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Comorbidity and Continuity of Psychiatric Disorders in Youth After Detention:

A Prospective Longitudinal Study

Karen M. Abram, PhD, **Naomi A. Zwecker, PhD**, **Leah J. Welty, PhD**, **Jennifer A. Hershfield, MA**, **Mina K. Dulcan, MD**, and **Linda A. Teplin, PhD**

Health Disparities and Public Policy, Department of Psychiatry and Behavioral Sciences, Northwestern University Feinberg School of Medicine, Chicago, Illinois (Abram, Welty, Hershfield, Teplin); Houston OCD Program, Houston, Texas (Zwecker); Department of Preventive Medicine, Northwestern University Feinberg School of Medicine, Chicago, Illinois (Welty); Department of Psychiatry and Behavioral Sciences, Northwestern University Feinberg School of Medicine, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, Illinois (Dulcan).

Abstract

IMPORTANCE—Psychiatric disorders and comorbidity are prevalent among incarcerated juveniles. To date, no large-scale study has examined the comorbidity and continuity of psychiatric disorders after youth leave detention.

OBJECTIVE—To determine the comorbidity and continuity of psychiatric disorders among youth 5 years after detention.

DESIGN, SETTING, AND PARTICIPANTS—Prospective longitudinal study of a stratified random sample of 1829 youth (1172 male and 657 female; 1005 African American, 296 non-Hispanic white, 524 Hispanic, and 4 other race/ethnicity) recruited from the Cook County Juvenile Temporary Detention Center, Chicago, Illinois, between November 20, 1995, and June 14, 1998, and who received their time 2 follow-up interview between May 22, 2000, and April 3, 2004.

Corresponding Author: Linda A. Teplin, PhD, Health Disparities and Public Policy, Department of Psychiatry and Behavioral Sciences, Northwestern University Feinberg School of Medicine, 710 N Lake Shore Dr, Ste 900, Chicago, IL 60611 (healthdisparities@northwestern.edu)..

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Study concept and design: Abram, Teplin. *Acquisition, analysis, or interpretation of data:* Abram, Zwecker, Welty, Dulcan, Teplin. *Drafting of the manuscript:* All authors.

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MAIN OUTCOMES AND MEASURES—At baseline, the Diagnostic Interview Schedule for Children Version 2.3. At follow-ups, the Diagnostic Interview Schedule for Children Version IV (child and young adult versions) and the Diagnostic Interview Schedule Version IV (substance use disorders and antisocial personality disorder).

RESULTS—Five years after detention, when participants were 14 to 24 years old, almost 27% of males and 14% of females had comorbid psychiatric disorders. Although females had significantly higher rates of comorbidity when in detention (odds ratio, 1.3; 95% CI, 1.0-1.7), males had significantly higher rates than females at follow-up (odds ratio, 2.3; 95% CI, 1.6-3.3). Substance use plus behavioral disorders was the most common comorbid profile among males, affecting 1 in 6. Participants with more disorders at baseline were more likely to have a disorder approximately 5 years after detention, even after adjusting for demographic characteristics. We found substantial continuity of disorder. However, some baseline disorders predicted alcohol and drug use disorders at follow-up.

CONCLUSIONS AND RELEVANCE—Although prevalence rates of comorbidity decreased in youth after detention, rates remained substantial and were higher than rates in the most comparable studies of the general population. Youth with multiple disorders at baseline are at highest risk for disorder 5 years later. Because many psychiatric disorders first appear in childhood and adolescence, primary and secondary prevention of psychiatric disorders offers the greatest opportunity to reduce costs to individuals, families, and society. Only a concerted effort to address the many needs of delinquent youth will help them thrive in adulthood.

The prevalence of psychiatric disorders among juvenile detainees has been well established.[1,2] Almost two-thirds of males and three-quarters of females entering juvenile detention have 1 or more psychiatric disorders.[2] Comorbid disorders are also common in this population, affecting approximately half of the youth in detention.[3,4]

Far less is known about youth after they leave detention. Teplin et al[5] found that after detention prevalence rates of psychiatric disorders decreased but were still substantially higher than general population rates. Five years after detention, half of the males and 40% of females had 1 or more psychiatric disorders. However, longitudinal studies to date have examined only the prevalence and persistence of specific disorders such as major depression or alcohol use disorders. To our knowledge, no study has examined the comorbidity and continuity of psychiatric disorders after youth leave detention.

Many excellent general population studies have examined the comorbidity and continuity of disorders. However, findings are not generalizable to detained youth for 2 reasons. First, the demographic characteristics of youth in detention are different from those of the general population.[6] Youth in detention are disproportionately poor, and racial/ethnic minorities are overrepresented.[6,7] More than any other racial/ethnic group, African Americans are disproportionately incarcerated,[6] comprising about 14% of the general population[8] but about 40% of youth and young adults in correctional facilities.[9,10] Second, delinquent youth are systematically under represented in general population investigations.[5] School-based samples exclude youth who are truant, have dropped out, or are incarcerated. Household surveys exclude incarcerated youth. Samples drawn from pediatric clinics exclude those who do not receive medical treatment. Even if sampled initially, delinquent youth may be

lost to follow-up when they are incarcerated because they cannot be found and because studying prisoners requires special procedures and approvals from the Secretary of Health and Human Services.[11]

