2015

From Building Blocks to Cell Blocks: An Analysis of the Effect of Public School Funding on Juvenile Delinquency

Chandrika Gupta
Claremont McKenna College

CLAREMONT MCKENNA COLLEGE

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Submitted to

Professor David Bjerk

and

Dean Nicholas Warner

by

Chandrika Gupta

for

Senior Thesis

Fall 2014

December 1st 2014

Abstract

In this study, the primary question that is addressed is that of whether there exists a relationship between juvenile arrest rates and public school funding. Using publically available FBI arrest data, data from the Current Population Survey (CPS), and Census data, I used two OLS models to answer this question. The first model suggested that there was no statistically significant correlation between school spending per child and juvenile arrest rates. However, it indicated that juvenile arrest rates were correlated with median income, percentage of children below the poverty line, percentage of Black, Hispanic, and Mixed children in the state. The second model had conflicting results. The model suggested that with a $1000 increase in school spending per child, there would be a 0.46 percentage point decrease in juvenile arrest rates. In addition, it maintained that there was a statistically significant correlation between median income and juvenile arrest rates; however, the direction of the effect was positive.

Table of Contents

I. Introduction

Numerous studies from varying disciplines have tried to explain the determinants and causes for juvenile delinquency. Attempts to understand this problematic and complex subject have given rise to a number of psychological, sociological, and biological theories that aim to understand criminal behavior in children. Sociological theories regarding delinquent behavior primarily focus on the effects of disorganization in society, and how that leads to the adoption of crime by children as a means to meet their goals. The Psychodynamic Theory and Social Learning Theory are two of the most influential theories in psychology that focus on the child's internal conflicts and the child's relation with the outside world in acquiring behaviors that can be classified as delinquent (Siegel and Welsh 2012).

Studies have shown that young children that display delinquent behaviors are more likely to have higher incarceration rates in adulthood (Tanner et al. 1999), showing that juvenile delinquency is a serious problem, with lifelong implications for not only the offenders, but the society that they affect. Biological, psychological, and sociological theories attribute causes of delinquency to familial, social, heritable, and other such factors (see for example Jensen 1976; Heimer 1996; Haynie and Osgood 2005). The causes that these theories attribute delinquency to are dynamic and difficult for public policy to control, therefore making the study of juvenile delinquency, its causes and possible preventative measures, not only an interesting but increasingly complex arena of research. However, these theories fail to incorporate the effect of education and school funding or quality in their assessment of delinquency and its determinants.

Education in itself is a vast subject, as it can be further broken down into smaller facets such as attainment, school rankings, funding, attendance, and so on. A large number of studies have tried to find links between education and crime; however, there is little proof to support the claim that crime can be somehow curbed by the use of education (Witte 1997)[1]. Although school funding and crime has not been looked into in great detail.

The question that my thesis primarily tackles is that of spending per child and delinquency rates. Is an increase in spending per child indicative of a lower rate of juvenile crime? My thesis is essentially a precursor to the question of how public policy can be altered such that juvenile crime rates can be lowered, perhaps by a change in public school funding.

In order to answer this question I used state level data with two OLS models. The first model failed to show any statistically significant link between juvenile arrest rates and spending per child, however suggested that with a dollar increase in median income, juvenile delinquency rates were negatively affected by 0.00018 percentage points, and with an increase in children below the poverty line delinquency decrease by .35 percentage points. In addition an increase in Black, Hispanic and mixed children would result in an increase in juvenile delinquency by 0.17, 0.18, and 0.03 percentage points respectively. My second model had conflicting results, as it showed that spending per child had negative effect on juvenile delinquency. The model suggested that with a $1000 increase in spending, the associated juvenile arrest rates decrease by 0.46 percentage

[1] According to Lochner and Moretti (2004), this may be due to the limited number of studies that Witte (1997) had access to.

points. Since spending per child is the variable of interest, this was the most valuable finding of the model. In addition, the second model suggested a positive correlation between median income and juvenile arrests.

II. Literature Review

Models on understanding criminal behavior fall into three broad categories: economic, sociological, and psychological (Stacey, 1998). The economic models that analyze criminality can further be broken down into the way that they aim to link certain behaviors to economic outcomes, and consequently economic circumstances to behavioral outcomes. A large number of the economic models look at criminal behavior from a labor economics viewpoint and in terms of foregone earnings (see for example, Becker 1965; Flinn 1986; Lochner and Moretti 2004).

Becker (1965) was one of the first economists to develop a model to understand criminal behavior. The model focused primarily on the allocation of time between labor and leisure, and the significance of forgone earnings. The idea that there is an inverse relation between labor and leisure was not a novel one. However what distinguished Becker's model was that he introduced the idea the there exist many different types of uses of time and consumption goods, that when combined, produce commodities that give us utility (Becker 1965). Therefore the model can be used to equate leisure to crime, and understand how that affects the consumption goods and budget constraint. However, the model did not account for educational attainment, achievement, or the quality of schools in the decision to allocate time.

Flinn (1986), states that every econometric model that has tried to quantify the reasons for criminal behavior has three essential characteristics. The assumption that the individual is rational and seeking to maximize their utility, an attempt to control for the risk factor associated with criminal behavior, and a strong focus on the monetary gains the individual receives by engaging in such activity. However, the "psychic rewards" are ignored by the assumption that all individuals have identical preferences. He highlights the flaw in this assumption by stating that differences in behavior arise from the different choices that the individual faces, and further emphasizes the need for a dynamic model that includes differentiating factors in behavior. He includes education in his model through the claim that it influences personal choices and behaviors by means of making the individual aware of the consequences of certain activities. Education does not take the center stage in the model; however the indication that education influences personal choice is an important one.

