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Working Paper Number	2021-011A
Creation Date	October 2021
Citable Link	https://doi.org/10.20955/wp.2021.011
Suggested Citation	Golan, L., Hai, R., Wabiszewski, H., 2021; The Impact of Juvenile Conviction on Human Capital and Labor Market Outcomes, Federal Reserve Bank of St. Louis Working Paper 2021-011. URL https://doi.org/10.20955/wp.2021.011

The Impact of Juvenile Conviction on Human Capital and Labor Market Outcomes*

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October 21, 2021

Abstract

This article documents the long-term relationship among juvenile conviction, occupation choices, employment, wages, and recidivism. Using data from NLSY97, we document that youths who are convicted at or before age 17 have lower full-time employment rate and lower wage growth rate even after 10 years into the labor market. Merging the NSLY97 with occupational characteristics data from O*NET, we show that youths with a juvenile conviction are less likely to be employed in occupations that have a higher on-the-job (OTJ) training requirement and these high OTJ occupations have higher wage and wage growth. The accumulated occupation-specific work experience, general experience, and education are important to explain the gaps in wage and recidivism between youths with and without a juvenile conviction. Our results highlight the important role of occupation choices as a human capital investment vehicle through which juvenile crimes have a long-term impact on wages and recidivism.

1 Introduction

In this article, we document the empirical relationship among juvenile conviction, education, adult labor market occupation choices, employment, wages, and recidivism. Although several studies have shown that juvenile adjudication is associated with lower formal educational attainment and an increased likelihood of high school dropout, no existing study examines human capital accumulation through on-the-job training.

Our data is from the National Longitudinal Survey of Youth 1997 (NLSY97) and The Occupational Information Network (O*NET). NLSY97 is a longitudinal survey that follows the lives of

*The views in this paper are those of the authors and do not necessarily reflect the views of the Federal Reserve Bank of St. Louis or the Federal Reserve System.

a sample of American youth born between 1980-84. It provides detailed information on each individual's convictions and incarcerations over time as well as the age and date of the first time that the individual had interactions with the correctional system. It also collects detailed information on each individual's history of employment, occupation, and wages. Finally, it has information on each individual's education, age, gender, race, and measures of cognitive ability. On another hand, the O*NET data surveys detailed job requirements and characteristics for each occupation. Matching the O*NET job requirement data to NLSY97 data, we are able to analyze the impact of juvenile convictions on occupation choices, which have long-term consequences on wages.

Using Data from NLSY97 and O*NET, we first document that youths with juvenile adjudications have worse education outcomes. We then show that juvenile convictions are associated with lower full-time employment rate, even after controlling for ability, education, and general work experience. Furthermore, we find that individuals who had a juvenile adjudication are less likely to be employed in occupations with high on-the-job training requirement. We also show that the wage gap between youths with and without a juvenile conviction can be explained by the differences in the accumulated occupation-specific work experience, general work experience, education, and ability. We analyze the wage growth over the 10-year period of employment and find that a juvenile conviction still reduces the wage growth rates even after controlling education and occupation-specific work experience. Lastly, we document juvenile conviction to be a strong predictor of the likelihood of adult incarceration.

We do find that there are race and gender differences in the effect of juvenile convictions and the above outcomes. For females, having a juvenile conviction does not have a statistically significant effect on the overall employment probability, but it reduces the probability of full-time employment. For males, having a juvenile conviction reduces both the overall employment probability and the full-time employment probability. In addition, male black workers are less likely to be employed in all the specifications; this is consistent with findings in the literature, see Ritter and Taylor (2011). Moreover, black workers are less likely to be employed in occupations with high training requirements even after controlling for test scores, education and experience. This is consistent with findings in Golan, James, and Sanders (2019). For females, however, once we control for test scores, the coefficient on the black race dummy becomes statistically insignificant. This is true for wages as well. These findings are consistent with the differences in labor force participation and selection into the labor market of black and white females, see Neal (2004). For Hispanic males and females, the negative effects on outcomes either lose statistical significance or the effect becomes positive once we account for the differences in test scores.

While our results are suggestive regarding the effects of juvenile convictions on education, employment, occupation choices and recidivism, it highlights the rich dynamic relationship among youth crime and labor market choices and outcomes (including occupation choices). We argue that juvenile conviction reduces the probability of future employment in occupations with high on-the-job training requirement and that this is an important channel through which youth crime interacts with labor market outcomes. Specifically, this channel helps to generate a long-term

impact of youth crimes on labor market outcome and it also acts as a cost which will affect youths' decision of committing crime ex-ante in a forward-looking model with crimes.

Our paper relates to three strands of the literature. First, our paper contributes to the literature on juvenile crime and human capital investment. These existing studies primarily focus on schooling as the human capital investment measure and find that: (i) juvenile arrest/adjudication reduces schooling and (ii) that school enrollment reduces future crimes. Focusing first on (i), Kirk and Sampson (2013) and Aizer and Doyle (2015) both find that juvenile arrest, adjudication, or incarceration reduces the probability of high school graduation. Kirk and Sampson (2013) further shows that juvenile arrests reduce the likelihood of four-year college enrollment conditional on high school graduation. Litwok (2014) supports this result, finding that automatic expungement of juvenile conviction records unconditionally increases the probability of college attendance and graduation. On the other hand, as evidence for (ii), Lochner (2004) shows that high school graduates are less likely to be incarcerated in their twenties than high school dropouts. Similarly, Merlo and Wolpin (2015) finds that attending school at age 16 reduces the probability of committing a crime at age 19.

Second, our paper relates to the literature on juvenile crime and labor market outcomes (see Western, Kling, and Weiman (2001) for a survey).[1] Litwok (2014) shows that automatic expungement of juvenile criminal records increases an individuals' average income in their late twenties. Imai and Krishna (2004) estimate a dynamic discrete choice model of criminal behavior where forward-looking youths make decisions about whether to commit a crime. Imai and Krishna (2004) show that policies that reduce future labor market punishments of committing crime lead to youths committing more crime ex-ante. Nagin and Waldfogel (1995) look at the impact of conviction at ages 17 and 18 on labor market outcomes at age 19 of young British offenders and find mixed results. Nagin and Waldfogel (1995) find that conviction status decreases job stability via more weeks unemployed, a decrease in job duration, and an increase in the number of jobs ever held, but increases weekly earning. Western and Beckett (1999) analyze youth incarceration between the ages of 15 and 22 and its impact on future employment using the NLSY79, finding a decrease in employment that is long-lasting and does not decay with time. Using NLSY97 data, Apel and Sweeten (2010) find that youth incarceration has a persistent negative impact on formal employment, driven mostly by an increased probability and duration of labor force non-participation. They find that incarceration reduces annual income and this income gap widens over time.

Third, our paper also relates to the literature that investigates the relationship between juvenile crime and future recidivism. This literature is vast, especially in criminology. Nagin and Paternoster (1991), Nagin and Land (1993), and Nagin, Farrington, and Moffitt (1995) evaluate the change in criminal behavior over the life course and find that participating in crime early in the life cycle increases the likelihood of participating in crime in the future as social and professional relationships deteriorate. Paternoster, Brame, and Farrington (2001) finds some evidence that variation in the

[1] Much of the existing literature on crime and labor market focuses on the relationship between adult conviction or incarceration and labor market outcomes, see Prescott and Starr (2019) for example.

propensity to commit crimes as an adult can be attributed to differences in individual criminal behavior established during adolescence as opposed to processes that occur during adulthood. There are also several studies in economics that evaluate this relationship. Levitt (1998) shows deterrence is empirically more important than incapacitation in reducing crime, particularly in the case of property crimes. Aizer and Doyle (2015) find that individuals on the margin of juvenile incarceration who are incarcerated are significantly more likely to recidivate as adults, especially for serious crimes, relative to those who are not incarcerated. Indeed, Bayer, Hjalmarsson, and Pozen (2009) explores the peer effects of juvenile incarceration on juvenile recidivism and finds that there are significant peer effects which increase the probability of recidivism for crimes in which an individual already has experience.

2 Data and Basic Analysis

2.1 Data

The data was compiled from the National Longitudinal Survey of Youth 1997 (NLSY97) and The Occupational Information Network (O*NET). NLSY97 is a longitudinal survey that follows the lives of a sample of American youth born between 1980-84.

NLSY97 collects information on each individual's criminal behavior, arrests, convictions, and incarceration in each survey round; it also has information regarding the age and date of the first time that the individual had interactions with the correctional system. We constructed an indicator variable of juvenile convictions which equals one if and only if the individual was convicted at least once before age 18. NLSY also asks individuals to report their monthly incarceration status. We defined an individual to be incarcerated in the corresponding year if the individual was incarcerated at least one month of the year.

We obtain a complete weekly history for each individual on their employment status and the number of jobs worked. We also have complete weekly information on occupation, hours of work, and hourly wage for every job the individual worked, as well as job starting date and job ending date, over the period 1997 to 2013. We aggregate the aforementioned weekly information into annual information. We define an individual as employed if his/her average weekly hours worked in the reference year is more than or equal to 10 hours; we define an individual as full-time employed if his/her average weekly hours worked is more than or equal to 30 hours. The number of years an individual has worked can be observed from the start and end date of each job. An individual's main job in the reference year is characterized by the occupation that the individual worked most hours in the year. We focus on the hourly wage of the individual's main job. In addition to hourly wage levels, we also look at wage growth over 10 years using the percentage changes in hourly wages between an individual's 1st and 11th year of employment. This variable is constructed using the percentage change in an individual's hourly wage at their tenth working year versus their first working year. All the wage data is in 2000 dollars.

NLSY97 also provides us information on an individual's age, race, education, year of graduation,

and ASVAB score. We categorize educational attainment by five bins: high school dropout (i.e. less than high school degree and no GED), GED, high school graduate, Associate college degree, and college degree and above.