Data on the comorbidity and continuity of disorders in delinquent youth are needed for 3 reasons. First, comorbid disorders present significant challenges.[12,13] Persons with comorbid disorders are less responsive to traditional treatments than those with only one disorder[12] and are more difficult to place in treatment because their needs cross traditional boundaries.[13] Second, identifying diagnostic predictors of later disorder has ramifications for secondary prevention, treatment, and policy in the community.[14,15] Juvenile detainees have a median length of stay of only 2 weeks.[16] After release, juvenile detainees become the responsibility of the community. Third, longitudinal studies of correctional populations provide needed data to address health disparities, a priority of the Institute of Medicine[17] and of the *Healthy People 2020* publication.[18] Data on females are especially needed because they are a growing minority in the juvenile justice system, now comprising 30% of juvenile arrests.[19]

This is the first article from the Northwestern Juvenile Project to examine the comorbidity and continuity of psychiatric disorders after youth leave detention; a prior article examined the prevalence and persistence of single disorders.[5] We examine 3 questions. What are the patterns of comorbidity, and how do they change over time? Among youth with a specific disorder at baseline, what are the odds that they will have the same disorder at follow-up (homotypic prediction)?[14] Among youth with a specific disorder at baseline, what are the odds that they will have a different disorder at follow-up (heterotypic prediction)?[14]

Methods

The most relevant information on our methods is summarized below. Additional information is available in the eMethods in the Supplement and is published elsewhere.[2,3,5,20]

Procedures to Obtain Assent and Consent at Baseline and Follow-up

The Northwestern University Institutional Review Board and the Centers for Disease Control and Prevention Institutional Review Board approved all study procedures and waived parental consent for persons younger than 18 years, consistent with federal regulations regarding research with minimal risk.[21] For all interviews, participants signed either an assent form (if <18 years old) or a consent form (if ≥18 years old).

Sample and Procedures

We recruited a stratified random sample of 1829 youth at intake to the Cook County Juvenile Temporary Detention Center in Chicago, Illinois, between November 20, 1995, and June 14, 1998, who were awaiting the adjudication or disposition of their case. The Cook County Juvenile Temporary Detention Center is used for pretrial detention and for offenders sentenced for less than 30 days.

To ensure adequate representation of key subgroups, we stratified our sample by sex, race/ethnicity (African American, non-Hispanic white, Hispanic, or other), age (10-13 or ≥14

years), and legal status at detention (processed in juvenile or adult court). Face-to-face structured interviews were conducted at the detention center in a private area, most within 2 days of intake.

Follow-up interviews were scheduled for 3 and 4½ years after baseline. For each follow-up, we interviewed participants whether they lived in the community or in correctional facilities. **Table 1** lists characteristics of the sample.

Measures

Baseline—We administered the Diagnostic Interview Schedule for Children Version 2.3 (DISC-2.3),[22,23] based on the *DSM-III-R*, the most recent English and Spanish versions then available, which assesses disorders in the past 6 months. Because the DISC-2.3 did not include posttraumatic stress disorder (PTSD), we used the module from the DISC-IV when it became available 13 months after the study began.[20,24,25]

Follow-up Interviews—We administered the DISC-IV (child and young adult versions), based on the *DSM-IV*, to assess schizophrenia, mood disorders, anxiety disorders, attention-deficit/hyperactivity disorder (ADHD), and disruptive behavior disorders in the past year.[25] To assess past-year substance use disorders and antisocial personality disorder (APD), we administered the Diagnostic Interview Schedule Version IV.[26] As in our group's prior work,[5] we checked that changes in prevalence rates over time were not due to changes in measurement.

Variables—We conducted analyses of specific disorders and 2 derived variables. The first variable is the number of disorders, including the count of disorders among mania, major depression, hypomania, dysthymia, generalized anxiety disorder (GAD), panic disorder, PTSD, ADHD (if ≤17 years old), conduct disorder (if ≤17 years old), oppositional defiant disorder (ODD) (if ≤17 years old), APD (if ≥18 years old), and alcohol and drug use disorders. The second variable comprises categories of disorder, including internalizing (mania, major depression, hypomania, dysthymia, GAD, panic disorder, and PTSD), substance (alcohol and drug use disorders), and behavioral (conduct disorder,ODD,and APD). Participants self-identified their race/ethnicity (African American, Hispanic, non-Hispanic white, or other).

Statistical Analysis

All analyses were conducted using commercial software (STATA, version 12; StataCorp LP) with its survey routines.[27] To generate prevalence rates and inferential statistics that reflect the population of the Cook County Juvenile Temporary Detention Center, each participant was assigned a sampling weight augmented with a nonresponse adjustment to account for missing data.[28] Taylor series linearization was used to estimate standard errors.[29,30] Because mental health needs of youth in detention differ by sex,[2,3] we conducted separate analyses for males and females.

We present prevalence rates of disorder at 3 time points: baseline (time 0), time 1, and time 2. As in our group's prior work,[2] time 1 is the first follow-up interview but excludes

interviews that occurred more than 18 months after the interview due date. The median time between baseline and time 1 was 3.0 years (mean [SD], 3.2 [0.3] years; range, 2.7-4.5 years).

Time 1 follow-up interviews were conducted between November 19, 1998, and August 8, 2002. For simplicity, we refer to the time 1 interview as occurring approximately 3 years after baseline. Table 1 summarizes the sample's demographics and retention; 90.7% of participants had a time 1 interview.

Time 2 is the 4½-year follow-up interview. As with time 1, we excluded interviews that occurred more than 18 months after this due date. The median time between baseline and the time 2 interview was 4.7 years (mean [SD], 4.8 [0.4] years; range, 4.3-6.0 years). Time 2 follow-up interviews were conducted between May 22, 2000, and April 3, 2004. For simplicity, we subsequently refer to the time 2 interview as occurring approximately 5 years after baseline; 82.2% of participants had a time 2 interview (Table 1) (see the eMethods in the Supplement for additional details on time 2).

