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Effects of Institutional Confinement for Delinquency on Levels of Depression and Anxiety among Male Adolescents

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Abstract

Youth within the juvenile justice system report higher rates of mental illnesses than their peers. This study tested whether institutional confinement increases levels of depression and anxiety among male adolescents. We examined heterogeneous trajectories of depression and anxiety from ages 11 to 14 for 510 male adolescents. Youths who were first placed in custody at age 15 (treatment group) were matched with control boys (no official arrest or reported confinement during adolescence) within each trajectory group using a propensity score matching procedure. Matches were found for 37 pairs for depression and 34 pairs for anxiety. There were no significant differences between the confined and control groups in levels of depression or anxiety at age 16. More research is needed to identify aspects of the juvenile justice system that may positively or negatively affect youth's mental health status.

Keywords

Juvenile Justice; Mental Health; Confinement; Adolescents; Residential Placement

Research indicates that there are high rates of mental disorders among youth involved with the juvenile justice system (Domalanta, Risser, Roberts, & Risser, 2003; Teplin, Abram, McClelland, Dulcan, & Mericle, 2002; Wasserman, Ko, & McReynolds, 2004). Across studies of detained and incarcerated adolescents, rates of internalizing disorders, such as depression and anxiety, range from 11% to 33% (Vermeiren, 2003). Although mental illnesses are clearly more prevalent among adolescents confined in juvenile justice

institutions than among their peers in the community (Copeland, Miller-Johnson, Keeler, Angold, & Costello, 2007; Grisso, 2008), the reasons for these elevated rates are not well understood. At least three explanations seem plausible: 1) mental health problems directly increase the risk of arrest, detention, and incarceration, 2) arrest and subsequent confinement trigger or exacerbate mental health problems, and 3) the relationship is spurious and both are associated because of common risk factors. Because most research on mental health and juvenile justice involvement examines juveniles at only one point in time (generally during confinement), it has not been possible to reliably untangle the temporal or causal order of the relationship between juvenile justice system involvement and mental health problems. Using prospective longitudinal data collected from male adolescents well before their first confinement, the present study examines whether institutional confinement worsens mental health, while taking the two competing interpretations into consideration.

Explaining Higher Rates of Mental Illnesses among Youth in Confinement

There are various factors that can contribute to both juvenile justice involvement and mental health problems. First, being poor and living in dysfunctional neighborhood and family conditions increase the formality and severity of juvenile justice processing, including custodial placement (Fader, Harris, Jones, & Poulin, 2001; Rodriguez, Smith, & Zatz, 2009), as well as mental health problems (Costello, Messer, Bird, Cohen, & Reinherz, 1998; Fergusson & Horwood, 2001). Another possible common cause explanation is comorbidity. That is, youths with mental disorders exhibit greater prevalence, frequency, and/or seriousness of delinquency and substance use (Elliott, Huizinga, & Menard, 1989; Loeber, Stouthamer-Loeber, & White, 1999; Molina & Pelham, 2003; Weinberg & Glantz, 1999) and these behaviors are important predictors of arrest and custodial placement decisions (Fader et al., 2001; Sanborn, 1996). Finally, both mental health and juvenile justice processing may be a function of other behaviors, including interactions at school and with peers. School problems, peer conflict, and peer isolation, as stressful life conditions, may contribute to anxiety and depression (Aseltine, Gore, & Gordon, 2000; Elgar & Arlett, 2002). At the same time, school problems and peer behaviors may influence arrest and court placement decisions (Brownfield, Sorenson, & Thompson, 2000; Hirschfield, Maschi, White, Taub, & Loeber, 2006; Leiber & Jamieson, 1995).

Another explanation for elevated psychopathology in secure juvenile institutions is that certain mental health disorders may elevate the likelihood and severity of formal juvenile justice processing. There is some evidence that externalizing behavior problems independently increase the risk of juvenile arrest (Hirschfield et al., 2006). In addition, both externalizing and internalizing behavior problems may indirectly increase the risk of detention and out-of-home placement. Mental health care, especially for lower income youth, has become increasingly inaccessible in both community outpatient settings and public mental hospitals (Grisso, 2008). When mental health placements are unavailable, juvenile court judges may order that delinquents be sent to detention or out-of-home placements if they are deemed dangerous to themselves or others. As a result, mental illnesses can increase the odds that delinquents (and non-delinquent foster children) are placed in a custodial setting (U.S. Congress, 2004; U.S. General Accounting Office, 2003).

A possible weakness of the foregoing explanation is that it treats mental health problems as pre-existing conditions that influence juvenile justice decision-making. A more dynamic explanation recognizes that some of the mental health problems manifested among juvenile inmates are situationally-conditioned and, accordingly, may be responsive to the juvenile justice process itself. Youth with mental health problems may be particularly vulnerable to stress associated with arrest and confinement, as well as to adverse juvenile detention conditions (Schuppe, 2004), leading them to act out in ways that make them seem “less

manageable and a greater risk to themselves or others” (Grisso, 2008, p. 151). Non-compliant, violent, or self-injurious behavior following apprehension may increase the likelihood of secure detention or out-of-home placement. Furthermore, conditions of residential placement, such as isolation from families and communities, may increase symptoms of anxiety and depression (Holman & Zeidenberg, 2006). On the other hand, separation from abusive family members and peers can be beneficial, especially in conjunction with immersion in a supportive, therapeutic environment. Some facilities, however, expose children to a risk of victimization. According to an Associated Press survey, juvenile correctional institutions in the U.S. generated over 13,000 claims of abuse between 2004 and 2007 (Mohr, 2008). Likewise, according to the U.S. Justice Department, staff members in public and private juvenile correctional facilities were accused of sexual abuse against inmates 2,821 times in 2004 alone (Mohr, 2008). Juveniles who experience trauma are unlikely to receive the treatment they need, owing to the inadequacy of mental health screening and treatment resources and methods inside facilities (Glisson, 1996; Pear, 2003; Teplin, Abram, McClelland, Washburn, & Pikus, 2005). One study found that among 18 juvenile detention residents diagnosed with major depression, seven reported an onset of symptoms *after* detention (Kashani, Manning, McKnew, Cytryn, Simonds, & Wooderson, 1980). Furthermore, five of the seven youth who were followed up after discharge reported reduced depressive symptomatology. In summary, juvenile justice interventions may cause depression and anxiety, or maintain or escalate preexisting disorders.

Testing Competing Explanations

The extant literature offers a very tenuous basis to evaluate these three interpretations. Studies on the prevalence of mental disorders among institutionalized juveniles do not help discern the temporal order and, much less, any causal relationship between mental health problems and secure confinement. To truly understand the potential causal mechanisms between mental health problems and custodial placement requires a community sample and a prospective longitudinal study design.