We merge NLSY97 data with O*NET data based on each employed individual's occupation. The O*NET data surveys detailed job requirements and characteristics for each occupation. Specifically, O*NET asks questions regarding the amount of on-the-job training (OTJ) required to perform the job. On-the-job training includes apprenticeships, internships, and other supervised experiences. For each occupation, we obtain an intensity of OTJ training variable that documents the percent of the jobs that require more than 1 month OTJ training in the occupation, ranging from 0% to 100%. We merge this variable with each individual's occupation in the NLSY97 data. The average OTJ training intensity increases with workers' education level. In particular, in our final sample, the average OTJ training intensity is 69 percent among college graduates, indicating that college graduates are employed in occupations where 69 percent jobs require at least 1 month OTJ training. The average OTJ training intensities are 65 percent, 58 percent, 57 percent, and 54 percent for individuals with associate college degree, high school degree, GED, and high school dropouts, respectively. We say an individual is employed at a high OTJ occupation if the percent of jobs that require 1 month OTJ training in the occupation is higher than the sample median level (i.e., 62 percent in our sample). Examples of occupations with low OTJ training requirement include parking lot attendants, dining room and cafeteria attendants and bartender helpers, etc. Examples of occupations with high OTJ training requirement include mechanics, installers, repairers, electricians, and first-line supervisors/managers of construction and production workers. Occupations with higher on-the-job training requirements allow for more human capital accumulation post-school and have higher wage growth.

The original NLSY97 data has 8,984 respondents. We drop the observations where we do not have information on the highest degree of education or the year when the individual left school. We also drop observations with missing information on juvenile conviction, ASVAB, or race. We only keep observation starting from the year when the individual enters the labor market (after obtaining the highest degree of education).

2.2 Summary Statistics

In this section, we discuss summary statistics of our data. Because males and females have very different patterns of human capital accumulation and crime behaviors over the lifecycle, we present the summary statistics as well as analysis results for males and females separately.

Table 1 presents the mean values of key variables used in our analysis. In our sample, the average juvenile conviction rate is 7.9% for men and 3.8% for females. In terms of education outcomes for men, 8.8% observations are high school dropouts, 12% have GED, 55.2% are high school graduates, 5.2% have an associate college degree, and the remaining 18.8% have a college degree or higher. Regarding woman's education outcomes, the rate of high school dropout is 7.6%, the rate of GED is 8.7%, 49.8% of females are high school graduates, 6.9% of them have an associate college degree, and

the remaining 27% have a college degree or higher. Figure 1 plots the distribution of educational outcomes by juvenile conviction status for men and women separately. Compared to men without juvenile convictions, men with juvenile convictions are more likely to drop out of high school or have a GED and are less likely to have a college degree or higher. Similar patterns hold for women.

Next, we discuss outcome variables on labor market employment, occupation, and wages. Among men, the employment rate is 86.9% and the full-time employment rate is slightly lower at 66.8%. The average number of years worked in our sample period is 4.66 years. 55.5% of men worked in a high OTJ occupation and the average number of years worked in a high OTJ occupation is 2.66 years. Regarding women, the employment rate is 78.6% and the full-time employment rate is 58.9%. The average number of years worked among women is 4.16 years. Only 43.1% of women worked at a high OTJ occupation and the average number of years worked in a high OTJ occupation is 1.87 years. Figure 2 plots the employment rate over age for individuals with and without a juvenile conviction. There is a large employment gap among men based on their juvenile conviction status and the gap increases over age as the employment patterns for men with and without juvenile convictions diverge over time. The employment gap also exists for women on average based on their juvenile conviction status, but the size of the gap is much smaller and the time trend is less clear compared to men.

The average hourly wage rate of employed men is \$13.06 (in 2000 dollars) and the average wage growth rate over 10 years worked is 88.5 percent. The average hourly wage among employed women is \$11.49 and the average wage growth rate over 10 years worked is 78 percent. Figure 3 plots the average hourly wages over ages based on the juvenile conviction status and for men and women separately. Similar to employment patterns seen in the previous figure, there is a clear and widening wage gap by juvenile conviction status among men. The initial wage gap begins relatively small at age 19: males with juvenile convictions earn an average hourly wage of \$7.85 compared to \$8.63 for males without juvenile convictions for a wage gap of \$0.78. By age 30, the gap increases over five-fold to \$3.91 where males with juvenile convictions earn an average hourly wage of \$12.30 compared to \$16.21 for males without juvenile convictions. The hourly wage gap for females demonstrates trends similar to the hourly wage gap for males. The wage gap among women increased from \$0.39 at age 19 to \$3.27 by age 30.

Table 2 reports the average worker characteristics for high and low OTJ occupations, separately. Both the hourly wage level and wage growth rate are lower in low OTJ occupations than in high OTJ occupations. The average hourly wage rate is \$10.07 in low OTJ occupation and is \$14.16 in high OTJ occupation. The average 10-year wage growth rates are 60 percent and 101 percent in low OTJ occupation and high OTJ occupation, respectively. Regarding workers' education levels in low OTJ occupations, 9.1% workers do not have a high school degree or GED, 11.6% have GED, 58.5% are high school graduates, 5% have an associate college degree, and the remaining 15.8% have a college degree or higher. Regarding high OTJ occupation workers' education levels, the rate of high school dropout (without GED) is 4.2%, the rate of GED is 7.8%, 47.3% are high school graduates, 7.4% have an associate college degree, and the remaining 33.3% have a college degree

or higher. Finally, the average ASVAB score is 44.3 in low OTJ occupations and is 54.3 and high OTJ occupations.

Finally, we discuss the adulthood crime outcomes measured by an incarceration indicator variable. As seen in Table 1, the average rate of incarceration is 2.7% and 0.5% for men and women in our sample period, respectively. The average age of men and women is 26 over our sample period. Figure 4 presents the probability of incarceration by juvenile conviction status over age for men and women separately. Individuals with juvenile convictions are more likely to be incarcerated during adulthood than individuals without juvenile convictions. This is suggestive evidence that a juvenile conviction predicts adult recidivism. The effects of a juvenile conviction on adulthood incarceration exist both for men and women, but the magnitude is larger for men than for women.

3 Conceptual Framework and Empirical Strategy

3.1 Conceptual Framework

Our conceptual framework is a dynamic model of human capital accumulation and crime behaviors. Heterogeneous individuals are forward-looking and make decisions on schooling, employment, occupational choices, and crime behaviors. Firms are also forward-looking and make decisions on occupation-specific job offers that differ in wages and on-the-job training requirements to workers based on workers' observed characteristics (also see the framework in Gayle and Golan (2012)). Jobs at occupations with higher on-the-job-training requirements incur higher training costs presently but also have higher future productivity growth if the employment relationship continues. Human capital investment in such a framework takes forms of education and post-school occupational specific on-the-job-training investment. Finally, the model allows for past choices as well as returns to accumulated human capital and crime capital affect current choices (Merlo and Wolpin (2015); Mancino, Navarro, and Rivers (2016)).

In this model, a juvenile conviction can have a long-lasting impact on a youth's human capital accumulation, labor market outcomes, and future criminal activity through three potential channels. The first channel is through changing an individual's schooling by increasing the psychic costs of schooling and reducing college admission probabilities. A juvenile conviction affects youths' psychic cost of schooling because interactions with the juvenile justice system can disrupt a youth's schooling activities ((Kirk and Sampson (2013); Aizer and Doyle (2015); Litwok (2014))) and harm a youth's mental health (Kashani, Manning, McKnew, Cytryn, Simonds, and Wooderson (1980); Forrest, Tambor, Riley, Ensminger, and Starfield (2000)). Youths with a record may find it hard to be re-enrolled into school after the disruption of schooling. College admission probabilities may also be reduced because schools may be unwilling to admit juveniles with a conviction record.

The second channel is through changing youth's post-school human capital accumulation – as measured by accumulated work experience on occupations with different on-the-job-training investment requirements. On one hand, youths with a juveniles record themselves may have less incentive to invest in post-school human capital accumulation because juvenile corrections encour-

age the accumulation of "criminal capital" (Bayer, Hjalmarsson, and Pozen (2009)) and reduce the psychic cost of future incarceration. On the other hand, a potential employer with asymmetric information may be less likely to offer them jobs and less likely to offer them jobs with higher on-the-job-training investment requirements, because employers anticipate these individuals have higher probabilities of quitting the job and committing crimes in the future.

The last and third channel through which a juvenile conviction record has a long-lasting effect is the dynamic interaction between human capital investment and crime behaviors over time. As discussed in the previous two channels, individuals with a juvenile record are likely to have lower human capital investment and hence lower future wages and wage growth. The decreased wage and wage growth increases the likelihood of future crime activities by reducing the opportunity cost of going to jail and leaving the labor force. As a result, youths with a juvenile record have a higher probability of recidivism, which then, in turn, reduces youths' ex-ante incentive to invest in human capital and decreases firms' ex-ante willingness to offer good jobs to them. The state dependence between past behaviors and current choices further reinforces such interactions. These dynamic interactions between human capital investment and crime behavior exacerbate the negative impact of juvenile records over time. Another factor that affects the correlations between juvenile records and the outcomes discussed above is unobserved heterogeneity that affects both the likelihood of having a criminal record early on and the likelihood of high educational attainment, stability in the labor market, selection into high training occupations and wages. However, in the empirical analysis below we are unable to quantify separately unobserved heterogeneity and state dependence.

3.2 Empirical Strategy

The preceding figures show that there are considerable differences in educational attainment, employment, wages, and adult incarceration between individuals with and without juvenile convictions. These differences are representative of an agglomeration of observable and unobservable differences between the two groups aside from juvenile conviction status. To begin sorting out the effects of differences in the composition of the two groups and the effect of juvenile conviction status, we next present regression results for the dependent variables of interest including employment, full-time employment, employment in jobs that require on-the-job training exceeding one month, log hourly wages, high school drop-out, college graduation, and adult incarceration. As evidenced by the figures above, age is an important determinant of these outcomes. There are also important differences in the racial makeup of each group. Other important omitted variables which are correlated with both juvenile conviction and the outcome variables of interest include educational attainment, individual ability or skills, and job market experience. For example, if individuals without juvenile adjudication have better skills and more education on average, both of which make them more employable, then the coefficient on juvenile adjudication will be biased downward. It is therefore important to control for these confounding variables when trying to analyze the effect of juvenile conviction status on the relevant outcome variable.