We used logistic regression for 2 analyses. First, we examined demographic differences in comorbidity (≥2 disorders [yes or no]) at time 2. Second, we examined whether the number of disorders at baseline was associated with having at least 1 disorder at time 2.

Models for Continuity of Disorders Over Time

We used a sequence of logistic regression models to examine continuity of disorders over time. First, in the unadjusted model the disorder at baseline was the single predictor of the disorder at follow-up. For example, is major depression at baseline associated with alcohol use disorder at time 2? (Models in which the baseline disorder predicts the same disorder at follow-up are referred to as *homotypic prediction*. Models in which the baseline disorder predicts a different disorder at follow-up are referred to as *heterotypic prediction*.) Second, in the adjusted model (heterotypic prediction only) we included whether the disorder being predicted at follow-up was present at baseline as well. For example, is major depression at baseline associated with alcohol use disorder at time 2, even after adjusting for having alcohol use disorder at baseline? To determine whether conduct disorder predicted APD, we used a modified diagnosis of APD that did not require adolescent conduct disorder. However, because findings were not substantially different from models using the original APD diagnosis, we present data with the original criteria. All models predicting substance use disorders at follow-up were adjusted for time in corrections (linear and quadratic terms for the number of days incarcerated in the year before follow-up) because access to substances is typically restricted in correctional settings.

Results

Comorbidity of Psychiatric Disorders

Number of Disorders—Table 2 lists prevalence rates of the number of disorders. One-third of males at time 1 and more than one-quarter of males at time 2 had 2 or more disorders. Although females were more likely to have 2 or more disorders at baseline (odds ratio [OR], 1.3; 95% CI, 1.0-1.7), males were 1.4 (95% CI, 1.0-2.0) times more likely than

females to have 2 or more disorders at time 1 and 2.3 (95% CI, 1.6-3.3) times more likely at time 2. African Americans had the lowest rates of comorbidity. At time 2, among males non-Hispanic whites were more likely than African Americans (OR, 2.2; 95% CI, 1.4-3.4) and Hispanics (OR, 1.9; 95% CI, 1.2-3.2) to have 2 or more disorders. At time 2, among females Hispanics were 1.8 (95% CI, 1.0-3.4) times more likely to have 2 or more disorders than African Americans.

Categories of Disorder—Figure 1 shows the overlap of 3 categories of disorder (internalizing, substance, and behavioral) at baseline, time 1, and time 2 for males and females. These figures show decreasing overlap of categories of disorder over time, especially for females. Among males, the most common comorbid profile at time 2 was substance use plus behavioral disorders (16%).

Continuity of Disorders Over Time

Participants with more disorders at baseline were more likely to have a disorder at time 2, even after adjusting for demographic characteristics. For every additional disorder at baseline, the odds of having a disorder at time 2 increased by 1.2 (95% CI, 1.1-1.4) among males and 1.3 (95% CI, 1.1-1.4) among females. Among participants with all 3 types of disorder at baseline (internalizing, substance, and behavioral), 93.3% of males and 76.0% of females had at least 1 disorder at time 2.

Figure 2 (males) and **Figure 3** (females) list prevalence rates of disorder at time 2 among those who did and did not have a disorder present at baseline (eTable 1 and eTable 2 in the Supplement list rates at time 1). Odds ratios contrast the prevalence of disorder at time 2 between those who had the disorder at baseline compared with those who did not have the disorder at baseline. The first OR is unadjusted, and the second OR is adjusted for the disorder at baseline (see the Statistical Analysis and Models for Continuity of Disorders Over Time subsections of the Methods section). Predictions between disorders belonging to the same category (eg, PTSD and GAD) are considered homotypic. We could not examine continuity of disorder for mania or hypomania because there were too few cases at baseline. We could not predict mania, hypomania, dysthymia, panic disorder, or GAD at time 1 or time 2 because prevalence rates were too low for stable estimates.

Males—Same Disorder at Follow-up (Homotypic Prediction) Figure 2 shows significant homotypic prediction of disorder among males for major depression, APD (from baseline conduct disorder), and alcohol use disorder. Homotypic prediction of disorder from baseline to time 1 was substantially similar (eTable 1 in the Supplement).

Different Disorder at Follow-up (Heterotypic Prediction): Major depression, ADHD, and conduct disorder all predicted both alcohol and drug use disorders at time 2, even after adjusting for the presence of alcohol and drug use disorders at baseline. Patterns were similar at time 1, but there were additional significant predictors: ADHD and ODD predicted major depression, dysthymia and drug use disorders predicted PTSD, drug use disorder predicted APD, and GAD predicted drug use disorder (eTable 1 in the Supplement).

Females

Same Disorder at Follow-up (Homotypic Prediction): Figure 3 shows significant homotypic prediction of disorder among females for anxiety disorders (PTSD from baseline GAD), APD (from baseline conduct disorder), and alcohol and drug use disorders. Homotypic prediction of disorder was substantially similar from baseline to time 1 (eTable 2 in the Supplement).

Different Disorder at Follow-up (Heterotypic Prediction): Generalized anxiety disorder predicted major depression, PTSD predicted APD, and ODD predicted both alcohol and drug use disorders. Patterns were similar at time 1, but there were additional predictors: major depression predicted PTSD and APD, alcohol use disorder predicted APD, and ADHD, conduct disorder, and ODD predicted PTSD (eTable 2 in the Supplement).

