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# Intergenerational effects of parental substance-related convictions and adult drug treatment court participation on children's school performance

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## Abstract

**Objective—**This study examined the intergenerational effects of parental conviction of a substance-related charge on children's academic performance and, conditional on a conviction, whether completion of an adult drug treatment court (DTC) program was associated with improved school performance.

**Method—**State administrative data from North Carolina courts, birth records, and school records were linked for 2005–12. Math and reading end-of-grade test scores and absenteeism were examined for 5 groups of children, those with parents who: were not convicted on any criminal charge, were convicted on a substance-related charge and not referred by a court to a DTC, were referred to a DTC but did not enroll, enrolled in a DTC but did not complete, and completed a DTC program.

**Results—**Accounting for demographic and socioeconomic factors, the school performance of children whose parents were convicted of a substance-related offense was worse than that of children whose parents were not convicted on any charge. These differences were statistically significant but substantially reduced after controlling for socioeconomic characteristics, e.g.,

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mother's educational attainment. We found no evidence that parent participation in an adult DTC program led to improved school performance of their children.

**Conclusion—**While the children of convicted parents fared worse on average, much—but not all—of this difference was attributed to socioeconomic factors, with the result that parental conviction remained a risk factor for poorer school performance. Even though adult DTCs have been shown to have other benefits, we could detect no intergenerational benefit in improved school performance of their children.

## Introduction

Demand for substance-use treatment in the criminal justice system is large, due in part to the overrepresentation of substance users in the criminal population and public policies that impose societally costly sanctions for criminal offenders (Harrison, 2001; James, 2005; Substance Abuse Mental Health Services Administration, 2013). In response, adult drug treatment courts (DTCs) emerged to meet the unique needs of this population and have been found to reduce criminal recidivism and increase abstinence from substances (Brown, 2010; Gottfredson, Kearley, Najaka, & Rocha, 2005; Mitchell, Wilson, Eggers, & MacKenzie, 2012; Rempel, Green, & Kralstein, 2012). To our knowledge, research has not examined whether there are spillover benefits to the children of those who participate in an adult DTC. Yet, as children both of criminal offenders and parents with substance-use problems, they are at risk for experiencing a host of negative outcomes. To begin to address this gap, this study examined the effect of parental participation in an adult DTC program on children's school performance.

Parental criminal involvement potentially is associated with a variety of collateral consequences for their children and other family members (Foster & Hagan, 2009; Gust, 2012). Arrests are often associated with court and attorney fees, as well as other intangible costs, e.g., difficulty in obtaining housing, employment, and governmental assistance such as participating in food stamps or the Temporary Aid to Needy Families program (Chin, 2002). These consequences, in addition to constraining family resources, can increase family conflict (Conger, Ge, Elder, Lorenz, & Simons, 1994).

Criminal offenders, relative to the general population, disproportionately have substance-use issues (James, 2005; Substance Abuse Mental Health Services Administration, 2013). For children, parental substance use increases risks of: experiencing abuse/neglect (Cunningham & Finlay, 2012; Miller & Jang, 1977; Young, Boles, & Otero, 2007); using substances as an adolescent (Obot, Wagner, & Anthony, 2001); and developing mental health problems (Cuijpers, Langendoen, & Bijl, 1999; Kelley & Fals-Stewart, 2004; Obot & Anthony, 2004) and/or behavioral problems (Stanger et al., 1999). Existing literature on the relationship between parental substance use and their children's school performance generally finds that children exposed to parental substance use do worse than others (Chandy, Harris, Blum, & Resnick, 1993; Hyphantis, Koutras, Liakos, & Marselos, 1991; Jennison, 2014; Marcus, 1986; McGrath, Watson, & Chassin, 1999; Rimmer, 1982; Serec et al., 2012; Torvik, Rognmo, Ask, Røysamb, & Tambs, 2011).

Much of the existing empirical research on the effects of parental criminal justice involvement on children's academic outcomes has focused on parental incarceration (Cho, 2009a, 2009d, 2010, 2011; Foster & Hagan, 2009; Hagan & Foster, 2012a; Haskins, 2014; Murray, Loeber, & Pardini, 2012; Nichols & Loper, 2012; Turney & Haskins, 2014). Results have been equivocal, with one study finding a beneficial relationship (Cho, 2009a), some finding no relationship (Cho, 2009d; Murray et al., 2012; Nichols & Loper, 2012), and others finding harmful associations with parental incarceration (Cho, 2011; Foster & Hagan, 2009; Hagan & Foster, 2012a, 2012d). Cho (2009a) found that children with incarcerated mothers were less likely to be retained in grade. But Turney and Haskins (2014) found that children with incarcerated fathers were more likely to have been retained in grade during elementary school and were at risk for having worse non-cognitive skills related to school readiness at school entry and a greater likelihood of special education placement by age nine (Haskins, 2014).

## Parental Substance-Use Treatment

Relatively little research has focused on the effects of parental substance-use treatment on school-aged youth or on children's educational outcomes. However, positive effects for children have been shown in other measures. For example, paternal substance-use treatment has been associated with lower rates of adjustment problems (Andreas & O'Farrell, 2007; Andreas, O'Farrell, & Fals-Stewart, 2006), lower externalizing problems (Andreas & O'Farrell, 2009), and less exposure to parental conflict (Rounsaville, O'Farrell, Andreas, Murphy, & Murphy, 2014). Parental substance-use treatment may also reduce the risk of a child developing a substance-use disorder (Arria, Mericle, Meyers, & Winters, 2012).

How parental substance-use treatment is delivered may also affect child outcomes. Coupling parental substance-use treatment with intensive case management or behavioral therapy may improve youth outcomes (e.g., decreased probability of being arrested) beyond those from substance-use treatment alone (Douglas-Siegel & Ryan, 2013). For example, parents' receipt of behavioral couples therapy with substance treatment was associated with greater improvements in children's psychosocial functioning than parents' receipt of individual-based therapy (Kelley & Fals-Stewart, 2002). Another study compared behavioral couples therapy with and without a parenting skills component and an individual-based treatment (Lam, Fals-Stewart, & Kelley, 2008, 2009). Only the children whose fathers received couples-based therapy with a parenting skills component consistently had improved internalizing and externalizing scores (Lam et al., 2008) and lower probabilities of being investigated by child protection services (CPS) (Lam et al., 2009). Children with fathers receiving only individual-based treatment showed no improvement in internalizing or externalizing problems (Lam et al., 2008) or the probability of being investigated by CPS (Lam et al., 2009).

While some studies have found that providing parents substance treatment paired with other services benefits children, not all studies found improved child outcomes on each domain studied. For example, the Focus on Families Study involved parents receiving treatment in a methadone clinic who were randomly assigned to a supplemental parenting program that included 33 family training sessions and nine months of home-based case management

(Catalano, Gainey, Fleming, Haggerty, & Johnson, 1999). This study found some positive effects at the one-year follow-up, such as less domestic conflict, more household rules, and better drug avoidance among the parents. However, the school grades, achievement scores, and delinquency rates of children did not differ from those of children whose parents were in the control group (Catalano et al., 1999). Another study employed a longer follow-up period and found that the program was associated with reductions in substance-use disorders among sons but that these reductions did not extend to participants' daughters (Haggerty, Skinner, Fleming, Gainey, & Catalano, 2008).

## Drug Treatment Courts

Adult DTCs are one mechanism used to connect criminal offenders with substance-use treatment services. DTCs specialize in treating persons charged with a criminal offense who also have a substance-use problem. These specialized courts provide treatment options to offenders to be used in lieu of or in conjunction with criminal penalties (Hora, 2002). Participants remain in a community setting rather being incarcerated.

Most research on DTCs has focused on criminal recidivism (Brown, 2010; Mitchell et al., 2012; Rempel et al., 2012) or reducing substance use (Gottfredson et al., 2005) and other criminal justice- related outcomes, e.g., incarceration (Evans, Li, & Hser, 2009). A few studies have examined effects of DTCs on participants' recovery from addiction (see e.g., Marinelli-Casey et al., 2008), family conflict, employment, and depression (Green & Rempel, 2012). There is empirical evidence that DTCs reduce criminal recidivism (Brown, 2010; Gifford, Eldred, McCutchan, & Sloan, 2014; Mitchell et al., 2012; Wilson, Mitchell, & MacKenzie, 2006). Since there is a detrimental association between parental substance use and child educational attainment (e.g., Chandy et al., 1993; Hyphantis et al., 1991; Jennison, 2014; Marcus, 1986; McGrath et al., 1999; Rimmer, 1982; Serec et al., 2012; Torvik et al., 2011), it is plausible that parental substance-use treatment could improve educational outcomes. Time away from home due to incarceration diminishes the parents' ability to spend time with their children and their ability to provide for their family (Geller, Garfinkel, Cooper, & Mincy, 2009; Geller, Garfinkel, & Western, 2011). Since participation in a DTC program reduces or even eliminates time in jail or prison, parents potentially have more time and resources to invest in their children.