Lochner and Moretti (2004) established a relationship between crime and schooling through the lens of "social returns" to investment. Instead of focusing on the personal returns an individual receives from staying in school, the social benefits of those around the individual are studied. In the same vein, they shift the focus to crime, and how educational attainment could be used as a method to lower crime rates. Much like Flinn (1986), they build on the idea that education influences personal preferences, and would thus affect the decision to engage in criminal activity. Their study analyzes educational attainment and its effect on incarceration. They first looked at the effect of one additional year of schooling and the probability of being incarcerated, and found .10 percentage point drop for Whites and .37 percentage point drop for Blacks. In order to analyze the

type of crime that inmates have been charged with, they looked at from FBI Uniform Crime Report data. Their findings using this data were consistent with their previous findings; however they found that education had a large negative effect on murder, assault and motor vehicle theft.

Jacob and Lefgren (2003) studied the short term effects of school on crime. However, rather than looking at post high school graduation crime, they focused on delinquency. They suggested that perhaps if schools days were longer and children were kept busy, they would not have time to partake in criminal activity. They analyzed school calendars and daily criminal activity, along with taking into account the kind of crime, property or violent crimes that were reported. Their study suggested that juvenile property crime decreased by 14 percent; however violent crime increased by 28 percent when school is in session. They attributed these findings to the interaction of children with one another, rather than more incidents being reported during the school year. Their findings draw attention to the volatile nature of these children as well as the kind of interactions that take place during school hours. Thus implying that behavioral tendencies are a key determinant of criminal outcomes.

The second facet of economic models that study criminal behaviors take a more sociological and psychological approach (see for example Sampson and Groves 1989; Moffitt 1993). Sampson and Groves tested Shaw and McKay's[2] theory of social disorganization. They viewed schools as social organizations, thus crediting criminal

[2]Shaw and McKay's theory suggests that ecology and environment, especially in urban areas where they found higher instances of delinquency, plays a large factor in criminal behavior outcomes. They theorized that the part of the city with social disorganization and higher poverty will have children with higher tendencies to commit crimes, as they emulate the behaviors of older offenders.

behavioral tendencies in adolescents to peer effects and friendships or social groups rather than the quality or funding of schools. Sampson and Groves hypothesized that factors such as higher ethnic diversity, low income, unstable families and residential mobility lead to social disorganization, which consequently lead to an increase in delinquency and crime. Their model tested for social organization by measuring neighborhood friendships, organized participation, and control of street corner peer groups. Their results supported the theory, showing a direct linkage between social disorganization and criminal behavior.

In the same vein, Deming (2011) examined the effect of high school allotment on crime. Since school allotment is traditionally done based on neighborhoods, this study further tests the effect of "social organization" on criminal outcomes. In the model, he used public school choice lotteries in Charlotte-Mecklenburg school (CMS) district to examine the effect of attending a good quality school on adult crime. Between the years 1971 and 2001, school allotment in the CMS district was according to race in order to maintain racial balance in schools. However, in 2001, children were reassigned to schools according to newly drawn school district boundaries. Admission to the district school was guaranteed, but parents could submit up to three school choices for the open enrollment lottery. Children were then assigned random lottery numbers, which determined if they got the school of their choice-lottery winners, or if they didn't-lottery losers. He hypothesized that the lottery winners would have much fewer and less serious criminal outcomes, therefore implying that children who attended a better quality school would have better life outcomes, and would be less likely to engage in criminal activity. He measured the quality of the school by school rankings, and teacher and peer inputs. Using

an OLS model, he found that after seven years of this random assignment, children who were lottery winners ended up being arrested for lesser serious crimes and rate of incarceration was also lower. In addition, he found that behavioral outcomes in middle school were largely influenced by peer effects, whereas in high school, the quality of the school was a major determinant.

By focusing exclusively on juvenile delinquency and how increased or decreased public school funding at a state level contributes to criminal outcomes in minors, my thesis adds to the current literature. Due to the nature of the explanatory and control variables included in my model, it is quite similar to Sampson and Groves (1989). However, rather than concentrating on urban settings and neighborhood social organization, I focus on public school funding by state. The studies that I have discussed focus largely on the role of social organization and settings in conjunction with neighborhood poverty, low income families, and crime, but do not touch upon public school funding as a key component in the model of juvenile delinquency.

Instead of viewing crime-education as a labor-leisure function (Flinn, 1986), I view it as a function of better schools, as I am not trying to explain the psychological or sociological factors that come into play when a child chooses to commit crimes rather than attend school. Neither am I putting into perspective the social or monetary returns to education (Lochner and Moretti, 2004). I am simply trying to understand the effect that higher spending per child can have on the juvenile crime outcomes.

I am interested in understanding whether higher per child expenditure results in lower delinquency rates. To do so, I examine whether states with higher public school

revenues have lower juvenile crime rates. Therefore I have not limited my study to the social or racial effects that influence delinquency, but rather I have tried to answer the public policy questions surrounding increased funding, and if increased funding has had any impact on juvenile crime.

III. Data and Methodology

This study uses data from three sources. For crime data, FBI data was used, while for the other variables, data was taken US Census Bureau and the Current Population Survey. Data for the years 2006-2010 was used in order to capture any changes in juvenile arrest rates and spending per child that occurred within state. However, there were a number of holes in the FBI data, which resulted in the elimination of 17 states from the study. These gaps exist due to failure to report crimes by local police stations. Due to this failure, the coverage rate of the states was lower than 90%, which rendered the data for the state inaccurate and falsely representative of the real crime figures. I only included the states which had juvenile arrest data for at least three out of the five years in my model due to this shortcoming. The states for which data was unavailable for at least three years were eliminated from the sample, and the ones that had three of four observations were included with the missing data marked as a missing observation. In addition, the FBI data did not report runaways, delinquents that flee before they can be arrested. Another disadvantage of the FBI data in that it is not organized according to school district. This would have made it a much more meaning full study as the effects of property price, and school quality from district to district, could have been studied. However, despite its flaws, the FBI data provides a reasonably good estimate of juvenile

delinquency in America and for the purposes of this study, as with the current data a state level analysis can be conducted that measures the variations within the states and regions of the country.