Discussion

Although the prevalence of comorbidity decreased among youth after detention, 5 years later (when the mean age of our sample was 20 years) almost 27% of males and 14% of females had comorbid psychiatric disorders. The drop in prevalence is similar to that of specific disorders.[5] The most comparable investigations of comorbidity in the general population included adults of all ages, who have fewer disorders than young adults.[31] Even with this caveat, the prevalence of comorbidity among our sample appears substantially higher than that in the National Comorbidity Survey Replication (5.8% of adults 18-44 years old)[32] and the Epidemiologic Catchment Area Survey (4.8% of adults ≥18 years old).[33]

Comorbid disorders generally predict worse prognoses.[34-36] Among youth who had 3 or more types of disorder at baseline, almost all males and three-quarters of females had 1 or more disorders 5 years later. These patterns are of concern. The longer a disorder persists (especially if there is more than 1 disorder), the greater is the impact on the individual in functioning, physical symptoms, and stress.[37]

Among males 5 years after detention, the most common comorbid profile was substance use plus behavioral disorders, affecting 1 in 6. Youth with substance use and comorbid externalizing disorders have poorer outcomes than those with substance use disorders alone and those with substance use and internalizing disorders.[38,39] We found substantial continuity of disorders among males for alcohol use disorder, APD (from conduct disorder), and major depression; general population studies[14,15] have established that the strongest predictor of a disorder is having had it previously. However, some baseline disorders predicted alcohol and drug use disorders at follow-up. Males in detention with ADHD, conduct disorder, or major depression were 2 to 4 times more likely to have substance use disorders at follow-up than those without those disorders at baseline. How can we account for these findings? Some argue that neurobehavioral disinhibition underlies both behavioral and substance use disorders, suggesting a shared mechanism.[40] Mood disorders may also lead to the abuse of substances (self-medication hypothesis).[41] Finally, mood and substance use disorders may also stem from a common neurobiological pathway, increasing vulnerability to both disorders.[42]

Among females, no diagnostic profile predominated at follow-up. We found substantial continuity for alcohol and drug use disorders, APD (from conduct disorder), and anxiety disorders (GAD to PTSD). As with males, heterotypic prediction was less common. However, females with ODD in detention were 2 to 4 times more likely than those without ODD to have substance use disorders at follow-up. Moreover, females in detention with GAD were 3 times more likely than those without GAD to have major depression at follow-up. In general population studies,[14,43,44] anxiety and depression commonly cross-predict.

Although females were significantly more likely to have comorbidity at baseline, 5 years after detention males were more likely than females to have comorbid disorders. Because males comprise more than 85% of youth in the juvenile justice system, mental health services for males are critical.[10] The prevalence of comorbidity over time may differ by sex for 3 reasons. First, female arrestees may be treated more leniently by the courts than males and are more likely to be diverted from detention (chivalry hypothesis).[45] Therefore, females who are detained may be more dysfunctional and have more problem behaviors and disorders than their male counterparts. Second, after detention females are more likely to receive mental health services than males.[46] Third, females are less likely to persist in delinquency than males.[47,48]

Racial/ethnic differences were similar to those for specific disorders.[5] African Americans had the lowest prevalence of comorbidity, and non-Hispanic whites had the highest. As noted in prior studies,[2,5] these differences may reflect racial/ethnic disparities in criteria for detention.

Limitations

Our data are subject to the limitations of self-report. Moreover, it was not feasible to study more than 1 jurisdiction; generaliz-ability may be limited to detained youth in urban centers with similar demographic compositions. Participants may have had disorders that we did not examine; hence, overall prevalence rates may be higher than reported. We changed measures during the follow-up period because of updates to the *DSM* and its associated measures and because of the aging of our participants. We could not adjust for all comorbid disorders in predictive models owing to small cell sizes. Although retention rates were high and hypomania was the only disorder associated with dropout, participants who missed interviews might be more likely to have had disorders than those who were interviewed. The sample was recruited in the late 1990s; however, critical features of the population (demographic characteristics, the increase in delinquent females, and the disproportionate incarceration of minorities) have not changed. Our findings do not take into account any mental health services received.

Implications for Mental Health Policy and Research

Provide Coordinated Treatment for Youth Leaving Detention—Recent efforts to improve interventions for delinquent populations have highlighted several empirically supported models to address not only their complex mental health needs (including comorbidity) but also their considerable psychosocial impairments.[49,50] These models have in common a system-oriented, family-based approach that integrates treatment across

service sectors and settings.[49,50] The Institute of Medicine's quality chasm series concluded that treatment of youth (and adults) with comorbid disorders continues to be compromised by our fragmented systems of care.[51] The Patient Protection and Affordable Care Act offers an opportunity to improve treatment by expanding access to care, payment reform, and information technology (to increase communication), as well as integrating services such as medical homes that focus on the whole person.[52,53]

Implement Early Interventions to Prevent Substance Use Disorders—By the time youth are detained (age range, 10-17 years), it is too late for primary prevention. Substance use and internalizing and behavioral disorders at baseline predicted substance use disorders at follow-up, consistent with findings from general population studies.[54-56] Treating childhood disorders (especially behavioral disorders) might reduce secondary substance use disorders.[15,57] By improving screening and referral practices in elementary school[15,58] and at pediatric clinics,[59] at-risk youth can be treated in early childhood.

Conduct Prospective Studies of Continuity and Comorbid Disorders From Childhood to Adulthood in Representative Samples of the General Population —How one disorder affects or predicts the subsequent development or course of another disorder appears to change as youth age.[60,61] Yet, knowledge is hampered by the limitations of general population investigations.[62] Most large-scale epidemiologic investigations of psychiatric disorders in the United States either did not draw samples during childhood or have not been longitudinal.[63-66] Landmark prospective studies[14,15,44,60,67,68] of children have insufficient diversity, particularly given racial/ethnic trends in the US census.[69] For example, there are few epidemiologic data on Hispanics, now the largest minority group in the United States. The advent of *DSM-5* and the opportunity to advance a new standard of assessment make this a timely endeavor.