If completion of a DTC program reduces parental substance abuse, many adverse effects on children caused by parental substance abuse may be reduced, e.g., being overly emotionally reactive (e.g., Johnson et al., 2002) and/or under-reactive (i.e., neglectful) (e.g., Eiden, 2001) to their children's needs and/or behavior (Chaplin & Sinha, 2013). In that DTCs reduce criminal recidivism, they may eliminate a major stressor from the child's life (Barnard & McKeganey, 2004). Also, DTCs aim not only to reduce addiction and substance use, but also to coordinate ancillary services (e.g., parenting classes, anger management classes, and/or vocational classes) that may improve parenting skills and/or parents' ability to provide for child needs, which in turn improve children's ability to function in school (Bouffard & Taxman, 2004; Innovation Research Training Inc., 2005c).

## The Current Study

The main goal of this study was to examine whether parental participation in an adult DTC improved students' school performance. Prior research has suggested that students whose parents misuse substances are at risk for low levels of academic performance, and prior evidence has suggested that DTCs have beneficial effects on participants. Therefore, we hypothesized that, among children of parents referred to a DTC, children of parents who complete a DTC may be more likely to have improved academic outcomes relative to children of parents who do not complete the program.

To understand the broader context of children whose parents may have come to the attention of the courts for substance-related offenses,[1] this study first compared the school performance of children whose parents (a) were not convicted of any offense, (b) were convicted of a substance-related offense and not referred to a DTC (96.4% of parents who were convicted of a substance-related offense were not referred to a DTC), or (c) were convicted of a non-substance-related offense. Based on the findings from prior research, we hypothesized that children of parents who were convicted of a substance-related offense would have worse school outcomes than children of parents who were not convicted of any offense. To our knowledge, prior research has not compared children of parents who were convicted of different types of offenses. We hypothesized that children of parents with substance-related offenses may have worse outcomes than children whose parents were convicted of other offenses, because substance use may impair parenting and parent's ability to function. We also examined how the timing of parental conviction may affect a student's school performance. For example, did students experience a short-term decline in school performance immediately after their parents' conviction, followed by a relative improvement? Or did students' performance continue to deteriorate as time since the conviction elapsed? The second part of the study focused on the subset of children whose parents were at least referred to a DTC. The primary research question that was explored was, "Do children whose parents participated in an adult DTC program experience improvements in school performance relative to children whose parents do not participate?" If so, when are those improvements realized?

Relative to children from high socioeconomic backgrounds, children who come from families of lower socioeconomic backgrounds are at risk for experiencing a constellation of factors that can impede their school performance. Lower socioeconomic status is also related to the probabilities their parents will become involved in criminal activity and experience substance-use problems. Therefore, this study controlled for a variety of factors associated with socioeconomic status.

The setting for this study was North Carolina. All North Carolina judicial districts with DTCs, except one, structure these courts as post-plea or post-sentence diversionary programs for persons convicted on a substance-related charge (Innovation Research Training Inc., 2005a, 2005c, 2005e, 2005g, 2005i, 2005k, 2005m, 2005o). Adult DTCs allowed participants to reduce or postpone jail time by enrolling in an intensive treatment

[1]Substance-related charges were those related to illicit drugs or driving while intoxicated (DWI).

program. Failure to complete a program resulted in the reinstatement of an original jail sentence or issuance of a new sentence. These courts required frequent meetings with the judge and the case coordinator, drug tests at least weekly, potential sanctions for failing to follow DTC procedures, and participation in treatment programs and/or Alcoholics Anonymous (AA) or Narcotics Anonymous (NA) meetings (Mecklenburg County, 2014). A treatment team created an individualized case plan for participants that may have included goals other than substance-use treatment, such as obtaining housing, additional education, and employment, and/or other supportive services, e.g., behavioral couples therapy, parenting classes, or life skills training.

## Materials and Methods

### Data

This study used statewide administrative data from multiple public systems linked at the child level, the observational unit. The first set of study questions used data from three sources. The North Carolina Administrative Office of the Courts (NCAOC) maintains information on parental convictions for substance-related and other offenses for 2005–2013 and on parental participation in adult DTCs via the Drug Treatment Court Management Information System (DTC-MIS). The North Carolina Department of Public Instruction supplied information on the school performance of public school 3rd–12th graders for 1999–2013. Youth leaving for private school or moving to other states were not tracked. Parental arrest data were linked with children's school records, using birth records from the North Carolina Bureau of Vital Statistics for children born in the state 1987–2007. A father was listed on over 80% of birth records. The analysis of the second set of questions relied on birth and school records and data on treatment for parental substance abuse from 19 adult DTCs in North Carolina, 2000–2012.

Matching between datasets was based on individual's first name, last name, gender, and birthdate (Figures 1 and 2). For observations that did not merge after the initial most stringent criteria were used, we used the child's birthdate and last and first name, assisted by use of Soundex. The Soundex algorithm codes words or names phonetically (Fan & Westat, 2004). The [Authors' Institution] Institutional Review Board approved this study, and each partnering agency signed a data use agreement.

### Samples

Two samples of public school children were examined. The first sample consisted of children whose biological parents fell into one of two groups: (1) were not convicted of any offense[2] excluding traffic offenses other than DWI during 2005–2012 (n= 842,767) and (2) were convicted on a substance-related charge and not referred to a DTC during this same time period (n= 76,119). The second sample was limited to children whose parents were referred to a DTC during 2000–12 (n= 2,846). Data were structured as a panel with one

[2]Infractions are excluded from our analysis. Infractions are a category of offenses that do not carry the possibility of jail. An example of an infraction in North Carolina is driving with expired registration or improper equipment.

observation per student/year. Each student could have up to five observations—for one year prior through three years post-conviction or referral to a DTC.

## Measures

In North Carolina, all 3rd–8th graders take a uniform statewide assessment in math and reading at the end of the school year. Although the test changes each year, test scores are standardized by grade and year. For a given grade and year, each student's standardized score was computed by subtracting the statewide mean score from that student's score and dividing by the statewide standard deviation (mean=0; standard deviation=1). Chronic absenteeism was measured by a binary variable indicating whether the student missed 18+ school days for any reason (i.e., 10% of the school year), a measure used by others (e.g., Balfanz & Byrnes, 2012; Mueller & Stoddard, 2006).

The key covariates described timing of the parent's substance-related conviction or DTC participation. A binary variable indicated whether the parent was convicted on a substance-related charge during the school year (July 1 to June 30) but not referred to a DTC program (1=yes, 0=no). For parents referred to a DTC program, a binary variable indicated if the person completed a program versus was referred but did not enroll. To construct the panel, separate binary variables indicated if the child's school year was a year before, the year of substance-related conviction, or one, two, or three years after the substance-related conviction. Children whose parents were never convicted on a substance-related charge were randomly assigned a "conviction date" using Stata's random date generator function, with the start and end dates restricted to mirror the observed conviction dates (StataCorp, 2013a).

In our analysis of parental substance-related convictions, we included binary variables describing whether the parent's substance-related conviction was for a felony, a misdemeanor, or misdemeanor-traffic charge (e.g., for DWI), the omitted category. These covariates were excluded from the analysis of children whose parents participated in a DTC program because our data did not permit linking a DTC referral to a specific conviction; the DTC sample began in 2000; data on convictions began in 2005.

Time-invariant child characteristics were child gender (1= male; 0=female), mutually exclusive binary variables for race/ethnicity (black non-Hispanic, other-non-Hispanic, Hispanic (white=omitted)). The child's birth records provided information on the families' socioeconomic status (SES) at time of birth including mother's education (binary variable set to 1 if < high school, 0 otherwise), whether a father was not listed on the birth certificate (1=not, 0 for father listed), whether mother initiated prenatal care in a timely fashion (1=initiated care in first trimester, 0 for initiated later or not at all), and whether the child had a low birth weight (1 ≤ 2,500, 0>2,500 grams). Time-varying covariates were binary indicators of student's grade (4th–12th, 3rd grade, omitted) for analyses of math and reading scores (test only administered through the 8th grade), and free and reduced-price lunch status.