In this section we use the following regression model to conduct our analysis:

$$y_{i,t} = \beta \cdot \text{Juvenile Conviction}_i + X_{i,t}\gamma + \epsilon_{i,t}$$

where $y_{i,t}$ is the outcome variables of interests including educational outcomes, employment, occupational characteristics, wages, and adulthood incarceration. Juvenile Conviction is an indicator variable that equals to one if the youth had been convicted at least once before age 18. $X_{i,t}$ is a vector that includes individual variables such as race, education, and work experience, and $\epsilon_{i,t}$ is an error term. We use the Logit model when the dependent variable is a dummy variable (including employment, occupational choices, educational outcomes) and we report the marginal effects associated with each regression variable. We perform OLS analysis when the outcome variables are continuous variables such as log wages and wage growth.

4 Results

4.1 Juvenile Conviction and Educational Outcomes

In this section, we investigate the effects of a juvenile conviction on educational outcomes. Educational outcomes are central to accumulation of human capital after individuals complete their education because it is a strong determinant of labor market attachment, occupational sorting and earnings growth. Consistent with existing literature, we also find that a juvenile conviction increases the probability of dropping out of high school and decreases the probability of having a 4-year college degree.

Starting from the results for males, Table 3 column (1) shows that males with juvenile convictions are 6.9 ppt more likely to drop out of high school. Race also affects the probability of dropping out of high school with black males being 4.7 ppt more likely to drop out and hispanic males being 4.9 ppt more likely. Once we control for ability measures, the effect of juvenile convictions is reduced to 3.3 ppt and the effects of two race dummies lost statistical significance. Table 3 column (1) shows that a juvenile conviction reduces the probability of obtaining a 4-year college degree or more by 36 ppt. Once we control for ability measures, a juvenile conviction leads to 27.2 ppt reduction in the probability of graduating from a 4-year college and both race dummies lost statistical significance.

Tables 5 and 5 repeat the analysis for females. After controlling for ability measures, a juvenile conviction increases the probability of dropping out of high school by 1.4 ppt (Table 5 column (2)) and decreases the probability of graduating from a 4-year college by 34.1 ppt (Table 5 column (2)) among females.

Compared to the existing studies, Kirk and Sampson (2013) finds a larger effect of arrest on high school dropout probability. This is likely due to a difference in how dropout is defined: in the Kirk and Sampson study high school dropouts include individuals who went on to obtain a GED.

4.2 Juvenile Conviction and Labor Market Employment

Section 4.1 shows that individuals with a juvenile conviction have worse educational outcomes and hence may have worse labor market outcomes. In this section, we show that a juvenile record has a negative impact on labor market employment even after controlling for education and ability. Employment and attachment to the labor market is important to understanding the amount of human capital workers accumulate and their wage growth over time, all important determinants of thelikelihood of recidivism and future incarceration.

We find large and statistically significant negative impacts of a juvenile conviction on both employment (extensive margin) and full-time employment (intensive margin) for males. In contrast, we find that for females, a juvenile conviction does not have a statistically significant impact on employment (extensive), but it does have a statistically significant negative impact on full-time employment probability conditional on employment (intensive margin).

Table 7 examines the marginal effect of juvenile conviction on male labor market employment using a Logit regression model. Controlling for age and two race dummies, a juvenile conviction reduces the probability of employment by 7.8 ppt for males (Column (1)). Columns (2), (3), and (4) sequentially add controls for ASVAB test scores, educational attainment, and labor market experience. Adding test scores in column 2, the magnitude of the negative effects of a juvenile conviction become smaller, 6.6 ppt, and reduces the dummy coefficient on the race dummy for black workers, but it remains statistically significant; this suggests a role for selection effect of innate skills on the probability of unemployment. Adding educational attainment has a large effect on the probability of employment and reduces it further to 3.5 ppt. which can be due to different traits and unobserved skills of workers who have higher educational achievement and also due to differences in the labor market conditions for high and low skill workers. As seen in Column (4), which is our most exhaustive specification and includes labor market experience to the regression, a juvenile conviction reduces the probability of employment by 2.1 ppt. This is not surprising because workers who are attached to the labor market and have more experience accumulate more human capital and are more likely to continue to be employed. Another interesting finding is that as we move from Column (1) to Column (4), the negative impact associated with black race dummy becomes smaller in magnitude, from -0.11 ppt to-0.03 ppt. Columns (5) and (6) focus on individuals without a college degree. This sub-population has low skills and may be more vulnerable to the negative impact of a juvenile conviction. As expected, we find a juvenile conviction has a larger negative impact on employment in this population. In our most exhaustive specification Column (6), a juvenile conviction reduces the employment probability by 3 ppt among males without a 4-year college degree. In all the specifications, the black coefficient remains significant. One possible explanation is that the type of labor experience black workers receive is different than that of whites, we further explore this below, however, this is consistent with labor market discrimination in hiring and differences in opportunities available to black workers as found in Golan, James, and Sanders (2019).

Table 8 reports the marginal effects of a juvenile conviction on the probability of full-time

employment among employed males. Typically full-time employment is associated with a higher accumulation of human capital and more attachment to the labor market. While qualitatively the results are similar to the ones in Table 7, the effect negative effect of juvenile conviction is larger and is not reduced by test scores, education or experience to the same extent employment is. As seen in our most exhaustive specification Column (4), conditional on ability, education, and labor market experience, having a juvenile conviction reduces the probability of full-time employment by 6.7 ppt. This estimate is statistically significant at the 1% level. Columns (5) to (6) focus on males without a 4-year college degree. As seen in Column (6), having a juvenile conviction reduces the probability of full-time employment by 6.9 ppt among employed males without a 4-year college degree.

Tables 9 and 10 present the analogous estimates for females. As seen in columns (2)-(6) once we control for test scores, there is no statistically significant relationship between a juvenile conviction and employment among females. This result is robust to excluding college graduates from the sample in columns (5) and (6). Hence, the observed employment gap between females with and without a juvenile conviction in Figure 2b is primarily explained by the differences in ability and education between these two groups of females.

Our results suggest a large and statistically significant negative impact of a juvenile conviction on the probability of full-time employment among employed females (Table 10). This result is robust across all our specifications and is particularly larger in size among the less educated female employees. Under our most exhaustive specification, a juvenile conviction reduces the probability of full-time working by 6.4 ppt for all employed females (Column (4)) and by 8.2 ppt for employed females who do not have a 4-year college degree (Column (6)). This result is significant because workers who do not work full time are less attached to the labor market and are less likely to invest in human capital ex-ante and are more likely to commit crimes as discussed in our conceptual framework. We will discuss recidivism in Section 4.5.

Compared with the literature, our estimated direct effects of juvenile records on male employment (after controlling for its impact on education) are in line with the estimated long-term effect of adult crime record on employment from Prescott and Starr (2019). Specifically, Prescott and Starr (2019) estimate that expunging adult criminal records leads to 6.7 ppt increases the employment rate three years later for all offenders. We do not have results on employment for females, however. Possible explanations include (i) juvenile conviction has a smaller direct impact than adult crime record on female employment, and (ii) the results in Prescott and Starr (2019) are primarily driven by male offenders.

4.3 Juvenile Conviction and On-the-job Training Investment

In Sections 4.1 and 4.2 we investigate the effects of a juvenile conviction on education and employment and our results are broadly in line with the findings of the literature. We found that adding experienced workers have a higher probability of employment after controlling for juvenile conviction, ability measures and education. This is partly because workers with more experience

acquire more human capital while working. To further explore the relationship between training experience and juvenile conviction, we investigate the effects of a juvenile conviction on an individual's post-school human capital investment as characterized by occupation-specific employment. To the best of our knowledge, our paper is the first paper that investigates such a relationship. Our findings suggest that a juvenile conviction reduces the probability of working in occupations with a high on-the-job-training requirement. As will be shown in the next section, occupations with a high on-the-job training requirement have higher wage levels and faster future wage growth. Hence this channel is an important mechanism through which a juvenile conviction can affect wages.

Table 11 reports the marginal effects of a juvenile conviction on the probability of working in an occupation that requires high OTJ training. As seen in column (1), controlling race dummies and age, a youth with a juvenile conviction is 13.8 ppt less likely to work in an occupation with a high OTJ training requirement. Once we control for ASVAB and education, the direct impact of juvenile conviction becomes -8.7 ppt (column (3)). In our most exhaustive specification Column (4), a juvenile conviction reduces the probability of working in a high OTJ occupation by 4.9 ppt among employed males, after controlling for both general and occupation-specific working history as well as education. Notice that both high education levels and accumulated years worked in high OTJ occupations are correlated with the increased probability of working in a high OTJ occupation. Therefore, the 4.9 ppt reduction as reported in column (4) is only the direct contemporaneous effects of a juvenile conviction. The long-term overall effect of a juvenile conviction on on-the-job training occupational choices is larger due to its accumulated impact through education and past work experience. As in our previous tables, we focus on low-skill workers who do not have a 4-year college degree in columns (5) and (6). We find that a juvenile conviction directly reduces the chances of working in a high OTJ occupation by 5.6 ppt among employed males without a 4-year college degree. As expected, the negative impact of a juvenile is larger among this disadvantaged population.

As with employment, the probability of black workers to be employed in occupations with high on-the-job training requirements is substantially lower, close to 19 ppt as shown in column (1), for hispanics it is 6.1 ppt less than white workers. Controlling for test scores reduces the coefficient on black indicator variable to 13.7 ppt and is not further reduced once education is included (see column (3)). However, Having experience in high training occupation reduces the coefficient on the black indicator variable to 8.7 ppt. For hispanic workers, the race effect on the probability of employment in the high level of training occupation becomes small and statistically insignificant once we account for test scores. The fact that black individuals are less likely to be employed in high on-the-job training occupations is consistent with the findings in Golan, James, and Sanders (2019), which finds evidence for discrimination in assignment and promotions of black workers to occupations with demand for complex and non-routine tasks in the NLSY1979. It is likely that these occupations are also occupations with higher training requirements although this variable is not directly analyzed in their paper.

