

The Impact of Juvenile Detention on Recidivism

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Abstract

The optimal detention policy for juvenile delinquents presents a challenge to the criminal justice system, which must balance the well-being of the community with that of the juvenile. Detention is often used as a way to protect the community by preventing a juvenile from committing more crimes while awaiting adjudication of the juvenile's current criminal offense. Detention may however adversely impact a juvenile's outcomes later in life and encourage future criminal activity. Theory suggests that detention could impact recidivism through a number of counteracting channels, including an increase in perceived crime costs, disruption of human capital development, and facilitation of criminal capital acquisition. A clear estimate of the net impact of these channels has evaded past empirical analyses, due in large part to endogeneity issues – arrestees with the greatest risk of future criminal activity may be those most likely detained. This study mitigates such issues by exploiting exogenous variation in pre-adjudication detention stemming from the variation of detention tendencies among randomly assigned probation officers. Through 2SLS estimates, this study finds no statistically significant relationship between pre-adjudication detention and a given juvenile's likelihood of committing a new offense.

1. Introduction

With over 1.6 million juvenile arrests in 2010 alone, juvenile crime represents a complex, salient issue for domestic policy makers (Sickmund & Puzzanchera, 2014). While the adult criminal justice system is primarily focused on maximizing public safety, the juvenile system must balance this objective with concern for the juvenile's well-being and development. In several United States communities, the ethos of juvenile justice has shifted in recent years, so that policies are being reevaluated with increased attention on the latter objective (Scott & Steinberg, 2008).

One dimension of policy that has come under increasing public scrutiny is the use of secure detention among juvenile offenders. According to the United States Justice Bureau, at any given moment over 70,000 juveniles are being held in a secure facility (Sickmund & Puzzanchera, 2014). However, the impact of detention on this sizeable population's later criminal behavior remains largely unknown. While detention may deter a juvenile from further criminal activity by increasing the juvenile's perceived cost of crime (Becker, 1968), a number of plausible mechanisms could potentially have the opposite effect. Detention may cause the juveniles to miss school, thus disrupting their human capital accumulation, or may expose juveniles to negative peer effects (Bayer et al., 2009).

Despite the unknown nature of the relationship between detention and recidivism, juvenile corrections departments across the United States have recently dramatically reduced the rate at which they detain juveniles prior to adjudication. Much of this reduction in pre-adjudication detention is due to the Juvenile Detention Alternatives Initiative (JDAI), an initiative launched by the Annie Casey Foundation two decades ago. Under this initiative, Annie Casey has provided grants to nearly 300 jurisdictions across the United States,

including St. Joseph County, the jurisdiction studied in this paper. Grants are provided under the promise that these sites would reach certain detention reduction goals using JDAI's recommended policies. According to JDAI's annual report, in 2013 alone nearly 68,000 juveniles who would otherwise have been detained at some point have been released prior to their adjudication as a direct result of the initiative. The United States juvenile justice system is thus currently engaging in a large experiment in which tens of thousands of juveniles are released each year with little preexisting evidence on the actual impact of detention.

Given the large number of juveniles and communities currently impacted by these detention policies, determining the relationship between detention and later criminal behavior is of the utmost importance. Obtaining unbiased estimates of this relationship, however, is subject to two major constraints as outlined by Aizer and Doyle (2013). First, detention has a potentially heterogeneous impact on offenders, depending on the offender's underlying characteristics and preexisting propensity to commit crimes. Because changes in policy would primarily impact those who are on the margin of being detained, relevant research should focus on this particular subset of arrestees. Second, when compared to the subset of arrested juveniles who are not detained, juveniles who are detained are likely to already have a higher likelihood of later criminal behavior. Hence, OLS estimates of the impact of detention on the rate of later criminal behavior would likely be biased upwards.

This paper combats these concerns in a style similar to that of Aizer and Doyle's 2015 analysis using data from the juvenile justice department in St. Joseph County, Indiana. In this jurisdiction, at the time of arrest, juveniles are randomly assigned to a probation officer who assesses whether or not to detain the juvenile prior to the juvenile's adjudication. For a small subset of crimes, detention decisions are automatic. For example, juveniles arrested for more

serious crimes such as murder or rape are automatically detained while those arrested for underage drinking are automatically released prior to adjudication. For the juveniles whose arresting crimes do not fall into these extreme categories, the detention decision is made by the assessing probation officer. In this way, St. Joseph County isolates juveniles who are on the margin of being detained, thus mitigating Aizer and Doyle's first concern.