School funding data from the US Census Bureau for the corresponding years was also collected. A cursory look at the sample makes it seem as if larger funds are linked with more arrest, which is quite counter intuitive. A large part of this is due to the sheer number of children and sizes of schools. In order to control for this effect, I calculated rates of juvenile arrests and spending per child, using population data from 2010, the total government spending, and total juvenile arrests. These rates were used in the model, so that number of children could be controlled for. In addition, race, median income, children below poverty line, and state and region dummy variables were included in the model to control for their effects on delinquency. For the control variables, just data from the census year 2010 was used, and for median income data from 2006-2010 was used (For variable descriptions see Appendix I, Table 1).

By calculating rates, I found that the difference in spending per child between states was very large. The average expenditure per child for the 35 states in my sample across all 5 years was $8009, with a standard deviation of $2190 (See Appendix II, Table 1.1). This was highly indicative if the discrepancy and inequality between the states. In 2010, Connecticut spent $12,030 per child, where as Arkansas spent a mere $5930, further exemplifying the existing disparity. States such as Connecticut, Massachusetts, New Jersey and New York had consistent higher per child spending. Arizona, Arkansas, Idaho, and Utah had consistent low per child spending. Another interesting observation

was that states with over 50% white children generally had higher per child spending than those with a more diverse population make up.

In addition, the use of state level data warrants the inclusion of state and region fixed effects in the two models that I have used to answer the question of whether higher school expenditure in linked to lower juvenile arrest rates. Due to the falling rates of crime in the country, coupled with the increasing average per child expenditure, a concern was the influence of this trend hampering the results of the data. In order to control for this, I included year fixed effects in my second model. The multiple specifications in each model serve as a basis of comparison as to how much the excluded variables matter in the model.

IV. Results

In order to examine the relationship between government spending and juvenile arrests, I divided the states into three categories according to their per student level of spending. If the spending was $10,000 and over they were classified as “high-spending”, below $10,000 to $6000 was medium spending and below $6000 was low spending. Grouping the states together according to the level of spending made analysis of corresponding juvenile arrest rates easier and more effective. The high spending states had a substantially lower average of juvenile arrest rates that the lower and medium spending states. However, the difference between medium and low spending states was not only slight, but also counterintuitive. Medium spending states had a higher average juvenile arrest rate at 3.12%, whereas low spending states had an average juvenile arrest rate of 3.01%. It is perhaps slightly more accurate to compare the summary statistics of

juvenile arrests only in the year 2010 and the other variables for which we only have 2010 data. Doing this for the three categories, it was found that the average juvenile arrest was still lowest for high spending states at 2.18%. The average juvenile delinquency rate however medium spending states was still more than that of low spending states by 0.171 percentage points. This is more or less consistent with the summary statistics of juvenile arrest rates for all 5 years. (See Appendix II, Tables 1.2-1.6)

I attribute the results of the medium and low spending states to the fact that other important variables were not controlled for. This is an important observation, as it was indicative of the large role that the other factors may play in the increase or decrease of delinquency. From the summary statistics, it can be noted that states with higher spending not only have lower juvenile arrest average, but also are less racially diverse, with an average of 66% white child population, and a maximum of 90.64% white child population in Vermont, which also has the lowest rate of juvenile delinquency at 0.99%. Higher spending states also have a higher average median income, as well as a lower average rate of children below poverty line. (See Appendix II, Table 1.7)

Another probable cause for the results was that perhaps juvenile delinquency is only affected by spending if the amount of spending is substantially high. The average juvenile delinquency rate for high spending states was 2.44%, 0.68 percentage points away from the medium spending states and 0.56 percentage points away from the lower spending states. The difference in the average juvenile delinquency for medium and low spending states is 0.11 percentage points for all years and 0.171 for 2010. While the difference in

average arrest rates between low and high spending states in 2010 is 0.63 percentage points and the difference between average arrest rates in medium and high spending states is 0.46 percentage points. Therefore, while the difference between average rates of juvenile arrests maybe marginal between medium and low spending states, it can be concluded that high spending states have, in comparison, a substantially lower average juvenile arrest rate.

However, without controlling for the other variables, any result or analysis would be flawed and incomplete. Descriptive summary statistics tells us very little about the actual causality, and validity of my hypothesis that increased public school funding will result in lower juvenile delinquency.

Another factor that was essential to take into account was that of variation in public school funding in a state, and how that variation has had an effect on juvenile crime. I selected two of the highest spending states and two of the lowest spending states and compared their yearly per child expenditure and the corresponding juvenile arrest rate. The consistently high spending states being New York and New Jersey, and low spending states being Idaho and Utah. There was a common theme in all four states, that with a rise in spending per child, there was a decline in juvenile delinquency rates. However, the most interesting trends were observed in the low spending states. Idaho, there was a sharp fall in the juvenile delinquency arrest rate in 2007, which coincided with an increase in spending per child. The same trend was noticed in Utah, where a sharp increase in spending in 2008 occurred with a steep drop in juvenile arrest rates. (See Appendix II, Graphs 1-4)

To further probe the relation between juvenile arrest rates and spending per child, I constructed a correlation table (See Appendix II, Table 3.1). The correlation between per child spending and juvenile arrest rates was -14.58%, giving further evidence that to my hypothesis that there exists an inverse relationship between the two. I found that median income and children below the poverty line were highly correlated with spending per child, at 44% and -52% respectively, which is indicative of the large role that income levels have to play in the allocation of schools funds, and the effect that that may have on the analysis.

I use two OLS models that primarily answer the question of whether higher public school funding is associated with lower juvenile delinquency rates. By using state level values, some of the effects that would most likely taint the analysis of the relationship, such as social effects, and neighborhood differences, are eliminated. This is due to the fact that the data is representative of the state as a whole, including richer and poorer school districts, rather than the individual schools, which may differ largely from one school district to another.

(1) First OLS Model

I estimate the model:

$$Y_i = \alpha + \beta_1 sdpch_i + \beta_2 X_i + \varepsilon_i$$

Where Y= Juvenile delinquency rate, and $sdpch$ is public school expenditure per child. X is representative of all the other explanatory variables in the model, which are: rate of children below the poverty line, median income, race (White, Black, Asian, Hispanic, and

Mixed). I also include region fixed effect dummies (South, West, and North-East), and i= State. The coefficient of interest is β_1, or the coefficient on spending per child.