We conduct the same analysis for employed females in Table 12. Looking at column (1) of

Table 12, females with juvenile convictions are 16.5 ppt less likely to be employed in high training occupations relative to females without juvenile convictions. After further controlling for test scores and education, the reduction in the probability of women with a juvenile conviction to be employed in high-training occupations is 8.4 ppt (and is significant at the 10 percent level). Controlling for experience and experience in high-training occupations, the coefficient in front of a juvenile conviction becomes smaller in magnitude (-3.9 ppt) and lost statistical significance (column (4)). However, a juvenile conviction may still affect a female's occupational choices through its indirect impact via education. Furthermore, the selection of women who have experience in high-training occupations may be different than that of men due to the effect of fertility and marriage on the choice of occupations and glass ceiling that women face.[2] These issues, however, are beyond the scope of this article. It is interesting to note that for females, the coefficient on the black indicator variables becomes small and statistically insignificant once we control for test scores. In addition, the coefficient on the indicator for hispanic becomes positive and statistically significant once we control for test scores.

In columns (5) and (6), we focus on low education females who are relatively disadvantaged in the labor market. As seen in column (6), a juvenile conviction reduces the probability of working at a high OTJ training occupation by 7.4 ppt everything else being equal. Moreover, we find large state dependence in occupation choices as past accumulated years worked in a high OTJ training occupation increases the probability of working in such an occupation in the future. This finding implies that the overall lifecycle effect of a juvenile conviction on an individual's occupational choices is likely to be bigger and more persistent.

4.4 Juvenile Conviction and Wages

So far, our results established that a juvenile conviction reduces a youth's educational achievement, employment, and probability of working in high OTJ occupations. In this section, we document that the accumulated number of years worked in a high OTJ occupation is associated with higher wages and wage growth. Higher wages and income imply higher opportunity cost of devoting time to crime and higher opportunity cost of time spent in jail. The observed wage gap by juvenile conviction records (see Figure 3) is primarily because of the accumulated effects of a juvenile conviction on employment and occupational choices over time.

We first examine the effect of a juvenile conviction on wage levels. Table 13 presents regression analysis of log hourly wages among employed males. Starting with the estimate in column (1), we find a statistically significant negative impact of a juvenile conviction on wages. The second and third columns repeat the initial estimate, now adding main effects for ability and education sequentially, the negative effects remain statistically significant but smaller in magnitude. The fourth column adds accumulated years worked and years worked squared terms, the coefficient in front of juvenile conviction variable becomes slightly smaller in magnitude, but remain negative and statistically significant. However, as we further add controls of the accumulated years worked in

[2] see for example, Gayle and Golan (2012) discussion on occupational sorting and discrimination.

high OTJ occupation and current employment in high OTJ occupation, the direct effect of a juvenile conviction is not significant anymore (column 5). This evidence suggests that the wage effects of a juvenile conviction mainly come from its indirect effect through accumulated work experience in high OTJ occupations and current employment in high OTJ occupation in particular. However, it can also reflect a selection based on unobserved characteristics and traits of the individuals (in the data). In other words, it could be that unobserved skills and traits make individuals more likely to accumulate experience and human capital and as a result these individuals earn higher wages. This can be seen from the statistically positive coefficients in front of both years worked in high OTJ occupations and employed in high OTJ occupations. Our findings are similar when we focus on less skilled males who don't have a 4-year college degree (columns (6) to (8)).

Table 14 repeats the analysis for employed females. Estimates in columns (1) and (2) suggest that a juvenile conviction has a negative impact on females' wages. However, as we introduce dummies for education categories, the coefficient of a juvenile conviction lost statistical significance. This suggests that much of the negative effects of a juvenile conviction that we found earlier can be explained by the effects of a juvenile conviction on educational outcomes. The coefficient of the juvenile conviction variable changes little after further controlling for general work experience (column 4). In column (5), estimates suggest that both accumulated years worked in high OTJ occupation and current employment in high OTJ occupation increase wages, which are important mechanisms through which a juvenile conviction can affect wages. A juvenile conviction has a negative wage impact among females without a 4-year college degree, but the significance disappears once we control for years worked in high OTJ occupation and current employment in high OTJ occupation.

An interesting contrast between the hourly wages of males and females is the role of race. Black males earn statistically significantly lower wages in all specifications and Hispanic males generally do not earn significantly different wages from non-Black, non-Hispanic males. On the other hand, Black females generally do not earn significantly different wages from non-Black, non-Hispanic females while Hispanic females are generally earning statistically significantly higher wages.[3]

Next we examine the effect of a juvenile conviction on the growth rate of wages in Tables 15 and 16 for males and females, respectively. Starting with estimates in Table 15 column (1), for males, a juvenile conviction reduces the 10-year growth rate of wages by 40.7 ppt and both black race dummy and Hispanic race dummy have negative coefficients on wage growth. Once we control for ability measures, the race dummies coefficients become statistically insignificant. The negative effects of a juvenile conviction remain large and significant across all our specifications. As seen in our most exhaustive specification column (4), a juvenile conviction reduces wage growth by 25.8 ppt among employed men. The results for less-educated male workers are reported in columns (5) and (6). The negative effects of a juvenile conviction are slightly larger in magnitude among this disadvantaged group. Column (6) shows that a juvenile conviction leads to a 26.1 ppt reduction in

[3]There are differences in the patterns of labor market attachment and labor supply of black and white women which is discussed in the literature.

wage growth. We also note that years worked at high OTJ occupation leads to higher wage growth in both columns (4) and (6).

Turning to estimates in Table 16 for employed female workers, we find a juvenile conviction reduces wage growth by a larger magnitude for females than for males. In our most exhaustive specification column (4), we find that a juvenile conviction reduces wage growth by 66.3 ppt. Compared to the average 10-year wage growth of females being 77.04 ppt, this estimate is very large in size. Column (6) shows that a juvenile conviction reduces wage growth by 63.1 ppt among less-educated female workers. The coefficients on years worked in a high OTJ occupation are not insignificant in columns (4) and (6), the coefficient on black race dummy remains negative and significant. Our finding here suggests an interesting gender difference in wage growth dynamics.

4.5 Juvenile Conviction and Recidivism

In Sections 4.1 to 4.4 we discussed the effect of a juvenile conviction on human capital investment and labor market outcomes. In this section, we investigate the relationship between a juvenile conviction and recidivism during adulthood. We find that individuals with a juvenile conviction are more likely to commit crimes. As discussed in the conceptual framework, a higher probability of future recidivism reduces an individual's incentive to invest in human capital ex-ante, which may help explain our estimated negative effects of a juvenile conviction on human capital investment.

Table 17 reports the estimates of marginal effect on adult male incarceration using a Logit model. A juvenile conviction has a positive and statistically significant impact on incarceration among adult males in all specifications. Starting in column (1), a juvenile conviction increases the probability of adult incarceration by 3.5 ppt. among males, after controlling for race and age. As we sequentially adding ability measure and education, the estimated effect of a juvenile conviction becomes 2.7 ppt and 1.4 ppt, respectively. In our most exhaustive specification, where measures of work experience are added, a juvenile conviction increases incarceration among adult males by 0.9 ppt in column (4). We also investigate the effects of a juvenile conviction among the less-educated population and find a much larger effect (1.4 ppt). It is also worth noting that once we control for labor market work experience measures, the black race dummy doesn't have a statistically significant impact on incarceration among adult males (columns (4) and (6)), suggesting that employment dynamics holds the key for understanding the racial difference in crime behavior.

Table 18 reports the results of the same analysis for females. The effect of the increase in the probability of incarceration is declining once we controlled for test scores; education reduces the coefficient on incarceration by half (see column (3)). Focusing on column (4), adding work experience and experience in high-training occupations, the effect of juvenile conviction on future probability of incarceration becomes small and statistically insignificant among adult females; in addition, we find a statistically significant negative coefficient in front of the years worked at high training occupation variable. Columns (5) and (6) conduct the analysis for females without a 4-year college degree and find a statistically significant positive impact of a juvenile conviction on incarceration for women with lower education. Overall the results confirm the relationship between

juvenile conviction and future incarceration, highlighting the importance of education and work experience in reducing this probability. Our analysis is suggestive, but these relationships can be also driven by unobserved traits and skills of individuals who have higher educational attainment and work experience, especially in occupations with high training requirements.

Aizer and Doyle (2015) also produce large recidivism estimates, finding that juvenile incarceration increases the probability of being incarcerated as an adult by age 25 by 23 ppt. They go on to show that individuals who experienced juvenile incarceration are more likely to recidivate for serious crimes including homicide, violent crime, and drug offenses. This suggests there is a behavioral change due to juvenile incarceration which may be watered down in our sample since we include all convicted juveniles, of which only about 29% are incarcerated in Aizer and Doyle's sample.

5 Conclusion

In this paper, we show that juvenile conviction has a long-term impact on human capital accumulation, wages, and recidivism. Specifically, we find that Individuals with a juvenile conviction have lower education levels, lower employment rates, and are less likely to work in occupations with high on-the-job-training (OTJ) requirements. Juvenile conviction reduces wages mainly through its negative impact on education and work experience (including both general experience and occupation-specific work experience). Regarding the effect on recidivism, we find that juvenile convictions are associated with a higher probability of incarceration in adulthood. Finally, all these effects are more pronounced among individuals without a 4-year college degree.

Our results highlight the rich dynamics and interplay between educational choices, occupation choices, employment, wages, and recidivism when analyzing the effects of a juvenile conviction. While we find effects of juvenile conviction on long-term labor market outcomes as well as on incarcaration, even after controlling for measures of ability and education, it is possible that some of the effect is due to unobserved traits and skills differences of individuals who have juvenile convictions and those who do not. In order to address this issue, including the interactions of Juvenile convicitions individuals' traits and skils and employers' discrimination, future analysis using a structural model to investigate these dynamic mechanisms and evaluate alternative policies is a fruitful directionOur results highlight the rich dynamics and interplay between educational choices, occupation choices, employment, wages, and recidivism when analyzing the effects of a juvenile conviction. While we find effects of a juvenile conviction on long-term labor market outcomes as well as on incarceration, even after controlling for measures of ability and education, it is possible that some of the effects are due to unobserved traits and skills differences of individuals with juvenile convictions and those without. To address this issue, including the interactions of Juvenile convictions, individuals' traits and skills, and employers' discrimination, future analysis using a structural model to investigate these dynamic mechanisms and evaluate alternative policies is a fruitful direction.