To assess such marginal cases, the probation officer is assisted by the Detention Risk Assessment Instrument (DRAI). The DRAI assigns the juvenile arrestee an integer score based on the juvenile's characteristics, including his or her criminal history and the nature of his or her current crime. This integer score corresponds to that juvenile's estimated risk of engaging in further criminal behavior before he or she can be adjudicated and sentenced with higher scores indicating increased risk. The DRAI then recommends that juveniles with scores above a certain threshold be detained while recommending that those below the threshold be released. In St. Joseph's County, however, the assessing probation officer has the ability to override the DRAI's recommendation, detaining juveniles below the threshold or releasing juveniles above it. As will be shown, these overrides are frequent, and probation officers vary in their propensity to detain juveniles. Thus, when a given juvenile is arrested, their likelihood of detention is significantly influenced by the preexisting detention behavior of the probation officer to whom the juvenile is randomly assigned.

Out of 5,000 recorded juvenile incidents occurring in St. Joseph County between January 2008 and June 2015, the sample is restricted to the roughly 3,800 incidents that were not automatic releases or detentions. This paper then exploits the exogenous variation in pre-adjudication detention generated by the random assignment of juveniles to probation officers with different detention propensities within a two-stage least-squares (2SLS) framework to

derive an unbiased estimate of the impact of detention on recidivism behavior within a year of the juvenile's release from detention. This specification is similar to Aizer and Doyle's 2015 analysis which used exogenous variation in the detention rate stemming from the random assignment of juveniles to judges with varying sentencing behaviors in order to determine the impact of detention on high school graduation and adult recidivism. Similar specifications were used by Kling (2006) and Di Tell and Schargrotsky (2013) to study the impact of sentence length on labor market outcomes and recidivism behavior among adults.

The estimates of the effect of pre-adjudication detention on recidivism that are produced by this 2SLS analysis are, though not statistically significant, still quite suggestive. Breaking up the recidivism measure by the timeframe and type of crime being committed, this analysis produces near-zero estimates for the effect of pre-adjudication detention on rates of 6 month recidivism of any type of crime, 6 month felony recidivism, and 12 month recidivism of any type of crime. However, all of these estimates have quite large confidence intervals, suggesting that the actual effect of pre-adjudication detention on these recidivism rates might range from largely negative to largely positive. Further, the confidence interval of the impact of detention on 12 month felony recidivism is entirely below zero, indicating that while the magnitude of the effect of detention is still quite ambiguous, the direction of that effect is likely negative, which suggests a discouraging effect of detention.

This paper is organized as the following: the next section of this paper provides more background on the existing literature regarding the relationship between juvenile detention and crime as well as an overview of the procedures in St. Joseph County. Section 3 details the data used in this analysis, and section 4 outlines the approach and specification. Section 5 presents the empirical results which are then discussed in section 6.

2. Background

2.1 Theory

This paper seeks to determine the impact of pre-adjudication detention on a juvenile's likelihood of recidivism within one year of being released. Starting with Becker's seminal 1968 paper, much theory has been proposed regarding the relationship between detention and later criminal activity. According to Becker's model, the supply of criminal behavior is determined by the perceived benefits and cost of that activity. Perceived cost is a function of the propensity of being caught and the severity of punishment. Evidence for these mechanisms has been found not only for adults, but for juveniles as well (Levitt, 1998). From Becker's theory, one can predict that detention could increase the juvenile's perceived cost of future criminal activity which in turn would suggest a negative relationship between detention and recidivism.

In addition to increasing the perceived cost of criminal activity, detention may impact recidivism through alternative channels that may have counteracting effects. One such channel that is particularly salient for juveniles is the human capital channel. Because juvenile delinquents as opposed to their adult counterparts are still at the early stages of their human capital development, disruptions in that development can have large impacts on later outcomes (Cunha et al. 2006). One mechanism through which detention could impact human capital development is by disrupting the juvenile's school attendance and reducing the likelihood of high school completion, which in turn has been shown to have a positive relationship with later criminal behavior (Levitt and Lochner, 2000; Lochner and Moretti, 2004; Machin, Marie and Vujic, 2011). However, because human capital's effect is amplified

throughout an individual's lifetime, this disruption in human capital development may not have a perceptible impact until later in the juvenile's life.