I estimated three specifications for the 5 years. I have primarily used the results for 2010 as a basis for comparison, as that is the most recent year of the data set. Starting with 2010, in the first specification, I only included the two focus variables, juvenile delinquency and spending per child. This was a very simplistic model just to get an understanding of the relation without any controls. As I expected, the R-squared was very low at 2%, and the adjusted R-squared was -0.84%. The coefficient on spending per child was -0.06, which implied that a unit ($1000) increase in spending per child was correlated with a 0.06 percentage point drop in juvenile arrest rate. Though this was not at all statistically significant at the p<0.05 level. (See Appendix II, Table 2.1)

For the second specification, I included the all of the control variables, but for the regional fixed effect dummies. The R-squared of this model was 44%, significantly larger than the first version of the regression. At the p<0.05 level, spending per child still remained statistically insignificant, with a negative coefficient of 0.01, indicating that a $1000 increase in spending per child was correlated with a 0.01 percentage point decrease in juvenile arrest rates. Median income and children below poverty line were statistically significant at the p<0.01 level, with negative coefficients of -0.00021 and -0.44. Thus implying that a unit increase in median income would result in a 0.00021 decrease in juvenile arrest rates, and that a percentage point increase in children below poverty line would result in a 0.44 percentage point decrease in juvenile arrest rates. In addition, the variable for the percentage of Hispanic children had a positive coefficient of

0.16, which was statistically significant at the p<0.05 level. The other variables were statistically insignificant at the p<0.05 level.

The final specification, including region fixed effects, gave results largely consistent with those of the second specification; however the R-squared was 57%, significantly larger than the r-squared of the second specification. The coefficient on spending per child remained statistically insignificant at the p<0.05 level. Just as the second specification, median income and children below poverty line were statistically significant at the p<0.01 level with negative coefficients of -0.00018 and -0.35 respectively. Implying that a unit increase in median income would result in a 0.00018 percentage point decrease in juvenile arrest rates and a percentage point increase in children below the poverty line would result in a 0.35 percentage decrease in juvenile arrest rates. The effect of children below poverty line was once again very counter intuitive. The effect of median income and children below poverty line having an extremely high correlation with spending per child was apparent through the second and third specifications of my model.

The results of my initial regressions went against my hypothesis that juvenile arrest rates and spending per child would be inversely related; as the model suggests that there is no correlation between the two. However, the most important observation was that of the effect of median income, children below the poverty line, percentage of Black, Hispanic and mixed children. The next step in my analysis was to estimate the same specifications for the other years in my data set. I excluded the variable capturing children below poverty line in each state, as my dataset did not include the values for all

five years. In addition, seeing from the correlation table median income and children below the poverty line essentially measures the same thing and are highly correlated. The effect of the financial crisis in the 2006-2010 time frame would have made a large dent in income levels and children below the poverty line; they would have changed in a significant way.

For 2009, the first specification yielded very similar results as the results for the year 2010 (See Appendix II, Table 2.2). However for the second specification, the coefficient on spending per child remained negative, -0.06; but this was not statistically significant. In addition, the coefficients on race were also quite different in 2009 than in 2010, primarily in terms of the direction of their effect, rather than the magnitude. In the third specification, the coefficient on spending per child was 0.093, implying a positive relation between juvenile arrest rates and spending. The result was similar to that of 2010. However, none of the variables were statistically significant.

In the 2008 model, I noticed that for the first specification the result were extremely similar to the 2009 and 2010 results. They differed only very slightly (See Appendix II, Table 2.3). However for the second and third specifications it was more similar to 2009 than 2010. The sign changes on the coefficients on the controls for race of children were identical to that of 2009. And the R-squared values were very similar as well. However, just as for 2009, the results were not statistically significant and therefore not viable sources of information for the relationship between juvenile delinquency and spending per child.

For 2007, I noticed that while the first specification stayed similar once again, the second and third specifications had different coefficients for the race controls, but similar coefficients for spending per child. The most significant change was that in the direction of the coefficients on race controls and not the magnitude, again, very similar to the results of the 2009 and 2008 specifications. The r-squared for the third specification was quite high at 32%, however with no statistical significance on the coefficients of the variables, little can be concluded about the question of juvenile arrests.

For 2006, the pattern of the first specification stayed constant to the previous regressions. Once again, the only noticeable change was that of the direction in which race was affecting the arrest rates in the second and third specifications. The r-squared of the third specification was 33%, making the specification for more accurate than the first two specifications for 2006.Due to the low statistical significance associated with spending per child, the question of juvenile arrests and public school funding was left unanswered. However, table 2.1 is indicative of a relation between children below the poverty line, median income, and juvenile arrests, as well as a relation between Hispanic, Black and children of two or more races. From the simple summary statistics, it was evident that high spending states were characterized by lower diversity and higher median income, and the 2010 specification of the model strengthened that claim.

However, the key variable that is being focused on is public school funding, or spending per child, for which there was no statistical significance found in the various specifications of the first model. In order to control for the overall variations through year

and state in the sample, I looked at a second model to try and understand the relation between juvenile arrests and public school funding.

(2) Second OLS Model

In the second OLS model, I attempted to look at the question in a different way by capturing the effect of change in the 2006-2010 time frame, I estimated a second model where:

$$Y_{it}=\alpha+\beta_1 sdpch_{it}+\beta_2 medinc_{it}+\theta_i+\gamma_t+\varepsilon_{it}$$

Where Y= Juvenile delinquency rates

$spdch$= Spending per child

$medinc$= State median income

θ= Individual state fixed effect dummies

γ= Year fixed effect dummies

t= Year

i= State

The individual state dummies are included to soak up any fixed state effects that there might be in the regression. I included only spending per child and median income as explanatory variables in the model, as the sample had data for all 5 years. In addition, I included year fixed effects in order to control for the effect of falling crime rates and the increasing per child school expenditure over the past years (See Appendix I, Graph 1 and

2). Once again, the coefficient of interest is β_1, or the coefficient on per child school expenditure.