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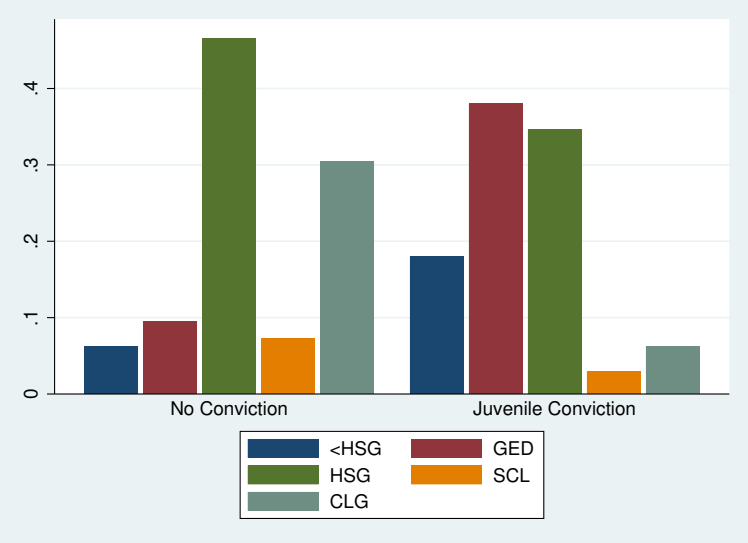
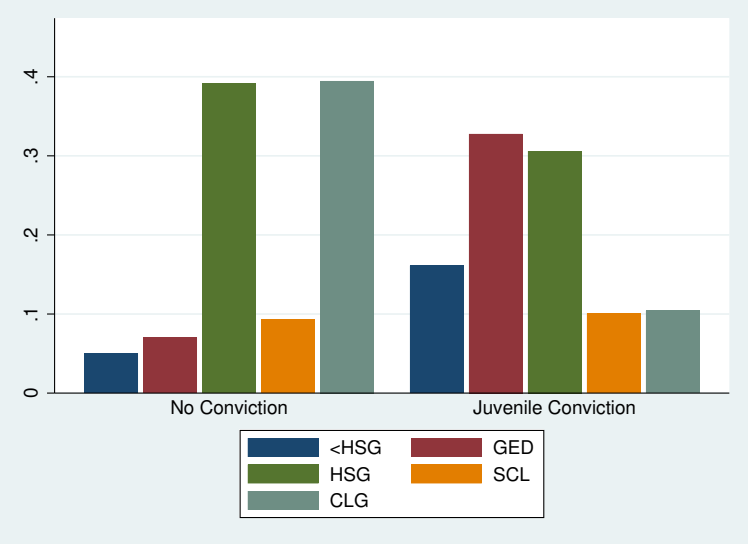
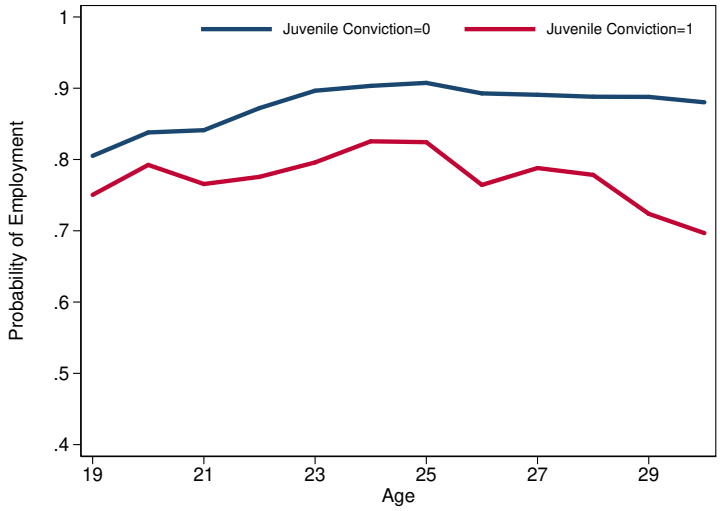


(a) Males

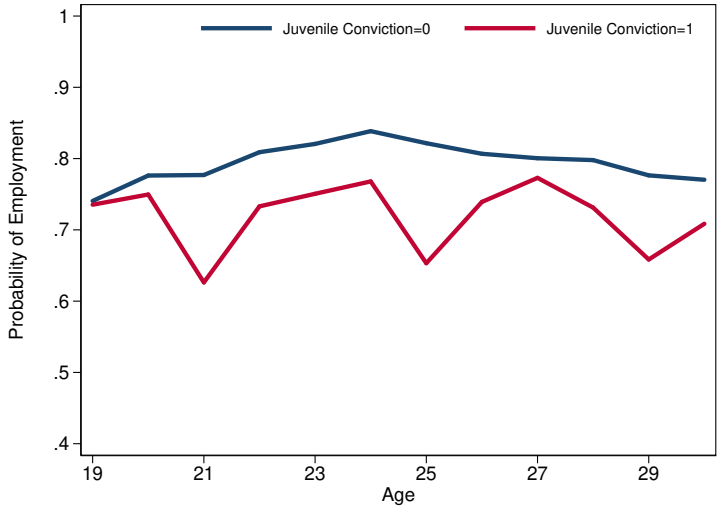


(b) Females

Figure 1: Educational outcomes for those with and without a juvenile adjudication

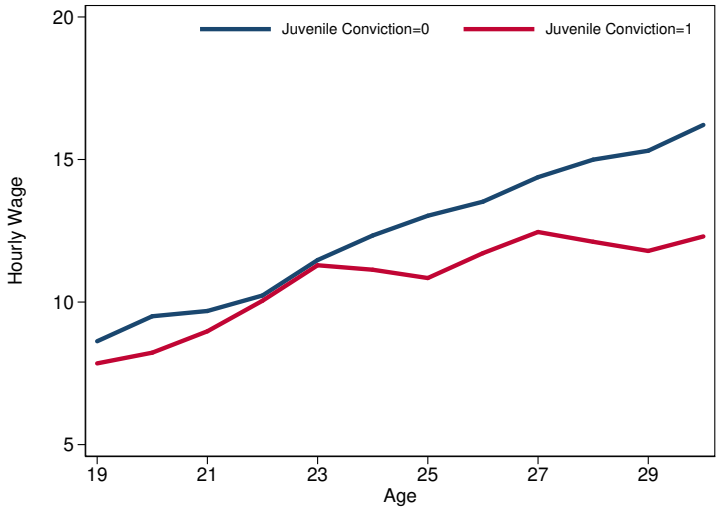


(a) Males

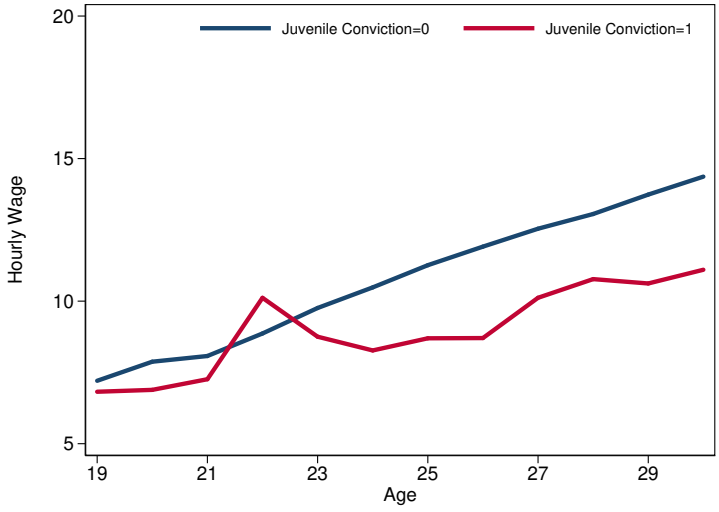


(b) Females

Figure 2: Employment rates for those with and without a juvenile adjudication

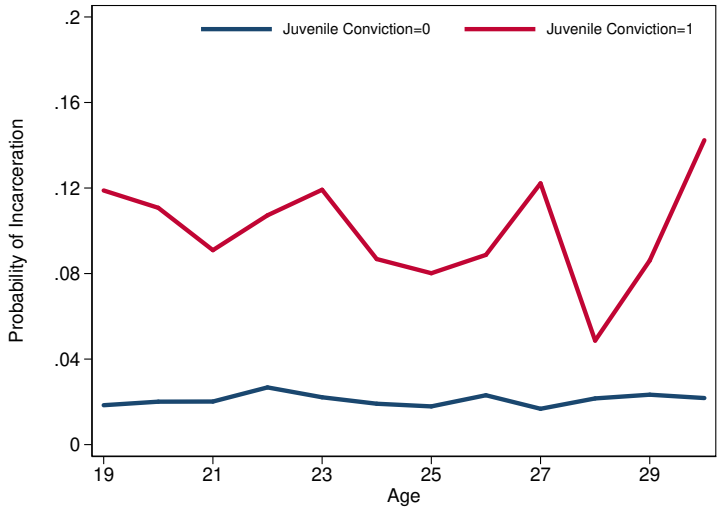


(a) Males

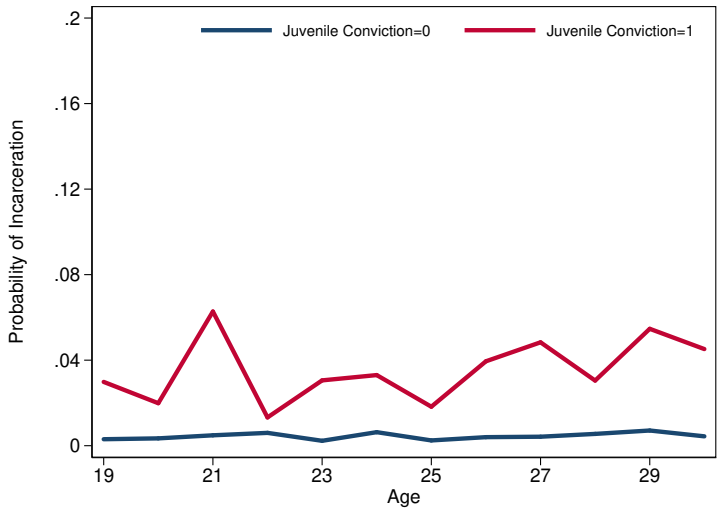


(b) Females

Figure 3: Wages for those with and without a juvenile adjudication



(a) Males



(b) Females

Figure 4: Adulthood incarceration rates for those with and without a juvenile adjudication