### Estimation

We employed three specifications. (1) Controlling for basic demographic information including child's gender, race/ethnicity, grade in school, and the parent's gender (model 1), we assessed the relationship between school performance and whether a parent was convicted on a substance-related charge during the observational period. (2) We added socioeconomic characteristics (model 2). (3) To examine intertemporal changes in the relation to parental involvement with the criminal justice system in school performance, we allowed for time-varying main effects and treatment-time interactions (model 3). This specification allowed us to examine possible non-linear changes in children's school performance. For example, math scores could have initially declined at the time of parental participation in a DTC program and improved subsequently.

$$Y_{it}=B_0+B_1G_1+B_2C_{it}+B_3G_1(B_A(T)_i+B_B(T+1)_i+B_C(T+2)_i+B_D(T+3)_i)+B_4SES_i+\mu_i+e_{it},$$

where *i* stands for child, *t* for school-year, and $Y_{it}$ for an outcome—math score, reading score, and an indicator for missed 18+ days of school. Time-varying child characteristics, $C_{it}$, included child's grade and free and reduced-price lunch status and parent's group status *(G)*. Group 1 represented children of parents convicted on a substance-related charge and not referred to a DTC (versus children whose parents were not convicted). Group 2 consisted of children of parents completing a DTC program (versus (a) children of referred parents who did not enroll and (b) children whose parents enrolled but did not complete). Socioeconomic characteristics included time-varying free or reduced-price lunch status and time-invariant characteristics measured at the child's birth—including child's race/ethnicity, maternal education and age, whether the birth record listed a father, whether the mother received timely prenatal services, and whether the child was of low or very low birth weight. Time ($T_{it}$) represented time relative to the parent's conviction or DTC referral date—the school year before, during, and one, two, or three school years after (separately).

All models were estimated using Stata version 13 (StataCorp, 2013c). The analyses of children's school performance were estimated using the *xtmixed* command and included a random error term for each child and child's mother. To test differences in the interaction between group and time, we conducted Wald tests using the contrast command with a Bonferroni correction using the contrast command (StataCorp, 2013a). The Bonferroni correction adjusted standard errors to account for multiple statistical tests and to reduce the chance of a Type I error.

## Results

### Children's School Performance by Parents' Involvement in the Criminal Justice System

#### Comparison of children by parental criminal justice system involvement

At baseline, descriptive comparisons showed that children whose parents were convicted of a substance-related offense had lower math (t=68.9; p-value<0.000) and reading scores (t=62.1; p-value<0.000) than children whose parents were not convicted on any charge; however, differences in the percentage chronically absent were not statistically significantly

different (z=−36.1; p=0.000) (Table 1). Among children with a convicted parent, the convicted parent was the father for two-thirds of children, the mother for a quarter of children, and both parents for the remainder. Few parents were convicted on a felony substance-related charge (12.8%), with the misdemeanors split between being non-traffic-related (41.4%) and DWI (45.7%). Children of parents convicted on a substance-related charge differed from other children on each of the remaining covariates. In particular, children of convicted parents were more likely to be: on the free and reduced-price lunch program (z=-128.2; p-value<0.000), Black (z=−53.5; p-value<0.000), and born to a mother with less than a high school degree (z=−89.5; p-value<0.000).

## Variation in school performance by parental criminal justice system involvement and socioeconomic status

Controlling for child gender, grade, and convicted parent's gender, children of parents convicted on a substance-related charge had math scores 42.9% of a standard deviation lower than other children (Table 2 model 1M). Without controlling for socioeconomic status, children of convicted mothers had math scores 15.6% of a standard deviation lower than children of convicted fathers. Controlling for socioeconomic status, the gap in math scores between children whose parent was and was not convicted on a substance-related charge fell by 62%[3] (Table 2, model 2M). Moreover, the difference in math scores between children of convicted mothers and fathers was no longer statistically significant (p > 0.05) (Table 2, model 2M). However, children with both parents convicted had a lower math score —6.9% of a standard deviation lower relative to children whose mother had been convicted (Table 2, model 2M). Lower socioeconomic status was consistently related to lower math scores, including free or reduced-price lunch program recipients, Black non-Hispanic, other non-Hispanic, or Hispanic children, children born to a mother lacking a high school diploma, children with no father on the birth certificate, children of mothers not receiving timely prenatal care, and low or very low birth weight children.

The pattern of results for reading scores mirrored that for math scores. In particular, when controlling only for a child's gender, grade, and convicted parent's gender, children of parents convicted of a substance-related offense performed 39.2% of a standard deviation lower than other children (Table 2, model 1R). Controlling socioeconomic status reduced this difference by 65%[4] of a standard deviation. Controlling for a child's gender, grade, and parental conviction status (Table 2 model 1 R), among children of parents who were convicted of a substance-related offense, reading scores were higher for children of convicted fathers relative to children of convicted mothers. Controlling for socioeconomic status, this relationship was no longer statistically significant (p>0.05), but children where both parents were convicted of a substance-related crime had 6.4% (t=−4.7, p<0.000) of a standard deviation lower reading scores relative to children for whom only the mother had been convicted (Table 2, model 2R). Low socioeconomic status was associated with lower reading scores (Table 2, model 2R).

[3]This estimate was calculated as follows based on coefficients for parent convicted of a substance-related offense in Table 2, models 1M and 2M (100%-(−16.5% ÷ −42.9%)).

[4]This estimate was calculated based on the coefficients for parent convicted for a substance-related offense in Table 2, models 1R and 2 R (100%-(−13.8% ÷ −39.2%)).

Controlling for child's gender, grade, and convicted parent's gender (Table 2, model 1CA), children of convicted parents were 8% (t=43.6, p<0.000) more likely to have been chronically absent than others. Controlling for socioeconomic status reduced the difference in probability of being chronically absent between the two groups by 51%[5] (Table 2, model 2CA). Among children whose parents were convicted on a substance-related charge, children whose fathers were convicted were less likely to be chronically absent than children with convicted mothers; this relationship was observed without (model 1CA) and with controls for socioeconomic status (model 2CA). Socioeconomic characteristics associated with a higher (p<0.05) probability of being chronically absent were receipt of free and reduced-price lunch, having a mother without a high school diploma at child's birth, having no father on the birth certificate, and having late prenatal care initiation (Table 2, model 2CA). However, controlling for these factors and parental conviction status, White children had a higher probability of being chronically absent than others.

## Variation in school performance by time and parental criminal justice system involvement

Overall, magnitudes of change over time by group tended to be small (Figure 3). For math, children of convicted parents experienced a larger decline in scores than other children did at two time points (Table 3). The first was from one year post-conviction relative to the conviction year (14.7% of a standard deviation z= −4.3, p=0.000), and the second was from three years post-conviction relative to two years post-conviction (13.3% of a standard deviation z=−3.5, p=0.002). Change in reading scores did not differ between children of convicted parents and other children. For chronic absenteeism, children of convicted parents experienced a 0.5% decrease in the difference of the probability of being chronically absent relative to others (z=−3.4, p=0.003).

## Children's School Performance by Parents' Participation in an Adult Drug Treatment Court Program

At baseline, children of parents referred to a DTC but who did not enroll did not differ from children whose parent enrolled in a DTC but did not complete on math scores, reading scores, or the probability of being chronically absent (p>0.05) (Table 4, Figure 4). The main difference between children in these two groups is which parent(s) was referred to a DTC. The father was the referred parent for a higher proportion of children in the referred sample relative to the enrolled sample (50.7% versus 45.3%, z=2.0, p=0.050).

Children whose parents completed a DTC program had higher math scores than children whose parents were referred to a DTC but did not enroll (−0.246 vs. −0.388, t=−2.1, p=0.041). Relative to children whose parents were referred to a DTC program but did not enroll, a smaller proportion of children whose parents completed had a mother with no high school diploma (z=4.2, p=0.000) or had low or very low birth weight (z=2.7, p=0.008).

[5]This estimate was calculated based on the coefficients for parent convicted for a substance-related offense in Table 2, models 1CA and 2CA (100%-(3.9% ÷ 7.9%)).

### Variation in school performance by type of parental participation in a DTC program, socioeconomic status, and time relative to parent DTC participation

Controlling for child's grade in school and gender, and which parent participated in a DTC program, children whose parents completed the program had 15.1% of a standard deviation higher math scores than children whose parents were referred but did not complete (Table 5, model 1M). Accounting for socioeconomic status narrowed this gap by 35%[6] (Table 5, models 1M and 2 M). Several factors related to lower socioeconomic status predicted lower math scores including free or reduced-price lunch status, child's race/ethnicity, mother's educational status, and birth weight (Table 5, model 2 M). Excluding time covariates, parental participation in a DTC program was not predictive of either reading scores or the probability of being chronically absent (Table 5, models 1R, 2R, 1CA, and 3CA).

The change in math, reading, and chronic absenteeism that occurred between time points was compared for each of the three groups. None of the differences were statistically significant for math (joint Wald test, $\chi^2$ (df=8) =3.7, p=0.89. Only one comparison was statistically significant: children whose parents completed a DTC program experienced a greater decline in reading scores than children whose parents enrolled but did not complete in the year after referral, relative to the year of referral ($\chi^2$ (df=1) =7.8, Bonferroni p=0.042). For chronic absenteeism, the joint test of the interaction between time and parental DTC group was not statistically significant ($\chi^2$ (df=8) =7.7, p=0.468).

