

# Psychiatric Disorders and Violence: A Study of Delinquent Youth After Detention

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**Objective:** To examine the relationship between psychiatric disorders and violence in delinquent youth after detention.

**Method:** The Northwestern Juvenile Project is a longitudinal study of youth from the Cook County Juvenile Temporary Detention Center (Chicago, Illinois). Violence and psychiatric disorders were assessed via self-report in 1,659 youth (56% African American, 28% Hispanic, 36% female, aged 13–25 years) interviewed up to 4 times between 3 and 5 years after detention. Using generalized estimating equations and logistic regression, we examined the following: the prevalence of violence 3 and 5 years after detention; the contemporaneous relationships between psychiatric disorders and violence as youth age; and whether the presence of a psychiatric disorder predicts subsequent violence.

**Results:** Rates of any violence decreased between 3 and 5 years after detention, from 35% to 21% (males), and from 20% to 17% (females). There was a contemporaneous relationship between disorder and violence. Compared to the group with no disorder, males and females with any

disorder had greater odds of any violence (adjusted odds ratio [AOR] = 3.0, 95% CI = 1.9–4.7, and AOR = 4.4, 95% CI = 3.0–6.3, respectively). All specific disorders were associated contemporaneously with violence, except for major depressive disorder/dysthymia among males. Substance use disorders predicted subsequent violence. Males with other drug use disorder and females with marijuana use disorder 3 years after detention had greater odds of any violence 2 years later (AOR = 3.4, 95% CI = 1.4–8.2, and AOR = 2.0, 95% CI = 1.1–3.8, respectively).

**Conclusion:** Aside from substance use disorders, the psychiatric disorders studied may not be useful markers of subsequent violence. Violence assessment and reduction must be key components of ongoing psychiatric services for high-risk youth.

**Key Words:** psychiatric disorder, violence, youth, delinquents, longitudinal

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Many studies have examined the association between psychiatric disorders and violence in adults.<sup>1–4</sup> Among adults with serious mental illness, those with psychotic symptoms or a co-occurring substance use disorder (SUD) are more likely to be violent than the general population.<sup>1,2,5</sup> Far less is known about youth, in part because studies have focused less on psychiatric disorders than on substance use or mental health problems and their relationship to violence.<sup>6–11</sup>

Studying psychiatric disorders allows a more systematic approach, providing a consistent, consensually understood, and clinically meaningful description of the frequency, severity, and recency of symptoms, and their relationship to violence. However, we found only 6 studies of youth, 2 cross-sectional<sup>12,13</sup> and 4 longitudinal,<sup>14–17</sup> that examined psychiatric disorders and violence. These investigations found that some psychiatric disorders (attention-deficit/hyperactivity disorder [ADHD], conduct disorder [CD], SUD, and schizophrenia spectrum disorder) were associated with violence.<sup>12–17</sup> Depression and anxiety disorders

predicted violence only when comorbid with CD or SUD.<sup>15</sup> Despite their contributions, these studies have limitations.

First, half of the studies examined only 1 or 2 disorders, providing limited information.<sup>14,16,17</sup> Moreover, these studies could not examine how co-occurring psychiatric disorders known to be associated with violence—SUD and disruptive behavior disorders (DBD)—may confound this association.<sup>12,13,15</sup>

Second, behavioral disorders and violence were assessed using similar questions.<sup>12–17</sup> *DSM* criteria for DBD include physically violent and aggressive behavior,<sup>18</sup> such as “initiating physical fights” or “using a weapon to cause serious physical harm to others.” Failure to adjust for this tautology may generate spurious associations.

Finally, few studies of psychiatric disorders and violence examined the highest-risk populations.<sup>13,14</sup> None studied youth in the juvenile justice system. The largest and best-designed investigations examined only youth in the general population.<sup>12,15–17</sup> This omission is critical: delinquent youth have much higher rates of psychiatric disorders and comorbid disorders than youth in the general population.<sup>19–21</sup> Moreover, risk factors for violence—impulsivity, child abuse, poor parental supervision, delinquent peers, and neighborhood disintegration—are more prevalent among delinquent youth.<sup>22–27</sup>



Supplemental material cited in this article is available online.

This article addresses these limitations. We use data from the Northwestern Juvenile Project, a prospective longitudinal study of a large stratified, random sample of delinquent youth. We examine the association between psychiatric disorders and violence in the following 3 ways: 1) the prevalence of violence 3 and 5 years after detention; 2) the contemporaneous relationship between violence and psychiatric disorders as youth age; and 3) whether the presence of psychiatric disorder predicts subsequent violence. Our analyses correct for the overlapping symptoms of DBD and violence and also control for DBD and SUD, disorders often associated with violence.

## METHOD

The most relevant information on our methods is summarized below. Additional information is available in Supplement 1 (available online) and is published elsewhere.<sup>20,21</sup>

### Sampling and Interview Procedures

**Baseline Interviews.** We recruited a stratified random sample of 1,829 youth at intake to the Cook County Juvenile Temporary Detention Center (CCJTDC) in Chicago, IL, between November 20, 1995, and June 14, 1998. Consistent with juvenile detainees nationwide,<sup>28</sup> nearly 90% of detainees at CCJTDC were male; most were of racial/ethnic minorities. To ensure adequate representation of key subgroups, we stratified our sample by gender, race/ethnicity (African American, non-Hispanic white, Hispanic, and "other" race/ethnicity), age (10–13 years or  $\geq 14$  years), and legal status (processed as a juvenile or as an adult). Face-to-face structured

interviews were conducted at the detention center in a private area, most within 2 days of intake.

**Follow-Up Interviews.** We conducted follow-up interviews at 3 and 4.5 years after baseline for the entire sample, and 2 additional interviews at 3.5 and 4 years after baseline for a random subsample of 997 participants. For each follow-up, we interviewed participants whether they lived in the community or in correctional facilities.

### Procedures to Obtain Assent and Consent

Participants signed either an assent form (if they were  $< 18$  years of age) or a consent form (if they were  $\geq 18$  years). 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, consistent with federal regulations regarding research with minimal risk.<sup>29,30</sup>

### Measures

We used data from only the follow-up interviews because many of the violence variables were measured only at follow-up.

**Perpetration of Violence.** We assessed violence via self-report because official arrest or court records underreport violent behavior.<sup>31</sup> Questions were drawn from the Denver Youth Survey.<sup>32</sup> Participants were asked if, during the 3 months prior to the interview, they had committed the following (yes/no): assault; assault with a weapon; robbery; forced sex; or use of a gun. An "any violence" variable (yes/no) reflects whether participants reported any of these violent behaviors.

**Psychiatric Diagnosis.** We administered the Diagnostic Interview Schedule for Children Version IV (child and young adult versions), based on the *DSM-IV*, to assess manic episode, hypomania, major depressive disorder (MDD), dysthymia, generalized anxiety

**TABLE 1** Prevalence of Violence at Time 1 and Time 2 for Males and Females<sup>a</sup>

Violent Behavior	Males				Females				Tests of Gender Differences, Contrasting Males to Females <sup>c</sup>		Changes in Prevalence Over Time, per Year <sup>d</sup>	
	Time 1 <sup>b</sup> (n = 1,044)		Time 2 <sup>b</sup> (n = 992)		Time 1 <sup>b</sup> (n = 604)		Time 2 <sup>b</sup> (n = 565)		AOR	(95% CI)	AOR	(95% CI)
	%	(SE)	%	(SE)	%	(SE)	%	(SE)				
Any Violence <sup>e</sup>	34.6	(2.6)	21.4	(2.2)	19.8	(1.7)	16.7	(2.4)	2.3*	(1.8, 3.0)	0.77*	(0.7, 0.9)
Forced sex <sup>f</sup>	0.04	(0.0)	0.0	-	0.2	(0.2)	0.2	(0.2)				
Assault without a weapon	25.1	(2.3)	18.1	(2.0)	16.1	(1.5)	11.6	(1.4)	2.0*	(1.5, 2.6)	0.83*	(0.7, 1.0)
Robbery	3.9	(1.1)	1.8	(0.7)	1.1	(0.4)	0.6	(0.3)	4.1*	(1.7, 9.9)	0.74	(0.5, 1.1)
Assault with a weapon	5.9	(1.2)	5.0	(1.2)	6.2	(1.0)	7.8	(2.4)	1.3	(0.8, 2.0)	0.84	(0.7, 1.0)
Gun use	14.8	(2.0)	6.8	(1.3)	4.3	(0.8)	5.1	(2.3)	4.7*	(3.1, 7.2)	0.67*	(0.6, 0.8)

Note: AOR = adjusted odds ratio; SE = standard error.

<sup>a</sup>Descriptive and inferential statistics are weighted to adjust for sampling design and reflect the demographic characteristics of the Cook County Juvenile Temporary Detention Center. Violence was assessed for the past 3 months.

<sup>b</sup>Of the 1,054 males and 605 females interviewed at time 1, 10 males and 1 female were not administered the violence questions. Of the 993 males and 568 females interviewed at time 2, 1 male and 3 females were not administered the violence questions.

<sup>c</sup>Odds ratios (ORs) contrast males to females and describe differences in prevalence as youth age. We used all available interviews to estimate gender differences in violent behavior. ORs are adjusted for race/ethnicity, incarceration (indicator for having spent none of the last 90 days incarcerated, yes/no; number of days in corrections), judicial status (processed in adult or juvenile court), age at baseline, and aging (time since baseline).