A mechanism through which detention could have a more immediate impact on criminal behavior is the acquisition of so-called "criminal capital." Much evidence exists for strong correlations in the criminal behaviors of juveniles, suggesting the influence of peer effects in the supply of juvenile crime (Bayer et al., 2009; Glueck and Glueck, 1950; Taylor 1996). When detained, a juvenile is placed in a peer group comprised solely of juveniles with at least some level of criminal involvement. Through interactions with other detainees, a juvenile could gain further knowledge of criminal behavior and networks. The acquisition of this criminal capital could plausibly increase the juvenile's propensity to engage in criminal behavior upon release.

A related mechanism by which detention could increase a juvenile's subsequent criminal behavior is through labelling. Juveniles who are formally detained may be labelled by the community as "delinquents" or "criminals," thus reducing their ability to reintegrate with the community and engage in the legal labor market upon release (Bernburg et al., 2006; Lemert 1967; Schwartz and Skolnick 1962).

The relationship between detention and recidivism is thus subject to a number of counteracting mechanisms. Detention may expose a juvenile to the true cost of criminal activity, making future criminal activity less appealing. However, detention may also disrupt human capital development, facilitate the acquisition of criminal capital, or induce harmful labelling. Given their counteracting directions, the net impact of these various mechanisms on subsequent criminal behavior is unclear.

2.2 Empirical Work

Most empirical research pertaining to the impact of incarceration focuses on adult offenders. These studies are subject to the same previously mentioned challenges posed by Aizer and Doyle (2013): first, detention has potentially heterogeneous impacts on offenders, depending on the offender's preexisting propensity to commit crimes. Second, the individual characteristics associated with a higher propensity of detention are likely to also be positively correlated with that individual's propensity to be involved in later criminal behavior. Different approaches have been taken in order to combat these challenges, and the resulting findings have been quite mixed. While some work has found that adult detention is associated with increased recidivism (Bernburg, Krohn and Rivera, 2006; Di Tella and Schargrodsky, 2009; Spohn and Holleran, 2002), others have found no effect (Gottfredson, 1999; Smith and Akers, 1993), and still others have found that it reduces recidivism (Murray and Cox, 1979; Brennan and Mednick, 1994).

In the context of juvenile delinquency, the body of research regarding the impact of detention is much smaller but yields similarly mixed findings. Most studies have attempted to ameliorate endogeneity issues by controlling for observed individual characteristics (De Li, 1999; Tanner et al., 1999; Sweeten, 2004). However, concern can remain regarding the potential biasing impact of unobserved characteristics that remained uncaptured by the standard set of controls. Alternatively, in a 2008 paper, Hjalmarsson used household fixed effects to estimate the relationship between criminal justice involvement and high school completion, however Hjalmarsson's dataset only contained nine households, undermining the credibility of his findings.

Regarding the specific question of how juvenile detention impacts recidivism, two papers have employed convincing specifications to mitigate concerns of endogeneity. The first is the previously mentioned 2013 Aizer and Doyle study from which much of this paper's framework of analysis is borrowed. Using variation in judge sentencing behavior, Aizer and Doyle found that juvenile detention is associated with lower high school completion rates and increased adult criminal behavior. In contrast, a 2009 study by Hjalmarsson exploited a sharp variation in detention arising from sentencing guideline discontinuities in Washington and found that detention significantly decreased a juvenile's propensity of subsequent criminal activity.

A potential explanation of the different findings of these two studies is the different time periods in which they measured recidivism. While Aizer and Doyle focused on adult recidivism, Hjalmarsson began measuring recidivism immediately after the juvenile was released in order to quantify the impact of detention on the daily risk that a juvenile would commit a crime. Together, these studies suggest that detention may decrease the likelihood of recidivating in the short term while increasing the likelihood of recidivating in the long term.

This persistent ambiguity indicates that further research is needed regarding the relationship between detention and subsequent criminal behavior. This paper follows the procedure of Aizer and Doyle, but like Hjalmarsson examines recidivism immediately following detention, thus providing insight into the uncertain impact of detention on subsequent criminal behavior.