## Discussion

Having a parent convicted on a substance-related charge was associated with poorer child performance on end-of-year tests. Although this study did not identify the relative importance of various pathways, we found that being convicted was an independent risk factor for poor school performance. Even though previous studies have documented benefits of adult DTCs, we could document no beneficial changes in test performance or school absences. The direct objective of such DTCs is to improve the lives of program participants. Any beneficial effect on the participants' children should be viewed as an extra, albeit unintended, benefit.

The observed gaps in math and reading scores between children whose parents were convicted of a substance-related offense and children whose parents were not convicted of an offense were large, a third of a standard deviation. To put this number in perspective, using data from the National Assessment of Educational Progress, Reardon (2011) estimated that a gap of one standard deviation was equivalent to three to six years of schooling. Therefore, a third of a standard deviation is roughly equivalent to one to two years of schooling. In North Carolina, according to our calculations, 9% of children born in 1997 had a parent who was convicted on a substance-related charge when the children were aged 8–16. Therefore, this at-risk population composed a sizable minority of the school-aged population.

[6]This number was calculated based on the coefficients for parent convicted for a substance-related offense in Table 5, models 1M and 2 M (100%-(9.9% ÷ 15.1%)).

Chronic absenteeism was higher among children whose parents were convicted on a substance-related charge relative to children whose parents were not convicted. Preventing school absenteeism is of public policy interest (Kearney, 2008a). Better school attendance appears to be causally related to higher levels of academic achievement (Gottfried, 2011), and absenteeism is linked to poor outcomes such as drug use (Hallfors et al., 2002) and problems such as failure to complete high school and poor employment prospects (Kearney, 2008c).

While children of parents who completed a DTC program did not improve more than children whose parents were referred but did not enroll, both groups improved academically in the years following a parental referral. One plausible explanation is that when a parent is referred to a DTC, children in these families may receive other services or supports. The DTC referral may serve as an opportunity for the courts to connect with other community providers or family members to ensure those children's needs are met.

For most children whose parents were convicted on a substance-related charge, the father was the convicted party. The distribution of mothers and fathers in adult DTCs was more equal. Yet results from our study suggest that children's math and reading scores did not differ based on whether the convicted parent was the mother or the father. While mothers may be more likely to live with their biological children, fathers are more likely to have substance-use issues (McMahon, Winkel, Luthar, & Rounsaville, 2005). Therefore, among those seeking or needing substance-use treatment, the number of fathers may exceed the number of mothers (McMahon et al., 2005). Moreover, even if fathers do not live with their children, they may have positive or negative interactions with their children in providing financial support, providing child care, or visiting or communicating with the child (McMahon, Winkel, Suchman, & Rounasville, 2007; Stewart, 2010). Researchers noted that the parenting role of fathers is often overlooked in substance-abuse treatment (McMahon & Rounsaville, 2002; Stover, Hall, McMahon, & Easton, 2012).

Prior research on parental substance-use treatment suggests that treatment mode affects children's outcomes. As discussed earlier, children of men receiving behavioral couples therapy improved psychosocial functioning more than children of men receiving an individual-based treatment (Kelley & Fals-Stewart, 2002; Ruff, McComb, Coker, & Sprenkle, 2010). In terms of improving psychosocial measures, children aged 8–12 may benefit more than older adolescents from their parents' behavioral couples therapy (Kelley & Fals-Stewart, 2008). Therefore, programs that treat substance-using parents may want to incorporate a family perspective tailored to the family's needs (Stewart, Gossop, & Trakada, 2007). Prior work has demonstrated that enhanced drug court services, e.g., education/vocational resources, can increase DTC completion rates (Deschenes, Ireland, & Kleinpeter, 2009) and, in turn, completion rates have been associated with beneficial outcomes for participants (Mitchell et al., 2012). To our knowledge, the association between access to parent training and adult DTC completion rates has not been examined. Suchman, Mayes, Conti, Slade, and Rounsaville (2004) argued that parent skills programs may fail because they focus too narrowly on parents' behavioral management skills and ignore skills aimed at improving parents' understanding of their children's emotional needs.

Children whose parents have substance problems coupled with criminal involvement may have their own complex treatment needs that include living in a family with relatively few economic resources and being behind in school. Addressing these academic needs would likely involve an approach tailored to the child's individual circumstances. For some children, targeted subject matter tutoring may be sufficient; for others, a more holistic approach may be warranted. Considering the diverse health and social services needs of the children whose parents are served by DTCs, courts may best serve these needs by connecting with local wraparound, system of care, or related service delivery mechanisms that draw on the community's unique ecology of service providers.

Previous studies have suffered from limitations including use of small localized samples (Marcus, 1986; McGrath et al., 1999; Rimmer, 1982), reliance on youth's self-report of academic performance and children's report of parents' substance use (Chandy et al., 1993; Hyphantis et al., 1991), non-use of multivariate techniques (Chandy et al., 1993; Hyphantis et al., 1991; Marcus, 1986; Rimmer, 1982), and inadequate matching between treatment and control groups when matching was attempted (Chandy et al., 1993; Marcus, 1986). Much of the published research on the effect of parental substance use and criminal involvement on youths' academic outcomes is self-reported or reported by a family member (e.g., adolescents who may report the criminal involvement of their parents) (Chandy et al., 1993; Serec et al., 2012). Such self-reports are subject to recall bias, ignorance of actual events that transpired, and sample attrition, which differ among groups (Junger-Tas & Marshall, 1999). Many studies are dated (e.g., Hyphantis, et al., 1991). Importantly, previous studies generally have lacked information on timing of parental arrests in relationship to youth's outcomes or were unable to take advantage of nuanced timing due to sample size limitations (Hagan & Foster, 2012a; Turney & Haskins, 2014). Studies based on non-U.S. data (e.g., (Hyphantis et al., 1991; Serec et al., 2012; Torvik et al., 2011)) may have limited applicability to the U.S. In other studies, when parental substance misuse occurred may have been broadly defined (e.g. ever versus never), therefore making it more difficult to assess the link between parental substance abuse per se and specific child outcomes, such as child's school performance (e.g., Jennison, 2012).

A strength of this study is its reliance on statewide administrative data. Our analysis sample is larger than in many studies. Use of administrative data in our study substituted for self-reported data in previous studies. We focused on an intervention, adult DTC programs, that has been frequently evaluated, but not in terms of its effects on child well-being.

We acknowledge these study limitations. Our empirical analysis was limited to a few measures of school performance. Our measure of parental substance use was based on a documented conviction on a substance-related charge from criminal records. However, some parents who abuse substances may not have a criminal record, and similarly, those who are arrested for substance use may not have dependency issues. However, individuals charged with drug trafficking offenses, such as manufacturing or selling, frequently do so to earn money to buy drugs, and as many as three-quarters of offenders serving time for a drug offense self-identify as regular drug users (Sevigny & Caulkins, 2004). Parents' criminal involvement may affect children in other grades and on other dimensions of school performance, e.g., school dropouts, school-readiness. We only examined links between

children's biological parents and children's school performance. We lacked information on whether the child was living with the parent during the observational period.

## Conclusion

Although children of convicted parents fared worse than their peers on average, much—but not all—of this difference was attributable to socioeconomic status, with the result that parental conviction remained a risk factor for poorer school performance. Even though adult DTC benefits, such as reduced criminal recidivism, have been amply demonstrated, and in spite of reasons to expect this intervention to benefit children, we could detect no intergenerational benefit in improved school performance of their children. While deterring future crime is a priority of the criminal justice system, to best serve societal goals, courts may be uniquely positioned to connect a vulnerable population to community resources. Courts that serve parents of minor children may consider partnering with substance-use treatment providers that use evidence-based programs (e.g., behavioral couples therapy or parent training) that are designed to meet the needs of families. Moreover, courts may partner with community providers that can address the individual health, education, and social services needs of children. While family participation in such services would be voluntary, the court may be able to facilitate access by helping families understand which resources are available in their community.