Conclusions

Many psychiatric disorders first appear in childhood and adolescence.[58,70] Early-onset psychiatric disorders are among the illnesses ranked highest in the World Health Organization's estimates of the global burden of disease,[71] creating annual costs of $247 billion in the United States.[72] Successful primary and secondary prevention of psychiatric disorders will reduce costs to individuals, families, and society.[73] Only a concerted effort to address the many needs of delinquent youth will help them thrive in adulthood.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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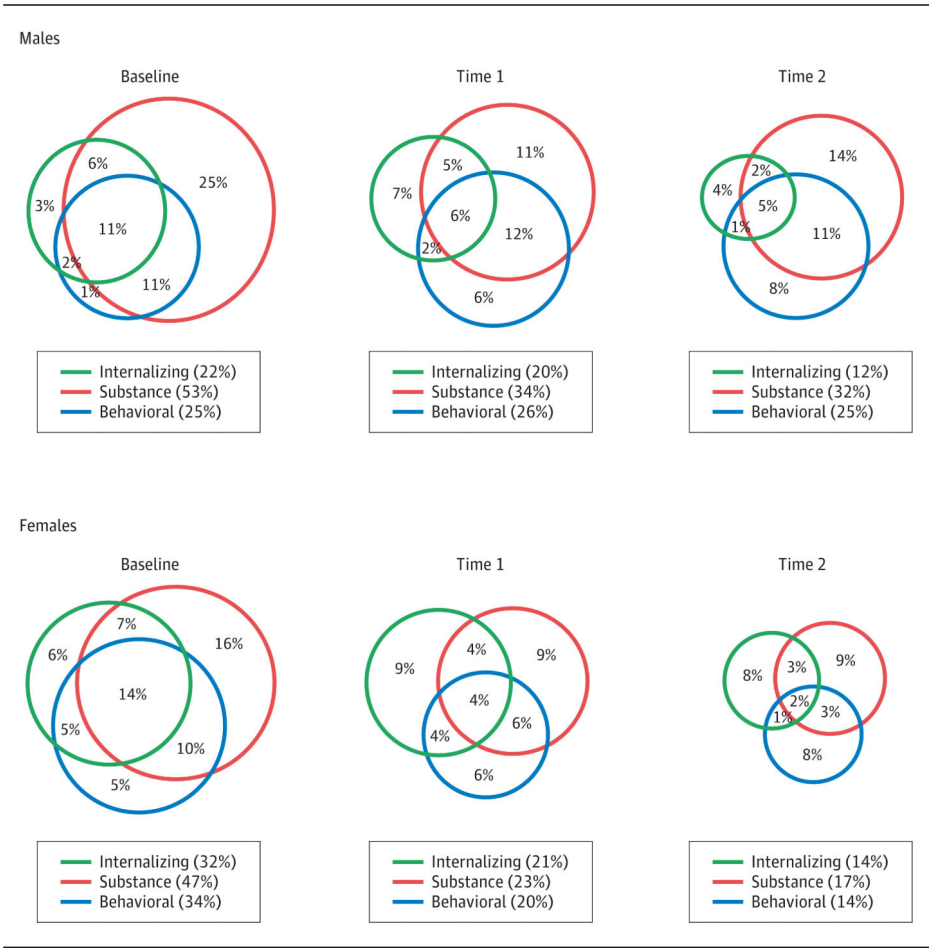

Figure 1. Comorbid Types of Disorder Among Males (A) and Females (B) at Baseline, Time 1, and Time 2

Internalizing disorders include any mood (major depression, mania, hypomania, and dysthymia) or anxiety (generalized anxiety, panic, and posttraumatic stress) disorders. Substance use disorders include any alcohol or drug use disorders. Behavioral disorders include conduct (if ≤17 years old), oppositional defiant (if ≤17 years old), or antisocial personality (if ≥18 years old) disorders.