2.3 This Analysis's Context: St. Joseph's County Juvenile Arrest Procedure

This analysis uses data from the juvenile justice department of St. Joseph County, a jurisdiction of over 266,000 residents in northwest Indiana. When a juvenile is arrested in St. Joseph's county, the arresting officer will call the probation department in order to determine whether the juvenile needs to be detained during the period of time before the juvenile is adjudicated. During normal business hours, the call is forwarded to whatever probation officer happens to be available. Conversations with employees in the probation office confirmed that the assignment of the call among available officers was completely random. Outside of business hours, probation officers voluntarily take shifts to be "on call" for a week at a time. During the week that a probation officer is on call, he or she is responsible for handling all arrest calls that occur outside of normal business hours.

During the call, the probation officer fills out the DRAI based on information regarding the current alleged crime provided by the arresting officer as well as information regarding past delinquent behavior from the Juvenile Justice Center's criminal database. If the juvenile's arresting crime falls into an automatic detention or automatic release category, the officer notes this on the DRAI and relays the decision to the officer. If the juvenile does not fall into either category, the officer fills out the remainder of the DRAI which assigns certain scores for different characteristics. The sum of these scores is the juvenile's total DRAI score, which is designed to be the basis of the probation officer's detention decision. Juveniles who score below 20 are supposed to be released while those who score 20 and above are to be detained.

While the DRAI gives a specific recommendation for either detention or release, probation officers are allowed to override at their discretion. As can be seen in Figure 1,

probation officers frequently override the DRAI's decision, often detaining juveniles who score well below 20. Approximately 60% of all individuals who score 11 to 19 points on the DRAI are detained regardless of the DRAI's recommendation. Deviations from the recommendation occur above the threshold score though at a lesser rate with roughly 15% of juveniles scoring 20 to 29 points being released. The fact that so many cases are overridden has led the county to recently restructure the DRAI with the goal of reducing overrides.

Hence, despite the fact that the version of the DRAI in this paper's dataset was designed to provide an assessment of the risks associated with not detaining a juvenile, in many cases the probation officers either observed in the juvenile what they believed to be a relevant characteristic that was not measured on the DRAI or weighed aspects of the case differently than the DRAI. As will be shown, probation officers exhibit observable tendencies in their individual likelihoods of exerting such discretion and detaining juveniles. Together, the frequent use of overrides and the varying observable tendencies of probation officers to detain individuals provide exogenous variation in detention that this analysis will be able to exploit.

3. Data Description

This analysis used three primary datasets provided by the Indiana Department of Justice and the St. Joseph Juvenile Justice Center: completed DRAIs (2008 - 2015), criminal incidents involving juveniles (1997 - 2015), and the formal supervision and detentions of those juveniles (2000 - 2015). Additionally, average income by zip code was obtained through the 2010 American Community Survey.

The DRAI dataset includes information from all DRAIs filled out in St. Joseph County from 2008 until June 2015. This information includes the date that the DRAI was completed, the file number of the juvenile who committed the offense, and an identification key associating the DRAI with a particular incident. The set also includes the name of the probation officer who completed the DRAI, the DRAI score, the characteristics that contributed to that DRAI score, and the probation officer's final decision whether to detain or release the juvenile.

The incident dataset contains all of the criminal incidents involving individuals under the age of 18 in St. Joseph County from 1997 through June 2015. It links the incident key with the file number of the juvenile who was involved in the incident, statutes filed for the incident, and the resulting adjudication decisions for the incident. The incident dataset also includes the race, age, and address of the juvenile. The address of the juvenile was used to link the juvenile with the average income in the juvenile's zip code. From this raw dataset, a longitudinal dataset was constructed in which an individual juvenile was matched with every incident in which he or she was involved, thus creating a comprehensive criminal history from 1997 to 2015. A drawback of this dataset is that it only contains incidents that take place in St. Joseph County.

The supervision and detention dataset contains every formal and informal supervision associated with each child in the St. Joseph County juvenile database from 2000 to June 2015. The set specified the type of supervision (i.e. secure detention, informal supervision, etc.) and the start and end dates of the supervision. Like the incidents, these supervisions were linked to the juvenile using that juvenile's identification number.

The final rectangular dataset matches each DRAI to the incident with which it is associated, the juvenile's past and future criminal behavior, and the juvenile's past and future supervisions. Incidents that were automatic detentions or releases were automatically dropped from the sample. Probation officers who had filled out fewer than ten DRAs were dropped as were their associated incidents. The resulting sample was comprised of approximately 3,800 incidents which were associated with 35 probation officers.