Prior to including the state and year fixed effect dummies, I included a specification with just juvenile arrest rates over the five years, and spending per child over the five years. The R-squared of this model was very low, 1.94%. The coefficient on spending was -0.07, but was not statistically significant at the p<0.05 level.

The second specification of the model included the fixed effect state dummies. The R-squared was very high at 90.8%. As per my hypothesis, spending per child had a negative coefficient of -0.041, implying that with every $1000 increase in spending, Y_t decreased by 0.041 percentage points, however this was not statistically significant at the p<0.05 level. The constant for the equation was positive, and statistically significant at the p<0.01 level. (See Appendix II, Table 3.1)

However, an important variable that has not been controlled for is median income. The time frame 2006-2010, coincides with the financial crisis that occurred in late 2008. The financial crisis is bound to have had a significant effect on median income and children below poverty line across all states. From Table 3.1, it is clear that median income and child poverty play an important role in determining juvenile arrest rates. Therefore median income has to be controlled for in the model, so that an accurate picture of juvenile arrests can be derived. Therefore the third specification of the model included the vales for median income for all 5 years per state, so that the effect of the financial crisis could be accounted for in the analysis.

In the third specification of the model, the inclusion of median income resulted in an interesting output. Median income had a negative coefficient in the previous regressions, however in the third specification of the second model, the coefficient was 0.00004, and was significant at the p<0.01 level. Indicating that with a unit increase in median income, juvenile delinquency increased by 0.00004 percentage points. This was clearly very counter intuitive; however, with the absence of year fixed effects, the influence of falling crime rates goes unchecked. The coefficient on spending per child was -0.07, and was not statistically significant.

The fourth specification of the model included the year fixed effects, in order to control for the variation in crime over the years. The individual year dummies absorb the fixed effects that may skew the results of the model. The coefficient on spending per child was -0.46, statistically significant at p<0.01 level. Indication that the is a correlation between spending per child and juvenile delinquency such that with a $1000 increase in per child public school expenditure, delinquency rates drop by 0.46 percentage points. In addition, the results suggest that median income and juvenile arrest rates are positively correlated such that a unit increase in state level median income will be associated with a 0.00004 increase in arrest rate. The coefficient on median income was statistically significant at p<0.01 level. The r-squared of the specification was very high at 95%.

V. **Conclusion**

The aim of this study was to understand how a change in public policy, that is increased education funding, can reduce juvenile arrest rates and essentially act as a method of crime prevention. Looking at individual states gave a clear picture of the

variation in funding within the country and the corresponding variation in juvenile arrests.

The model finds strong evidence in favor of the hypothesis that spending per child and arrest rates are negatively correlated. However, the failure of my first model to find such results can be attributed to a number of causes. Primarily the nature of the crime data, as well as exclusion of a number of key variables that may have influenced juvenile delinquency. Another reason maybe that there are factors other than just funding that attribute to the quality of the school. Management of funds, quality of teachers, social effects associated with peers, academics, and co-curricular activities are more likely to have an effect of the quality of the school and its success rate in having a positive effect on children rather than the amount of funding alone.

From the first OLS model, the results suggest that there is a negative relation between median income and juvenile arrest rates, which is quite intuitive. The study shows that there is a negative relation between children below poverty line and arrest rates, implying that with an increase in poverty, arrest rates drop by 0.35 percentage points. This is a very counter intuitive result, as poverty and median income move in opposite directions. However, this can perhaps be attributed to the nature of the crime observations, since they are representative solely of the arrests, and do not take into account runaways or unsolved crimes that may be committed by children. Since children living in poverty are more likely to be exposed to delinquent behaviors, perhaps they are just better at not getting caught, thus resulting in crime figures that are not fully representative of the actual level of juvenile crimes being committed. Another reason

maybe the nature of crimes that children living in poverty are likely to commit, and the chances that they have of getting arrested. The inclusion of crimes according to property, violent, theft, drug use and possession may have been likely to point out what kinds of crimes children are most likely to commit, and whether improving the quality of public schools can change that. For example, Jacob and Lefgren (2003) found that by extending the hours of school, property crimes decreased, but violent crimes increased.

Another important finding of the model was that of the racial effects on juvenile delinquency. The 2010 cohort indicated that a larger number of Black, Hispanic and mixed children was associated with an increase in juvenile delinquency. The policy implications for such a result are apparent. These are high-risk, socially disadvantaged youths that are more likely to engage in delinquent behavior. Previous studies such as Sampson and Groves (1989) support the claim that neighborhoods with high ethnic diversity generally have higher juvenile delinquency rates. However instead of neighborhoods, my model suggests the same for regions.

The second model suggested a strong negative correlation between juvenile arrest rates and spending per child, implying that a $1000 increase in school expenditure per child is associated with 0.46 percentage point lower juvenile arrest rates. However, the model had conflicting results where median income was concerned. The results indicated that an increase in median income was associated with an increase in delinquency. Once again the nature of the crime data could be held accountable for the conflicting and counter intuitive results. In addition, it could be possible that a number of privileged youths were engaging in delinquent behavior just for fun. It would be more telling if the

nature of the crimes could be included in the model, as that would give a clearer evaluation of which section of society was committing these crimes, and why these crimes were being committed in the first place. The important question is what portion of delinquent behavior is due to poorly funded schools, and how public policy can be changed to minimize the effect of low funding on delinquent behavior. There seem to be a lot of other factors that largely control delinquent arrests and behavior.

Finally, the results of my second model give reason to further probe the effectiveness of school funding and education as a means to reduce juvenile crime. In addition, education and school quality should take more of a center stage in models aiming to explain delinquent behavior. Future studies should aim to include total juvenile delinquency levels, and not only arrests. In addition, it would be a more complete study if observations for all the years in the sample size could be collected. Perhaps more variables could be added to the model in order to control for the effects of the financial crisis, and its influence on school funding and budget cuts. The enactment of programs such as Common Core and No Child Left Behind would also affect school quality and funding, as well as dropout rates and child engagement in schools.