<sup>d</sup>ORs are given per 1 year. For example, an OR of 0.80 means that the odds of violence were decreasing by 20% per year. We used all available interviews to estimate changes in prevalence over time. ORs are adjusted for gender, race/ethnicity, incarceration (indicator for having spent none of the last 90 days incarcerated, yes/no; number of days in corrections), judicial status (processed in adult or juvenile court), and age at baseline.

<sup>e</sup>"Any violence" includes the violent behaviors listed.

<sup>f</sup>There were too few instances of forced sex to examine gender differences or changes in prevalence over time. Forced sex was reported by 1 male and 1 female at time 1, and by 1 female at time 2.

\* $p < .05$ .

disorder (GAD), posttraumatic stress disorder (PTSD), panic disorder, schizophrenia, conduct disorder (CD), and oppositional defiant disorder (ODD) in the past year.<sup>33</sup> To assess past-year SUD and antisocial personality disorder (APD), we administered the Diagnostic Interview Schedule, Version IV (DIS-IV<sup>34</sup>). Additional information on our diagnostic measurement and prevalence of disorders has been published elsewhere.<sup>20,21</sup>

We examined the following diagnostic groups: manic episode or hypomania; MDD or dysthymia; any anxiety disorder (GAD, PTSD, or panic disorder); any DBD (CD, ODD, or APD); alcohol use disorder; marijuana use disorder; and other drug use disorder. There were too few cases of schizophrenia (<14 participants at any follow-up interview) to reliably estimate associations with violence.

We omitted symptoms of violent behavior from CD and APD criteria to avoid spurious associations between these disorders and violence. Prevalence of DBD after adjustment was approximately 1% less than original rates. Supplement 1, available online, describes how diagnoses were adjusted.

### Statistical Analysis and Sample Characteristics

All analyses were conducted using Stata software and its survey routines.<sup>35</sup> To generate prevalence rates and inferential statistics that reflect the CCJTD population, each participant was assigned a sampling weight augmented with a nonresponse adjustment to account for missing data. Taylor series linearization was used to estimate standard errors (SEs). Our analyses consist of 3 parts.

**TABLE 2** Prevalence of Violence Among Males With and Without Psychiatric Disorder<sup>a</sup>

		Violence, Time 1 (n = 1,044) <sup>b</sup>									
		Any Violence <sup>d</sup>		Assault Without Weapon		Robbery		Assault With Weapon		Gun Use	
Psychiatric Disorder, Time 1 <sup>c</sup>	Disorder Present n	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)
Any disorder	537	43.9	(3.8)	31.5	(3.5)	7.8	(2.2)	9.9	(2.2)	19.5	(3.1)
Mania or hypomania	58	48.3	(11.0)	40.7	(10.7)	12.9	(7.7)	15.3	(8.2)	20.0	(8.9)
Major depression or dysthymia	89	42.8	(8.9)	32.9	(8.2)	9.4	(5.6)	10.5	(5.6)	6.3	(4.1)
Any anxiety disorder <sup>e</sup>	91	45.3	(8.9)	27.9	(7.8)	6.0	(4.4)	16.7	(7.0)	17.5	(7.0)
Any behavioral disorder <sup>f</sup>	275	49.9	(5.4)	37.0	(5.1)	10.3	(3.6)	14.6	(3.8)	23.3	(4.7)
Alcohol use disorder	195	57.4	(6.2)	39.6	(5.9)	11.2	(4.1)	12.2	(3.8)	29.1	(5.8)
Marijuana use disorder	289	49.1	(5.1)	32.8	(4.6)	10.5	(3.3)	13.0	(3.4)	26.8	(4.7)
Other drug use disorder	70	54.3	(9.5)	49.7	(9.6)	7.7	(3.5)	17.4	(5.7)	23.4	(9.4)
No disorder	418	24.7	(3.8)	16.9	(3.3)	0.1	(0.1)	2.5	(1.4)	8.9	(2.5)

  

		Violence, Time 2 (n = 992) <sup>b</sup>									
		Any Violence <sup>d</sup>		Assault Without Weapon		Robbery		Assault With Weapon		Gun Use	
Psychiatric Disorder, Time 2 <sup>c</sup>	Disorder Present n	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)
Any disorder	463	30.9	(3.6)	27.8	(3.5)	2.9	(1.3)	6.1	(1.8)	10.0	(2.4)
Mania or hypomania	31	60.8	(14.2)	44.9	(15.4)	17.5	(13.1)	18.7	(13.1)	17.4	(13.1)
Major depression or dysthymia	48	23.0	(9.0)	17.3	(7.7)	6.1	(5.4)	7.2	(5.5)	6.1	(5.4)
Any anxiety disorder <sup>e</sup>	52	42.9	(10.8)	30.9	(9.9)	5.8	(5.6)	17.4	(8.9)	24.9	(9.9)
Any behavioral disorder <sup>f</sup>	236	38.9	(5.4)	34.2	(5.2)	4.6	(2.5)	9.3	(3.4)	14.7	(4.0)
Alcohol use disorder	200	37.4	(5.7)	31.1	(5.3)	6.2	(3.0)	10.7	(3.6)	18.7	(4.8)
Marijuana use disorder	230	37.4	(5.5)	34.2	(5.4)	0.7	(0.4)	6.2	(2.6)	10.7	(3.5)
Other drug use disorder	66	36.4	(10.4)	30.8	(10.3)	1.2	(1.2)	4.4	(2.5)	9.4	(3.5)
No disorder	446	11.7	(2.6)	9.6	(2.4)	0.2	(0.1)	2.4	(1.3)	3.2	(1.3)

Note: SE = standard error.

<sup>a</sup>Descriptive statistics are weighted to adjust for sampling design and reflect the demographic characteristics of the Cook County Juvenile Temporary Detention Center. Violence was assessed for the past 3 months.

<sup>b</sup>Of the 1,054 males interviewed at time 1, a total of 1,044 were administered the violence questions and also administered either the Diagnostic Interview Schedule for Children (DISC) or the Diagnostic Interview Schedule (DIS). Of those 1,044, 89 have missing values for any disorder and no disorder because they have missing values for 1 or more of the subcategories. Out of the 993 males interviewed at time 2, a total of 992 were administered the violence questions and also administered either the DISC or the DIS. Of those 992, 83 have missing values for any disorder and no disorder because they have missing values for 1 or more of the subcategories.

<sup>c</sup>Categories of psychiatric disorder are not mutually exclusive.

<sup>d</sup>"Any violence" includes the violent behaviors listed as well as forced sex, which was reported by 1 male at time 1.

<sup>e</sup>"Any anxiety disorder" consists of generalized anxiety disorder, panic disorder, or posttraumatic stress disorder.

<sup>f</sup>For participants younger than 18 years, any disruptive behavior disorder is defined as having conduct disorder (CD) or oppositional defiant disorder. For participants 18 years and older, it is defined as having antisocial personality disorder. CD and antisocial personality disorder were adjusted to exclude violent symptoms.

1) The prevalence of violence. As in our prior paper,<sup>21</sup> we present prevalence rates for the entire sample at 2 time points: time 1 and time 2. Time 1 is approximately 3 years after baseline (mean [SD] = 3.2 [0.3] years; range = 2.7–4.5 years); 1,659 (90.7%) of participants had a time 1 interview. Time 2 is approximately 5 years after baseline (mean [SD] = 4.9 [0.4] years; range = 4.3–6.0 years); 1,561 (85.3%) of participants had a time 2 interview. Table S1 (available online) describes sample demographics at time 1 and time 2.

2) The contemporaneous relationships between violence and psychiatric disorders as youth aged. We used generalized estimating equations (GEEs), a standard approach for prospective longitudinal studies. We report odds ratios (ORs) examining both changes in the

prevalence of violence over time, and associations between psychiatric disorder and violence over time. These analyses use all available interviews (average 2.9 interviews/person; range, 1–4 interviews).

Models estimating changes in violent behavior over time included covariates for gender, race/ethnicity (African American, Hispanic, or non-Hispanic white), aging (time since baseline), age at baseline (10–18 years), and legal status at detention (processed in juvenile or adult court). Because incarceration may restrict opportunities for violent behavior, we included covariates for incarceration during the 90 days before the interview to match the recall period for violent behavior.