Table 1: Key variables by gender

	Male	Female
Juvenile conviction	0.079	0.038
Less than high school/GED	0.088	0.076
GED	0.120	0.087
High school	0.552	0.498
Associate college	0.052	0.069
College and above	0.188	0.270
Employment	0.869	0.786
Full-time employment (among employed workers)	0.668	0.589
Employed at high OTJ occupation	0.555	0.431
Years worked	4.663	4.160
Years worked at high OTJ occupation	2.657	1.873
Hourly wage	13.059	11.488
Pct changes in wage over 10 years worked	88.504	78.227
Incarceration	0.027	0.005
Race = Black	0.153	0.155
Race = Hispanic	0.124	0.116
Age	25.575	25.837
ASVAB pct score	46.977	48.438

Table 2: Key variables by Occupation Categories

	Low OTJ	High OTJ
Hourly wage	10.071	14.161
Pct changes in wage over 10 years worked	59.709	101.298
Less than high school/GED	0.091	0.042
GED	0.116	0.078
High school	0.585	0.473
Associate college	0.050	0.074
College and above	0.158	0.333
ASVAB pct score	44.300	54.291

Table 3: The effects of juvenile conviction on male educational outcomes: less than high school/GED

	(1)	(2)
Juvenile conviction	0.069***	0.033***
	(0.012)	(0.009)
Race = Black	0.047***	-0.009
	(0.009)	(0.007)
Race = Hispanic	0.049***	0.005
	(0.009)	(0.007)
ASVAB pct score		-0.002***
		(0.001)
ASVAB squared		0.000*
		(0.000)
Mean Value	0.091	0.091
Observations	2,646	2,646
Pseudo R^2	0.040	0.181

Marginal effects; Standard errors in parentheses
(d) for discrete change of dummy variable from 0 to 1
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: The effects of juvenile conviction on male educational outcomes: 4-year college or more

	(1)	(2)
Juvenile conviction	-0.360***	-0.272***
	(0.063)	(0.056)
Race = Black	-0.217***	0.013
	(0.028)	(0.029)
Race = Hispanic	-0.165***	-0.033
	(0.029)	(0.030)
ASVAB pct score		0.007***
		(0.001)
ASVAB squared		0.000
		(0.000)
Mean Value	0.239	0.239
Observations	2,646	2,646
Pseudo R^2	0.047	0.241

Marginal effects; Standard errors in parentheses
(d) for discrete change of dummy variable from 0 to 1
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: The effects of juvenile conviction on female educational outcomes: less than high school/GED

	(1)	(2)
Juvenile conviction	0.064***	0.014**
	(0.015)	(0.007)
Race = Black	0.029***	-0.014***
	(0.008)	(0.004)
Race = Hispanic	0.031***	-0.005
	(0.009)	(0.004)
ASVAB pct score		-0.001***
		(0.000)
ASVAB squared		0.000
		(0.000)
Mean Value	0.067	0.067
Observations	2,781	2,781
Pseudo R^2	0.023	0.271

Marginal effects; Standard errors in parentheses
(d) for discrete change of dummy variable from 0 to 1
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: The effects of juvenile conviction on female educational outcomes: 4-year college or more

	(1)	(2)
Juvenile conviction	-0.418***	-0.341***
	(0.093)	(0.093)
Race = Black	-0.213***	0.020
	(0.026)	(0.030)
Race = Hispanic	-0.248***	-0.100***
	(0.031)	(0.034)
ASVAB pct score		0.011***
		(0.002)
ASVAB squared		-0.000
		(0.000)
Mean Value	0.324	0.324
Observations	2,781	2,781
Pseudo R^2	0.039	0.203

Marginal effects; Standard errors in parentheses
(d) for discrete change of dummy variable from 0 to 1
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: The effects of juvenile conviction on adult male labor market employment

	(1)	(2)	(3)	(4)	(5)	(6)
Juvenile conviction	-0.078***	-0.066***	-0.035***	-0.021***	-0.046***	-0.030***
	(0.012)	(0.012)	(0.011)	(0.007)	(0.013)	(0.010)
Race = Black	-0.109***	-0.070***	-0.064***	-0.030***	-0.082***	-0.040***
	(0.008)	(0.009)	(0.009)	(0.005)	(0.011)	(0.007)
Race = Hispanic	-0.015	0.009	0.011	0.007	0.015	0.011
	(0.011)	(0.011)	(0.011)	(0.006)	(0.014)	(0.009)
Age	0.004***	0.004***	0.002**	-0.023***	0.002**	-0.032***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
ASVAB pct score		0.004***	0.003***	0.001***	0.004***	0.001***
		(0.001)	(0.001)	(0.000)	(0.001)	(0.000)
ASVAB squared		-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GED			0.017	0.061***	0.022	0.084***
			(0.013)	(0.009)	(0.017)	(0.012)
High school			0.064***	0.038***	0.081***	0.051***
			(0.012)	(0.007)	(0.015)	(0.009)
Associate college			0.117***	0.214***	0.148***	0.293***
			(0.025)	(0.021)	(0.032)	(0.027)
College and above			0.199***	0.297***	0.000	0.000
			(0.019)	(0.014)	(.)	(.)
Years worked				0.049***		0.066***
				(0.002)		(0.003)
Years worked squared				-0.001***		-0.002***
				(0.000)		(0.000)
Mean Value	0.846	0.846	0.846	0.852	0.824	0.829
Observations	26,610	26,610	26,610	25,757	22,407	21,596
Pseudo R^2	0.036	0.057	0.084	0.207	0.057	0.189

Marginal effects; Standard errors in parentheses

(d) for discrete change of dummy variable from 0 to 1

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: The effects of juvenile conviction on adult male labor market full-time employment (among employed workers)

	(1)	(2)	(3)	(4)	(5)	(6)
Juvenile conviction	-0.107***	-0.104***	-0.076***	-0.067***	-0.080***	-0.069***
	(0.021)	(0.021)	(0.022)	(0.022)	(0.023)	(0.025)
Race = Black	-0.098***	-0.086***	-0.087***	-0.067***	-0.093***	-0.066***
	(0.013)	(0.014)	(0.014)	(0.015)	(0.016)	(0.016)
Race = Hispanic	-0.019	-0.011	-0.009	-0.003	-0.007	0.001
	(0.014)	(0.014)	(0.014)	(0.014)	(0.016)	(0.016)
Age	0.031***	0.031***	0.029***	-0.010***	0.029***	-0.020***
	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)	(0.004)
ASVAB pct score		0.001	0.001	-0.001	0.002**	0.000
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ASVAB squared		-0.000	-0.000	-0.000	-0.000***	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GED			-0.004	0.052**	-0.005	0.068**
			(0.024)	(0.025)	(0.025)	(0.027)
High school			0.056***	0.050**	0.061***	0.053**
			(0.021)	(0.021)	(0.022)	(0.022)
Associate college			0.108***	0.265***	0.118***	0.325***
			(0.031)	(0.034)	(0.033)	(0.038)
College and above			0.137***	0.349***	0.000	0.000
			(0.026)	(0.032)	(.)	(.)
Years worked				0.074***		0.086***
				(0.004)		(0.006)
Years worked squared				-0.002***		-0.002***
				(0.000)		(0.000)
Mean Value	0.652	0.652	0.652	0.655	0.624	0.626
Observations	22,487	22,487	22,487	21,908	18,424	17,883
Pseudo R^2	0.057	0.057	0.062	0.087	0.051	0.082

Marginal effects; Standard errors in parentheses

(d) for discrete change of dummy variable from 0 to 1

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9: The effects of juvenile conviction on adult female labor market employment

	(1)	(2)	(3)	(4)	(5)	(6)
Juvenile conviction	-0.068**	-0.037	0.009	0.011	0.009	0.012
	(0.030)	(0.030)	(0.028)	(0.020)	(0.036)	(0.026)
Race = Black	-0.079***	0.014	-0.002	0.006	-0.009	-0.001
	(0.013)	(0.014)	(0.013)	(0.010)	(0.017)	(0.013)
Race = Hispanic	-0.022	0.038**	0.036**	0.025**	0.048**	0.033**
	(0.014)	(0.015)	(0.015)	(0.011)	(0.019)	(0.014)
Age	-0.001	-0.003***	-0.007***	-0.040***	-0.007***	-0.055***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.003)
ASVAB pct score		0.006***	0.004***	0.001	0.005***	0.001
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ASVAB squared		-0.000***	-0.000***	-0.000	-0.000***	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GED			0.107***	0.137***	0.129***	0.182***
			(0.023)	(0.017)	(0.027)	(0.022)
High school			0.163***	0.100***	0.198***	0.124***
			(0.019)	(0.013)	(0.024)	(0.016)
Associate college			0.223***	0.338***	0.272***	0.454***
			(0.033)	(0.033)	(0.040)	(0.045)
College and above			0.338***	0.471***	0.000	0.000
			(0.025)	(0.020)	(.)	(.)
Years worked				0.064***		0.094***
				(0.004)		(0.005)
Years worked squared				-0.001***		-0.002***
				(0.000)		(0.000)
Mean Value	0.770	0.770	0.770	0.775	0.728	0.732
Observations	26,949	26,949	26,949	26,273	20,948	20,345
Pseudo R^2	0.006	0.049	0.085	0.178	0.053	0.166