VI. References

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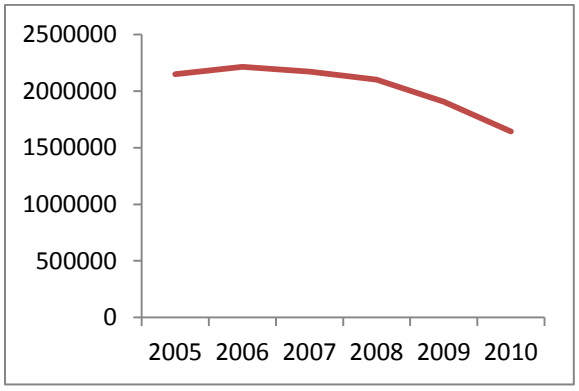
APPENDIX I

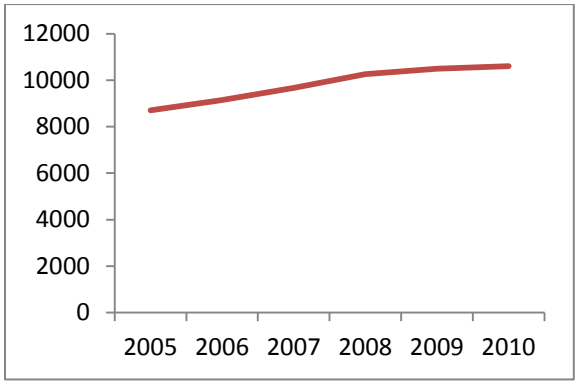
Table 1: Variable Descriptions

Variable Definition	**Variable Label**
Year	Year
State	State
Juvenile Arrest Rates (calculated on 2010 population estimates)	JUVARR
% of White children in the state	RACEW
% of Black children in the	RACEB
% of Hispanic children in the state	RACEH
% of Asian children in the state	RACEA
% of Racially mixed children in the state	RACET
Median Income	MEDINC
Public school spending per child (calculated on 2010 population estimates, thousands of dollars)	SDPCH
Binary variable, if state is the South=1	SOUTH
Binary variable, if state is the West=1	WEST
Binary variable, if state is the North East=1	NEAST

Graph 1: Declining Juvenile Arrests-Nationwide Aggregate



Graph 2: Increasing per Child School Spending-Nationwide Aggregate



APPENDIX II

Table 1.1: Summary Statistics of the entire Sample

Variable	Observations	Mean	St. Deviation	Min	Max
Juvenile Arrest Rates	171	2.96	1.16	0.64	8.13
Spending per Child	175	8.01	2.19	3.8	13.06

Table 1.2: Summary Statistics of High Spending States

Variable	Observations	Mean	St. Deviation	Min	Max
Juvenile Arrest Rates	35	2.44	1.07	.99	5.43
White Children (%)	9	66.68	16.08	50.13	90.64
Hispanic Children (%)	9	14.69	8.57	2.34	23.67
Black Children (%)	9	7.15	5.55	1.02	15.98
Asian Children (%)	9	4.35	2.83	.66	9.02
Mixed Children (%)	9	4.33	3.04	2.85	12.36
Median Income	35	62222	7250	51209	78632
Children Below Poverty Line (%)	9	15.23	2.83	12.5	20.7

Table 1.3: **Summary Statistics of Medium Spending States**

	Observations	**Mean**	**St. Deviation**	**Min**	**Max**
Juvenile Arrest Rates	109	3.12	1.25	.64	8.13
White Children (%)	22	58.95	18.76	13.43	89.84
Hispanic Children (%)	22	16.87	13.75	2.06	51.81
Black Children (%)	22	12.10	9.44	.61	31.65
Asian Children (%)	22	4.37	5.16	.69	25.1
Mixed Children (%)	22	5.57	5.99	2.22	31.67
Median Income	111	55698.35	7831.012	39681	73734
Children Below Poverty Line (%)	22	19.25	4.16	11.9	26.7

Table 1.4: Summary Statistics of Low Spending States

Variable	Observations	Mean	St. Deviation	Min	Max
Juvenile Arrest Rates	27	3.01	.54	1.92	3.98
White Children (%)	4	64.84	16.39	41.03	76.19
Hispanic Children (%)	4	21.47	15.34	7.97	43.54
Black Children (%)	4	6.52	9.02	.83	19.84
Asian Children (%)	4	1.72	.59	1.11	2.53
Mixed Children (%)	4	3.26	.16	3.1	3.47
Median Income	29	51977.41	7182.048	41230	67659
Children Below Poverty Line (%)	4	20.1	5.02	13.7	24.2

Table 1.5: **Summary Statistics of High Spending States, Year=2010**

Variable	Observations	Mean	St. Deviation	Min	Max
Juvenile Arrest Rates	9	2.18	.99	.99	4.44
White Children (%)	9	66.68	16.08	50.13	90.64
Hispanic Children (%)	9	14.69	8.57	2.34	23.67
Black Children (%)	9	7.15	5.55	1.02	15.98
Asian Children (%)	9	4.35	2.83	.66	9.02
Mixed Children (%)	9	4.33	3.04	2.85	12.36
Median Income	9	61164	8378.73	48219	71637
Children Below Poverty Line (%)	9	15.23	2.83	12.5	20.7