According to one recent longitudinal study of a community sample, depression and anxiety did not appear to increase the risk of arrest (Hirschfield et al., 2006). In fact, affective (i.e., depression) and anxiety problems reduced the risks of arrest when demographic characteristics, delinquency, substance use, and school and peer factors were controlled. Furthermore, there is only scant evidence that delinquents’ mental health influences juvenile justice placement decisions (Fader et al., 2001; Glisson, 1996). If mental health problems do not elevate the risk of arrest or juvenile justice placement, what accounts for the high rates of depression and anxiety found among youth in confinement? Comorbidity between mental health problems and delinquency is a well-grounded explanation, but, as suggested above, it is also possible that arrest and subsequent juvenile justice processing, including institutional confinement, expose youth to adverse conditions that may cause depression or anxiety or exacerbate existing problems. However, this latter explanation has received almost no empirical attention. Our study weighs these two interpretations.

The best empirical test of this “iatrogenesis” hypothesis (see Gatti, Tremblay, & Vitaro, 2009) would involve random assignment of a group of delinquents to be either released or detained and then to examine changes in depression and anxiety among both groups. Such a strategy is unethical and impractical, because the “treatment” (i.e., confinement) is potentially harmful. Statisticians have attempted to achieve balance between treatment and comparison groups in non-randomized studies through quasi-experimental methods, such as propensity score (PS) matching analysis (DeLisi, Barnes, Beaver, & Gibson, 2009; Rosenbaum & Rubin, 1984). This approach can be used with observational longitudinal data to make causal inferences about the impact of a turning-point event (e.g., detainment) on

behavioral trajectories (e.g., internalizing problems) (Haviland, Nagin, & Rosenbaum, 2007). Haviland and colleagues (Haviland & Nagin, 2007; Haviland et al., 2007; Haviland, Nagin, Rosenbaum, & Tremblay, 2008) have recently developed a method for increasing balance in studies using PS matching. Their method uses a group-based trajectory analysis (Nagin, 2005) that stratifies the sample into distinctive trajectory groups based on prior levels of the outcome variable and then uses PSs to match “treatment” and “control” groups within trajectory groups. Group-based trajectory modeling helps preclude the possibility that treatment group differences in mental health are a function of the fact that confined and non-confined delinquents were on different mental health trajectories prior to confinement. With this approach, youths who experienced recent confinement can be matched to those never confined but who appear to be on a similar developmental pathway for internalizing problems (Haviland et al., 2008). Additional advantages and limitations of this method have been addressed elsewhere (Haviland & Nagin, 2007, Haviland et al., 2007, 2008; see also the Discussion below).

Present Study

Using the strategy developed by Haviland and colleagues (Haviland & Nagin, 2007, Haviland et al., 2007, 2008) described above, the present study tests whether custodial placement increases levels of depression and anxiety. We combine group-based trajectory modeling with PS matching to compare levels of depression and anxiety at age 16 for those who were first placed in custody at age 15 (the modal age of confinement in this sample) to those who were neither arrested nor confined during adolescence. PSs are based on pre-confinement levels of depression and anxiety, as well as 26 other confounding factors at the individual, family, and neighborhood levels that could influence confinement. We hypothesize that controlling for prior levels of depression and anxiety, youth who are first confined at age 15 will exhibit higher levels of depression and anxiety the year following their first period of confinement compared to non-confined, non-arrested youth with the same estimated risk of confinement.

Methods

Design and Sample

Data were collected as part of the Pittsburgh Youth Study (PYS) (Loeber, Farrington, Stouthamer-Loeber, & White, 2008). The PYS is a prospective longitudinal study of the development of delinquency, substance use, and mental health problems. In 1987–88, random samples of first and seventh grade boys enrolled in the City of Pittsburgh public schools were selected. Approximately 850 boys in each grade (85% of the target sample) were screened. Families were paid for their participation, and informed written consent was obtained from both the participants and their legal guardians. The 15% nonparticipation rate did not result in sample selection bias in regard to achievement test results and racial distribution, which were the only two variables that could be compared from school records (Loeber et al., 2008). As part of the screening assessment, information was collected on the boys’ delinquent behavior from primary caretakers (usually mothers), teachers, and the boys themselves. Boys who ranked in the top 30% in anti-social behavior, based on the screening assessment, as well as a relatively equal number of boys randomly selected from the remainder, were chosen for longitudinal follow-up, resulting in 506 boys in the older cohort and 503 in the younger cohort. During the first three years of the study, the boys were followed up at six-month intervals and then assessments were conducted annually. We combined the two six-month assessments in the early waves to create a uniform annual assessment at all ages.

Attrition has remained relatively low and the completion rate has averaged over 90% during 14 years of data collection. The sampling pool was 57.5% African American, with the remainder almost all non-Hispanic white (less than 2% of the sample were Hispanic or Asian). In addition, 36.2% of the boys' families received public assistance or food stamps at the time the boys entered the study. For greater detail on participant selection and sample characteristics see Loeber et al. (2008).

Out of the 1009 youths in the two cohorts, 62 were first confined at age 15.¹ Confinement was defined as a custodial out-of-home placement, excluding out-of-home placements for mental health or substance use treatment or for child welfare. It was determined based on caretakers' reports and participants' self-reports (see below for greater detail). After removing anyone who had missing values for the outcome variables (i.e., levels of depression and anxiety at age 16; $n = 13$), we retained 49 observations in the treatment group. Out of 932 potential controls (not confined prior to age 17), we removed those who had an official juvenile arrest or unclear detention history ($n = 298$) or missing outcome variables ($n = 173$) and retained 461 young men in the control group as potential matches. Thus, a total of 510 youths were analyzed for the group-based trajectory analysis and PS matching (49 confined and 461 controls).

Measures

The measures were based on official records and self-reports from the adolescent, his primary caretaker, and a teacher.

Custodial placement and arrest—The age of first official arrest was based on participants' court records collected from Allegheny Juvenile Court and the Commonwealth of Pennsylvania. Because there were incomplete data extracted from the official court records on age of first custodial intervention, the age of first confinement was based on a combination of concurrent and retrospective youth and caretaker reports. Primary indicators included youths' reports of whether they were sent to "a correctional facility" following their arrests, caretakers' reports of whether the participant was in an "institution" for delinquent behavior, and youths' reports of their present living situations. This derived measure effectively excluded child welfare placements and placements in treatment facilities for substance abuse or mental health issues. Data were not available to reliably assess length of time confined. Thus, confinement is a dichotomous measure of first confinement at age 15 versus no confinement/official arrest prior to age 17.