4. Specification

4.1 Set Up

The basic OLS model of the relationship between juvenile detention and the likelihood of later recidivism for juvenile (j) is the following:

$$(1) Y_j = \beta_0 + JD_j \beta_1 + X_j \beta_2 + \varepsilon_j$$

In this linear probability model, Y_j is a dummy for recidivating, JD_j is a dummy for juvenile detention, and X_j is a vector of individual character controls. Estimates of β_1 produced by regressions of the form above would likely be biased upward given the positive correlation between the likelihood of detention and a number of factors that are also associated with later recidivism.

To address this issue, this analysis exploits the random assignment of probation officers with varying propensities to detain juveniles. For each juvenile, a detention propensity is calculated using the rate at which the juvenile's probation officer has detained all of the other juveniles whom the probation officer has assessed. Using this instrumented version of detention, an unbiased causal estimate of the impact of detention of later criminal behavior can then be calculated.

4.2 Instrumental Variable

The detention propensity Z_j is calculated for each juvenile (j) based on the detention behavior of their probation officer (p). This is a simple “leave-out” mean of the following form:

$$(2) Z_{jp} = d_{pj} \left(\frac{1}{n_p - 1} \right) \left[\sum_{k \neq j}^{n_p - 1} JD_k - JD_j \right]$$

In the above specification, d_{pj} is a dummy variable indicating that a juvenile j has been randomly assigned to a probation officer (p); n_p is the total number of cases that is observed for probation officer (p); k indexes the juvenile cases assessed by probation officer (p); JD_k is a dummy variable which is equal to one if juvenile (k) is detained. The instrument is thus the mean detention outcome for a juvenile’s probation officer calculated from all of the probation officer’s detention decisions except for the juvenile’s own.

This analysis includes 35 probation officers with an average number of 108 cases per officer. There is significant variation in the detention behavior of probation officers. The detention rate has a median of 37% with a standard deviation of 13%.

Though the DRAI is often ignored in detention decisions, as seen in Figure 1, there does exist a discontinuity at the threshold score of 20. Hence, in both the first and second stage of IV regressions, a dummy variable S_j is included to indicate whether the juvenile scored above a 20 on the DRAI. Also included in both sets of regressions is a vector X_j of the juvenile’s characteristics including dummies for the juvenile’s age and ethnicity, the income percentile of the zip code where the juvenile resides as provided by the ACS, their age,

whether the juvenile has had a previous felony charge, and the type of statute under which the juvenile's current crime is filed (felony, misdemeanor, status). To address potentially nonrandom variation in availability among the probation officers during the random assignment, also included in both the first and second stages are two sets of dummy variables to account for the day and time of the arrest--six dummies for days of the week and five dummies for four hour increments to account for the 24 hours in a day.

4.3 Instrumental Validity

The credibility of the instrument's validity hinges on a few necessary conditions. First, the assignment of a juvenile's assessing probation officer has to be independent of the juvenile's likelihood of offending, conditional on the day and time of arrest. Second, the assignment to a high detention probation officer cannot affect the juvenile's later criminal behavior in any way, aside from the probation officer's likelihood to detain the juvenile.

Although the first condition cannot be tested explicitly, a comparison of the characteristics of juveniles assigned to low and high detention propensity officers can be done to determine whether significant differences in the groups exist. However, as shown below, no statistically significant differences are found between the two groups, indicating that certain types of juveniles are not assigned to certain probation officers. The implication of these empirical tests is corroborated by conversations with probation officers and other employees at the St. Joseph Juvenile Justice Center who reported that assignment is indeed random.

Turning now to the second concern, there appears no channel through which being assigned to a high detention propensity probation officers for initial assessment could influence the juvenile's later criminal behavior aside from the probation officer's detention

decision. According to the employees at the Juvenile Justice Center, the probation officer who will ultimately handle a given juvenile's case is assigned after the initial assessment is made. Hence, the probation officer who initially takes the police officer's call at arrest, completes the DRAI, and makes the detention decision will not be more likely to interact with that juvenile than any other probation officer. Hence, assignment to a low or high detention propensity probation officer should not influence a juvenile's likelihood of recidivating except through the influence of the probation officer's detention decision.

4.4 Recidivism Measure

The outcome of interest in this study is the juvenile's likelihood of recidivating within a certain amount of time after being released from detention. For this analysis, dummy variables were created to indicate whether a juvenile had any new criminal incident within the first 6 and 12 months after being released from supervision. A similar set of dummies were created to indicate whether a juvenile was involved in a felony incident within that same 6 and 12 months of unsupervised time.