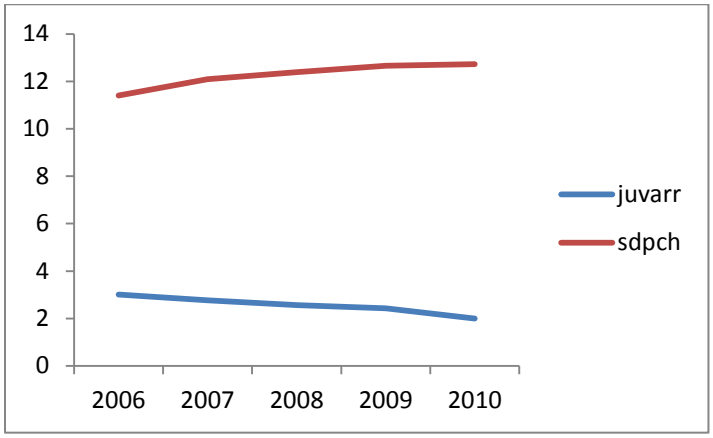
Table 1.6: Summary Statistics of Medium Spending States, Year=2010

	Observations	Mean	St. Deviation	Min	Max
Juvenile Arrest Rates	22	2.64	1.004	.64	5.71
White Children (%)	22	58.95	18.76	13.43	89.84
Hispanic Children (%)	22	16.87	13.75	2.06	51.81
Black Children (%)	22	12.10	9.44	.61	31.65
Asian Children (%)	22	4.37	5.16	.69	25.1
Mixed Children (%)	22	5.57	5.99	2.22	31.67
Median Income	22	52920.77	8537.48	40400	72999
Children Below Poverty Line (%)	22	19.25	4.16	11.9	26.7

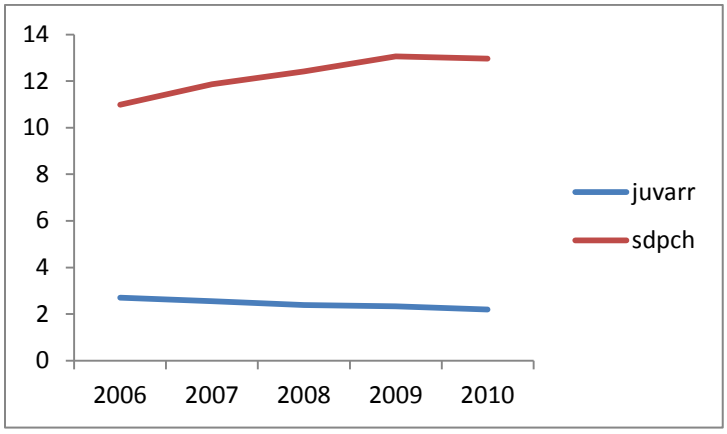
Table 1.7: Summary Statistics of Low Spending States, Year=2010

Variable	Observations	Mean	St. Deviation	Min	Max
Juvenile Arrest Rates	4	2.81	.18	2.55	2.98
White Children (%)	4	64.84	16.39	41.03	76.19
Hispanic Children (%)	4	21.47	15.34	7.97	43.54
Black Children (%)	4	6.52	9.02	.83	19.84
Asian Children (%)	4	1.72	.59	1.11	2.53
Mixed Children (%)	4	3.26	.16	3.1	3.47
Median Income	4	49893.75	6053.13	44140	58164
Children Below Poverty Line (%)	4	20.1	5.02	13.7	24.2

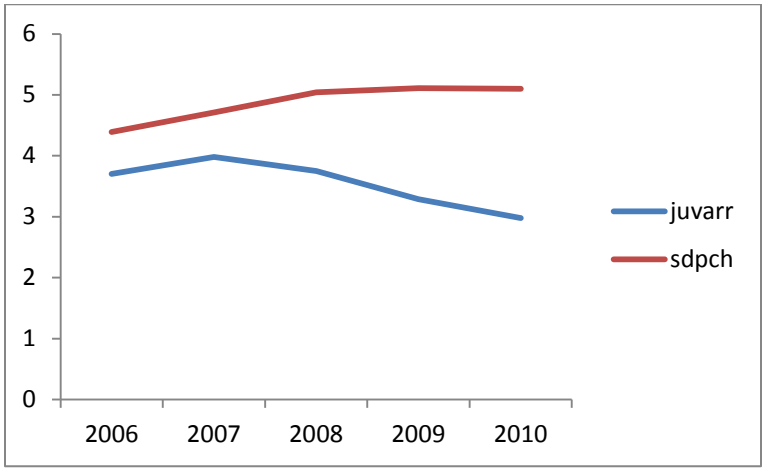
Graph 1.1: Variance in Spending per Child and Juvenile Arrest Rates, New Jersey



Graph 1.2: Variance in Spending per Child and Juvenile Arrest Rates, New York



Graph 1.3: Variance in Spending per Child and Juvenile Arrest Rates, Idaho



Graph 1.4: Variance in Spending per Child and Juvenile Arrest Rates, Utah

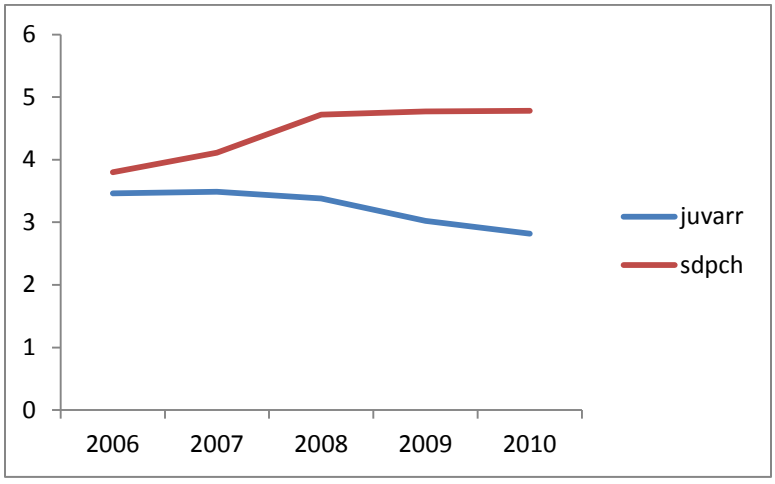


Table 1.8: Correlation Matrix

	Juvenile Arrest Rates	White	Hispanic	Black	Asian	Mixed	Median Income	Children Below Poverty Line	Spending per Child
Juvenile Arrest Rates	1								
White	-0.063	1							
Hispanic	0.102	-0.69	1						
Black	-0.2	-0.27	-0.114	1					
Asian	0.09	-0.71	-0.26	-0.043	1				
Mixed	0.15	-0.51	-0.05	-0.2	0.81	1			
Median Income	0.18	-0.33	0.18	-0.04	0.51	0.26	1		
Children Below Poverty Line	-0.22	-0.96	0.203	0.24	-0.3	-0.214	-0.81	1	
Spending per Child	-0.15	0.95	-0.208	-0.005	0.18	0.012	0.44	-0.52	1