Mental health problems—We used the Child Behavior Checklist (CBCL) completed by the parent/primary caretaker and the Youth Self-Report (YSR) completed by the participant (Achenbach, 1991). Although proximate clinical diagnostic assessments were not available on the participants, we employed two DSM-oriented sub-scales for the CBCL and YSR items developed by Achenbach, Dumenci, and Rescorla (2003): affective problems (i.e., depression; $\alpha = 0.76$; e.g., cries, doesn't eat well, feels worthless, feels too guilty) and anxiety problems ($\alpha = 0.71$; e.g., dependent, fears, nervous) (see Appendix A for more detail). Following Achenbach and Rescorla (2001), the DSM-oriented sub-scales were computed through combining scores on the CBCL and the YSR (both covering the previous year). The ordinal response set for each item included 0 ("not true"), 1 ("somewhat or sometimes true"), and 2 ("very true or often true"). The corresponding item scores on the CBCL and the YSR were summed into a single item score, and item scores were summed to

¹We chose age 15 for age of first confinement because that was the modal age of first confinement during adolescence in this sample and provided the largest number of cases of first confinement. Rates were 2.8% at age 13, 13.0% at age 14, 21.3% at age 15, and 13.8% at age 16. The jurisdiction in the State of Pennsylvania changes at age 18. However, for serious offenses juveniles can be referred to criminal court at an earlier age.

create affective (depression) and anxiety problem scale scores. These scales were computed at ages 11 through 16 (ages 12 through 16 for the oldest cohort). The correlation between levels of depression and anxiety was 0.67 at age 14. Although there is a high correlation between these two types of problems, they nonetheless measure distinctive types of internalizing problems, each of which can be affected differentially by custodial placement.

Background control variables—To create PSs, we selected 26 variables, in addition to affective and anxiety problems at age 14, that have been linked theoretically or empirically to arrest/incarceration (Hirschfield et al., 2006). These included cohort, race/ethnicity (African American vs. others), and risk group, as well as individual, family, and neighborhood variables assessed at age 14: family on welfare, household structure, frequency of alcohol, marijuana, tobacco, and hard drug use, frequency of delinquency, theft, and violence, delinquency variety, frequency of drug selling, gang membership, peer substance use and delinquency, amount of time spent with parents, amount of time spent with friends, running away, truancy, suspended from school, low academic achievement, bad neighborhood impression, caretaker supervision, and caretaker-child communication (see Appendix A for a description of how each of these variables was measured). Inclusion of these variables in the logistic regression analysis for PSs did not pose multicollinearity problems.²

Analyses

The first stage of the analysis used group-based trajectory modeling (Nagin, 2005) to identify heterogeneous trajectory groups separately for depression and anxiety from ages 11 to 14 for the 510 youths in the treatment and control groups.³ Using the censored normal distribution option and controlling for cohort, 2-group through 5-group models were tested. The selection of the appropriate number of groups was based on the Bayesian Information Criterion (BIC), with the model with the smallest absolute BIC indicating the most parsimonious, best fitting model (Schwartz, 1978). In addition, model selection depended on stability and size of the group (White, Jackson, & Loeber, 2009).

In the second stage of the analyses, a model was fit to calculate the probability (i.e., propensity score [PS]) that each juvenile would be first confined at age 15. Then each adolescent who was first confined at age 15 was matched with an adolescent who had not been arrested or confined within his trajectory group.⁴ The matching procedure was done separately within the depression trajectory groups and then again within the anxiety trajectory groups. In addition to trajectory groups, if possible, we also matched adolescents on the basis of race and cohort when matching PSs.

According to the missing data pattern, among the 28 covariates, eight adolescents had more than 20 missing covariates. Excessive missing data can make model estimation less accurate and, therefore, these eight adolescents were excluded from the logistic model used to create PSs and were not included for matching.⁵ Among those eight adolescents who had excessive

²Multicollinearity affects the interpretation of individual covariates and not the predicted probabilities (PSs) from the model. Also every covariate that is theoretically meaningful was included in the PS model because even if some covariates might not be statistically significant, they might potentially be a modifier for other covariates.

³Because the oldest cohort was first interviewed at approximate age 12, there was missing data at ages 11 for many of them. The trajectory analysis assumes that data are missing at random and accommodates such data structure without deleting individuals with incomplete assessments from the sample. In addition, cohort was included as a covariate in the trajectory group analyses.

⁴Some studies match each treatment group member to more than one control group member (i.e., full matching; Stuart & Green, 2008). We chose one-to-one matching because, although matching more control cases would reduce the variance among the controls, it could not reduce the variance for the “treatment” cases and one-to-one matching has been shown to be relatively effective in reducing selection bias (see Glazer, Levy, & Myer, 2003). In addition, full matching would then require weighting of control group members and this procedure would further complicate the analysis.

missing values only one was first confined at age 15 (12.5%), which was similar to the portion among the sub-sample without excessive missing data (9.6% were first confined at age 15).

The loss of information from missing data was moderate in the data set; each variable used in the analysis had a relatively small number of missing observations (range: 0% to 36.5% with mean = 3.6% and $SD = 0.067$). Assuming that data were missing at random (MAR), we imputed five multiple data sets (Rubin, 1987, 1996) to account for the uncertainty of missing values while preserving the inter-correlations between variables.⁶ After the multiple imputation, logistic regression analysis was conducted separately for each imputed data set and the results were combined together to generate a mean estimated propensity score (i.e., PS) for matching. In the third stage of the analysis, we used t-tests to compare levels of depression and anxiety at age 16 for the confined group and their matched controls.

Results

Trajectory Analysis

Group-based trajectory analysis was used to identify distinctive trajectory groups based on levels of depression and anxiety between ages 11 and 14 separately for each behavior. For both types of problems, a linear model fit the data better than a quadratic model. Based on the BIC⁷ and stability of the model, we chose a 4-group solution for depression. Adolescents were classified into one of four groups based on the trajectory group to which they had the highest posterior probability of belonging. The four groups identified were: (1) very low (51.3%, average posterior probability for assigned group [pp] = .81), (2) low (36.3%, pp = .83), (3) moderate (9.2%, pp = .91), and (4) high (3.1%, pp = .90) (see Figure 1a). Rates of first confinement at age 15 for the four groups were: 8.0%, 10.3%, 11.1%, and 25.0%, respectively, from group 1 to group 4.

Based on the BIC and stability of the model, we also chose a 4-group linear model for anxiety. The four groups identified were: (1) very low (27.5%, pp = .88), (2) low (48.9%, pp = .82), (3) moderate (16.6%, pp = .79), and (4) high (7.0%, pp = .90) (see Figure 1b). Rates of first confinement at age 15 for the four groups were: 8.5%, 9.3%, 13.0%, and 8.6%, respectively, from group 1 to group 4.

A cross-tabulation indicated that membership in trajectory groups for both sets of trajectories (depression and anxiety) was not statistically related to first confinement at age 15 (Chi-square = 5.41, $df = 3$, $p = 0.14$, for depression trajectory membership and Chi-square = 1.26, $df = 3$, $p = 0.74$, for anxiety trajectory membership). Membership in depression trajectory groups was significantly associated with membership in anxiety trajectory groups (Chi-square = 372.40, $df = 9$, $p < .01$).

Propensity Score Matching

The PSs were estimated by using a main effect logistic regression model to regress the conditional probability of being first confined at age 15 on the 28 covariates. We matched each adolescent who was first confined at age 15 with a control adolescent who was not involved with the juvenile justice system by finding the one control adolescent who had the

⁵We tested whether there was a difference between the treatment group and possible controls on missing data and there was no substantial difference.