**TABLE 3** Prevalence of Violence Among Females With and Without Psychiatric Disorder<sup>a</sup>

		Violence, Time 1 (n = 604) <sup>b</sup>									
		Any Violence <sup>d</sup>		Assault Without Weapon		Robbery		Assault With Weapon		Gun Use	
Psychiatric Disorder, Time 1 <sup>c</sup>	Disorder Present n	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)
Any disorder	270	28.8	(3.0)	23.3	(2.7)	1.7	(0.8)	9.1	(1.8)	5.7	(1.4)
Mania or hypomania	34	29.5	(8.4)	28.4	(8.2)	0.0	-	9.1	(5.1)	2.2	(2.2)
Major depression or dysthymia	86	28.5	(5.1)	22.1	(4.6)	3.6	(2.0)	8.0	(2.9)	6.7	(2.7)
Any anxiety disorder <sup>e</sup>	67	22.8	(5.4)	17.4	(4.8)	2.9	(2.1)	11.0	(4.0)	5.8	(2.8)
Any behavioral disorder <sup>f</sup>	118	32.8	(5.0)	25.0	(4.3)	2.8	(1.4)	8.8	(2.6)	7.6	(2.4)
Alcohol use disorder	69	32.2	(5.8)	29.9	(5.6)	2.5	(1.7)	6.7	(2.9)	10.2	(3.5)
Marijuana use disorder	89	32.2	(5.9)	26.5	(5.3)	1.7	(1.2)	12.5	(3.6)	9.9	(3.2)
Other drug use disorder	29	34.3	(9.3)	34.4	(9.3)	11.1	(6.1)	6.8	(4.7)	14.5	(6.8)
No disorder	271	10.3	(1.9)	7.8	(1.7)	0.8	(0.6)	3.1	(1.1)	3.1	(1.1)

  

		Violence, Time 2 (n = 565) <sup>b</sup>									
		Any Violence <sup>d</sup>		Assault Without Weapon		Robbery		Assault With Weapon		Gun Use	
Psychiatric Disorder, Time 2 <sup>c</sup>	Disorder Present n	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)
Any disorder	202	30.7	(5.0)	21.2	(3.1)	1.7	(0.9)	16.4	(5.4)	11.1	(5.5)
Mania or hypomania	14	53.2	(13.5)	41.2	(13.2)	6.1	(5.9)	20.3	(10.6)	6.1	(5.9)
Major depression or dysthymia	62	25.7	(5.6)	22.6	(5.4)	0.0	-	14.3	(4.5)	3.2	(2.2)
Any anxiety disorder <sup>e</sup>	41	28.7	(7.1)	22.1	(6.6)	4.6	(3.2)	14.3	(5.5)	7.2	(4.0)
Any behavioral disorder <sup>f</sup>	65	49.0	(10.1)	26.6	(6.7)	2.4	(1.7)	27.7	(12.7)	23.3	(13.1)
Alcohol use disorder	49	42.2	(7.1)	35.0	(6.9)	5.6	(3.2)	22.2	(6.0)	10.0	(4.3)
Marijuana use disorder	77	32.8	(5.4)	27.0	(5.1)	2.2	(1.5)	14.2	(4.0)	6.2	(2.7)
Other drug use disorder	25	38.2	(9.7)	23.1	(8.4)	11.5	(6.3)	11.5	(6.3)	11.5	(6.3)
No disorder	311	6.6	(1.4)	4.6	(1.2)	0.0	-	2.9	(1.0)	0.3	(0.3)

Note: SE = standard error.

<sup>a</sup>Descriptive statistics are weighted to adjust for sampling design and reflect the demographic characteristics of the Cook County Juvenile Temporary Detention Center. Violence was assessed for the past 3 months.

<sup>b</sup>Of the 605 females interviewed at time 1, a total of 604 were administered the violence questions and also administered either the Diagnostic Interview Schedule for Children (DISC) or the Diagnostic Interview Schedule (DIS). Of those 604, 63 have missing values for any disorder and no disorder because they have missing values for 1 or more of the subcategories. Out of the 568 females interviewed at time 2, a total of 565 were administered the violence questions and also administered either the DISC or the DIS. Of those 565, 52 have missing values for any disorder and no disorder because they have missing values for 1 or more of the subcategories.

<sup>c</sup>Categories of psychiatric disorder are not mutually exclusive.

<sup>d</sup>"Any violence" includes the violent behaviors listed as well as robbery and forced sex. Robbery was reported by 7 females at time 1 and 4 females at time 2. Forced sex was reported by 1 female at time 1 and 1 female at time 2.

<sup>e</sup>"Any anxiety disorder" consists of generalized anxiety disorder, panic disorder, or posttraumatic stress disorder.

<sup>f</sup>For participants younger than 18, any disruptive behavior disorder is defined as having conduct disorder (CD) or oppositional defiant disorder. For participants 18 years and older, it is defined as having antisocial personality disorder. CD and antisocial personality disorder were adjusted to exclude violent symptoms.

**TABLE 4** Contemporaneous Relationship Between Psychiatric Disorder and Violence as Males Age (n = 1,115)<sup>a,b,c,d</sup>

	Any Violence <sup>e</sup>		Assault Without Weapon		Assault With Weapon		Gun Use	
	AOR	(95% CI)	AOR	(95% CI)	AOR	(95% CI)	AOR	(95% CI)
Any Disorder	3.02	(1.94, 4.70)*	3.37	(2.10, 5.40)*	2.35	(1.21, 4.54)*	2.33	(1.36, 3.97)*
Mania or hypomania	3.04	(1.35, 6.81)*	2.89	(1.25, 6.71)*	2.77	(1.32, 5.84)*	1.82	(0.79, 4.16)
+ Any behavioral	2.81	(1.04, 7.64)*	2.35	(0.83, 6.64)	2.19	(0.81, 5.88)	1.57	(0.70, 3.53)
+ Alcohol, marijuana, other drug	2.47	(1.06, 5.75)*	2.36	(0.97, 5.72)	2.59	(1.21, 5.54)*	1.53	(0.66, 3.53)
Major depression or dysthymia	1.47	(0.73, 2.98)	1.47	(0.69, 3.12)	1.57	(0.74, 3.33)	0.90	(0.39, 2.08)
+ Any behavioral	1.43	(0.59, 3.44)	1.43	(0.55, 3.72)	1.52	(0.54, 4.31)	0.85	(0.32, 2.26)
+ Alcohol, marijuana, other drug	1.27	(0.64, 2.53)	1.29	(0.62, 2.72)	1.44	(0.67, 3.08)	0.81	(0.36, 1.82)
Any anxiety <sup>f</sup>	2.79	(1.39, 5.61)*	1.89	(0.90, 3.94)	3.55	(1.76, 7.17)*	2.81	(1.45, 5.43)*
+ Any behavioral	2.62	(1.25, 5.52)*	1.60	(0.71, 3.64)	3.47	(1.58, 7.63)*	2.67	(1.34, 5.31)*
+ Alcohol, marijuana, other drug	2.08	(1.04, 4.17)*	1.40	(0.64, 3.08)	3.33	(1.54, 7.21)*	2.33	(1.19, 4.53)*
Any behavioral <sup>g</sup>	2.65	(1.70, 4.13)*	2.52	(1.59, 3.99)*	3.40	(1.70, 6.80)*	2.68	(1.57, 4.59)*
+ Alcohol, marijuana, other drug	1.84	(1.15, 2.96)*	1.80	(1.07, 3.02)*	2.70	(1.45, 5.02)*	1.99	(1.16, 3.40)*
Alcohol use disorder	3.27	(2.19, 4.89)*	2.88	(1.97, 4.22)*	2.23	(1.11, 4.49)*	2.95	(1.75, 4.98)*
+ Any behavioral	3.38	(2.06, 5.53)*	2.90	(1.80, 4.65)*	2.29	(1.19, 4.42)*	2.97	(1.69, 5.24)*
+ Marijuana, other drug	2.60	(1.70, 3.96)*	2.30	(1.52, 3.48)*	2.06	(0.97, 4.38)	2.48	(1.41, 4.38)*
Marijuana use disorder	2.27	(1.60, 3.22)*	2.14	(1.45, 3.15)*	1.55	(0.80, 3.03)	2.15	(1.39, 3.31)*
+ Any behavioral	2.54	(1.67, 3.87)*	2.41	(1.52, 3.83)*	1.57	(0.90, 2.75)	1.80	(1.07, 3.01)*
+ Alcohol, other drug	1.64	(1.12, 2.41)*	1.58	(1.02, 2.43)*	1.24	(0.60, 2.54)	1.60	(0.98, 2.60)
Other drug use disorder	2.49	(1.50, 4.13)*	2.50	(1.45, 4.30)*	1.82	(1.01, 3.28)*	2.23	(1.11, 4.47)*
+ Any behavioral	2.65	(1.50, 4.67)*	2.72	(1.46, 5.04)*	2.03	(0.96, 4.28)	2.15	(0.85, 5.42)
+ Alcohol, marijuana	1.69	(1.05, 2.74)*	1.75	(1.02, 2.99)*	1.49	(0.79, 2.82)	1.55	(0.72, 3.31)

Note: "Any behavioral" refers to any disruptive behavior disorder, "Alcohol" refers to alcohol use disorder, "marijuana" refers to marijuana use disorder, and "other drug" refers to other drug use disorder. AOR = adjusted odds ratio.

<sup>a</sup>Odds ratios (ORs) and their associated 95% CIs are weighted to account for sampling design.

<sup>b</sup>ORs compare violent behavior by disorder present to disorder absent.

<sup>c</sup>Models include the listed disorder(s), along with race/ethnicity, age at the interview, age at baseline, legal status (processed as an adult or juvenile), and incarceration status (indicator for having spent none of the last 90 days incarcerated, yes/no; number of days in corrections).

<sup>d</sup>Models were estimated using all available interviews (range 1–4 interviews per person; 3,269 total interviews for 1,115 males).

<sup>e</sup>"Any violence" includes assault without a weapon, robbery, assault with a weapon, gun use, and forced sex. There were too few instances of robbery (58) and forced sex (1) to reliably estimate associations between these behaviors and psychiatric disorder.

<sup>f</sup>"Any anxiety disorder" consists of generalized anxiety disorder, panic disorder, or posttraumatic stress disorder.

<sup>g</sup>For participants younger than 18 years, any disruptive behavior disorder is defined as having conduct disorder (CD) or oppositional defiant disorder. For participants 18 years and older, it is defined as having antisocial personality disorder. CD and antisocial personality disorder were adjusted to exclude violent symptoms.

\*p < .05.

To examine the contemporaneous association between violence and psychiatric disorder, we estimated a series of 3 GEE models. The first model (the "single disorder" model) estimated the association between the violent behavior and a single psychiatric disorder over time. The second model added a covariate for DBD. The third model added alcohol use disorder, marijuana use disorder, and other drug use disorder to the "single disorder" model. We fit the second and third models because many delinquent youth have more than 1 disorder<sup>19</sup> and because prior studies found that DBD and SUD<sup>12,13,15,16</sup> in youth are associated with violence. This allowed us to examine whether DBD and SUD confound the association between specific psychiatric disorders and violence. We estimated separate models for males and females.