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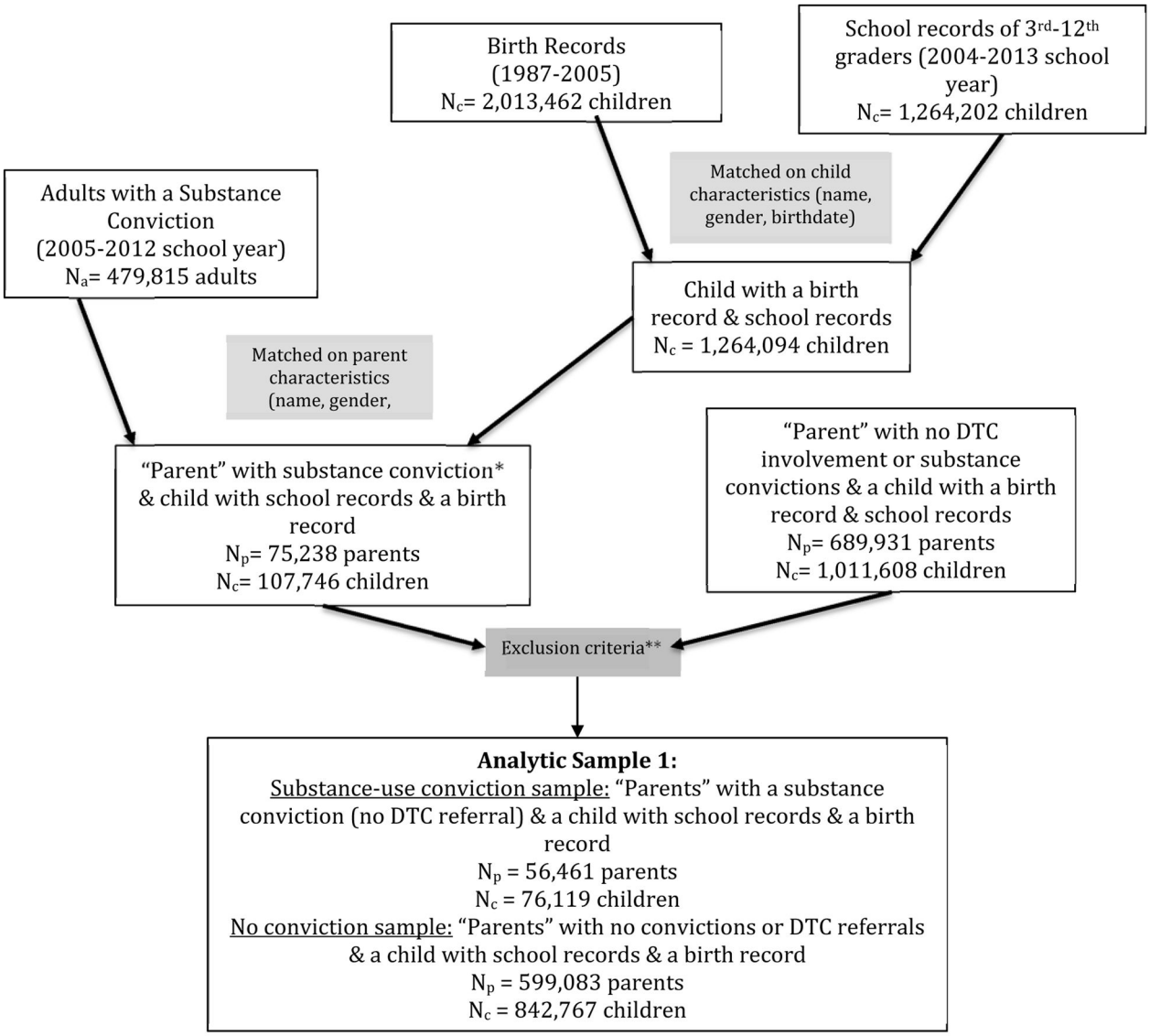


**Figure 1. Description of Dataset Linking to Compare Children of a) Parents Convicted of a Substance-Related Offense and b) Parents Not Convicted of Any Offense**

*Note: To make groups mutually exclusive with the DTC sample, adults in the convictions sample were also linked to court records from the drug treatment courts. Individuals who were referred to a drug treatment court during our observation window 2000–12 (2.3% of parents) were excluded from the sample.

**Exclusion criteria: Sample was limited to an individual's first observed conviction; If both parents were convicted, then mother's information for DTC participation was used; observations with item missingness on covariates or dependent variables were omitted; Children who were missing education outcomes during the window of year before referral to 3 years after referral also were not eligible for inclusion.

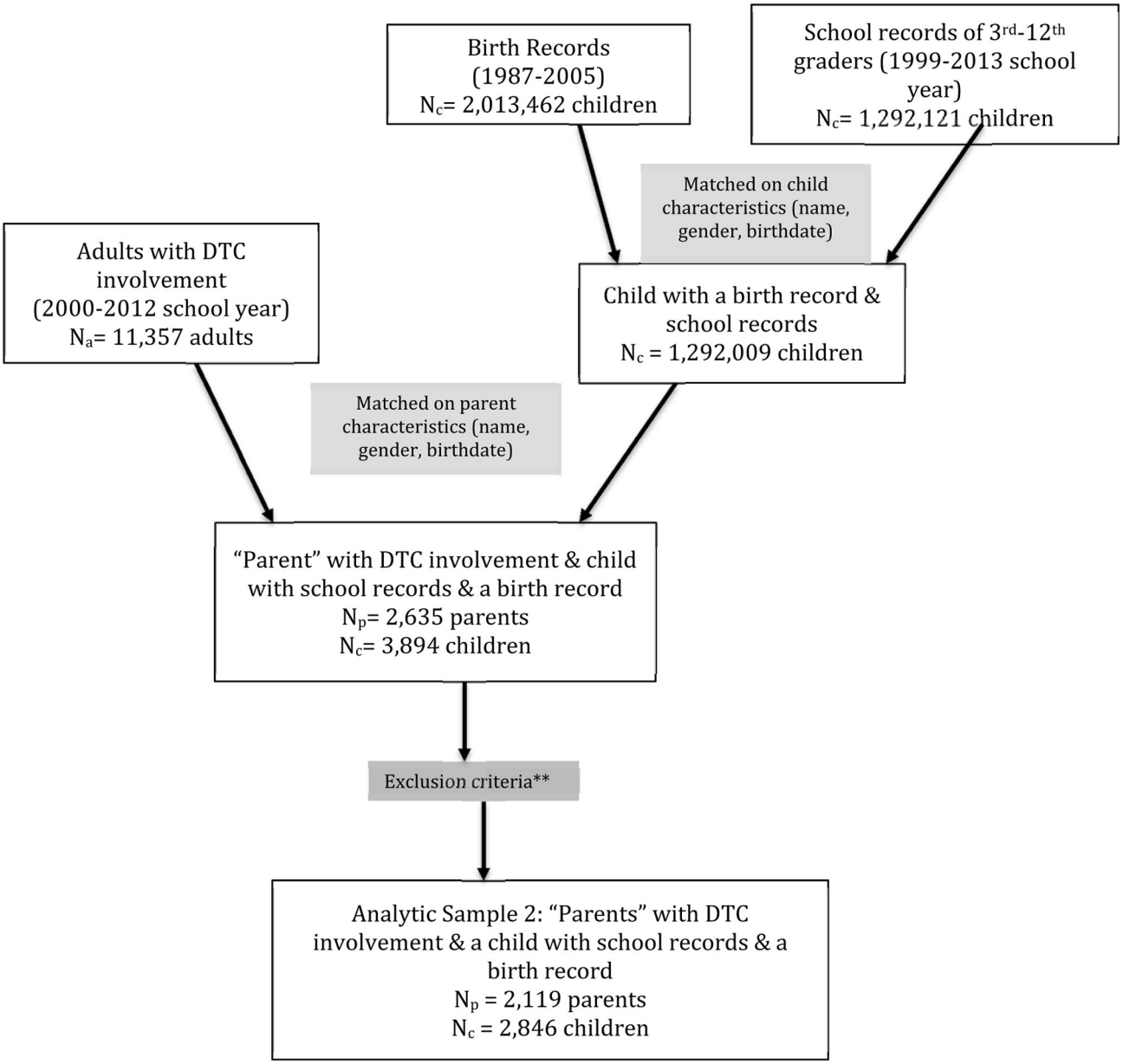


**Figure 2. Description of Dataset Linking to Compare Children of Parents Who Participated (Referred, Enrolled, and/or Completed) a Drug Treatment Court**

*Exclusion criteria: If both parents were referred, then mother's information for DTC participation was used. Cases were omitted if there was item missingness on covariates or dependent variables, or if the referral date was more recent than enrollment or completion date. Children who were missing education outcomes during the window of year before referral to 3 years after referral also were not eligible for inclusion.