Baseline Disorder, (N)		Disorder at Time 2 (n = 960)[c] Major Depression	Posttraumatic Stress Disorder	Antisocial Personality Disorder[d]	Alcohol	Drug
Major Depression						
% Absent	(856)	**4.9**	4.4	26.0	**17.3**	**22.3**
% Present	(97)	**16.0**	10.5	31.0	**35.4**	**36.6**
OR (95% CI)		**3.7 (1.2-11.0)**	2.6 (0.8-8.6)	1.3 (0.6-2.8)	**3.8 (1.6-9.2)**	**2.6 (1.1-5.9)**
aOR (95% CI)		**NA**	1.9 (0.4-8.2)	0.8 (0.4-1.7)	**2.9 (1.2-7.0)**	**2.5 (1.1-5.6)**
Dysthymia						
% Absent	(877)	5.4	4.9	26.2	**17.8**	23.0
% Present	(79)	12.8	7.0	30.0	**33.4**	31.5
OR (95% CI)		2.6 (0.8-8.3)	1.5 (0.4-5.9)	1.2 (0.5-2.8)	**3.0 (1.1-8.5)**	1.9 (0.8-4.8)
aOR (95% CI)		0.8 (0.2-4.3)	1.1 (0.3-4.6)	0.8 (0.4-1.7)	2.3 (0.8-6.1)	1.8 (0.7-4.5)
Generalized Anxiety Disorder						
% Absent	(920)	6.2	4.8	27.3	19.6	24.3
% Present	(31)	5.9	12.4	14.5	14.9	16.1
OR(95%CI)		0.9 (0.3-3.3)	2.8 (0.5-16.9)	0.5 (0.1-2.1)	1.6 (0.3-7.3)	1.0 (0.3-3.9)
aOR(95%CI)		0.3 (0.1-1.4)	NA	0.3 (0.1-1.5)	1.0 (0.2-5.0)	0.9 (0.3-3.4)
Posttraumatic Stress Disorder[e]						
% Absent	(387)	7.5	4.1	23.8	18.0	28.8
% Present	(32)	0.0	4.0	11.6	26.6	7.2
OR (95% CI)		NA	1.0 (0.2-6.1)	0.4 (0.1-1.2)	1.9 (0.4-9.6)	0.2 (0.1-0.9)
aOR (95% CI)		NA	NA	0.4 (0.2-1.2)	1.3 (0.3-5.8)	0.2 (0.1-0.9)
Attention-deficit/Hyperactivity Disorder						
% Absent	(836)	5.5	**4.0**	25.8	**17.8**	**21.2**
% Present	(119)	11.4	**13.1**	33.0	**31.5**	**43.2**
OR (95% CI)		2.2 (0.7-6.8)	**3.6 (1.1-11.5)**	1.4 (0.7-2.9)	**3.6 (1.6-8.2)**	**4.6 (2.2-9.6)**
aOR (95% CI)		1.3 (0.2-8.0)	4.7 (0.7-30.0)	0.8 (0.4-1.9)	**3.0 (1.3-6.7)**	**4.3 (2.1-9.0)**
Conduct Disorder						
% Absent	(669)	**4.5**	**3.3**	**21.5**	**14.6**	**20.2**
% Present	(286)	**11.5**	**10.3**	**42.0**	**34.4**	**35.0**
OR (95% CI)		**2.8 (1.1-7.2)**	**3.3 (1.2-9.3)**	**2.6 (1.6-4.5)**	**3.3 (1.8-5.9)**	**2.2 (1.2-3.8)**
aOR (95% CI)		2.2 (0.7-6.4)	3.7 (0.6-21.7)	NA	**2.7(1.4-5.1)**	**2.1 (1.2-3.7)**
Oppositional Defiant Disorder						
% Absent	(821)	5.3	4.3	26.0	**18.5**	25.0
% Present	(134)	11.9	10.1	30.8	**24.9**	16.7
OR (95% CI)		2.4 (0.8-7.3)	2.5 (0.7-8.5)	1.3 (0.6-2.5)	**2.4 (1.1-5.2)**	0.8 (0.4-1.7)
aOR (95% CI)		1.6 (0.4-7.0)	0.4 (0.1-2.0)	0.8 (0.4-1.7)	1.8 (0.8-4.2)	0.8 (0.4-1.6)
Alcohol						
% Absent	(708)	6.0	5.1	24.3	**15.8**	22.6
% Present	(238)	7.0	5.2	34.1	**29.7**	28.6
OR (95% CI)		1.2 (0.4-3.2)	1.0 (0.3-3.1)	1.6 (0.9-2.8)	**2.4 (1.3-4.5)**	1.3 (0.7-2.3)
aOR (95% CI)		0.8 (0.2-2.8)	0.6 (0.2-2.4)	1.2 (0.7-2.1)	**NA**	1.2 (0.7-2.3)
Drug						
% Absent	(530)	6.8	3.4	25.8	**15.9**	21.0
% Present	(418)	4.7	6.2	27.3	**23.2**	27.9
OR (95% CI)		0.7 (0.3-1.8)	1.9 (0.6-5.6)	1.1 (0.7-1.8)	**1.8 (1.04-3.2)**	1.5 (0.9-2.4)
aOR (95% CI)		0.6 (0.2-1.8)	3.4 (0.8-14.8)	0.8 (0.5-1.4)	1.4 (0.8-2.5)	NA

Figure 2. Time 2 *DSM-IV* Diagnoses Predicted From Baseline Diagnoses Among Males[a,b]

Abbreviations: aOR, adjusted odds ratio; NA, not applicable; OR, odds ratio.

[a] Descriptive statistics are weighted to adjust for sampling design and reflect the demographic characteristics of the Cook County Juvenile Temporary Detention Center.

[b] Prevalence rates of disorder at Time 2 among males who did and did not have disorder present at baseline. Odds ratios contrast the prevalence of disorder at Time 2 (shown in the columns) between males who had the disorder at baseline (shown in the rows), compared with those who did not have the disorder at baseline. In each cell, the first odds ratio is

unadjusted and the second is adjusted for the disorder at baseline (see Methods section). Shading indicates homotypic prediction within category of disorder (affective, anxiety, behavioral, or substance). Bolding indicates statistically significant ORs or AORs ($p < 0.05$).

[c] Of the 960 males interviewed at Time 2, 956 received the DISC-IV and 958 received the DIS-IV.

[d] Adjusted odds ratios for predicting APD at Time 2 control for CD at baseline.

[e] Assessed at baseline for males who were interviewed after the posttraumatic stress disorder module of the Diagnostic Interview Schedule for Children, Version IV became available.