3) Psychiatric disorder and the prediction of subsequent violence. We used logistic regression to examine whether psychiatric disorder at time 1 is associated with violence at time 2. To control for prior violence, we included violent behavior at time 1 as a covariate. We estimated separate models for males and females.

**Missing Data.** Thirty-one participants had died by time 1, and 50 participants, by time 2 (Table S1, available online). Retention was high (85.3% at time 2). Although we augmented sampling weights to account for missing data, we also examined the sensitivity of our findings to attrition. To ensure that any decrease in the prevalence of violent behavior was not due to dropout, we repeated our analysis on the 1,491 participants who had interviews at both time 1 and time 2. Prevalence rates were nearly identical to those presented in the Results section (tables available from the authors upon request).

## RESULTS

### Prevalence of Violence at Time 1 and Time 2 After Detention

Table 1 shows the prevalence of violence at time 1 and time 2 for males and females. At time 1, more than one-third of males (34.6%) and nearly one-fifth of females (19.8%) were violent. At time 2, more than 1 in 5 males (21.4%) and 1 in 6

**TABLE 5** Contemporaneous Relationship Between Psychiatric Disorder and Violence as Females Age ( $n = 636$ )<sup>a,b,c,d</sup>

	Any Violence <sup>e</sup>		Assault Without Weapon		Assault With Weapon	
	AOR	(95% CI)	AOR	(95% CI)	AOR	(95% CI)
Any disorder	4.35	(3.00, 6.30)*	4.71	(3.12, 7.12)*	3.86	(2.11, 7.07)*
Mania or hypomania	2.64	(1.45, 4.81)*	2.66	(1.43, 4.95)*	2.01	(0.71, 5.66)
+ Any behavioral	2.04	(1.00, 4.19)	2.60	(1.27, 5.35)*	1.66	(0.50, 5.52)
+ Alcohol, marijuana, other drug	1.75	(0.87, 3.51)	1.81	(0.88, 3.71)	1.40	(0.48, 4.09)
Major depression or dysthymia	2.15	(1.48, 3.14)*	2.03	(1.37, 3.01)*	2.86	(1.70, 4.79)*
+ Any behavioral	1.74	(1.08, 2.79)*	1.59	(0.97, 2.60)	2.17	(1.13, 4.16)*
+ Alcohol, marijuana, other drug	1.67	(1.10, 2.52)*	1.52	(0.99, 2.33)	2.21	(1.24, 3.91)*
Any anxiety <sup>f</sup>	1.68	(1.09, 2.61)*	1.64	(1.01, 2.67)*	2.61	(1.45, 4.68)*
+ Any behavioral	1.51	(0.91, 2.53)	1.32	(0.77, 2.27)	2.22	(1.07, 4.59)*
+ Alcohol, marijuana, other drug	1.36	(0.84, 2.21)	1.26	(0.74, 2.15)	2.16	(1.15, 4.06)*
Any behavioral <sup>g</sup>	3.92	(2.70, 5.68)*	3.37	(2.27, 4.99)*	2.63	(1.42, 4.85)*
+ Alcohol, marijuana, other drug	3.08	(2.05, 4.63)*	2.56	(1.63, 4.03)*	2.16	(1.08, 4.31)*
Alcohol use disorder	2.91	(2.03, 4.16)*	3.14	(2.19, 4.50)*	2.83	(1.71, 4.69)*
+ Any behavioral	2.42	(1.51, 3.88)*	2.70	(1.67, 4.37)*	1.63	(0.77, 3.43)
+ Marijuana, other drug	2.37	(1.64, 3.45)*	2.59	(1.78, 3.78)*	2.31	(1.33, 4.01)*
Marijuana use disorder	2.62	(1.88, 3.64)*	2.61	(1.85, 3.69)*	2.56	(1.54, 4.24)*
+ Any behavioral	2.50	(1.65, 3.79)*	2.64	(1.69, 4.12)*	2.97	(1.58, 5.58)*
+ Alcohol, other drug	2.16	(1.53, 3.04)*	2.11	(1.47, 3.05)*	2.19	(1.28, 3.73)*
Other drug use disorder	2.71	(1.53, 4.81)*	2.37	(1.34, 4.20)*	2.54	(1.07, 6.04)*
+ Any behavioral	2.49	(1.23, 5.02)*	2.32	(1.10, 4.89)*	1.45	(0.47, 4.49)
+ Alcohol, marijuana	1.91	(1.10, 3.32)*	1.59	(0.90, 2.83)	1.81	(0.79, 4.10)

Note: "Any behavioral" refers to any disruptive behavior disorder, "Alcohol" refers to alcohol use disorder, "marijuana" refers to marijuana use disorder, and "other drug" refers to other drug use disorder. AOR = adjusted odds ratio.

<sup>a</sup>Odds ratios (ORs) and their associated 95% CIs are weighted to account for sampling design.

<sup>b</sup>ORs compare violent behavior by disorder present to disorder absent.

<sup>c</sup>Models include the listed disorder(s), along with race/ethnicity, age at the interview, age at baseline, legal status (processed as an adult or juvenile), and incarceration status (indicator for having spent none of the last 90 days incarcerated, yes/no; number of days in corrections).

<sup>d</sup>Models were estimated using all available interviews (range 1–4 interviews per person; 1,963 total interviews for 636 females).

<sup>e</sup>"Any violence" includes assault without a weapon, robbery, assault with a weapon, gun use, and forced sex. There were too few instances of robbery (14), gun use (59), and forced sex (2) among females to reliably estimate associations between these behaviors and psychiatric disorder.

<sup>f</sup>"Any anxiety disorder" consists of generalized anxiety disorder, panic disorder, or posttraumatic stress disorder.

<sup>g</sup>For participants younger than 18 years, any disruptive behavior disorder is defined as having conduct disorder (CD) or oppositional defiant disorder. For participants 18 years and older, it is defined as having antisocial personality disorder. CD and antisocial personality disorder were adjusted to exclude violent symptoms.

\* $p < .05$ .

females (16.7%) were violent. Irrespective of gender, assault without a weapon was the most common violent behavior. Robbery and forced sex were the least common. Compared with females, males had significantly higher prevalence of any violence and 3 subcategories: assault without a weapon, robbery, and gun use. Prevalence of any violence, assault without a weapon, and gun use decreased significantly over time. There were few racial/ethnic differences in violence among males or females (Tables S2 and S3, available online).

### Contemporaneous Relationship Between Psychiatric Disorder and Violence

Tables 2 and 3 present prevalence of violence and psychiatric disorder at time 1 and time 2 for males and females. Tables 4 and 5 show ORs for the contemporaneous relationship between psychiatric disorder and violence among males and females, respectively.

**Males.** Males with no disorder at time 1 had the lowest rates of violence at time 1—less than 25%. More than half of

the males with an alcohol use disorder or other drug use disorder were violent. At time 2, prevalence of violence was lowest among males with no disorder (11.7%) and highest among males with mania or hypomania (60.8%).

Compared with males who did not have a disorder, males with any disorder had greater odds of any violence and 3 subcategories—assault with a weapon, assault without a weapon, and gun use (Table 4). Even after controlling for DBD and SUD, nearly every psychiatric disorder was associated with any violence and 1 or more of its subcategories. Of note, DBD and alcohol use disorder were associated with every violent behavior; marijuana use disorder was associated with every behavior except assault with a weapon. Some of the largest ORs were for any anxiety disorder, which was associated with every behavior except assault without a weapon.

**Females.** Females with no disorder at time 1 had the lowest rates of violence at time 1 (10.3%; Table 3). Approximately one-third of females with DBD, alcohol use disorder, marijuana use disorder, or other drug use disorder were

**TABLE 6** Psychiatric Disorder at Time 1 and the Prevalence of Subsequent Violence at Time 2 Among Males and Females<sup>a</sup>