For this analysis, supervision means any sort of formal supervision dictated by the juvenile justice department, including secure detention as well as alternative measures such as electronic monitoring and home detention. Care was taken in the construction of these variables so that each juvenile was given an identical "follow up period" of unsupervised time in which they could potentially recidivate. This process for constructing the 12 month follow up period is illustrated in Figure 2.

In this figure, all four juveniles are detained at time t . The first juvenile labeled "Released A" is immediately released by the probation officer at the time of the juvenile's

incident, hence, the juvenile's follow up period immediately begins. After seeing a judge at day $t + 30$, the juvenile is not sentenced to any further supervision, hence the juvenile's follow up period continues uninterrupted. This follow up period continues until time $t+365$, creating a yearlong time frame in which the juvenile can potentially recidivate. In the second row, the juvenile labeled "Released B" is also immediately released by the probation officer at the time of the juvenile's incident, so the juvenile's follow up period also immediately starts. However, at time $t + 30$, the juvenile's case is adjudicated and the juvenile is sentenced to 40 days under supervision, whether secure detention or home monitoring. The follow up period is then paused for this 40 day period. The follow up period resumes at $t + 70$. The final day of observation for this follow up period is then day $t + 40 + 365$, so that the juvenile's follow up period is exactly one year long. The construction of the follow up periods of individuals who are detained are similarly illustrated in the last two lines of Figure 2.

Because this analysis only uses data from St. Joseph County's juvenile division, criminal activity after a juvenile turns 18 will not be observed in the dataset, posing an additional challenge to observing recidivism. To avoid systematically under-reported recidivism, individuals who have eighteenth birthdays before the final day of their follow up period are dropped from the recidivism variable associated with that period. Similarly, individuals whose follow up period has an end date past the last date in the analysis's incident dataset are dropped as well. Thus, DRAIs that were filled out in the summer of 2015 would not be included in recidivism regressions because the juveniles involved would not have had an equal follow up period in which they could potentially recidivate.

5. Results

5.1 Instrument Validity Test

In order to use probation officer detention propensities as an instrument for a juvenile's detention, one must have reasonable confidence that high and low propensity officers are functionally randomly assigned, conditional on the day and time of arrest, and are thus not associated with a given juvenile's later criminal behavior, aside from the impact on the likelihood of the juvenile's detention. Although this exclusion restriction cannot be directly tested, one can compare the pre-existing characteristics of juveniles assigned to low propensity probation officers and juveniles assigned to high propensity probation officers. Low and high propensity officers are defined as probation officers with detention rates below and above the median probation officer detention rate, respectively. These regressions take on the following form where x_j is a given characteristic for juvenile (j), HD_j is a dummy that is equal to one if the juvenile is assigned to a high detention propensity probation officer and zero otherwise, and H_j is a vector of the day of the week and time of day dummies.

$$(3) x_j = \beta_0 + HD_j\beta_1 + T_j\beta_2 + \epsilon_j$$

The results are summarized in Table 1. These regressions find no statistically significant difference between those assigned a high propensity officer and their counterparts for characteristics such as age, racial composition, gender, or previous felony involvement. These results suggest that assignment to a high or low detention propensity probation officer is indeed random. This bodes well for the validity of the use of probation officer detention propensity as an instrument for detention.

5.2 First-Stage Estimates: Probation Officer Assignment and Juvenile Detention

The equation of the first stage is a linear probability model, which is specified as follows where D_{jp} is a dummy that is equal to one if juvenile (j) who is assigned to probation officer (p) is detained.

$$(4) D_{jp} = \beta_0 + Z_{jp}\beta_1 + S_j\beta_2 + X_j\beta_3 + \epsilon_{jp}$$

Z_{jp} is the instrument as defined by equation (2) in section 4.2, S_j is a dummy variable equal to one if juvenile (j) scores 20 or higher on the DRAI (the threshold over which juveniles are to be detained), and X_j is the vector of juvenile characteristics detailed in the final paragraph of section 4.2.

The results of the first stage are presented in Table 2. The model estimates that there is a statistically significant positive relationship between a juvenile's assigned assessment probation officer and that juvenile's likelihood of being detained. This relationship is robust to the inclusion of the controls. Using this multivariate model, increasing a juvenile's assessing probation officer's "leave out" detention mean from zero to one increases a given juvenile's likelihood of being detained by 66 percentage points.