Marginal effects; Standard errors in parentheses

(d) for discrete change of dummy variable from 0 to 1

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10: The effects of juvenile conviction on adult female labor market full-time employment (among employed workers)

	(1)	(2)	(3)	(4)	(5)	(6)
Juvenile conviction	-0.121***	-0.103***	-0.064**	-0.064**	-0.076**	-0.082**
	(0.031)	(0.030)	(0.031)	(0.031)	(0.034)	(0.035)
Race = Black	-0.073***	-0.024	-0.033**	-0.021	-0.040**	-0.027
	(0.014)	(0.016)	(0.016)	(0.016)	(0.019)	(0.019)
Race = Hispanic	-0.009	0.024	0.031*	0.035**	0.043**	0.047**
	(0.016)	(0.017)	(0.017)	(0.017)	(0.020)	(0.020)
Age	0.032***	0.031***	0.026***	0.000	0.027***	-0.008**
	(0.001)	(0.001)	(0.001)	(0.003)	(0.002)	(0.004)
ASVAB pct score		0.004***	0.002**	0.001	0.003**	0.001
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ASVAB squared		-0.000**	-0.000**	-0.000	-0.000**	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GED			0.077**	0.117***	0.080**	0.132***
			(0.034)	(0.034)	(0.035)	(0.036)
High school			0.142***	0.124***	0.147***	0.122***
			(0.028)	(0.029)	(0.029)	(0.031)
Associate college			0.194***	0.303***	0.203***	0.347***
			(0.037)	(0.040)	(0.039)	(0.044)
College and above			0.269***	0.404***	0.000	0.000
			(0.031)	(0.034)	(.)	(.)
Years worked				0.059***		0.070***
				(0.005)		(0.007)
Years worked squared				-0.002***		-0.002***
				(0.000)		(0.000)
Mean Value	0.576	0.576	0.576	0.577	0.520	0.521
Observations	20,729	20,729	20,729	20,341	15,221	14,885
Pseudo R^2	0.046	0.051	0.061	0.076	0.043	0.061

Marginal effects; Standard errors in parentheses

(d) for discrete change of dummy variable from 0 to 1

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11: The effects of juvenile conviction on adult male occupation choices: employed at high OTJ occupation

	(1)	(2)	(3)	(4)	(5)	(6)
Juvenile conviction	-0.138***	-0.126***	-0.087***	-0.049**	-0.092***	-0.056**
	(0.026)	(0.027)	(0.027)	(0.020)	(0.029)	(0.022)
Race = Black	-0.188***	-0.137***	-0.138***	-0.069***	-0.159***	-0.087***
	(0.019)	(0.021)	(0.021)	(0.016)	(0.023)	(0.018)
Race = Hispanic	-0.061***	-0.026	-0.021	-0.007	-0.023	-0.013
	(0.020)	(0.021)	(0.020)	(0.014)	(0.022)	(0.016)
Age	0.024***	0.023***	0.019***	0.002	0.020***	0.004
	(0.001)	(0.001)	(0.001)	(0.004)	(0.002)	(0.005)
ASVAB pct score		0.005***	0.005***	0.004***	0.005***	0.004***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ASVAB squared		-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GED			0.018	0.019	0.019	0.021
			(0.034)	(0.026)	(0.035)	(0.028)
High school			0.068**	0.028	0.071**	0.032
			(0.029)	(0.021)	(0.030)	(0.023)
Associate college			0.166***	0.138***	0.166***	0.146***
			(0.047)	(0.039)	(0.048)	(0.044)
College and above			0.243***	0.207***	0.000	0.000
			(0.037)	(0.036)	(.)	(.)
Years worked				-0.032***		-0.017*
				(0.007)		(0.009)
Years worked squared				-0.002***		-0.003***
				(0.001)		(0.001)
Years worked at high OTJ occupation				0.149***		0.143***
				(0.004)		(0.005)
Mean Value	0.521	0.521	0.521	0.549	0.477	0.501
Observations	23,912	23,912	23,912	19,114	19,859	15,292
Pseudo R^2	0.040	0.049	0.060	0.234	0.042	0.216

Marginal effects; Standard errors in parentheses

(d) for discrete change of dummy variable from 0 to 1

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 12: The effects of juvenile conviction on adult female occupation choices: employed at high OTJ occupation

	(1)	(2)	(3)	(4)	(5)	(6)
Juvenile conviction	-0.165***	-0.128***	-0.084*	-0.039	-0.108**	-0.074**
	(0.045)	(0.047)	(0.044)	(0.034)	(0.046)	(0.035)
Race = Black	-0.100***	0.006	-0.002	0.004	-0.022	-0.014
	(0.018)	(0.019)	(0.019)	(0.016)	(0.021)	(0.018)
Race = Hispanic	-0.016	0.059***	0.072***	0.043**	0.067***	0.041**
	(0.020)	(0.021)	(0.022)	(0.018)	(0.022)	(0.018)
Age	0.022***	0.020***	0.013***	0.001	0.014***	0.001
	(0.001)	(0.002)	(0.002)	(0.004)	(0.002)	(0.005)
ASVAB pct score		0.007***	0.005***	0.002**	0.005***	0.002**
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ASVAB squared		-0.000***	-0.000***	-0.000	-0.000***	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GED			0.139***	0.133***	0.126***	0.128***
			(0.042)	(0.041)	(0.039)	(0.039)
High school			0.172***	0.133***	0.157***	0.115***
			(0.035)	(0.035)	(0.033)	(0.032)
Associate college			0.289***	0.262***	0.261***	0.254***
			(0.046)	(0.047)	(0.043)	(0.047)
College and above			0.368***	0.316***	0.000	0.000
			(0.039)	(0.043)	(.)	(.)
Years worked				-0.058***		-0.020**
				(0.008)		(0.008)
Years worked squared				0.000		-0.001*
				(0.001)		(0.001)
Years worked at high OTJ occupation				0.162***		0.129***
				(0.005)		(0.005)
Mean Value	0.413	0.413	0.413	0.445	0.343	0.367
Observations	22,762	22,762	22,762	17,424	17,149	12,239
Pseudo R^2	0.028	0.054	0.073	0.224	0.042	0.185

Marginal effects; Standard errors in parentheses

(d) for discrete change of dummy variable from 0 to 1

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 13: The effects of juvenile conviction on adult male log hourly wage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Juvenile conviction	-0.147***	-0.128***	-0.077***	-0.068**	-0.027	-0.087***	-0.076**	-0.038
	(0.029)	(0.029)	(0.029)	(0.030)	(0.028)	(0.029)	(0.030)	(0.028)
Race = Black	-0.215***	-0.147***	-0.147***	-0.129***	-0.098***	-0.161***	-0.135***	-0.105***
	(0.020)	(0.021)	(0.021)	(0.019)	(0.021)	(0.022)	(0.021)	(0.022)
Race = Hispanic	-0.075***	-0.027	-0.018	-0.020	-0.022	-0.023	-0.024	-0.023
	(0.020)	(0.020)	(0.019)	(0.019)	(0.019)	(0.020)	(0.019)	(0.020)
Age	0.047***	0.045***	0.038***	0.007*	0.016***	0.036***	-0.006	-0.005
	(0.001)	(0.001)	(0.001)	(0.004)	(0.005)	(0.001)	(0.005)	(0.006)
ASVAB pct score		0.003***	0.003***	0.002*	0.000	0.005***	0.003***	0.002*
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ASVAB squared		-0.000	-0.000*	-0.000	-0.000	-0.000***	-0.000**	-0.000*
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GED			0.012	0.051*	0.032	0.011	0.067**	0.062*
			(0.030)	(0.031)	(0.035)	(0.030)	(0.031)	(0.035)
High school			0.063**	0.056**	0.043	0.064**	0.055**	0.048*
			(0.026)	(0.026)	(0.029)	(0.026)	(0.026)	(0.029)
Associate college			0.216***	0.338***	0.235***	0.222***	0.387***	0.328***
			(0.045)	(0.048)	(0.049)	(0.045)	(0.049)	(0.051)
College and above			0.328***	0.494***	0.365***	0.000	0.000	0.000
			(0.034)	(0.041)	(0.048)	(.)	(.)	(.)
Years worked				0.055***	0.032***		0.066***	0.053***
				(0.006)	(0.007)		(0.006)	(0.007)
Years worked squared				-0.002***	-0.002***		-0.001***	-0.002***
				(0.000)	(0.000)		(0.000)	(0.000)
Years worked at high OTJ occupation					0.026***			0.025***
					(0.004)			(0.004)
Employed at high OTJ occupation					0.177***			0.179***
					(0.014)			(0.014)
Constant	1.276***	1.168***	1.283***	1.845***	1.647***	1.330***	2.104***	2.035***
	(0.033)	(0.040)	(0.044)	(0.087)	(0.099)	(0.046)	(0.097)	(0.113)
Mean Value	2.384	2.384	2.384	2.385	2.404	2.310	2.310	2.324
Observations	22,009	22,009	22,009	21,456	17,770	18,097	17,579	14,147
R^2	0.143	0.163	0.197	0.218	0.278	0.126	0.157	0.233