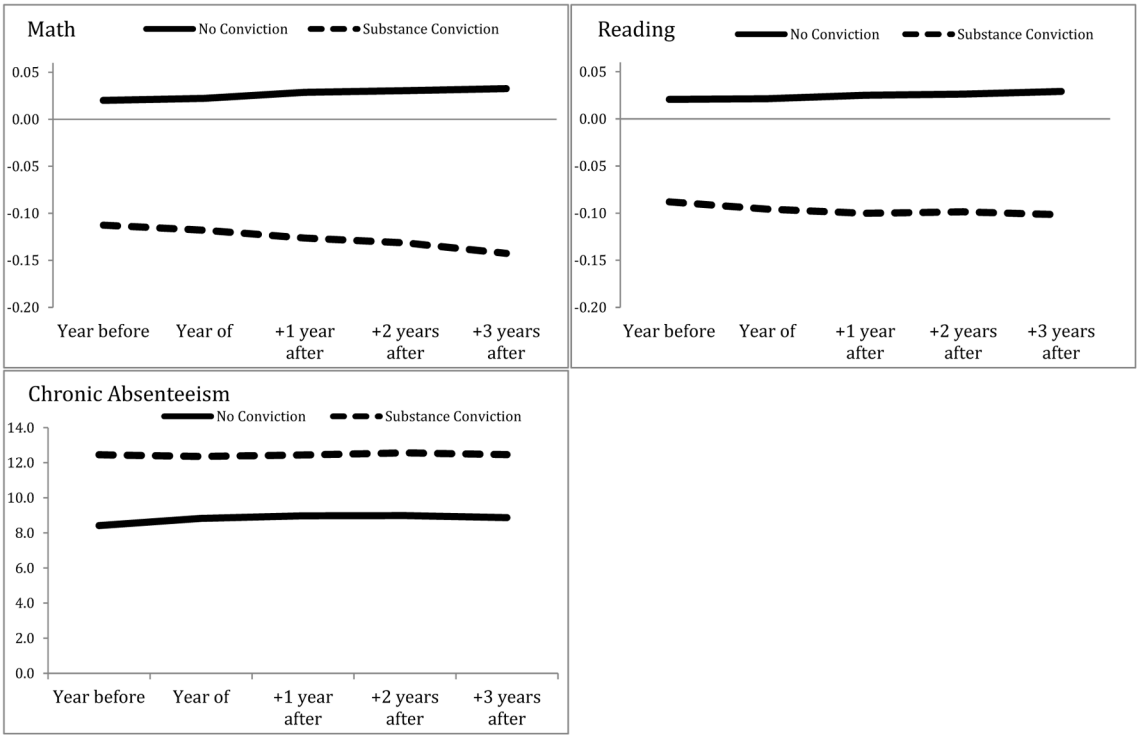


**Figure 3. Change Over Time in Predicted Means of School Performance Indicators by Parental Substance-Related Conviction Status**

The y-axis represents the predicted mean standardized math score, standardized reading score, and probability of missing 18 or more school days (i.e. chronic absenteeism) respectively. Difference at each time point were statistically significantly different $p<0.05$ based on regression results presented in table 3.

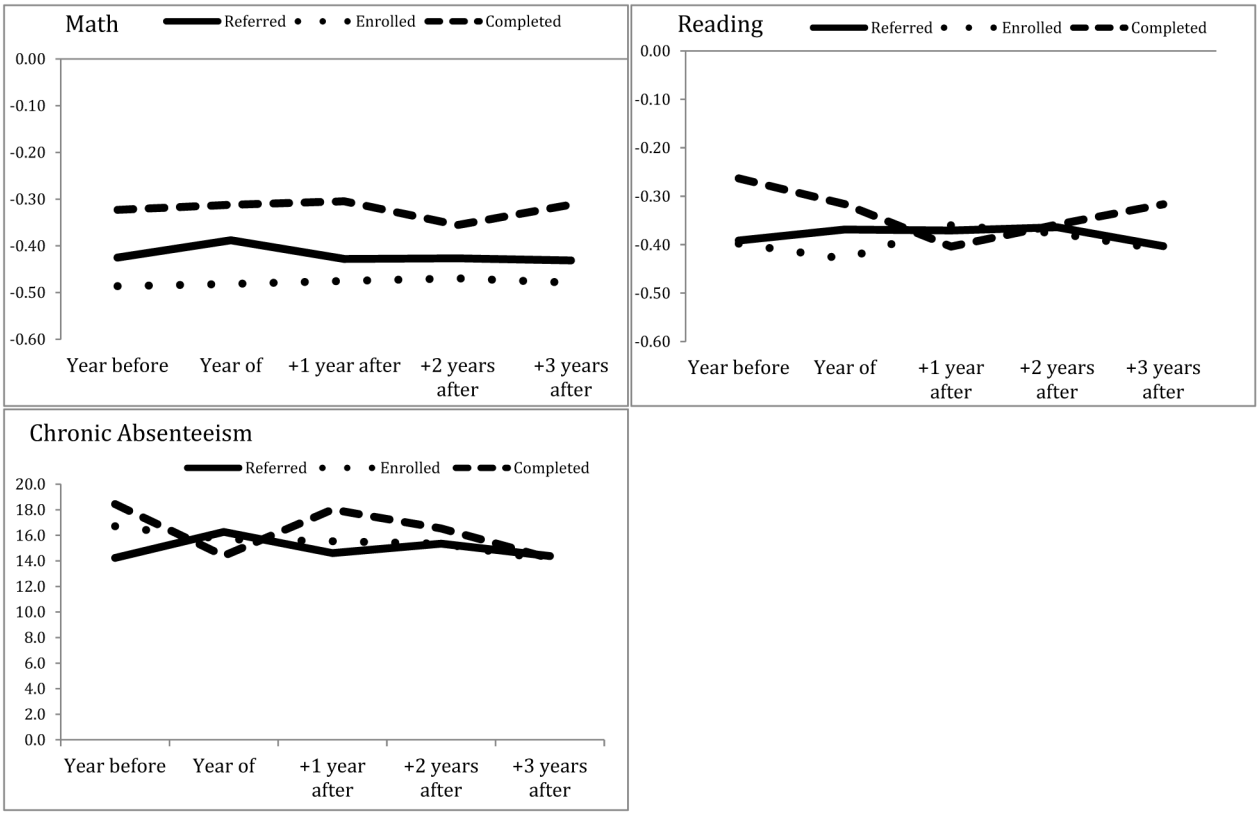


**Figure 4. Change Over Time in Predicted Means of School Performance Indicators by Parental Participation in a Drug Treatment Court Program**

The y-axis represents the predicted mean standardized math score, standardized reading score, and probability of missing 18 or more school days (i.e. chronic absenteeism) respectively. Chronic absenteeism is a binary variable that is one if a student missed 18 or more days of school and zero otherwise. A joint Wald test was used to compare the amount change over time between time points for each group. The only statistically significant difference was that children whose parents completed a DTC program experienced a greater decline in reading scores than children whose parents enrolled but did not complete between the year of referral and the year after referral.

## Table 1

Comparison of Children by Parent's Conviction Status at Time of "Conviction"[Ŧ]

| Variables | No parent convicted | Parented convicted of a Substance-related conviction |
|---|---|---|
| Dependent Variables | **Mean** (std. dev.) | **Mean** (std. dev.) |
| Math (std. score) | 0.057 (0.994) | −0.291[a] (0.911) |
| Reading (std. score) | 0.053 (0.992) | −0.272 [a] (0.942) |
| | **(%)** | **(%)** |
| Absent 18+ days | 8.0 | 12.6[a] |
| Covariates | **(%)** | **(%)** |
| Convicted parent | | |
| Father | | 66.9 |
| Mother | | 24.7 |
| Both | | 8.5 |
| Type of substance-related conviction | | |
| Felony substance-related conviction | | 12.8 |
| Mis. substance-related conviction | | 41.4 |
| Mis. driving while under the influence | | 45.7 |
| Child: male | 50.8 | 50.2 [b] |
| Free or reduced lunch | 36.5 | 65.2 [a] |
| Free or reduced lunch missing | 9.2 | 2.5 [a] |
| Child's race/ethnicity | | |
| White non-Hispanic | 62.4 | 53.2 [a] |
| Black non-Hispanic | 27.2 | 38.2 [a] |
| Other non-Hispanic | 5.3 | 6.5 [a] |
| Hispanic | 5.1 | 2.0 [a] |
| Mother < high school degree at child's birth | 19.5 | 36.1 [a] |
| No father on birth certificate | 8.3 | 6.0 [a] |
| No 1st trimester prenatal care | 17.0 | 24.3 [a] |
| Low or very low birth weight | 7.2 | 9.5 [a] |

[Ŧ] Time of conviction is the school-year (July 1-June 30) of the year the parent was convicted (or pseudo convicted). Children whose parents were not convicted of any crime were randomly assigned a pseudo conviction time.

Mis.=Misdemeanor

Grade binary variables omitted from table.

The number of students varied based on the dependent variable. For the children of parents with no-conviction sample there were 517,350 students in the analysis of math, 515,527 in the analysis of reading, and 798,691 in the analysis of truancy. Corresponding numbers for the substance-related conviction sample are 35,133, 34,950, and 49,695, respectively. For children of parents with no-conviction sample there were 800,636 students in the covariates analysis and 49,931 in the substance conviction sample.