⁶Because the missing data had an arbitrary pattern, the Markov chain Monte Carlo (MCMC) method was used with a single chain (SAS PROC MI) (SAS OnlineDoc, 2003) to create five imputed data sets that are from multivariate normal distributions.

⁷For depression trajectories, the BICs were: -2959.01 for the 2-group model, -2849.78 for the 3-group model, -2839.48 for the 4-group model, and -2838.63 for the 5-group model. For anxiety trajectories, the BICs were: -2522.89 for the 2-group model, -2418.41 for the 3-group model, -2399.82 for the 4-group model, and -2407.51 for the 5-group model.

nearest PS to the confined adolescent. Among 49 confined adolescents, we successfully found 37 matches for depression trajectories and 34 matches for anxiety trajectories. On average, the matched pairs differed in PSs by 0.02 and none differed greater than .11 (see Figure 2). There were 12 and 15 treatment adolescents, respectively, who were not matched for the depression and anxiety analyses because their PS was either missing (one case who was missing more than 10 covariates) or too high to find a match in the same trajectory group (i.e., a PS difference greater than .11). These unmatched adolescents were eliminated from the subsequent analysis.

Figure 2 shows the PSs for the confined youth, their non-confined matched controls, and the remaining unmatched youth within each trajectory group for the depression (Figure 2a) and anxiety (Figure 2b) analyses, respectively, *after* matching PSs. Each elongated box represents the middle 50% of the group with remaining 50% of the group contained within the areas between the box and the two vertical lines from each box (whiskers), with some exceptions (outliers) shown in dots and stars. The horizontal line inside the box indicates the median. The confined adolescents and their matched controls look similar and balanced in PSs, while the medians of unmatched youths look different than the rest, which demonstrates that propensity score matching brought a balance between the 34 and 37 paired samples.⁸

Differences between Confined and Non-confined Youths on Levels of Depression and Anxiety

The analysis comparing the two groups was limited to 37 and 34 matched pairs for levels of depression and anxiety, respectively. Table 1 shows the means and standard deviations for the confined group and matched control group on levels of depression and anxiety at age 16. There were no significant mean differences between the confined and control groups in levels of depression or anxiety at age 16. Because of the small sample size, there might not have been enough power to identify significant differences. Therefore, we calculated between-group effect sizes. The differences between groups were small ($d = 0.143$ for levels of depression and $d = 0.334$ for levels of anxiety) with the effect for levels of anxiety approaching a moderate effect size (Cohen, 1988).⁹ Note that those first confined at age 15 reported *lower* levels of depression and higher levels of anxiety than the control group at age 16.

Additionally, we adopted mixed regression models to control for levels of depression and anxiety at age 14 to compare those participants who were first confined at age 15 to controls in terms of levels of depression and anxiety, respectively, at age 16.¹⁰ Although the confined group was matched to controls within trajectory groups that were derived from levels of depression and anxiety at ages 11 through 14 (and the propensity score included age 14 levels of depression and anxiety as two covariates), the trajectory groups only serve as a stratification variable in propensity score matching analysis. Given the negative findings from earlier t-tests, we questioned whether any individual differences within each trajectory group, as well as trajectory group differences in levels of depression and anxiety at age 14, could be additionally adjusted. Therefore, by including controls for age 14 levels, we examine change (i.e., residualized change) in these problems from before confinement (age 14) until after confinement (age 16). The random effect was not significant in the mixed regression analysis, suggesting insignificant correlations among the pairs. Therefore, only

⁸After matching, matched treatment and control groups were equivalent in all covariates. There were no statistical differences between groups in percentages or means associated with these covariates at $p < .10$.

⁹ $d = \text{Cohen's effect size} = |X_A - X_B|/SD$ (Cohen, 1988, p. 20). $d = .2, .5$, and $.8$ indicate small medium, and large effect, respectively.

¹⁰Mixed regression was used to account for the fact that each treatment youth was matched with a control individual (i.e., two matched individuals nested within a pair).

the fixed effects regression coefficients are reported in Table 2. There were no significant effects of first confinement at age 15 on changes in levels of depression ($\beta = -0.128$, $p = 0.694$) or anxiety ($\beta = 0.393$, $p = 0.119$) at age 16.

Post-hoc Analyses

Because custodial placement had no apparent effect on subsequent internalizing problems and because Hirschfield et al. (2006) found a negative effect of prior internalizing problems on arrest, it is still unclear what explains the high rates of internalizing problems among detained or incarcerated youth found in previous studies (e.g., Vermeiren, 2003). One possible explanation is that youths who are interviewed during confinement are more depressed and anxious than those interviewed after release. We, therefore, divided the confined group into those who were interviewed while they were in custody at age 16 ($n = 5$ for the depression analysis and $n = 8$ for the anxiety analysis) and those interviewed on the outside ($n = 32$ for the depression analysis and $n = 26$ for the anxiety analysis).

Results indicated that neither those youth who were interviewed in custody at age 16 nor those interviewed on the outside were significantly more likely to report higher levels of depression or anxiety at age 16 than their matched controls (see Table 3). However, those youths who were first confined at age 15 but interviewed post-release at age 16 reported statistically non-significant, lower levels of depression than controls ($d = 0.181$). Further, the confined youths who were interviewed while in custody at age 16 reported (nonsignificantly) higher levels of anxiety than controls ($d = .568$). In addition, youths who were interviewed during confinement reported higher (although not statistically significant) levels of depression and anxiety than their previously confined peers interviewed on the outside ($d = 0.251$ and $d = 0.217$, respectively).

Discussion

Elevated rates of depression and anxiety among residents of juvenile justice institutions are widely reported but not well understood. Hirschfield et al. (2006) found that affective and anxiety problems actually mitigated the risk of getting arrested, when the effects of concurrent externalizing behavior problems, substance use, delinquency, school- and peer-related problems, and socio-demographic factors were statistically controlled. The current study, using a similar sample, found that first custodial experience did not increase levels of depression or anxiety among male adolescents. The explanation for the elevated rates, therefore, remains largely unsettled.

Our unexpected null results may reflect some particularities of the data and measures. First, measures of confinement did not distinguish between short-term and long-term confinement. However, available data suggest that most youths probably spent enough time in confinement for it to have some impact on their lives.¹¹ Second, we did not distinguish among institutions where the youths were confined. The mental health effects of confinement may depend, in part, on the nature of the institution (e.g., pre-trial detention center, long-term secure facility far from home, minimum security group home, etc.). During the mid 1990's, Pennsylvania placed a greater share of committed delinquents in private facilities than any other state in the U.S. (http://ojjdp.ncjrs.gov/ojstatbb/cjrp/asp/State_Facility.asp) and private facilities are often heavily focused on providing treatment and a nurturing, supportive environment.