Psychiatric Disorder at Time 1 <sup>c</sup>	Disorder Present n	Violent Behavior at Time 2									
		Any Violence <sup>d</sup>		Assault Without Weapon		Robbery		Assault With Weapon		Gun Use	
		%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)
<b>Males (n = 945)<sup>b</sup></b>											
Any disorder	491	23.9	(3.2)	20.9	(3.0)	3.3	(1.5)	5.3	(1.7)	7.8	(2.1)
Mania or hypomania	56	29.3	(9.5)	29.1	(9.5)	7.3	(5.6)	8.3	(5.7)	10.2	(5.8)
Major depression or dysthymia	85	19.5	(6.1)	18.8	(6.1)	1.1	(0.8)	3.3	(1.3)	7.1	(4.0)
Any anxiety disorder <sup>e</sup>	87	17.3	(6.3)	16.1	(6.0)	0.0	—	1.2	(0.9)	0.7	(0.5)
Any behavioral disorder <sup>f</sup>	253	24.7	(4.5)	19.6	(4.0)	4.3	(2.5)	7.5	(3.0)	12.4	(3.8)
Alcohol use disorder	175	24.5	(5.2)	21.0	(4.8)	7.9	(4.0)	8.9	(4.1)	8.1	(3.5)
Marijuana use disorder	266	29.4	(4.7)	25.4	(4.4)	5.5	(2.5)	7.9	(2.9)	10.6	(3.2)
Other drug use disorder	66	42.7	(10.3)	38.6	(10.6)	1.9	(1.9)	6.1	(3.2)	8.7	(3.5)
No disorder	379	19.2	(3.4)	15.8	(3.2)	0.3	(0.2)	5.2	(2.1)	5.3	(1.8)
<b>Females (n = 542)<sup>b</sup></b>											
Any disorder	236	22.3	(4.4)	14.0	(2.3)	1.1	(0.7)	11.1	(4.5)	9.3	(4.5)
Mania or hypomania	32	18.2	(6.8)	18.2	(6.8)	0.0	—	2.5	(2.5)	0.0	—
Major depression or dysthymia	73	21.7	(4.9)	15.0	(4.2)	1.1	(1.1)	4.1	(2.3)	5.5	(2.7)
Any anxiety disorder <sup>e</sup>	63	14.9	(4.4)	8.9	(3.5)	1.3	(1.3)	6.4	(3.1)	1.3	(1.3)
Any behavioral disorder <sup>f</sup>	106	28.0	(8.6)	12.4	(3.3)	2.3	(1.4)	18.2	(9.2)	17.9	(9.3)
Alcohol use disorder	60	25.9	(5.7)	23.0	(5.5)	1.4	(1.4)	5.8	(2.8)	4.8	(2.7)
Marijuana use disorder	81	34.0	(10.0)	17.1	(4.5)	0.9	(0.9)	20.0	(11.2)	20.1	(11.3)
Other drug use disorder	24	28.1	(9.0)	16.6	(7.6)	3.9	(3.8)	7.8	(5.3)	3.9	(3.8)
No disorder	250	9.9	(1.9)	8.2	(1.8)	0.3	(0.3)	3.7	(1.2)	0.8	(0.5)

Note: SE = standard error.

<sup>a</sup>Descriptive statistics are weighted to adjust for sampling design and reflect the demographic characteristics of the Cook County Juvenile Temporary Detention Center. Violence was assessed in the 3 months before time 2.

<sup>b</sup>Out of the 946 males interviewed at time 1 and time 2, a total of 945 were administered the violence questions and also administered either the Diagnostic Interview Schedule for Children (DISC) or the Diagnostic Interview Schedule (DIS). Of those 945, 75 have missing values for any disorder and no disorder because they have missing values for 1 or more of the subcategories. Of the 545 females interviewed at time 1 and time 2, a total of 542 were administered the violence questions and also administered either the DISC or the DIS. Of those 542, 56 have missing values for any disorder and no disorder because they have missing values for 1 or more of the subcategories.

<sup>c</sup>Categories of psychiatric disorder are not mutually exclusive.

<sup>d</sup>"Any violence" includes the violent behaviors listed as well as forced sex, which was reported by 1 male at time 1, 1 female at time 1, and 1 female at time 2.

<sup>e</sup>"Any anxiety disorder" consists of generalized anxiety disorder, panic disorder, or posttraumatic stress disorder.

<sup>f</sup>For participants younger than 18 years, any disruptive behavior disorder is defined as having conduct disorder (CD) or oppositional defiant disorder. For participants 18 years and older, it is defined as having antisocial personality disorder. CD and antisocial personality disorder were adjusted to exclude violent symptoms.

violent. At time 2, 6.6% of females with no disorder were violent, compared with 30.7% of females with any disorder.

Compared with females with no disorder, females with any disorder had more than 4 times the odds of any violence and its subcategory, assault without a weapon, and more than 3 times the odds of assault with a weapon (Table 5). After controlling for DBD or SUD, MDD or dysthymia, DBD, alcohol use disorder, and marijuana use disorder were also associated with any violence and 1 or more of its subcategories.

### Psychiatric Disorder and the Prediction of Subsequent Violence

Table 6 shows the prevalence of violence at time 2 for males and females with and without psychiatric disorders at time 1. Tables 7 and 8 show ORs for psychiatric disorder at time 1 predicting subsequent violence at time 2 for males and females, respectively.

**Males.** About 20% of males without disorder at time 1 were violent at time 2. Among males with any disorder at time 1, 23.9% were violent at time 2. Males with other drug use disorder at time 1 had the highest prevalence of violence at time 2 (42.7%); males with anxiety disorders had the lowest prevalence (17.3%).

Only the presence of other drug use disorder and anxiety disorder predicted subsequent violence at time 2 (Table 7). Males with other drug use disorder at time 1 had approximately 3 times the odds of any violence and its subcategory, assault without a weapon, at time 2. Males with an anxiety disorder at time 1 were less likely to commit assault with a weapon or use a gun at time 2 compared with males without anxiety disorder at time 1.

**Females.** Among females without disorder at time 1, 1 in 10 were violent at time 2 (Table 6); among females with any disorder at time 1, more than 1 in 5 were violent at time 2.

**TABLE 7** Psychiatric Disorder at Time 1 and the Prediction of Subsequent Violence at Time 2, Among Males (n = 945)<sup>a,b,c,d</sup>

Disorder	Any Violence <sup>e</sup>		Assault Without Weapon		Assault With Weapon		Gun Use	
	AOR	(95% CI)	AOR	(95% CI)	AOR	(95% CI)	AOR	(95% CI)
Any disorder	1.10	(0.61, 1.99)	1.18	(0.64, 2.16)	0.52	(0.16, 1.67)	1.12	(0.42, 2.99)
Mania or hypomania	1.19	(0.43, 3.30)	1.41	(0.51, 3.92)	1.36	(0.33, 5.61)	1.48	(0.39, 5.66)
Major depression or dysthymia	0.63	(0.26, 1.53)	0.76	(0.31, 1.86)	0.47	(0.14, 1.52)	0.55	(0.21, 1.43)
Any anxiety disorder <sup>f</sup>	0.77	(0.30, 1.99)	0.88	(0.35, 2.25)	0.09	(0.01, 0.65)*	0.09	(0.02, 0.35)*
Any behavioral disorder <sup>g</sup>	1.09	(0.59, 2.00)	0.99	(0.53, 1.85)	0.83	(0.30, 2.29)	2.50	(0.98, 6.36)
Alcohol use disorder	1.26	(0.66, 2.39)	1.21	(0.64, 2.31)	1.67	(0.54, 5.19)	1.07	(0.41, 2.80)
Marijuana use disorder	1.43	(0.79, 2.60)	1.55	(0.85, 2.81)	0.94	(0.31, 2.81)	1.53	(0.59, 3.97)
Other drug use disorder	3.37	(1.38, 8.24)*	3.38	(1.31, 8.73)*	0.86	(0.24, 3.08)	1.33	(0.45, 3.94)

Note: AOR = adjusted odds ratio.  
<sup>a</sup>Odds ratios (ORs) and their associated 95% CIs are weighted to account for sampling design.  
<sup>b</sup>ORs compare violent behavior by disorder present to disorder absent.  
<sup>c</sup>Models include the listed disorder along with the violent behavior at time 1.  
<sup>d</sup>Out of the 946 males interviewed at time 1 and time 2, a total of 945 were administered the violence questions and also administered either the Diagnostic Interview Schedule for Children (DISC) or the Diagnostic Interview Schedule (DIS). Of those 945, 75 have missing values for any disorder because they have missing values for 1 or more of the subcategories.  
<sup>e</sup>Any violence includes assault without a weapon, robbery, assault with a weapon, gun use, and forced sex. At time 2, there were too few instances of robbery (17) and forced sex (0) to reliably estimate ORs.  
<sup>f</sup>Any anxiety disorder consists of generalized anxiety disorder, panic disorder, or posttraumatic stress disorder.  
<sup>g</sup>For participants younger than 18 years, any disruptive behavior disorder is defined as having conduct disorder (CD) or oppositional defiant disorder. For participants 18 years and older, it is defined as having antisocial personality disorder. CD and antisocial personality disorder were modified to exclude violent symptoms.  
\**p* < .05.

Females with marijuana use disorder at time 1 had the highest prevalence of subsequent violence at time 2 (34.0%); they had more than twice the odds of any violence and its subcategory, assault without a weapon, at time 2 (Table 8). Alcohol use disorder was associated with subsequent assault without a weapon.

## DISCUSSION

Although violence decreased significantly as youth aged—mirroring general population trends<sup>8,36,37</sup>—5 years after detention, when participants were 15 to 23 years old, approximately 21% of males and 17% of females reported recent violent behavior. Consistent with prior studies,<sup>7,10,36-38</sup> males had higher rates than females.

Overall, alcohol, marijuana, and other drug use disorders were contemporaneously associated with violence. However, the degree to which SUDs predicted subsequent violence depended on gender, specific substance used, and violent behavior. These findings corroborate and extend prior studies of substance use and violence in delinquent and general population youth.<sup>10,39-41</sup> The mechanisms underlying the association between SUDs and violence likely vary by substance. Alcohol intoxication increases aggression and violence in youth and young adults.<sup>11,12</sup> The association between violence and illicit drugs is influenced, in part, by involvement in the illegal drug trade and associations with gang members and other violent individuals.<sup>12,42</sup>

No other disorder predicted subsequent violence; however, most disorders were contemporaneously associated with violence as youth aged. DBD and violence were

associated even after adjusting for overlap in their definitions. This finding extends those of prior studies of general population youth<sup>12,15</sup> and suggests that other symptoms of DBD—such as nonphysical aggressiveness and antisocial or oppositional attitudes—are associated with violence.<sup>43</sup>

The contemporaneous association between anxiety disorders and violence may be explained by PTSD, the most common anxiety disorder among our participants. Symptoms of PTSD—being easily startled, feeling on-edge, having anger outbursts—have been linked to violence in studies of high-risk youth<sup>44</sup> and adults.<sup>45,46</sup> The association between mania/hypomania and any violence in males confirms prior studies of adults,<sup>4,47</sup> which found that acute manic symptoms (e.g., aggression, irritability, explosiveness, impulsivity) elevate the immediate risk for violent behavior. Finally, the association between MDD or dysthymia and violence for females may reflect that underlying risk factors for violence and MDD or dysthymia, such as exposure to community violence, are more common among delinquent females than among the general population.<sup>48,49</sup>

In sum, even after accounting for disorders that are commonly associated with violence—SUD and DBD—most disorders were contemporaneously associated with violence as youth aged. However, only SUD predicted subsequent violence. Taken together, our findings suggest that, first, aside from SUDs, the psychiatric disorders studied may not be useful markers to predict subsequent violence; and second, violence assessment and reduction must be key components of ongoing psychiatric services for high-risk youth.



