (1.5–2.4)	2.5 (1.8–3.6)	2.9 (2.0–4.2)

CD, Conduct disorder.

Latent classes estimated on the basis of reported symptoms at age 15 or earlier. Respondents assigned to the latent class according to posterior probability of class membership. Odds ratios were estimated in binary logistic regression models with latent class as a categorical predictor and statistical control for age and sex. Models for past-year events also included statistical control for educational attainment