¹¹Among the 18 sampled youth for whom there are data on the number of weeks in custody at age 15, 57% were confined for at least four weeks (mean = 13.1 weeks) and, among the 34 for whom these data are available at age 16, 74% were held for at least four weeks and 50% were confined for at least 12 weeks (mean = 19.4 weeks).

Based on the very limited available information on the composition of placement settings in the data and contact with some treatment settings, we can reasonably make a few assumptions about the confinement experiences of sampled youth. First, very few sampled youth were placed, at age 15, in settings that fit traditional conceptions of “correctional facilities.” A far more common custodial experience was pre-trial confinement in a secure juvenile detention center. This assumption is based on two facts. First, most youths recorded as confined at age 15 had no official post-adjudicatory residential placement at age 15, and, therefore, were presumably detained prior to trial. Second, the large majority of recorded residential placements were in a privately-run day treatment center that supervises youth in around-the-clock institutional and home confinement. According to the center’s current director, the majority of youth in this program spent time in the juvenile detention center prior to entering the program. The other assumption we draw is that these residential placements are at least as likely to exhibit conditions that the literature suggests could be helpful to juveniles as they are to exhibit conditions that could be harmful. The day treatment center offered a variety of educational, recreational, and mental health services and programs. In addition, at least three sampled youth were placed in small group homes with “counselor parents.” Thus, one interpretation of the null findings is that some youth placed in institutional confinement experienced mental health benefits, which may offset the harms of confinement experienced by these same or other youths in less therapeutic settings.

On the other hand, echoing Kashani et al. (1980), our preliminary ad hoc analyses provide limited evidence that being in confinement may increase concurrent anxiety problems and being released from confinement may decrease depression. The results from this study, although based on a very small sample, are consistent with concerns that institutional confinement may make youths anxious because of fears of victimization or depressed because of a sense of isolation and helplessness (Holman & Zeidenberg, 2006; Seltzer, 2001). Other aspects of the experience of confinement may also increase anxiety such as fears about significant others who are left unprotected in the community or uncertainties about prospects once released. Thus, the failure to consider institutional context when collecting data on detained and incarcerated youth may have led to over-estimations about the level of mental illnesses in such populations.

The results also suggest that, once released, those youth who experienced adverse mental health effects may rebound or that negative internalizing states during confinement may be temporary. In other words, confined youth may get a new lease on life once they are released, which makes them feel happier and freer. Thus, by combining their responses with those still in custody, one might obscure the negative effects of confinement on mental health. In our post hoc analyses, we found that youth who had been confined at age 15, but interviewed outside at age 16, reported slightly lower levels of depression than their peers who were never confined, and those who were interviewed when still confined reported the highest levels of depression, although these potential group differences were not statistically significant. Given the small sample size for these analyses, the results are only preliminary and findings should be interpreted cautiously. Nevertheless, assuming the results are valid, they are consistent not only with the possibility of positive treatment effects for some youth but also with two observations in the ethnographic literature. First, in the most disadvantaged urban contexts, short-term juvenile confinement is typically not stigmatizing and does little harm to male adolescents’ social relationships and self-concepts (Hirschfield, 2008), which in turn may help youth sustain or restore pre-custodial levels of mental health. Second, among limited segments of such communities (e.g., street gangs) spells of incarceration signal toughness, commitment, and maturity and can be status-enhancing (Anderson, 1999; Hirschfield, 2008; Meares & Kahan 1998). Post-confinement increases in social support and self-esteem could offset any negative psychological consequences of diminished access to conventional opportunities (Sampson & Laub, 1997).

Besides the heterogeneity of institutional placements, this study had several other limitations that need to be considered when interpreting the findings. First, although PS matching attempts to approximate an experimental design, unlike randomization in an experiment, “neither PSs nor trajectory modeling can control for covariates that were not measured, and the threat to validity from such unobserved covariates will always remain a key difference between experiments and observational studies” (Haviland & Nagin, 2007, p. 67). In addition, we did not find suitable matches for the most extreme boys (i.e., those with the highest PSs in the most problematic trajectory groups), which may limit the generalizability of our findings to those facing low to moderate risks of confinement. Although not ideal, this is a typical limitation of studies that utilize PS matching (see Haviland et al., 2007). Furthermore, the sample size of confined youths and, thus, their matched controls was quite small and may have lacked the statistical power necessary to uncover significant differences between groups especially for anxiety ($d = .33$). Nevertheless, the levels of depression among the confined youth were lower than their matched controls at age 16 suggesting that within a larger sample, we would still not find that confinement significantly increased levels of depression. Also, effect sizes were small and should be interpreted cautiously. In addition, the post hoc analysis conducted did not have groups balanced in their propensity to be in custody at age 16, unlike the confined versus control groups, because of the extremely small number of youths interviewed in custody. Thus, these results need to be interpreted with caution. Future research with larger samples is needed to investigate the factors that may condition the effects of custodial intervention including institutional factors, such as length of time in placement, type of placement, treatment received while in placement, and victimization experiences within the facility, as well as individual and family factors, such as pre-confinement family dysfunction, socioeconomic status, and ethnicity.

This study focused only on the short-term effects of confinement on mental health problems. There may be “sleeper effects” from confinement that are not immediately evident. Research suggests that whether child abuse and trauma, which are common among institutionalized delinquents (Steiner, Garcia, & Matthews, 1997), eventuate in adult depression and other mental health problems, may depend on exposure to subsequent life stressors (Horwitz, Widom, McLaughlin, & White, 2001). Institutional confinement may represent one of these life stressors. Victimization and other harmful triggers within confinement may lead youth to re-experience trauma, thereby increasing their risk of institutional misconduct and harsh institutional responses (DeLisi, Drury et al., 2009). Victimization experiences in confinement, as well as social exclusion following release, may have lasting effects on these young men’s mental health (Siennick, 2007). Analyses of the follow-up surveys on this sample as adults will permit assessment of these longer-term effects.

In addition, the measures of depression and anxiety levels were not based on a diagnostic interview or assessment. Symptoms counts may not adequately capture clinical diagnoses of anxiety and depression, which have been assessed in earlier studies of detained youths (e.g., Teplin et al., 2002). Nevertheless, the CBCL DSM-oriented sub-scales that we used for depression and anxiety levels have been validated in other studies (Achenbach et al., 2003). Further research should broaden the study of the impact of incarceration beyond anxiety and depression. For example, Vaughn, Edens, Howard and Smith (2009) identified sub-groups of incarcerated juveniles with elevated levels of interpersonal sensitivity and paranoid ideation. Their work also suggests that incarcerated youth who exhibit primary psychopathy exhibit low levels of anxiety and depression. Future research can examine whether psychopathic personalities moderate the impact of incarceration on anxiety and depression.

Finally, this study was based on a sample of young men who were recruited from public schools in one geographically limited area during a specific time period. Therefore, these results may not be relevant for other samples of young men. In addition, the results may not

generalize to young women given potentially differential confinement experiences, as well as differences in levels of internalizing problems between men and women (Horwitz & White, 1987).