Baseline Disorder, (N)		Disorder at Time 2 (n = 544)[c] Major Depression	Posttraumatic Stress Disorder	Antisocial Personality Disorder[d]	Alcohol	Drug
Major Depression						
% Absent	(450)	8.7	5.7	**12.2**	7.8	14.6
% Present	(94)	14.5	5.1	**27.6**	9.2	14.9
OR (95% CI)		1.8 (0.9-3.6)	0.9 (0.3-2.3)	**2.8 (1.01-7.5)**	1.3 (0.6-2.9)	1.1 (0.6-2.1)
aOR (95% CI)		NA	0.8 (0.1-3.9)	2.2 (0.9-5.1)	1.1 (0.5-2.8)	0.8 (0.4-1.8)
Dysthymia						
% Absent	(473)	**8.7**	5.7	14.6	8.1	14.2
% Present	(71)	**18.1**	4.9	18.7	7.7	18.2
OR (95% CI)		**2.3 (1.1-4.7)**	0.9 (0.3-2.5)	1.3 (0.6-2.9)	1.0 (0.4-2.7)	1.4 (0.7-2.7)
aOR (95% CI)		2.0 (0.8-4.9)	1.4 (0.4-5.3)	1.0 (0.4-2.6)	1.0 (0.3-2.7)	1.1 (0.5-2.2)
Generalized Anxiety Disorder						
% Absent	(518)	**9.2**	**5.2**	15.3	8.2	14.4
% Present	(22)	**26.2**	**16.5**	8.4	4.9	23.3
OR (95%CI)		**3.5 (1.3-9.5)**	**3.6 (1.1-11.5)**	0.5 (0.1-2.3)	0.6 (0.1-4.7)	1.9 (0.6-5.7)
aOR (95%CI)		**3.0 (1.03-8.7)**	**7.7 (2.0-29.5)**	0.4 (0.1-1.9)	0.7 (0.1-5.6)	1.6 (0.5-4.8)
Posttraumatic Stress Disorder[e]						
% Absent	(247)	9.4	5.1	**11.2**	9.2	16.5
% Present	(36)	6.9	5.5	**43.3**	9.6	14.5
OR (95% CI)		0.7 (0.2-2.8)	1.1 (0.2-4.9)	**6.1 (1.1-34.5)**	1.0 (0.3-3.9)	0.9 (0.3-2.8)
aOR (95% CI)		0.5 (0.1-2.5)	NA	**4.6 (1.2-18.6)**	1.0 (0.2-4.0)	0.6 (0.1-2.4)
Attention-deficit/Hyperactivity Disorder						
% Absent	(457)	9.7	5.0	14.1	7.5	**13.2**
% Present	(87)	10.6	9.0	20.9	11.3	**22.9**
OR (95% CI)		1.1 (0.5-2.4)	1.9 (0.8-4.4)	1.6 (0.8-3.3)	1.6 (0.7-3.4)	**2.0 (1.1-3.7)**
aOR (95% CI)		0.9 (0.4-2.0)	2.1 (0.7-6.3)	1.2 (0.5-2.8)	1.5 (0.7-3.3)	1.8 (0.9-3.4)
Conduct Disorder						
% Absent	(391)	10.0	6.7	**11.0**	7.1	**11.8**
% Present	(152)	9.3	2.9	**25.0**	10.5	**21.5**
OR (95% CI)		0.9 (0.5-1.8)	0.4 (0.2-1.2)	**2.7 (1.2-6.0)**	1.6 (0.8-3.2)	**2.2 (1.3-3.8)**
aOR (95% CI)		0.8 (0.4-1.5)	0.9 (0.3-3.4)	**NA**	1.2 (0.5-2.7)	1.7 (0.97-3.1)
Oppositional Defiant Disorder						
% Absent	(463)	9.0	5.4	13.8	**5.9**	**12.5**
% Present	(81)	14.7	7.0	23.5	**21.2**	**27.7**
OR (95% CI)		1.7 (0.9-3.5)	1.3 (0.5-3.4)	1.9 (0.9-4.0)	**4.4 (2.2-8.7)**	**2.8 (1.6-5.0)**
aOR (95% CI)		1.5 (0.7-3.4)	1.9 (0.6-6.1)	1.4 (0.5-3.6)	**4.2 (2.1-8.5)**	**2.2 (1.2-4.2)**
Alcohol						
% Absent	(393)	9.9	5.7	12.2	**6.5**	**12.6**
% Present	(139)	10.5	5.8	23.5	**11.6**	**21.0**
OR (95% CI)		1.1 (0.6-2.0)	1.0 (0.4-2.3)	2.2 (0.9-5.2)	**2.0 (1.01-4.0)**	**2.1 (1.2-3.6)**
aOR (95% CI)		1.0 (0.5-1.9)	0.9 (0.3-2.8)	1.6 (0.7-3.3)	NA	1.3 (0.6-2.5)
Drug						
% Absent	(318)	9.9	5.2	12.3	6.7	**9.8**
% Present	(215)	10.2	6.4	19.1	9.8	**21.9**
OR (95% CI)		1.0 (0.6-1.9)	1.3 (0.6-2.6)	1.7 (0.8-3.5)	1.5 (0.8-2.9)	**2.7 (1.6-4.5)**
aOR (95% CI)		1.0 (0.5-1.8)	1.1 (0.4-3.5)	1.2 (0.7-2.3)	1.02 (0.4-2.4)	**NA**

Figure 3. Time 2 *DSM-IV* Diagnoses Predicted From Baseline Diagnoses Among Females[a,b]

Abbreviations: aOR, adjusted odds ratio; NA, not applicable; OR, odds ratio.

[a] Descriptive statistics are weighted to adjust for sampling design and reflect the demographic characteristics of the Cook County Juvenile Temporary Detention Center.

[b] Prevalence rates of disorder at Time 2 among females who did and did not have disorder present at baseline. Odds ratios contrast the prevalence of disorder at Time 2 (shown in the columns) between females who had the disorder at baseline (shown in the rows), compared with those who did not have the disorder at baseline. In each cell, the first odds ratio is

unadjusted and the second is adjusted for the disorder at baseline (see Methods section). Shading indicates homotypic prediction within category of disorder (affective, anxiety, behavioral, or substance). Bolding indicates statistically significant ORs or AORs ($p < 0.05$).