**TABLE 8** Psychiatric Disorder at Time 1 and the Prediction of Subsequent Violence at Time 2, Among Females (n = 542)<sup>a,b,c,d</sup>

Disorder	Any Violence <sup>e</sup>		Assault Without Weapon		Assault With Weapon	
	AOR	(95% CI)	AOR	(95% CI)	AOR	(95% CI)
Any disorder	1.81	(0.99, 3.30)	1.75	(0.92, 3.33)	1.82	(0.74, 4.49)
Mania or hypomania	1.19	(0.41, 3.46)	1.45	(0.50, 4.20)	0.46	(0.06, 3.79)
Major depression or dysthymia	1.82	(0.93, 3.56)	1.35	(0.64, 2.84)	0.78	(0.22, 2.79)
Any anxiety disorder <sup>f</sup>	1.10	(0.48, 2.51)	0.64	(0.23, 1.73)	1.30	(0.38, 4.48)
Any behavioral disorder <sup>g</sup>	1.44	(0.79, 2.61)	1.21	(0.62, 2.37)	1.77	(0.75, 4.18)
Alcohol use disorder	1.98	(1.00, 3.94)	2.44	(1.19, 5.00)*	1.21	(0.40, 3.68)
Marijuana use disorder	2.04	(1.10, 3.78)*	2.29	(1.19, 4.43)*	1.54	(0.58, 4.12)
Other drug use disorder	2.34	(0.86, 6.41)	1.44	(0.44, 4.77)	1.79	(0.39, 8.34)

Note: AOR = adjusted odds ratio.

<sup>a</sup>Odds ratios (ORs) and their associated 95% CIs are weighted to account for sampling design.

<sup>b</sup>ORs compare violent behavior by disorder present to disorder absent.

<sup>c</sup>Models include the listed disorder along with the violent behavior at time 1.

<sup>d</sup>Out of the 545 females interviewed at time 1 and time 2, a total of 542 were administered the violence questions and also administered either the Diagnostic Interview Schedule for Children (DISC) or the Diagnostic Interview Schedule (DIS). Of those 542, 56 have missing values for any disorder because they have missing values for 1 or more of the subcategories.

<sup>e</sup>"Any violence" includes assault without a weapon, robbery, assault with a weapon, gun use, and forced sex. At time 2, there were too few instances of robbery (4) and forced sex (1) to reliably estimate ORs.

<sup>f</sup>"Any anxiety disorder" consists of generalized anxiety disorder, panic disorder, or posttraumatic stress disorder.

<sup>g</sup>For participants younger than 18 years, any disruptive behavior disorder is defined as having conduct disorder (CD) or oppositional defiant disorder. For participants 18 years and older, it is defined as having antisocial personality disorder. CD and antisocial personality disorder were modified to exclude violent symptoms.

\*p < .05.

Our study has several limitations. Data were drawn from a single site. Findings may be generalizable only to detained youth in urban centers with similar demographic composition, and cannot be generalized to community populations. We cannot determine whether psychiatric disorders and violence are causally related. Participants may have had more than 1 disorder; however, we did not have enough power to determine whether specific combinations of disorders or uncommon disorders (e.g., schizophrenia) increased the likelihood of being violent. We also could not examine how incarceration affects mental disorder, violence, or the relationship between them. Our data are subject to the reliability and validity of the youth's self-report; many parents of detained youth were unavailable.<sup>20</sup> Underreporting of psychiatric symptoms is common among adolescents,<sup>50</sup> and delinquent youth may underreport violent behaviors. Our findings do not take into account treatment services that might have been provided. Finally, although the demographic characteristics of delinquent youth have not changed substantially over time,<sup>51,52</sup> findings might differ in a contemporary sample.

Despite these limitations, our findings have implications for research, mental health policy, and clinical services, as given below.

*Examine the Development of Violence in Delinquent Females.* Although males comprise a larger proportion of the delinquent population, and juvenile arrests for violence have decreased in the past 10 years, the decrease has been slower for females (28% versus 45%).<sup>53</sup> Yet most research on violence has focused on males or has not examined gender differences.<sup>54</sup> Our findings on mood disorders and violence suggest

that pathways to violence may be different for males and females.<sup>49</sup> Future studies will provide the empirical basis to develop gender-specific programs to reduce violence.

*Explore the Role of Comorbid Disorders and Violence.* Copeland *et al.*<sup>15</sup> found that comorbid disorders increase the odds of violence among youth in the general population. Yet no study of delinquent youth has examined comorbid disorders and violence. This omission is critical: more than half of delinquent youth have a comorbid SUD,<sup>19</sup> which substantially increases violence in adults with psychiatric disorders.<sup>2,5</sup>

*Augment Standard Psychiatric Treatment With Interventions to Reduce Violence.* Psychiatric disorders and violence co-occur over time in delinquent youth. Community mental health clinics are uniquely positioned to address violent behaviors in delinquent youth with psychiatric disorders. However, few mental health or substance abuse treatment programs also target violence. Successful programs, such as multisystemic therapy or functional family therapy, are costly (\$1,842–\$5,800 per person annually)<sup>55,56</sup> but are far less expensive than the average annual cost of incarceration (\$88,000 per youth).<sup>57</sup>

*Provide Early Identification and Treatment of SUD in Delinquent Youth.* Treating SUD—in our study, the sole predictor of subsequent violence—may prevent future violence<sup>58-60</sup> and reduce the likelihood that delinquent youth will persist in a violent and criminal lifestyle.<sup>61</sup>

Delinquent youth are detained for an average of 2 weeks before they return to their communities.<sup>31</sup> Due to the Affordable Care Act,<sup>62</sup> more youth will be eligible to receive care in the community as they age. Yet delinquent youth

have many characteristics that complicate treatment—histories of trauma and abuse, comorbid disorders, high-risk peer groups, and disrupted family systems<sup>24-26,49,63</sup>—making them difficult to engage and manage in standard care.<sup>64</sup> Thus, the critical question is: How can we provide community mental health systems with the resources needed to treat delinquent youth when they return home? &

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## SUPPLEMENT 1

### EXPANDED NOTES ON STUDY METHODS

#### Characteristics of the Cook County Juvenile Temporary Detention Center

Consistent with juvenile detainees nationwide,<sup>1</sup> nearly 90% of detainees at the Cook County Juvenile Temporary Detention Center (CCJTDC) were male; most were racial/ethnic minority youth.

#### Sampling

Participants were 1,829 male and female youth, 10 to 18 years old, randomly sampled from intake into the CCJTDC from November 20, 1995, through June 14, 1998. To ensure adequate representation of key subgroups, the sample was stratified by gender, race/ethnicity (African American, non-Hispanic white, Hispanic, other), age (10–13 years of age or 14 years and older), and legal status (processed in juvenile or adult court) to obtain enough participants to examine key subgroups (e.g., females, Hispanics, younger persons). There were a total of 13 strata, as listed below. There were too few female detainees of each race/ethnicity and too few detainees identified as “other” race/ethnicity to further stratify these groups. Detainees aged 10 to 13 years were not stratified by legal status because they were generally too young to be considered for transfer to adult court.

The strata were as follows:

African American females

Non-Hispanic white females

Hispanic females

African American males, aged 10 to 13 years

Non-Hispanic white males, aged 10 to 13 years

Hispanic males, aged 10 to 13 years

African American males, 14 years or older and processed in adult court

Non-Hispanic white males, 14 years or older and processed in adult court

Hispanic males, 14 years or older and processed in adult court

African American males, 14 years or older and processed as a juvenile

Non-Hispanic white males, 14 years or older and processed as a juvenile

Hispanic white males, 14 years or older and processed as a juvenile

Other race/ethnicity

A study liaison was scheduled to work every day (including weekends) throughout the study. Each day, the liaison randomly selected potential participants within strata. Detainees were classified in strata using information listed in the intake log. The liaison sampled from the strata in a pre-set order. If no participants were available for a strata,

the liaison sampled from the next strata. If multiple detainees were available for a strata, the liaison used a random number table and the last digit of the CCJTDC ID number to randomly sample potential participants from within the strata.<sup>2</sup> The final sampling fractions for the strata ranged from 0.018 to 0.689.