The study had several strengths to counterbalance these limitations. It is the only study that we are aware of to examine mental health problems among a community sample both before and after institutional confinement. In addition, using PS matching within groups based on prior trajectories of the outcome variable is a relatively novel analytic approach to improve causal inference. Overall, the results suggest that more research is needed to identify aspects of the juvenile justice system that may positively or negatively affect youth's mental health status.

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References

- Achenbach, TM. Integrative guide to the 1991 CBCL/4-18, YSR, and TRF Profiles. Burlington, VT: University of Vermont, Department of Psychology; 1991.
- Achenbach TM, Dumenci LL, Rescorla LA. DSM-oriented and empirically based approaches to constructing from the same item pools. *Journal of Clinical and Adolescent Psychology*. 2003; 32:328–340.
- Achenbach, TM.; Rescorla, LA. Manual for the ASEBA School-Age Forms and Profiles. Burlington, VT: University of Vermont, Research Center for Children, Youth, and Families; 2001.
- Anderson, E. Code of the street: Decency, violence and the moral life of the inner city. New York: W.W. Norton and Company, Inc; 1999.
- Aseltine RH Jr, Gore S, Gordon J. Life stress, anger and anxiety, and delinquency: A test of general strain theory. *Journal of Health and Social Behavior*. 2000; 41:256–275. [PubMed: 11011504]
- Brownfield D, Sorenson AM, Thompson KM. Gang membership, race, and social class: A test of the group hazard and master status hypotheses. *Deviant Behavior*. 2000; 22:73–89.
- Cohen, J. Statistical power analysis for the behavioral sciences. 2. Hillsdale, NJ: Lawrence Erlbaum; 1988.
- Copeland W, Miller-Johnson S, Keeler G, Angold A, Costello EJ. Childhood psychiatric disorders and adult crime: A prospective, population-based study. *American Journal of Psychiatry*. 2007; 164:1668–1675. [PubMed: 17974931]
- Costello EJ, Messer SC, Bird HR, Cohen P, Reinherz HZ. The prevalence of serious emotional disturbance: A re-analysis of community studies. *Journal of Child and Family Studies*. 1998; 7:411–423.
- DeLisi M, Barnes JC, Beaver KM, Gibson CL. Delinquent gangs and adolescent victimization revisited: A propensity score matching approach. *Criminal Justice and Behavior*. 2009; 36:808–823.
- DeLisi M, Drury AJ, Kosloski AE, Caudill JW, Conis PJ, Anderson CA, et al. The cycle of violence behind bars: Traumatization and institutional misconduct among juvenile delinquents in confinement. *Youth Violence and Juvenile Justice*. 2009; 10:1177/1541204009349399
- Domalanta DD, Risser WL, Roberts RE, Risser JMH. Prevalence of depression and other psychiatric disorders among incarcerated youth. *Journal of American Academy of Child & Adolescent Psychiatry*. 2003; 42:477–484.

- Elgar FJ, Arlett C. Perceived social inadequacy and depressed mood in adolescents. *Journal of Adolescence*. 2002; 25:301–305. [PubMed: 12128040]
- Elliott, DS.; Huizinga, D.; Menard, S. Multiple problem youth: Delinquency, substance use, and mental health problems. New York: Springer-Verlag Publishing; 1989.
- Fader JJ, Harris PW, Jones PR, Poulin ME. Factors involved in decisions on commitment to delinquency programs for the first time juvenile offenders. *Justice Quarterly*. 2001; 18:323–341.
- Fergusson DM, Horwood LJ. The Christchurch Health and Development Study: Review of findings on child and adolescent mental health. *Australian and New Zealand Journal of Psychiatry*. 2001; 35:287–296. [PubMed: 11437801]
- Gatti U, Tremblay RE, Vitaro F. Iatrogenic effect of juvenile justice. *Journal of Child Psychology and Psychiatry*. 2009; 50:991–998. [PubMed: 19673053]
- Glisson C. Judicial and service decisions for children entering state custody: The limited role of mental health. *Social Service Review*. 1996; 70:257–281.
- Glazerman S, Levy DM, Myer M. Nonexperimental versus experimental estimates of earnings impacts. *The ANNALS of the Academy of Political and Social Science*. 2003; 589:63–93.
- Grisso T. Adolescent offenders with mental disorders. *Future of Children*. 2008; 18:144–164.
- Haviland AM, Nagin DS. Using group-based trajectory modeling in conjunction with propensity scores to improve balance. *Journal of Experimental Criminology*. 2007; 3:65–82.
- Haviland A, Nagin DS, Rosenbaum PR. Combining propensity score matching and group-based trajectory modeling in an observational study. *Psychological Methods*. 2007; 12:247–267. [PubMed: 17784793]
- Haviland A, Nagin DS, Rosenbaum PR, Tremblay RE. Combining group-based trajectory modeling and propensity score matching for causal inferences in nonexperimental longitudinal data. *Developmental Psychology*. 2008; 44:422–436. [PubMed: 18331133]
- Hirschfield PJ. The declining significance of delinquent labels in disadvantaged urban communities. *Sociological Forum*. 2008; 23:575–601.
- Hirschfield P, Maschi T, White HR, Traub LG, Loeber R. The effects of mental health problems on juvenile arrests: Criminality, criminalization, or compassion? *Criminology*. 2006; 4:593–630.
- Holman, B.; Zeidenberg, J. The dangers of detention: The impact of incarcerating youth in detention and other secure facilities. 2006. Retrieved August 1, 2009, from http://www.vjja.org/Resources/Publications/Dangers_of_Detention_Justice_Policy_Institute_2006.pdf
- Horwitz AV, White HR. Gender role orientations and styles of pathology among adolescents. *Journal of Health and Social Behavior*. 1987; 28:158–170. [PubMed: 3611702]
- Horwitz AV, Widom CS, McLaughlin J, White HR. The impact of childhood abuse and neglect on adult mental health: A prospective study. *Journal of Health and Social Behavior*. 2001; 42:184–201. [PubMed: 11467252]
- Kashani JH, Manning GW, McKnew DH, Cytryn L, Simonds JF, Wooderson PC. Depression among incarcerated delinquents. *Psychiatry Resources*. 1980; 3:185–191.
- Leiber MJ, Jamieson KM. Race and decision making within juvenile justice: The importance of context. *Journal of Quantitative Criminology*. 1995; 11:363–388.
- Loeber, R.; Farrington, D.; Stouthamer-Loeber, M.; White, HR. Violence and serious theft: Developmental course and origins from childhood to adulthood. Mahwah, NJ: Lawrence Erlbaum; 2008.
- Loeber R, Stouthamer-Loeber M, White HR. Developmental aspects of delinquency and internalizing problems and their association with persistent juvenile substance use between ages 7 and 18. *Journal of Clinical Child Psychology*. 1999; 28:322–332. [PubMed: 10446681]
- Meares T, Kahan D. Law and (norms of) order in the inner city. *Law and Society Review*. 1998; 32:805–838.
- Mohr, H. AP: 13,000 abuse claims in juvie centers. *USA Today*. 2008 Mar 2. Retrieved August 1, 2009, from http://www.usatoday.com/news/nation/2008-03-02-juvenile-detention_N.htm
- Molina BSG, Pelham WE Jr. Childhood predictors of adolescent substance use in a longitudinal study. *Journal of Abnormal Psychology*. 2003; 112:497–507. [PubMed: 12943028]
- Nagin, DS. Group-based modeling of development. Cambridge, MA: Harvard University Press; 2005.