Table 2.1: Model 1, Year=2010

Control Variables	**(1)**	**(2)**	**(3)**
Spending per Child	-0.06	-0.01	0.09
	(0.071)	(0.095)	(0.1)
White Children (%)	-	0.08	0.113
		(0.061)	(0.06)
Black Children (%)	-	0.115	0.17**
		(0.07)	(0.07)
Hispanic Children	-	0.16**	0.18**
(%)		(0.07)	(0.07)
Asian Children (%)	-	-0.032	-0.03
		(0.08)	(0.09)
Mixed Children (%)	-	0.25	0.03**
		(0.15)	(0.16)
Median Income	-	-0.00021***	-0.00018***
		(0.00006)	(0.00006)
Children Below	-	-0.44***	-0.35***
Poverty Line		(0.11)	(0.12)
Constant	3.05***	11.9	5.5
	(0.62)	(6.9)	(6.9)
Region Fixed	No	No	Yes
Effects			
Observations	35	35	35
R-squared	0.02	0.44	0.57

Standard Errors are given in parenthesis

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

Table 2.2: Model 1, Year=2009

Control Variables	**(1)**	**(2)**	**(3)**
Spending per Child	-.06	-0.08	0.093
	(0.08)	(0.11)	(0.14)
White Children (%)	-	0.04	0.078
		(0.08)	(.079)
Black Children (%)	-	0.11	0.081
		(0.08)	(0.085)
Hispanic Children	-	0.038	0.082
(%)		(0.09)	(0.086)
Asian Children (%)	-	-0.0003	0.002
		(0.11)	(0.012)
Mixed Children (%)	-	0.12	0.18
		(0.2)	(0.2)
Median Income	-	0.000017	0.000003
		(0.00003)	(0.00003)
Constant	3.36***	-1.12	-5.4
	(0.67)	(8.7)	(8.5)
Region Fixed Effects	No	No	Yes
Observations	34	34	34
R-squared	0.02	0.12	0.32

Standard Errors are given in parenthesis

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

Table 2.3: Model 1, Year=2008

Control Variables	(1)	(2)	(3)
Spending per Child	-.064	-0.12	0.06
	(0.098)	(0.14)	(0.17)
White Children (%)	-	0.018	0.06
		(0.096)	(.094)
Black Children (%)	-	-0.003	0.09
		(0.097)	(0.1)
Hispanic Children	-	0.02	0.07
(%)		(0.12)	(0.103)
Asian Children (%)	-	-0.034	-0.05
		(0.13)	(0.13)
Mixed Children (%)	-	0.09	0.12
		(0.24)	(0.23)
Median Income	-	0.00005	0.000023
		(0.00004)	(0.000035)
Constant	3.36***	-0.26	-4.7
	(0.84)	(10.6)	(10.23)
Region Fixed Effects	No	No	Yes
Observations	34	34	34
R-squared	0.013	0.14	0.35

Standard Errors are given in parenthesis

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

Table 2.4: Model 1, Year=2007

Control Variables	**(1)**	**(2)**	**(3)**
Spending per Child	-.07	-0.14	0.07
	(0.11)	(0.15)	(0.19)
White Children (%)	-	-0.003	0.038
		(0.098)	(.096)
Black Children (%)	-	-0.03	0.073
		(0.1)	(0.1)
Hispanic Children	-	-0.01	0.039
(%)		(0.11)	(0.104)
Asian Children (%)	-	-0.009	-0.05
		(0.15)	(0.15)
Mixed Children (%)	-	0.01	0.12
		(0.25)	(0.23)
Median Income	-	0.00004	0.00002
		(0.00004)	(0.00004)
Constant	3.79***	2.44	-1.6
	(0.88)	(10.9)	(10.4)
Region Fixed Effects	No	No	Yes
Observations	33	33	33
R-squared	0.015	0.1	0.32

Standard Errors are given in parenthesis

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

Table 2.5: Model 1, Year=2006

Control Variables	**(1)**	**(2)**	**(3)**
Spending per Child	-.05	-0.2	-0.03
	(0.11)	(0.16)	(0.23)
White Children (%)	-	0.03	0.04
		(0.09)	(.09)
Black Children (%)	-	0.013	0.08
		(0.09)	(0.1)
Hispanic Children	-	0.02	0.05
(%)		(0.1)	(0.098)
Asian Children (%)	-	-0.02	-0.07
		(0.15)	(0.14)
Mixed Children (%)	-	0.08	0.15
		(0.23)	(0.22)
Median Income	-	0.00006	0.00004
		(0.00004)	(0.00004)
Constant	3.5***	-1.8	-3.13
	(0.82)	(9.7)	(9.7)
Region Fixed Effects	No	No	Yes
Observations	35	35	35
R-squared	0.006	0.14	0.33

Standard Errors are given in parenthesis

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

Table 3: Model 2

Control Variables	**(1)**	**(2)**	**(3)**	**(4)**
Spending per	-0.07	-0.041	0.006	-0.46***
Child	(0.034)	(0.043)	(0.044)	(0.043)
Median Income	-	-	0.00004***	0.00004***
			(0.00001)	(0.00001)
State Fixed Effects	No	Yes	Yes	Yes
Year Fixed Effects	No	No	No	Yes
Constant	3.55***	4.7***	1.7	7.9***
	(0.04)	(0.42)	(1.03)	(0.76)
Observations	171	171	171	171
R-squared	0.019	0.908	0.914	0.95

Standard Errors are given in parenthesis

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