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 14: The effects of juvenile conviction on adult female log hourly wage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Juvenile conviction	-0.211***	-0.148***	-0.075	-0.071	-0.045	-0.104**	-0.105**	-0.079
	(0.058)	(0.053)	(0.049)	(0.050)	(0.055)	(0.051)	(0.052)	(0.059)
Race = Black	-0.134***	0.019	0.009	0.024	0.022	0.009	0.028	0.025
	(0.020)	(0.020)	(0.018)	(0.018)	(0.020)	(0.020)	(0.020)	(0.022)
Race = Hispanic	-0.045**	0.064***	0.092***	0.098***	0.065***	0.107***	0.111***	0.083***
	(0.020)	(0.021)	(0.020)	(0.020)	(0.021)	(0.022)	(0.022)	(0.024)
Age	0.049***	0.044***	0.031***	0.009**	0.025***	0.027***	-0.005	0.010
	(0.002)	(0.002)	(0.002)	(0.004)	(0.005)	(0.002)	(0.005)	(0.007)
ASVAB pct score		0.007***	0.004***	0.003***	0.002	0.005***	0.004***	0.003
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
ASVAB squared		-0.000	-0.000*	-0.000	-0.000	-0.000*	-0.000	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GED			0.134***	0.167***	0.081*	0.140***	0.185***	0.114**
			(0.042)	(0.043)	(0.049)	(0.042)	(0.043)	(0.051)
High school			0.177***	0.161***	0.105***	0.178***	0.152***	0.112***
			(0.032)	(0.032)	(0.037)	(0.032)	(0.032)	(0.038)
Associate college			0.365***	0.456***	0.293***	0.378***	0.507***	0.375***
			(0.048)	(0.051)	(0.059)	(0.048)	(0.053)	(0.065)
College and above			0.568***	0.680***	0.476***	0.000	0.000	0.000
			(0.037)	(0.041)	(0.050)	(.)	(.)	(.)
Years worked				0.041***	0.019***		0.045***	0.024***
				(0.005)	(0.007)		(0.007)	(0.009)
Years worked squared				-0.001***	-0.002***		-0.000	-0.001
				(0.000)	(0.000)		(0.000)	(0.000)
Years worked at high OTJ occupation					0.018***			0.018***
					(0.004)			(0.005)
Employed at high OTJ occupation					0.182***			0.170***
					(0.014)			(0.016)
Constant	1.046***	0.818***	1.011***	1.438***	1.164***	1.097***	1.742***	1.474***
	(0.038)	(0.045)	(0.049)	(0.087)	(0.099)	(0.053)	(0.107)	(0.136)
Mean Value	2.256	2.256	2.256	2.257	2.289	2.118	2.118	2.133
Observations	20,343	20,343	20,343	19,979	15,796	14,960	14,640	10,898
R^2	0.131	0.201	0.278	0.288	0.332	0.124	0.144	0.191

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 15: The effects of juvenile conviction on adult male 10-year pct changes of hourly wage

	(1)	(2)	(3)	(4)	(5)	(6)
Juvenile conviction	-40.730***	-37.674***	-34.127***	-25.814***	-34.445***	-26.056***
	(10.282)	(10.109)	(10.548)	(9.739)	(10.636)	(9.797)
Race = Black	-24.034**	-9.385	-9.239	-1.803	-14.393	-5.950
	(9.744)	(9.996)	(10.159)	(10.513)	(10.062)	(10.366)
Race = Hispanic	-15.135*	-4.010	-3.841	3.996	-7.347	1.019
	(8.808)	(8.795)	(8.840)	(9.118)	(8.446)	(8.535)
Age	-4.650	-5.751**	-7.541**	-11.230***	-7.507**	-11.375***
	(2.853)	(2.871)	(3.559)	(4.163)	(3.570)	(4.186)
ASVAB pct score		1.470***	1.456***	1.089**	1.181**	0.826
		(0.533)	(0.556)	(0.541)	(0.586)	(0.570)
ASVAB squared		-0.008	-0.009	-0.006	-0.006	-0.004
		(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
GED			-13.364	-17.409	-12.520	-16.249
			(22.696)	(26.311)	(22.601)	(26.206)
High school			4.140	-7.065	4.631	-6.539
			(20.847)	(23.769)	(20.789)	(23.718)
Associate college			23.102	27.678	23.050	28.152
			(32.977)	(36.484)	(32.928)	(36.407)
College and above			21.057	30.340	0.000	0.000
			(32.260)	(36.103)	(.)	(.)
Years worked				0.000		0.000
				(.)		(.)
Years worked squared				0.000		0.000
				(.)		(.)
Years worked at high OTJ occupation				3.509***		3.741***
				(1.260)		(1.277)
Constant	232.643***	218.839***	269.608***	367.359***	273.385***	374.795***
	(84.279)	(83.752)	(103.512)	(119.797)	(103.867)	(120.575)
Mean Value	86.017	86.017	86.017	83.420	84.965	82.010
Observations	952	952	952	792	907	751
R^2	0.014	0.035	0.038	0.054	0.040	0.056

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 16: The effects of juvenile conviction on adult female 10-year pct changes of hourly wage

	(1)	(2)	(3)	(4)	(5)	(6)
Juvenile conviction	-63.858***	-60.016***	-63.292***	-66.399**	-62.997***	-63.148**
	(18.998)	(17.093)	(23.935)	(29.042)	(24.199)	(29.415)
Race = Black	-43.461***	-29.748***	-28.558***	-29.628**	-28.283***	-28.379**
	(11.727)	(10.675)	(10.067)	(12.523)	(10.016)	(12.651)
Race = Hispanic	-22.030*	-11.244	-11.970	-20.432	-10.136	-18.533
	(12.725)	(11.590)	(12.243)	(14.853)	(12.484)	(15.312)
Age	9.419*	6.076	1.554	0.806	1.825	0.994
	(5.259)	(4.223)	(5.178)	(7.747)	(5.177)	(7.836)
ASVAB pct score		-1.231	-1.658	-2.211	-1.221	-1.639
		(1.614)	(1.695)	(2.133)	(1.934)	(2.508)
ASVAB squared		0.022	0.025	0.028	0.020	0.021
		(0.020)	(0.020)	(0.025)	(0.023)	(0.030)
GED			21.079	-5.849	19.165	-8.951
			(19.314)	(28.303)	(19.412)	(27.916)
High school			31.952*	13.768	30.303*	10.782
			(16.418)	(26.013)	(16.406)	(25.711)
Associate college			140.774	151.562	139.333	149.241
			(103.715)	(114.438)	(102.905)	(111.290)
College and above			38.241	29.132	0.000	0.000
			(35.914)	(55.290)	(.)	(.)
Years worked				0.000		0.000
				(.)		(.)
Years worked squared				0.000		0.000
				(.)		(.)
Years worked at high OTJ occupation				2.852		4.351
				(3.098)		(3.455)
Constant	-188.667	-98.178	12.388	56.164	-1.428	38.667
	(149.058)	(121.317)	(161.566)	(229.763)	(162.523)	(234.264)
Mean Value	71.923	71.923	71.923	73.477	68.712	69.181
Observations	709	709	709	543	657	498
R^2	0.021	0.045	0.064	0.074	0.060	0.072

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 17: The effects of juvenile conviction on adult male incarceration

	(1)	(2)	(3)	(4)	(5)	(6)
Juvenile conviction	0.035***	0.027***	0.014***	0.009***	0.022***	0.014***
	(0.004)	(0.004)	(0.003)	(0.002)	(0.004)	(0.003)
Race = Black	0.020***	0.009***	0.007**	0.002	0.010**	0.003
	(0.003)	(0.004)	(0.003)	(0.002)	(0.004)	(0.003)
Race = Hispanic	0.001	-0.005	-0.003	-0.002	-0.005	-0.003
	(0.004)	(0.004)	(0.003)	(0.002)	(0.004)	(0.003)
Age	0.000	0.000	0.000	0.001*	0.000	0.001*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
ASVAB pct score		0.000	0.000	0.000	0.000	0.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ASVAB squared		-0.000***	-0.000**	-0.000	-0.000**	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GED			0.003	-0.001	0.005	-0.001
			(0.003)	(0.002)	(0.004)	(0.003)
High school			-0.013***	-0.008***	-0.021***	-0.012***
			(0.003)	(0.002)	(0.004)	(0.003)
Associate college			-0.032***	-0.022***	-0.050***	-0.033***
			(0.008)	(0.006)	(0.012)	(0.009)
College and above			-0.036***	-0.023***	0.000	0.000
			(0.006)	(0.004)	(.)	(.)
Years worked				-0.001*		-0.002*
				(0.001)		(0.001)
Years worked squared				-0.000		-0.000
				(0.000)		(0.000)
Years worked at high OTJ occupation				-0.000		-0.000
				(0.000)		(0.001)
Mean Value	0.030	0.030	0.030	0.017	0.035	0.021
Observations	26,878	26,878	26,878	19,981	22,633	16,076
Pseudo R^2	0.059	0.085	0.132	0.129	0.103	0.106

Marginal effects; Standard errors in parentheses

(d) for discrete change of dummy variable from 0 to 1

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 18: The effects of juvenile conviction on adult female incarceration

	(1)	(2)	(3)	(4)	(5)	(6)
Juvenile conviction	0.010***	0.008***	0.004**	0.002	0.009***	0.004**
	(0.002)	(0.002)	(0.002)	(0.001)	(0.003)	(0.002)
Race = Black	0.001	-0.001	-0.000	-0.001*	-0.001	-0.004*
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
Race = Hispanic	0.001	-0.001	-0.000	-0.001	-0.000	-0.002
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
Age	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ASVAB pct score		-0.000	-0.000	-0.000	0.000	0.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ASVAB squared		-0.000	-0.000	-0.000	-0.000	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GED			-0.001	-0.001	-0.003	-0.002
			(0.001)	(0.001)	(0.002)	(0.002)
High school			-0.003**	-0.001	-0.007***	-0.003*
			(0.001)	(0.001)	(0.003)	(0.002)
Associate college			-0.003*	-0.002	-0.008**	-0.004
			(0.002)	(0.001)	(0.004)	(0.003)
College and above			-0.010***	-0.005***	0.000	0.000
			(0.002)	(0.002)	(.)	(.)
Years worked				-0.000		-0.000
				(0.000)		(0.000)
Years worked squared				0.000		0.000
				(0.000)		(0.000)
Years worked at high OTJ occupation				-0.000*		-0.001*
				(0.000)		(0.000)
Mean Value	0.006	0.006	0.006	0.003	0.007	0.005
Observations	27,139	27,139	27,139	18,572	21,109	13,222
Pseudo R^2	0.042	0.062	0.101	0.104	0.062	0.067

Marginal effects; Standard errors in parentheses

(d) for discrete change of dummy variable from 0 to 1

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$