- Pear, R. The New York Times. 2003 Sep 1. Mental care poor for some children in state custody; p. A1
- Rodriguez N, Smith H, Zatz MS. "Youth is enmeshed in a highly dysfunctional family system": Exploring the relationship among dysfunctional families, parental incarceration, and juvenile court decision making. *Criminology*. 2009; 47:177–208.
- Rosenbaum PR, Rubin DB. Reducing bias in observational studies using subclassification on the propensity score. *Journal of the American Statistical Association*. 1984; 79:516–524.
- Rubin, DB. Multiple imputation for nonresponse in surveys. New York: John Wiley & Sons, Inc; 1987.
- Rubin DB. Multiple imputation after 18+ years. *Journal of the American Statistical Association*. 1996; 91:473–489.
- Sampson, RJ.; Laub, JH. A life course theory of cumulative disadvantage and the stability of delinquency. In: Thornberry, TP., editor. *Developmental theories of crime and delinquency*. New Brunswick, NJ: Transaction Publishing; 1997. p. 133-161.
- Sanborn JB Jr. Factors perceived to affect delinquent dispositions in juvenile court: Putting the sentencing decision into context. *Crime and Delinquency*. 1996; 42:99–113.
- SAS Institute Inc. SAS OnlineDoc (Version 9). Cary, NC: Author; 2003.
- Schuppe, J. Where mentally ill youths are left to despair. Child advocate says county detention centers are being illegally used. *Star-Ledger*. 2004 Nov 23. Retrieved August 1, 2009, from http://studentadvocate-nj.org/MSAER_001006.htm
- Schwartz G. Estimating the dimension of a model. *Annals of Statistics*. 1978; 6:461–464.
- Seltzer R. Juveniles with mental disabilities: When incarceration makes youth worse. *Juvenile Justice Update*. 2001; 7(2):9–10.
- Siennick SE. The timing and mechanisms of the offending-depression link. *Criminology*. 2007; 45:701–734.
- Steiner H, Garcia L, Matthews Z. Posttraumatic stress disorder in incarcerated juvenile delinquents. *Journal of the American Academy of Child and Adolescent Psychiatry*. 1997; 36:357–365. [PubMed: 9055516]
- Stuart EA, Green KM. Using full matching to estimate causal effects in nonexperimental studies: Examining the relationship between adolescent marijuana use and adult outcomes. *Developmental Psychology*. 2008; 44:395–406. [PubMed: 18331131]
- Teplin LA, Abram KM, McClelland GM, Dulcan MK, Mericle AA. Psychiatric disorders in youth in juvenile detention. *Archives of General Psychiatry*. 2002; 59:1133–1143. [PubMed: 12470130]
- Teplin LA, Abram KM, McClelland GM, Washburn JJ, Pikus AK. Detecting mental disorder in juvenile detainees: Who receives services. *American Journal of Public Health*. 2005; 95:1773–1780. [PubMed: 16186454]
- U.S. Congress. House Committee on Government Reform—Minority Staff. Special Investigations Division. Incarceration of youth who are waiting for community mental health services in the United States. Washington, DC: Government Printing Office; 2004. Retrieved August 1, 2009, from <http://oversight.house.gov/documents/20040817121901-25170.pdf>
- U.S. General Accounting Office. Child welfare and juvenile justice (GAO-03-397). Washington, DC: Government Printing Office; 2003.
- Vaughn MG, Edens JF, Howard MO, Toney Smith S. An investigation of primary and secondary psychopathy in a statewide sample of incarcerated youth. *Youth Violence and Juvenile Justice*. 2009; 7:172–188.
- Vermeiren R. Psychopathology and delinquency in adolescents: A descriptive and developmental perspective. *Clinical Psychology Review*. 2003; 23:277–318. [PubMed: 12573673]
- Wasserman, G.; Ko, SJ.; McReynolds, LS. *Juvenile Justice Bulletin*. Washington, DC: Office of Juvenile Justice and Delinquency Prevention; 2004 Aug. Assessing the mental health status of youth in juvenile justice settings. Retrieved August 1, 2009, from http://www.njjn.org/media/resources/public/resource_281.pdf
- Weinberg NZ, Glantz MD. Child psychopathology risk factors for drug abuse: Overview. *Journal of Clinical Child Psychology*. 1999; 28:290–297. [PubMed: 10446678]

White, H.R.; Jackson, K.; Loeber, R. Developmental sequences and comorbidity of substance use and violence. In: Krohn, M.; Lizotte, A.; Hall, P.G., editors. *Handbook of deviance and crime*. New York: Springer Publications; 2009. p. 433-468.

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Appendix A. Description of the Measures Included in the Propensity Score Matching Analysis

Cohort: 1 = older cohort, 0 = younger cohort.

Black: 1 = African American, 0 = other.

Risk group: 1 = low risk, 2 = high risk.

Age14 depression level (combines parent and youth report): cries, harms self, doesn't eat well, feels worthless, feels too guilty, overtired, sleeps less, sleeps more, sleep problems, talks suicide, underactive, and sad ($\alpha = .76$).

Age14 anxiety level (combines parent and youth report): fears, school fears, nervous, fearful, and worries ($\alpha = .71$).

Age 14 family on welfare (parent report): 1 = if anyone in the child's household had received public assistance during the previous year, 0 = no public assistance in household.

Age 14 household structure (parent report): 1 = single parent household at least for 6 months, 2 = two or more adults in the household.

Age 14 frequency of alcohol use (logged) (youth report): sum of the number of times drank beer, wine, and hard liquor in the last year.

Age 14 frequency of marijuana use (logged) (youth report): number of times used marijuana in the last year.

Age 14 frequency of tobacco use (logged) (youth report): number of times used any form of tobacco (cigarettes, smokeless, pipes, and cigars) in the last year.

Age 14 frequency of hard drug use (logged) (youth report): sum of the number of times used hallucinogens, powder cocaine, crack cocaine, heroin, barbiturates, amphetamines, tranquilizers, codeine, other prescription drugs, and PCP in the past year. Drugs prescribed by a doctor were excluded.

Age 14 frequency delinquency (logged) (combines parent and youth report): Number of incidents of reported violent and theft offenses (see below) plus drug dealing in the past year. Status offenses (e.g., truancy or running away) were not included in this scale.