[a] =p<0.001

[b] =p<0.01

[c] = p<0.05

**Table 2**

Effect of Parental Conviction on a Substance-Related Offense on Children's School Performance

| | Math (M) | | | Reading (R) | | | Chronic Absenteeism (CA) | | |
|---|---|---|---|---|---|---|---|---|---|
| **Parameters Model (1,2, or 3):** | **1M** | **2M** | **3M** | **1R** | **2R** | **3R** | **1CA** | **2CA** | **3CA** |
| Parent convicted for substance related offense (*reference*=parent not convicted ) | −0.429[a] (0.009) | −0.165[a] (0.008) | −0.133[a] (0.009) | −0.392[a] (0.009) | −0.138[a] (0.008) | −0.109[a] (0.009) | 0.079[a] (0.002) | 0.039[a] (0.002) | −0.040[a] (0.002) |
| Convicted parent (*reference=mother)* | | | | | | | | | |
| Parent convicted: Father | 0.156[a] (0.01) | −0.003 (0.009) | −0.004 (0.009) | 0.144[a] (0.01) | −0.006 (0.009) | −0.008 (0.009) | −0.051[a] (0.002) | −0.023[a] (0.002) | −0.023[a] (0.002) |
| Both parents convicted | 0.003 (0.015) | −0.069[a] (0.014) | −0.068[a] (0.014) | 0.001 (0.015) | −0.064[a] (0.014) | −0.063[a] (0.014) | 0.003 (0.003) | 0.005 (0.003) | 0.005 (0.003) |
| Child Characteristics | | | | | | | | | |
| Child: male | −0.036[a] (0.002) | −0.042[a] (0.002) | −0.042[a] (0.002) | −0.156[a] (0.002) | −0.162[a] (0.002) | −0.162[a] (0.002) | 0.008[a] (0.0) | 0.008[a] (0.0) | 0.008[a] (0.0) |
| Free or reduced lunch status (FRL) (*reference*=did not receive FRL) | | | | | | | | | |
| Free or reduced lunch | | −0.120[a] (0.001) | −0.120[a] (0.001) | | −0.133[a] (0.001) | −0.133[a] (0.001) | | 0.039[a] (0.0) | 0.039[a] (0.0) |
| Free or reduced lunch missing | | −0.100[a] (0.004) | −0.100[a] (0.004) | | −0.114[a] (0.004) | −0.114[a] (0.004) | | −0.001[c] (0.001) | 0.000 (0.001) |
| Child's race/ethnicity (*reference*=White non-Hispanic) | | | | | | | | | |
| Black non-Hispanic | | −0.614[a] (0.003) | −0.614[a] (0.003) | | −0.594[a] (0.003) | −0.593[a] (0.003) | | −0.013[a] (0.001) | −0.013[a] (0.001) |
| Other non-Hispanic | | −0.125[a] (0.005) | −0.126[a] (0.005) | | −0.180[a] (0.005) | −0.181[a] (0.005) | | −0.004[a] (0.001) | −0.005[a] (0.001) |
| Hispanic | | −0.194[a] (0.005) | −0.197[a] (0.005) | | −0.357[a] (0.005) | −0.359[a] (0.005) | | −0.070[a] (0.001) | −0.071[a] (0.001) |
| Mother < high school degree at child's birth | | −0.412[a] (0.003) | −0.411[a] (0.003) | | −0.419[a] (0.003) | −0.418[a] (0.003) | | 0.071[a] (0.001) | 0.071[a] (0.001) |
| No father on birth certificate | | −0.152[a] (0.004) | −0.152[a] (0.004) | | −0.128[a] (0.004) | −0.128[a] (0.004) | | 0.027[a] (0.001) | 0.027[a] (0.001) |
| No 1st trimester prenatal care | | −0.119[a] (0.003) | −0.118[a] (0.003) | | −0.122[a] (0.003) | −0.121[a] (0.003) | | 0.023[a] (0.001) | 0.023[a] (0.001) |
| Low or very low birth weight | | −0.152[a] (0.004) | −0.152[a] (0.004) | | −0.091[a] (0.004) | −0.091[a] (0.004) | | 0.002 (0.001) | 0.002 (0.001) |
| Time (*reference*=year before "conviction"[1]) | | | | | | | | | |
| Year of "conviction" | | | 0.002[c] (0.001) | | | 0.001 (0.001) | | | 0.004[a] (0.0) |
| 1 year post-"conviction" | | | 0.009[a] (0.001) | | | 0.004[b] (0.001) | | | 0.006[a] (0.0) |
| 2 years post-"conviction" | | | 0.010[a] (0.002) | | | 0.006[b] (0.002) | | | 0.006[a] (0.0) |
| 3 years post-"conviction" | | | 0.012[a] (0.002) | | | 0.008[a] (0.002) | | | 0.005[a] (0.001) |
| Interaction: Time and parental conviction (*reference=year before "conviction")* | | | | | | | | | |
| Convicted * year of "conviction" | | | −0.007[c] (0.004) | | | −0.008[c] (0.004) | | | −0.005[a] (0.001) |

| Parameters Model (1,2, or 3): | Math (M) | | | Reading (R) | | | Chronic Absenteeism (CA) | | |
|---|---|---|---|---|---|---|---|---|---|
| | **1M** | **2M** | **3M** | **1R** | **2R** | **3R** | **1CA** | **2CA** | **3CA** |
| Convicted*1 year post-“conviction” | | | −0.022[a] (0.004) | | | −0.016[a] (0.004) | | | −0.006[a] (0.002) |
| Convicted*2 years post-“conviction” | | | −0.029[a] (0.004) | | | −0.016[a] (0.004) | | | −0.005[b] (0.002) |
| Convicted*3 years post-“conviction” | | | −0.042[a] (0.004) | | | −0.022[a] (0.005) | | | −0.005[b] (0.002) |
| Conviction type (*reference*=driving under the influence misdemeanor) | | | | | | | | | |
| Felony Substance-related conviction | | | 0.006 (0.012) | | | −0.01 (0.011) | | | −0.002 (0.003) |
| Misdemeanor Substance-related conviction | | | −0.037[a] (0.008) | | | −0.039[a] (0.008) | | | 0.005[b] (0.002) |
| Constant | 0.091[a] (0.002) | 0.446[a] (0.002) | 0.448[a] (0.002) | 0.153[a] (0.002) | 0.518[a] (0.002) | 0.520[a] (0.002) | 0.033[a] (0.001) | 0.007[a] (0.001) | 0.006[a] (0.001) |
| # of student-years | | 1,916,361 | | | 1,909,049 | | | 3,105,386 | |
| # of students | | 491,794 | | | 490,994 | | | 646,532 | |

Standard errors in parentheses

[1]Children of parents who were never convicted were assigned a “pseudo conviction date” that was randomly generated.

Grade binary variables are included in the model but not displayed. Models 1, 2, and 3 are multilevel models that account for clustering at the child level and the mother level.

[a]p<0.001,

[b]p<0.01,

[c]p<0.05

**Table 3**

Interpretation of Time Interactions with Parental Substance Use Conviction

| | Difference in Difference: (Children of parents who were convicted of a substance-related offense vs. never convicted) | | |
|---|---|---|---|
| **Comparison time periods** | **Math Change (Std. Err)** | **Reading Change (Std. Err)** | **Chronic Absenteeism Change (Std. Err)** |
| Year of "conviction" vs. year before "conviction" | −0.007 (0.004) | −0.008 (0.004) | −0.005[b] (0.001) |
| 1 year post-"conviction" vs. year of "conviction" | −0.147[a] (0.003) | −0.008 (0.004) | −0.001 (0.001) |
| 2 years post-"conviction" vs. 1 year post-"conviction" | −0.007 (0.004) | 0.000 (0.004) | 0.001 (0.002) |
| 3 years post-"conviction" vs. 2 years post-"conviction" | −0.133[b] (0.004) | −0.006 (0.004) | 0.00 (0.002) |

[a] p<0.001,

[b] p<0.01,

[c] p<0.05

## Table 4

Comparison of Children Whose Parents Participated in an Adult Drug Treatment Court at Baseline

| Variables | Referred to DTC but did not enrolled | Enrolled in DTC but not complete | Completed DTC |
|---|---|---|---|
| Dependent Variables | **Mean** (std. dev.) | **Mean** (std. dev.) | **Mean** (std. dev.) |
| Math (std. score) | −0.388 (0.874) | −0.440 (0.968) | −0.246[c] (0.957) |
| Reading (std. score) | −0.366 (0.929) | −0.402 (0.986) | −0.276 (0.919) |
| | **(%)** | **(%)** | **(%)** |
| Absent 18+ days | 15.4 | 15.0 | 13.4 |
| Covariates | **(%)** | **(%)** | **(%)** |
| Parent referred to DTC was father | 50.7 | 45.3[c] | 53.4 |
| Parent referred to DTC: Mother | 48.4 | 53.9[c] | 44.8 |
| Both parents in DTC | 0.9 | 0.8 | 1.8 |
| Child: male | 49.2 | 53.3 | 47.8 |
| Free or reduced lunch | 68.1 | 70.3 | 63.5 |
| Free or reduced lunch missing | 5.6 | 6.9 | 7.1 |
| White non-Hispanic | 43.2 | 41.4 | 41.5 |
| Black non-Hispanic | 52.4 | 52.1 | 52.5 |
| Other non-Hispanic | 3.9 | 5.7 | 4.7 |
| Hispanic | 0.5 | 0.8 | 1.2 |
| Mother < high school at child's birth | 41.0 | 39.6 | 28.2[a] |
| No father on birth certificate | 14.6 | 15.8 | 13.9 |
| No 1st trimester prenatal care | 28.0 | 28.9 | 24.6 |
| Low or very low birth weight | 14.6 | 11.1 | 8.9[b] |

Baseline is the school-year (July 1-June 30) of the year the parent was referred to DTC.