5.3 2SLS Results: Juvenile Detention and Recidivism Behavior

Having found a robust first stage relationship, the measure of detention propensity D_{jp} , estimated in the first stage specified in equation (4), may then be substituted into the baseline model specified in equation (1) to yield the following equation:

$$(5) Y_j = \beta_0 + D_{jp}\beta_1 + X_j\beta_2 + \epsilon_j$$

Here, Y_j is a dummy variable for recidivating in a certain time frame during which the juvenile is unsupervised as discussed in section 4.4 and X_j is the same set of controls from the first

stage that are detailed in the final paragraph of section 4.2. The results of these regressions are presented in Table 3.

For each of the recidivism measures used, no statistically significant relationship between detention and recidivism is found, a result that persists with and without controls. However, estimates have quite large standard errors, suggesting that within the 95% confidence interval a large range of effects are possible. The effect of detention on 6 month general recidivism rates, 6 month felony recidivism rates, and 12 month general recidivism rates could range anywhere from largely negative to largely positive. For instance, though the 2SLS model estimates that pre-adjudication detention is associated with a 2.4 percentage point decrease in the likelihood of committing a new crime within 12 months of release, its confidence interval indicates that the actual effect could be anywhere ranging from a 13.4 percentage point decrease to an 8.6 percentage point increase. For 12 month felony recidivism rates, the 95% confidence interval of pre-adjudication detention's effect is entirely below zero. While this result suggests that the effect of detention on the likelihood of committing a felony within 12 months of release is likely negative in direction, the magnitude of this effect is quite uncertain, ranging from 3 to over 25 percentage points.

The ambiguity of these estimates is likely a result of small sample size. Once all restrictions are in place, sample sizes for these estimates range from approximately 2,100 to slightly below 2,500. Given the strength of the first stage, this analysis might be able to produce more precise estimates with a larger sample.

6. Discussion

Unlike the adult criminal justice system, juvenile justice is guided by an ethos which must balance the welfare of the community with that of the juvenile. As such, the impact of detention on recidivism is an important consideration. In the relationship between juvenile detention and subsequent criminal behavior, several conflicting mechanisms are at work. While detention may make the cost of the commission of a crime more salient for the juvenile and thus decrease the juvenile's likelihood of committing a new crime, it may also have the opposite effect by disrupting the juvenile's human capital accumulation, facilitating the development of criminal capital, or inducing harmful labelling. While past empirical analyses of this relationship have been stymied by endogeneity concerns, this analysis is able to elucidate an unbiased estimate by exploiting the plausibly exogenous variation in detention generated by the differing detention propensities among randomly assigned probation officers. This analysis finds that for a juvenile who is on the margin of detention, the individual impacts of these mechanisms counteract each other, producing a nonsignificant estimated net impact on the juvenile's likelihood of recidivating. If these near-zero estimates are accurate, they suggest that detaining juveniles leads to an overall lower level of juvenile crime since individuals are unable to recidivate during the period of time when they are detained.

However, the estimates produced by this analysis have quite large confidence intervals, a result likely stemming from the analysis's small sample size. Hence, the actual effect of pre-adjudication detention on recidivism could possibly range from largely negative to largely positive. The only measure of recidivism for which the estimated effect has a confidence interval that does not include zero is the likelihood of committing a felony within 12 months of release. The entirety of this interval is less than zero, which suggests that pre-

adjudication detention may have some discouraging effect against the most serious of crimes. However, given the large standard errors, the magnitude of this effect is highly ambiguous. While this analysis does not produce statistically significant estimates, its results are quite suggestive. Further, the first stage of the analysis is quite strong, hence the prospect of yielding more precise estimates from a similarly styled analysis with a larger sample size is quite promising.

In addition to recidivism rates, the impact of detention on a number of other possible factors should also be considered when designing optimal detention policy. Relevant considerations include detention's impact on a juvenile's access to education and employment opportunities as well as the marginal cost of each detention to the taxpayer. Policy makers should also consider juvenile detention's long-term effects, which could potentially eclipse these short term valuations. Thus, further research on the impact of juvenile detention on a juvenile's likelihood of short-term recidivism as well as other potential outcomes in both the long and short term should be elucidated before decisive policy recommendations are made.