All detainees who were awaiting the adjudication or disposition of their case were eligible to participate in the study. Among these, 2,275 detainees were randomly selected; 4.2% (34 youth and 62 parents or guardians) refused to participate. There were no significant differences in refusal rates by gender, race/ethnicity, or age. A total of 27 youth left the detention center before an interview could be scheduled, and 312 left the detention center while we attempted to locate their caretakers for consent. Eleven others were excluded from the sample because they were unable to complete the interview. The final sample size was 1,829, comprising 1,172 males, 657 females; 1,005 African Americans, 296 non-Hispanic whites, 524 Hispanics, 4 “other” race/ethnicity; age range, 10 to 18 years (mean, 14.9 years; median, 15 years). Face-to-face structured interviews were conducted at the detention center in a private area, most within 2 days of intake. Participants were paid \$25 for the 2- to 3-hour baseline interview.

For each follow-up, we interviewed participants irrespective of where they lived: in the community (approximately two-thirds of interviews); at correctional facilities (nearly 30% of interviews); or by telephone if they lived more than 2 hours away (<5% of interviews). Participants were paid \$50 for each of the 3- to 4-hour follow-up interviews.

Of the 1,829 youth interviewed at baseline, 31 died before receiving any follow-up interview; an additional 5 refused participation, 42 could not be located, and 92 were interviewed too late after their due date. More information on the remaining 1,659 youth is presented in Table S1.

#### Youth Processed in Juvenile or Adult Court

Although most juvenile detainees are processed in juvenile court, all 50 states and the District of Columbia have legal mechanisms to try juveniles as adults in criminal court.<sup>3-5</sup> Transfers to adult criminal court typically result from the following: judicial waiver on a case-by-case basis<sup>3,6,7</sup>; automatic transfers based on the type of offense, criminal history, and age of the detainee<sup>3</sup>; and prosecutorial direct-file mechanisms that allow prosecutors to determine when to file certain juvenile cases directly in adult criminal court. The increased availability of legal mechanisms to process juveniles in adult criminal court is largely responsible for the 366% increase between 1983 and 1998 in the number of juveniles held in adult jails.<sup>8</sup> As of 2004, about 7% of the approximately 2 million arrests of youths eligible for processing in the juvenile justice system were cases in which the youth was transferred directly to adult criminal court.<sup>9,10</sup>

#### Procedures for Obtaining Parental Consent for Minor Youth for Baseline and Follow-Up Interviews

For all interviews, participants signed a consent form (if they were more than 18 years of age) or an assent form (if they

**TABLE S1** Demographic Characteristics at Time 1 and Time 2

Characteristic	Time 1, 3 Years (n = 1,659, 91% of 1,829)		Time 2, 5 Years (n = 1,561, 85% of 1,829)	
	n	(%)	n	(%)
Race/ethnicity				
African American	927	(56)	893	(57)
Non-Hispanic white	267	(16)	242	(16)
Hispanic	461	(28)	423	(27)
Other	4	(0)	3	(0)
Gender				
Male	1,054	(64)	993	(64)
Female	605	(36)	568	(36)
Legal status at detention				
Processed in adult court	263	(16)	244	(16)
Processed in juvenile court	1,396	(84)	1,317	(84)
Incarcerated entire past 3 months	341	(21)	328	(21)
Age, y				
Mean (SD)	18.6	(1.4)	20.2	(1.4)
Median	19		20	
Range	13–23		15–25	
Nonresponse				
Died	31		50	
Refused	5		27	
Skipped <sup>a</sup>	42		81	
Interview out of range <sup>b</sup>	92		110	

Note: Percentages may not sum to 100% because of rounding error.  
<sup>a</sup>Participant was not located in time to be interviewed for the current wave.  
<sup>b</sup>Participant was interviewed <1.35 years after the previous interview, or participant was interviewed after the cut-off. A cut-off of 1.5 years after the planned interview date was used for time 1 and time 2.

were less than 18 years). The Northwestern University Institutional Review Board and the Centers for Disease Control and Prevention Institutional Review Board waived parental consent for persons younger than 18 years, consistent with federal regulations regarding research with minimal risk.<sup>11</sup> We nevertheless tried to contact parents of minors to provide them information on the study, and used an independent participant advocate to represent the minors' interests.<sup>11</sup>

**Baseline.** Study liaisons tried to reach detainees' parents or guardians in 2 ways. First, the liaisons attempted to call the parents or guardians by telephone at least 3 times over 2 days; second, they tried to obtain consent from the parents or guardians in person during visiting hours. A participant advocate acted on the child's behalf if the parents or guardians were not reachable. In the absence of a parent or guardian, the participant advocate protects the interests of the youth and determines that they are consenting voluntarily, understand the research procedure, and are not being coerced to participate. Consistent with federal regulations, we excluded detainees who did not

wish to participate, even if their parents or guardians consented.<sup>11,12</sup>

**Follow-Up.** Two weeks before a follow-up interview was due, a study liaison telephoned the parent or guardian of minors to obtain their consent. If they provided consent, the project liaison then contacted the youth to obtain assent and schedule their interview. The Illinois Department of Child and Family Services allowed us to re-contact and interview participants who were under their guardianship, provided that we received assent from the youth. Consistent with federal regulations, we excluded detainees who did not wish to participate, even if their parents or guardians consented.<sup>11,12</sup> If we could not reach them after 1 week and at least 5 attempts, we initiated the participant advocate system described above. In these cases, the project liaison contacted the participant directly to request his or her assent. If we could not reach the participant by telephone, an interviewer traveled to the participant's location.

#### Clinical Research Interviewers

For baseline and follow-up interviews, female participants were interviewed by female interviewers. Most interviewers had graduate degrees in psychology or an associated field and had experience interviewing at-risk youth; one-third were fluent in Spanish. All interviewers were trained for at least 1 month. Reliability was assessed via scripted mock interviews. Follow-up interviews were longer than baseline interviews because, at the request of our funding agencies, we added additional variables.

#### Measures

**Violence Perpetration.** We assessed violence perpetration via self-report because official arrest and court records underreport violent behavior.<sup>13–15</sup> The violence questions were drawn from the Denver Youth Survey.<sup>16</sup> Participants were asked if, during the 3 months prior to the interview, they had committed any of the following (yes/no): assault ("beat someone up or hit someone with the idea of seriously hurting them"); assault with a weapon ("attacked someone with a weapon with the idea of seriously hurting him/her or killing him/her"); robbery ("used a weapon, force or strong arm methods to get money or things from people"); forced sex ("had or tried to have sexual relations with someone against their will"); or used a gun ("used a gun ... for instance, firing a gun or showing a gun in a threatening manner"). An "any violence" variable (yes/no) reflects whether participants reported any of these violent behaviors.

**Psychiatric Diagnosis.** We administered the Diagnostic Interview Schedule for Children, version IV (DISC-IV, Child and Young Adult versions), based on the *DSM-IV*, to assess schizophrenia, mood disorders, anxiety disorders, and disruptive behavior disorders in the past year.<sup>17,18</sup> Impairment was defined as "moderate impairment in at least 1 area of functioning" (criterion A).<sup>19</sup> Consistent with the *DSM-IV*, impairment was not required for hypomania and panic disorders.

To assess past-year substance use disorders (SUDs) and antisocial personality disorder (APD), we administered the Diagnostic Interview Schedule, version IV (DIS-IV).<sup>20,21</sup> We used the DIS-IV to assess SUDs at follow-up because the DIS-IV is not sufficiently detailed for our population. Consistent with the *DSM-IV*, impairment was not required for a diagnosis of SUD. APD was assessed for participants 18 years and older (who were no longer eligible for childhood disruptive behavior disorders [DBDs]). Consistent with the National Comorbidity Survey Replication,<sup>22</sup> participants who met criteria for SUD or APD with “partial recovery” were scored as having the disorder. We did not implement *DSM* exclusionary criteria.

For participants younger than 18 years, we assessed oppositional defiant disorder (ODD) and conduct disorder (CD); for participants older than 18 years, we assessed APD. Both CD and APD include symptoms of violent behavior (e.g., initiating physical fights; forced sexual activity) that would tautologically associate these disorders with violence. Therefore, we adjusted the CD and APD criteria to omit the symptoms of violent behavior so as not to artificially inflate the association between these disorders and violence. For CD, we rescored as “absent” the following symptoms: often initiates physical fights; has used a weapon that can cause serious physical harm to others (e.g., a bat, brick, broken bottle, knife); has been physically cruel to people; has stolen while confronting a victim (e.g., mugging, armed robbery); and has forced someone into sexual activity. For APD, we rescored as “absent” the following symptom: irritability and aggressiveness, as indicated by repeated physical fights or assaults. We used these modified (and more conservative) diagnoses of CD and APD for all analyses. Rates of any DBD before modification were 26.4% at time 1 and 25.3% at time 2 and after modification were 24.8% and 24.6% at time 1 and time 2, respectively.

We examined the association between violence and the following diagnostic groups: manic episode or hypomania; major depressive disorder (MDD) or dysthymia; any anxiety disorder (generalized anxiety disorder, posttraumatic stress disorder, and panic disorder); any DBD (CD, ODD, or APD); alcohol use disorder; marijuana use disorder; and other drug use disorder. There were too few cases of schizophrenia in this sample (fewer than 14 participants at any follow-up interview) to reliably estimate associations with violent behavior. We differentiated between hypomanic/manic episode and MDD/dysthymic episode because the symptoms characteristic of each (e.g., grandiosity, high energy, impulsivity versus withdrawal, isolation, low energy) might have a different association with violence.

The prevalence of psychiatric disorders at time 1 was as follows: 5.7%, mania/hypomania; 13.9%, major depression/dysthymia; 4.3%, any anxiety disorder; 28.3%, any DBD; 13.4%, alcohol use disorder; 16.9%, marijuana use disorder; and 5.2%, other drug use disorder. The prevalence of psychiatric disorders at time 2 was as follows: 3.0%, manic/hypomanic episode; 8.9%, MDD/dysthymic episode; 2.1%, any anxiety disorder; 29.0%, any DBD; 13.3%, alcohol use disorder; 15.2%, marijuana use disorder; and 5.1%, other drug use disorder.