[c] Of the 544 females interviewed at Time 2, all 544 received the DISC-IV and all 544 received the DIS-IV.

[d] Adjusted odds ratios for predicting APD at Time 2 control for CD at baseline.

[e] Assessed at baseline for females who were interviewed after the posttraumatic stress disorder module of the Diagnostic Interview Schedule for Children, Version IV became available.

Table 1

Demographic Characteristics at Baseline, Time 1, and Time 2[a]

Characteristic	Baseline (n = 1829)	Time 1[b] (n = 1659)	Time 2[c] (n = 1504)
Race/ethnicity, No. (%)			
African American	1005 (54.9)	927 (55.9)	859 (57.1)
Non-Hispanic white	296 (16.2)	267 (16.1)	233 (15.5)
Hispanic	524 (28.6)	461 (27.8)	409 (27.2)
Other	4 (0.2)	4 (0.2)	3 (0.2)
Sex, No. (%)			
Male	1172 (64.1)	1054 (63.5)	960 (63.8)
Female	657 (35.9)	605 (36.5)	544 (36.2)
Legal status at detention, No. (%)			
Processed in adult court	275 (15.0)	263 (15.9)	234 (15.6)
Processed in juvenile court	1554 (85.0)	1396 (84.1)	1270 (84.4)
Age, y			
Mean (SD)	14.9 (1.4)	18.6 (1.4)	20.2 (1.5)
Median (range)	15 (10-19)	19 (13-23)	20 (15-25)

[a] Percentages may not sum to 100.0% due to rounding.

[b] Of 1829 baseline participants, 31 had died (25 males and 6 females), 5 refused participation (5 males and 0 females), 42 were lost to follow-up (27 males and 15 females), and 92 had follow-up interviews that were out of range (61 males and 31 females).

[c] Of 1829 baseline participants, 51 had died (42 males and 9 females), 27 refused participation (19 males and 8 females), 101 were lost to follow-up (65 males and 36 females), and 146 had follow-up interviews that were out of range (86 males and 60 females).

Table 2

Prevalence of the Number of *DSM-IV* Disorders at Baseline, Time 1, and Time 2 for Males and Females[a]

No. of Disorders	Prevalence, % (SE)							
	Overall	African American	Hispanic	Non-Hispanic White	Overall	African American	Hispanic	Non-Hispanic White
Baseline[b]	**Males (n = 1145)**				**Females (n = 639)**			
≥1	60.6 (2.4)	58.2 (3.0)	67.3 (3.5)	78.2 (2.9)	66.5 (2.0)	61.9 (2.4)	73.2 (3.9)	81.5 (4.2)
≥2	39.9 (2.4)	37.3 (3.0)	47.9 (3.9)	55.6 (3.5)	47.1 (2.2)	42.1 (2.4)	53.5 (4.4)	62.4 (5.2)
≥3	23.7 (2.1)	22.2 (2.5)	28.9 (3.9)	30.7 (3.3)	29.5 (2.1)	24.3 (2.1)	38.4 (4.2)	38.8 (5.2)
Time 1[c]	**Males (n = 957)**				**Females (n = 543)**			
≥1	57.1 (2.7)	55.5 (3.4)	59.1 (4.5)	72.2 (3.5)	49.9 (2.3)	45.5 (2.6)	56.5 (4.9)	62.1 (5.8)
≥2	33.7 (2.6)	32.1 (3.2)	37.6 (4.0)	40.7 (3.9)	26.5 (2.3)	23.6 (2.2)	28.1 (4.4)	31.7 (5.5)
≥3	15.9 (2.0)	14.6 (2.4)	20.6 (2.8)	18.9 (3.1)	10.1 (1.3)	9.6 (1.5)	13.0 (3.3)	11.0 (3.7)
Time 2[d]	**Males (n = 896)**				**Females (n = 503)**			
≥1	50.4 (2.9)	48.0 (3.6)	54.5 (4.7)	69.7 (3.8)	38.9 (2.5)	34.4 (2.5)	41.5 (5.1)	52.5 (6.7)
≥2	26.8 (2.6)	25.5 (3.2)	27.5 (3.8)	42.5 (4.1)	13.7 (1.5)	11.7 (1.7)	19.8 (4.1)	21.0 (5.4)
≥3	10.3 (1.7)	9.7 (2.2)	9.9 (1.9)	17.4 (3.2)	5.5 (1.0)	4.6 (1.1)	7.2 (2.6)	10.5 (4.1)

[a] Descriptive statistics are weighted to adjust for sampling design and reflect the demographic characteristics of the Cook County Juvenile Temporary Detention Center. The number of disorders is based on the following disorders: mania, major depression, hypomania, dysthymia, generalized anxiety disorder, panic disorder, posttraumatic stress disorder, attention-deficit/hyperactivity disorder (if ≤17 years old), conduct disorder (if ≤17 years old), oppositional defiant disorder (if ≤17 years old), antisocial personality disorder (if ≥18 years old), and alcohol and drug use disorders.

[b] Of 1172 males and 657 females with baseline interviews, 27 males and 18 females were treated as missing because they had zero disorders but were missing a diagnosis of at least 1 disorder listed above.

[c] Of 1054 males and 605 females with time 1 interviews, 97 males and 62 females were treated as missing because they had zero disorders but were missing a diagnosis of at least 1 disorder listed above.

[d] Of 960 males and 544 females with time 2 interviews, 64 males and 41 females were treated as missing because they had zero disorders but were missing a diagnosis of at least 1 disorder listed above.