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Table 1
Characteristics of Individuals and High Detention Propensity Assignment

	Juvenile Age	White	Black	Hispanic	Median Household Income in Zip	Male	Previous Felony Charge
Assignment to high detention propensity PO	-0.097 (0.08)	-0.039 (0.02)	0.024 (0.02)	-0.010 (0.01)	82.966 (556.76)	0.009 (0.02)	-0.035 (0.05)
Constant	15.741*** (0.16)	-0.104 (0.10)	0.752*** (0.10)	0.243*** (0.06)	40696.251*** (1379.21)	0.993*** (0.02)	0.951*** (0.05)
Observations	2680	2680	2680	2680	2495	3804	3568

Included in the above regressions are date and time controls. “Assignment to high detention propensity PO” is a dummy variable that is equal to one if the probation officer assigned to assess the juvenile has a mean detention rate above the median detention rate. P-values less than 0.05, 0.01, and 0.001 are indicated by *, **, and *** respectively.

Table 2
2SLS First Stage

	Juvenile Detention	
PO Detention Propensity	0.845*** (0.07)	0.663*** (0.07)
Constant	0.065* (0.03)	0.040 (0.11)
Controls	No	Yes
Observations	3804	2495

“PO Detention Propensity” is the instrumental variable defined in section 4.2. The set of controls included in the right column regression includes the following juvenile characteristics: race, gender, income percentile of the zip code, age, previous felony involvement, and the nature of the current crime. The set also includes time and date controls. P-values less than 0.05, 0.01, and 0.001 are indicated by *, **, and *** respectively.

Table 3
2SLS Regressions, Recidivism

	6 Month Recidivism, Any Crime		6 Month Recidivism, Felony Crime		12 Month Recidivism, Any Crime		12 Month Recidivism, Felony Crime	
Detention	0.104 (0.08)	0.008 (0.11)	0.040 (0.07)	-0.015 (0.10)	0.062 (0.09)	-0.024 (0.11)	-0.052 (0.08)	-0.144 (0.11)
Constant	0.231*** (0.04)	0.361*** (0.10)	0.167*** (0.04)	0.433*** (0.09)	0.343*** (0.04)	0.625*** (0.11)	0.281*** (0.04)	0.657*** (0.11)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	2483	2309	2442	2270	2329	2167	2265	2105

Estimates of detention in the first row is instrumented by PO Detention Propensity as defined in section 4.2. The set of controls included in the right column regression includes the following juvenile characteristics: race, gender, income percentile of the zip code, age, previous felony involvement, and the nature of the current crime. The set also includes time and date controls. P-values less than 0.05, 0.01, and 0.001 are indicated by *, **, and *** respectively.

Figure 1
DRAI Score vs. Likelihood of Detention

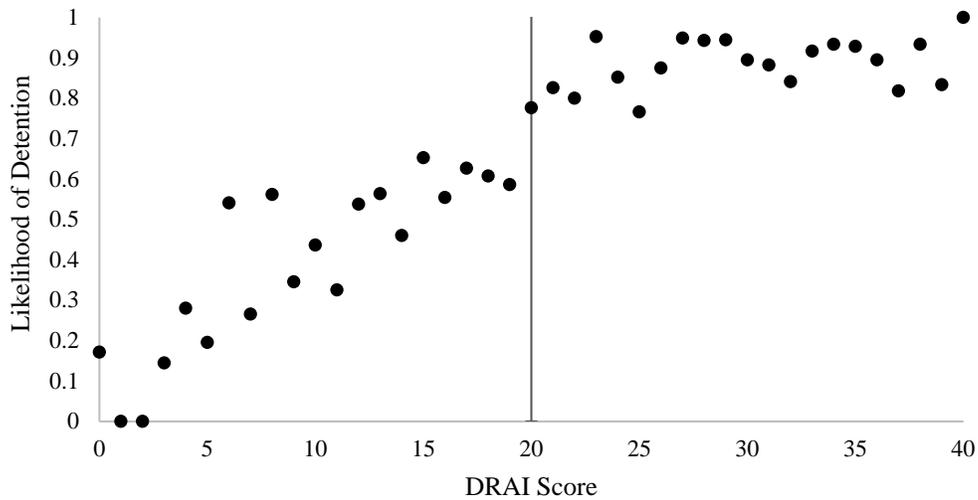


Figure 1 plots the mean detention rate of juveniles by their DRAI score. The vertical line indicates the threshold score of 20 at which the DRAI recommends juveniles be detained.

**Figure 2:
Recidivism Follow Up Period Construction**