**TABLE S2** Prevalence of Violence at Time 1 and Time 2 for Males by Race/Ethnicity<sup>a</sup>

Violent Behavior	African American			Hispanic			Non-Hispanic White			Tests of Racial/Ethnic Differences <sup>c</sup>		
	Time 1 <sup>b</sup>	Time 2 <sup>b</sup>		Time 1 <sup>b</sup>	Time 2 <sup>b</sup>		Time 1 <sup>b</sup>	Time 2 <sup>b</sup>		AA vs. W	H vs. W	AA vs. H
	(n = 521)	(n = 505)	(SE)	(n = 338)	(n = 314)	(SE)	(n = 182)	(n = 171)	(SE)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Any violence <sup>d</sup>	34.6 (3.2)	19.9 (2.6)		34.2 (4.1)	24.1 (3.8)		33.0 (3.6)	30.3 (3.7)		0.9 (0.6, 1.3)	0.92 (0.6, 1.34)	0.97 (0.7, 1.4)
Forced sex <sup>e</sup>	0.1 (0.1)	0.0		0.0	0.0		0.0	0.0				
Assault without a weapon	24.4 (2.8)	16.4 (2.4)		26.9 (3.8)	21.8 (3.8)		28.2 (3.5)	25.6 (3.5)		0.7 (0.5, 1.1)	0.85 (0.6, 1.3)	0.85 (0.6, 1.2)
Robbery	4.5 (1.4)	2.1 (0.9)		1.5 (0.7)	0.8 (0.6)		3.1 (1.4)	1.3 (0.9)		1.1 (0.4, 2.8)	0.28* (0.1, 0.8)	3.96* (1.5, 10.8)
Assault with a weapon	5.5 (1.5)	4.9 (1.4)		6.6 (1.5)	5.0 (2.6)		8.5 (2.1)	7.1 (2.0)		0.6 (0.3, 1.1)	0.68 (0.4, 1.2)	0.88 (0.5, 1.6)
Gun use	15.4 (2.4)	6.8 (1.7)		13.2 (2.9)	5.0 (1.3)		10.8 (2.4)	12.9 (2.7)		1.3 (0.8, 2.1)	1.03 (0.6, 1.7)	1.24 (0.8, 2.0)

Note: AA = African American; AOR = adjusted odds ratio; H = Hispanic; SE = standard error; W = non-Hispanic white; CI = confidence interval.  
<sup>a</sup>Descriptive and inferential statistics are weighted to adjust for sampling design and reflect the demographic characteristics of the Cook County Juvenile Temporary Detention Center.  
<sup>b</sup>Of the 526 African Americans, 341 Hispanics, and 184 non-Hispanic whites interviewed at time 1, 5 African Americans, 3 Hispanics, and 2 non-Hispanic whites were not administered the violence questions. Out of the 505 African Americans, 315 Hispanics, and 171 non-Hispanic whites interviewed at time 2, 1 Hispanic individual was not administered the violence questions.  
<sup>c</sup>Odds ratios (ORs) contrast race/ethnicity and describe differences in prevalence across the course of the follow-up period. We used all available interviews to estimate gender differences in violent behavior. ORs are adjusted for gender, incarceration (indicator for having spent none of the last 90 days incarcerated, yes/no; number of days in corrections), judicial status (processed in adult or juvenile court), age at baseline, and time.  
<sup>d</sup>Any violence<sup>e</sup> includes the violent behaviors listed as well as forced sex, which was reported by 1 African American at time 1.  
<sup>e</sup>There were too few instances of forced sex to compare rates by race/ethnicity.  
<sup>\*</sup>p < .05.

**TABLE S3** Prevalence of Violence at Time 1 and Time 2 for Females by Race/Ethnicity<sup>a</sup>

Violent Behavior	African American			Hispanic			Non-Hispanic White			Tests of Racial/Ethnic Differences <sup>c</sup>								
	Time 1 <sup>b</sup> (n = 400)		Time 2 <sup>b</sup> (n = 385)		Time 1 <sup>b</sup> (n = 120)		Time 2 <sup>b</sup> (n = 108)		Time 1 <sup>b</sup> (n = 83)		Time 2 <sup>b</sup> (n = 71)		AA vs. W		H vs. W		AA vs. H	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	AOR	(95% CI)	AOR	(95% CI)	AOR	(95% CI)
Any violence <sup>d</sup>	20.9	(2.1)	13.5	(1.8)	19.2	(3.7)	19.3	(3.8)	16.4	(4.2)	15.6	(4.3)	1.3	(0.8, 2.1)	1.3	(0.7, 2.2)	1.02	(0.7, 1.5)
Forced sex <sup>e</sup>	0.3	(0.3)	0.3	(0.3)	0.0	-	0.0	-	0.0	-	0.0	-	-	-	-	-	-	-
Assault without a weapon	16.4	(1.9)	11.3	(1.6)	17.2	(3.5)	14.8	(3.4)	14.8	(4.0)	11.3	(3.8)	1.2	(0.7, 1.9)	1.2	(0.7, 2.1)	0.96	(0.7, 1.4)
Robbery <sup>f</sup>	0.8	(0.4)	0.3	(0.3)	2.0	(1.4)	1.8	(1.3)	2.4	(1.7)	1.4	(1.4)	-	-	-	-	-	-
Assault with a weapon	7.1	(1.3)	5.8	(1.2)	4.9	(2.0)	5.4	(2.2)	2.5	(1.8)	4.2	(2.4)	2.0	(0.9, 4.5)	1.4	(0.5, 3.7)	1.46	(0.7, 2.9)
Gun use	4.3	(1.0)	2.9	(0.9)	5.7	(2.1)	2.7	(1.6)	2.4	(1.7)	2.8	(2.0)	2.7	(1.0, 7.6)	2.1	(0.7, 6.9)	1.27	(0.6, 2.6)

Note: AA = African American; AOR = adjusted odds ratio; H = Hispanic; SE = standard error; W = non-Hispanic white.  
<sup>a</sup>Descriptive and inferential statistics are weighted to adjust for sampling design and reflect the demographic characteristics of the Cook County Juvenile Temporary Detention Center.  
<sup>b</sup>Of the 401 African Americans, 120 Hispanics, and 83 non-Hispanic whites interviewed at time 1, 1 African American was not administered the violence questions. Of the 388 African Americans, 108 Hispanics, and 71 non-Hispanic whites at time 2, 3 African Americans were not administered the violence questions.  
<sup>c</sup>Odds ratios (ORs) contrast race/ethnicity and describe differences in prevalence across the course of the follow-up period. We used all available interviews to estimate gender differences in violent behavior. ORs are adjusted for gender, incarceration (indicator for having spent none of the last 90 days incarcerated, yes/no; number of days in corrections), judicial status (processed in adult or juvenile court), age at baseline, and time.  
<sup>d</sup>Any violence<sup>e</sup> includes the violent behaviors listed as well as forced sex, which was reported by 1 African American at time 1, and by 1 African American at time 2.  
<sup>e</sup>There were too few instances of forced sex and robbery to compare rates by race/ethnicity.

**Description of Time 1 and Time 2**

As in a prior article,<sup>23</sup> because some participants were interviewed more often than others, we summarize prevalence rates for the entire sample at 2 time points: time 1 and time 2.

*Time 1.* Time 1 is the first follow-up interview but excludes interviews that occurred more than 18 months after the interview due date. Use of a narrower window would restrict the generalizability of our findings because, in this high-risk and highly mobile population, participants can be difficult to track. 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). For simplicity, we refer to the time 1 interview as occurring approximately 3 years after baseline. As reported in Table S1, which summarizes sample demographics and retention rates, a total of 1,659 of the participants (90.7%) had a time 1 interview.

*Time 2.* For each participant, time 2 consists of the earliest follow-up interview that occurred approximately 4.5 years after baseline. 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] = 4.9 [0.4]; range = 4.3–6.0 years). To ensure that prevalence rates reflect temporally distinct cross-sections of the sample, we required at least 16 months between the time 1 and time 2 interviews. We subsequently refer to the time 2 interviews as occurring approximately 5 years after baseline. As reported in Table S1, a total of 1,561 participants (85.3%) had a time 2 interview.

**GEE Models for the Contemporaneous Relationship Between Psychiatric Disorder and Violence as Youth Age**

We used generalized estimating equations (GEEs) to estimate marginal models examining changes in the prevalence of violent behavior over time, and associations between psychiatric disorder diagnosis and violent behaviors over time. Presence/absence of violent behavior at each follow-up interview was modeled as binomial with a logit link function. We used a robust sandwich estimator with an unstructured correlation matrix; in the few instances in which models failed to converge, we specified an exchangeable correlation structure.

GEE models estimating changes in violent behavior over time included covariates for gender, race/ethnicity (African American, Hispanic, or non-Hispanic white), and aging (time since baseline). We also included age at baseline (10–18 years) and legal status at detention (processed in juvenile or adult court) because they were stratification characteristics. The 4 participants who were identified as “other” race/ethnicity at baseline were excluded. Because incarceration may restrict opportunities for violent behavior, we included covariates for incarceration during the 90 days before the interview to match the recall period for violent behavior: models included an indicator for having been incarcerated (yes/no) as well as number of days in corrections (0–90 days). All GEE models were estimated with sampling weights to account for study design.

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