Age 14 frequency of drug selling (youth report): Number of incidents of selling marijuana or other drugs in the last year.

Age 14 frequency theft (logged) (combines parent and youth report): Number of incidents of stealing less than \$5 outside the home, shoplifting, stealing a bicycle or skateboards from the street, stealing things worth more than \$5, joyriding, purse snatching, dealing in stolen goods, stealing from a car, breaking and entering, and auto theft.

Age 14 frequency violence (logged) (combines parent and youth report): Number of incidents of gang fighting, forcible robbery, sexual coercion, and rape in the past year.

Age 14 delinquency variety (logged) (combines parent and youth report): Number of different types of violent and theft offenses in the past year.

Age 14 gang membership (youth report): Belonged to a gang = 1; did not belong to a gang = 0 in the last year.

Age 14 peer substance use (logged) (youth report): How many of the child's friends (none, few, half, most, or all) drank alcohol, used tobacco, used marijuana, and used hard drugs ($\alpha = .70$).

Age 14 peer delinquency (logged) (youth report): How many of the child's friends (none, few, half, most, or all) participated in delinquent acts such as skipping school, lying, stealing, joyriding, attacking someone and carrying a weapon ($\alpha = .83$).

Age 14 amount of time spent with parents (parent report): The amount time that the child spends with his parents (coded 1 if 0-5 hours per week, 2 if 6-10 hours per week, and 3 if 11+ hours per week).

Age 14 amount of time spent with friends (parent report): The amount time that the child spends with his friends (coded 1 if 0-5 hours per week, 2 if 6-10 hours per week, and 3 if 11+ hours per week).

Age 14 past year run away (parent and youth report): 1= ran away in the last year, 0 = did not run away in the past year based on if any informant reported that the participant had ran away in the last year.

Age 14 truancy (parent, teacher and youth report): 1= truant, 0 = not truant, based on if any informant reported that the participant had been truant in the last year.

Age 14 suspended from school (completed by parent): 1 = suspended, 0 = not suspended.

Age 14 academic achievement (completed by parent, teacher and child): Performance was rated on a 4-point scale from “failing” to “above average” in reading, math, writing, and spelling. All responses were averaged to form the scale. The ratings of all academic subjects by all informants were averaged to create the construct ($\alpha = .67$).

Age 14 neighborhood impression (parent report): Scale contains 17 items (e.g., prevalence of abandoned buildings, racial tensions, unemployment, and various criminal activities). The response set for each item is 0 (“not a problem”), 1 (“somewhat of a problem”), and 2 (“big problem”) ($\alpha = .95$).

Age 14 caretaker supervision (parent and youth report): four items about the extent to which parent knows about child’s activities ($\alpha = .90$).

Age 14 caretaker-child communication (parent and youth report): Summarizes 30 items from the caretaker and 28 from the youth regarding everyday communication between caretaker and youth regarding emotions, disagreements, and problems (e.g., how often discuss the youth’s personal problems together, whether the caretaker could interpret the youth’s emotional state without asking) ($\alpha = .97$).

Figure 1a

Figure 1b

Figure 1.

Figure 1a. Observed trajectories of depression from ages 11 through 14 for the four trajectory groups ($N = 510$). G1 = Group 1: very low; G2 = Group 2: low; G3 = Group 3: moderate; and G4 = Group 4: high. Est. = Estimated trajectory. Solid lines indicate estimated trajectories while dotted lines indicate observed trajectories.

Figure 1b. Observed trajectories of anxiety from ages 11 through 14 for the four trajectory groups ($N = 510$). G1 = Group 1: very low; G2 = Group 2: low; G3 = Group 3: moderate; and G4 = Group 4: high. Est. = Estimated trajectory. Solid lines indicate estimated trajectories while dotted lines indicate observed trajectories.

Figure 2a

Figure 2b

Figure 2.

Figure 2a. Propensity score overlap for the confined youths, their matched controls, and the remaining unmatched youths within each depression trajectory group.

Figure 2b. Propensity score overlap for the confined youths, their matched controls, and the remaining unmatched youths within each anxiety trajectory group.

Table 1

Group Differences on Depression and Anxiety Levels

Group	Depression Level at Age 16 ^a	Anxiety Level at Age 16 ^b
	Mean (<i>SD</i>) (<i>n</i> = 74)	Mean (<i>SD</i>) (<i>n</i> = 68)
Not-confined	2.42 (1.84)	1.13 (0.92)
Confined	2.15 (1.94)	1.54 (1.47)

^aCohen's (1980) $d = 0.143$,

^bCohen's $d = 0.334$

T-test for depression level: Mean difference score (Not-confined – Confined) = 0.27, $SD = 1.89$; $t = 0.62$, $df = 72$, $p = 0.54$;

T-test for anxiety level: Mean difference score (Not-confined – Confined) = -0.42 , $SD = 1.22$; $t = -1.41$, $df = 66$, $p = 0.16$.

Mixed Model Results Predicting Levels of Depression and Anxiety at Age 16 for Those Who were First Confined at Age 15 Compared to Controls Controlling for Earlier Levels

Table 2

Variables	Depression Levels at Age 16 (<i>n</i> = 74)			Anxiety Levels at Age 16 (<i>n</i> = 68)		
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Confined at age 15	-.128	.322	.694	.393	.246	.119
Same problems at age 14 ^a	.621	.078	<.001	.472	.084	<.001
BIC	264.1			201.7		

^aThe depression levels model included depression level at age 14 and the anxiety levels model included anxiety level at age 14.

Table 3

Mean Comparisons for Two Different Confined Groups and Control Group

Variables	Confined at age 15 and interviewed in custody at age 16	Confined at age 15, but interviewed outside at age 16	Controls	F-test (<i>df</i>) and <i>p</i> -values
Depression Levels at Age 16	<i>n</i> = 5	<i>n</i> = 32	<i>n</i> = 37	$F(2, 71) = 0.35$;
Mean (<i>SD</i>)	2.60(2.22)	2.08 (1.92)	2.42 (1.84)	$p = 0.71$
Anxiety Levels at Age 16	<i>n</i> = 8	<i>n</i> = 26	<i>n</i> = 34	$F(2, 65) = 1.18$;
Mean (<i>SD</i>)	1.78(1.33)	1.47(1.52)	1.13(0.92)	$p = 0.31$

No means are significantly different from each other.

Depression Levels:

Confined at age 15 and interviewed in custody vs. controls; Cohen's $d = 0.088$

Confined at age 15 and interviewed in custody vs. Confined interviewed outside of custody; Cohen's $d = 0.251$

Confined at age 15 and interviewed outside of custody vs. controls; Cohen's $d = 0.181$

Anxiety Levels:

Confined at age 15 and interviewed in custody vs. controls; Cohen's $d = 0.568$

Confined at age 15 and interviewed in custody vs. Confined interviewed outside of custody; Cohen's $d = 0.217$

Confined at age 15 and interviewed outside of custody vs. controls; Cohen's $d = 0.271$