Grade binary variables omitted from table.

The number of students varied based on the dependent variable. For the children of parents with referred only sample there were 732 students in the analysis of math, 729 in the analysis of reading, and 930 in the analysis of chronic absenteeism. Corresponding numbers for the enrolled only sample are 387, 383, and 466, respectively, and for the completed only sample 241, 240, and 305, respectively. The number of students in the covariate analysis were 1,022, 505, and 337 in the referred, enrolled and completed sample respectively.

T-tests and tests of proportions were calculated to compare differences between children whose parents were referred but did not enroll with children whose parents :1) enrolled in DTC but did not complete, and 2) completed a DTC program.

[a] $p<0.001$

[b] $p<0.01$

[c] $p<0.05$

**Table 5**

Effect of Parental Participation in an Adult Drug Treatment Court Program on Children's School Performance

| | Math (M) | | | Reading (R) | | | Chronic Absenteeism (CA) | | |
|---|---|---|---|---|---|---|---|---|---|
| **Parameters Model (1,2, or 3):** | **1M** | **2M** | **3M** | **1R** | **2R** | **3R** | **1CA** | **2CA** | **3CA** |
| DTC participation (*reference=referred but did not enroll)* | | | | | | | | | |
| Enrolled but did not complete | −0.040 (0.045) | −0.059 (0.041) | −0.061 (0.05) | 0.005 (0.047) | −0.015 (0.043) | −0.006 (0.053) | 0.005 (0.013) | 0.004 (0.013) | 0.025 (0.021) |
| Completed | 0.151[b] (0.053) | 0.099[c] (0.048) | 0.102 (0.06) | 0.101 (0.056) | 0.048 (0.051) | 0.128[c] (0.064) | 0.006 (0.015) | 0.013 (0.015) | 0.042 (0.024) |
| Referred parent (*reference=mother)* | | | | | | | | | |
| Parent referred to DTC was father | 0.142[a] (0.039) | 0.043 (0.039) | 0.043 (0.039) | 0.144[a] (0.041) | 0.039 (0.041) | 0.040 (0.041) | −0.028[c] (0.011) | −0.01 (0.012) | −0.01 (0.012) |
| Both parents in DTC | 0.398[c] (0.19) | 0.346[c] (0.175) | 0.346[c] (0.175) | 0.382 (0.197) | 0.318 (0.183) | 0.322 (0.183) | −0.027 (0.053) | −0.038 (0.052) | −0.037 (0.052) |
| Child Characteristics | | | | | | | | | |
| Child: male | −0.054 (0.034) | −0.072[c] (0.032) | −0.071[c] (0.032) | −0.163[a] (0.036) | −0.178[a] (0.034) | −0.178[a] (0.034) | 0.021[c] (0.01) | 0.022[c] (0.01) | 0.023[c] (0.01) |
| Free or reduced lunch status (FRL) (*reference*=did not receive FRL) | | | | | | | | | |
| Free or reduced lunch | | −0.068[b] (0.024) | −0.067[b] (0.024) | | −0.057[c] (0.025) | −0.054[c] (0.025) | | 0.041[a] (0.01) | 0.041[a] (0.01) |
| Free or reduced lunch missing | | −0.073 (0.053) | −0.069 (0.053) | | −0.053 (0.057) | −0.054 (0.057) | | 0.027 (0.018) | 0.025 (0.018) |
| Child's race/ethnicity (*reference*=White non-Hispanic) | | | | | | | | | |
| Black non-Hispanic | | −0.551[a] (0.038) | −0.551[a] (0.038) | | −0.578[a] (0.04) | −0.579[a] (0.04) | | −0.038b (0.012) | −0.039[a] (0.012) |
| Other non-Hispanic | | −0.185[c] (0.08) | −0.182[c] (0.08) | | −0.199[c] (0.084) | −0.196[c] (0.084) | | −0.021 (0.025) | −0.021 (0.025) |
| Hispanic | | −0.182 (0.186) | −0.181 (0.186) | | −0.266 (0.194) | −0.264 (0.194) | | −0.008 (0.06) | −0.007 (0.06) |
| Mother < high school at child's birth | | −0.237[a] (0.037) | −0.237[a] (0.037) | | −0.238[a] (0.039) | −0.239[a] (0.039) | | 0.062[a] (0.011) | 0.061[a] (0.011) |
| No father on birth certificate | | −0.082 (0.054) | −0.081 (0.054) | | −0.099 (0.057) | −0.098 (0.057) | | 0.012 (0.016) | 0.012 (0.016) |
| No 1st trimester care | | −0.042 (0.039) | −0.042 (0.039) | | −0.057 (0.041) | −0.058 (0.041) | | 0.026[c] (0.011) | 0.026[c] (0.011) |
| Low or very low birth weight | | −0.162[b] (0.052) | −0.161[b] (0.052) | | −0.130[c] (0.054) | −0.131[c] (0.054) | | −0.030[c] (0.015) | −0.030[c] (0.015) |
| Time (*reference*=year before referral[1]) | | | | | | | | | |
| Year of referral | | | 0.037 (0.026) | | | 0.023 (0.027) | | | 0.02 (0.014) |

| | Math (M) | | | Reading (R) | | | Chronic Absenteeism (CA) | | |
|---|---|---|---|---|---|---|---|---|---|
| **Parameters Model (1,2, or 3):** | **1M** | **2M** | **3M** | **1R** | **2R** | **3R** | **1CA** | **2CA** | **3CA** |
| 1 year post-referral | | | −0.003 (0.028) | | | 0.021 (0.03) | | | 0.004 (0.014) |
| 2 years post-referral | | | −0.002 (0.032) | | | 0.027 (0.034) | | | 0.011 (0.014) |
| 3 years post-referral | | | −0.006 (0.036) | | | −0.012 (0.038) | | | 0.001 (0.015) |
| Interaction: Time and parental DTC participation (*reference=referred but did not enroll)* | | | | | | | | | |
| Enrolled * year of referral | | | −0.032 (0.042) | | | −0.054 (0.045) | | | −0.030 (0.024) |
| Enrolled * 1 year after referral | | | 0.014 (0.043) | | | 0.017 (0.046) | | | −0.015 (0.023) |
| Enrolled * 2 years after referral | | | 0.018 (0.046) | | | −0.006 (0.049) | | | −0.025 (0.024) |
| Enrolled * 3 years after referral | | | 0.014 (0.049) | | | −0.000 (0.053) | | | −0.028 (0.025) |
| Completed * Year of referral | | | −0.026 (0.05) | | | −0.076 (0.053) | | | −0.061[c] (0.028) |
| Completed * 1 year post-referral | | | 0.021 (0.051) | | | −0.161[b] (0.055) | | | −0.008 (0.028) |
| Completed * 2 years post-referral | | | −0.031 (0.054) | | | −0.122[c] (0.058) | | | −0.03 (0.028) |
| Completed * 3 years post-referral | | | 0.017 (0.059) | | | −0.042 (0.063) | | | −0.044 (0.029) |
| Constant | −0.408[a] (0.041) | 0.134[c] (0.051) | 0.122[c] (0.053) | −0.312[a] (0.043) | 0.237[a] (0.054) | 0.220[a] (0.056) | 0.078[a] (0.014) | 0.028 (0.018) | 0.018 (0.02) |
| # of student-years | | 6,476 | | | 6,435 | | | 8,711 | |
| # of students | | 1,714 | | | 1,705 | | | 2,115 | |

Standard errors in parentheses

[1] Children of parents who were never referred were assigned a “pseudo referral date” that was randomly generated.

Grade binary variables are included in the model but not displayed. Models 1, 2, and 3 are multilevel models that account for clustering at the child level and the mother level.

[a] p<0.001

[b] p<0.01

[c] p<0.05