High School Mathematical Contest in Modeling (HiMCM)
Team 2544
November 2010

Problem B
Curbing City Violence

Restatement of Problem

The purpose of this model is to decrease the crime rate relating to gangs and violence in a city. Although the crime rate has decreased from 2000-2006, it has started increasing again. From 2006-2008, the incidence of homicide increased by 78%. The Mayor of the city has contacted us to find a model to decrease crime rate.

Definitions

- Defining juvenile delinquents as children of high school age or younger (since particular age depends on the US state)
- Defining persistently low-performing schools as high schools with a graduation rate of under 70%
- All costs referred to are in US dollars.

Assumptions

Some of the data was unclear as to what refers to within the city or within the country, so we had to make some assumptions:
- The high school enrollment rate only refers to high schools within the city.
- The incidences of violence refer only to those that occurred within the city.
- That there was a disease outbreak or natural disaster in the year 2000 seeing as the county population increased from 2000-2008 and a 7000 person drop from 2000-2001 seems very unlikely since at all other times ratio of city to county population growth has remained constant.
- Empirical evidence shows that normally unemployment rate correlates with crime rates, but since there is no correlation in this city, we can assume that most of the crime comes from gangs of youth.
- This city is in the United States and hence eligible for federal funding.

We calculated incidence of violence divided by population to obtain a crime rate rather than simply a figure with the number of incidents of violence.

Crime Rate in City

Year	Crime Rate
2000	.00498
2001	.00563
2002	.00485
2003	.00482
2004	.00464
2005	.00436
2006	.00463
2007	.00486
2008	.00488

We then compared variables of the statistics to other data to see what needs to be focused on to reduce crime rate.

First we focused on the variable on unemployment rate.
To see if there was a relationship between **crime rate and unemployment rate**, we graphed the two vs each other. The resulting linearization of the data was: **y=(604.52x) + 8.3106.** However, the r^2 value was .04127, showing that this linearization was a very bad fit and there wasn't a big correlation between crime rate and unemployment rate.
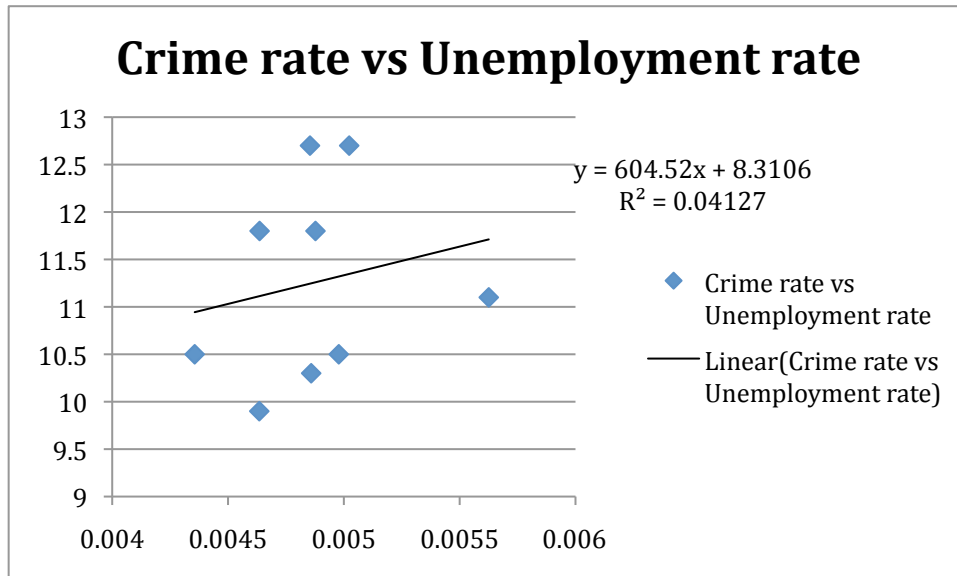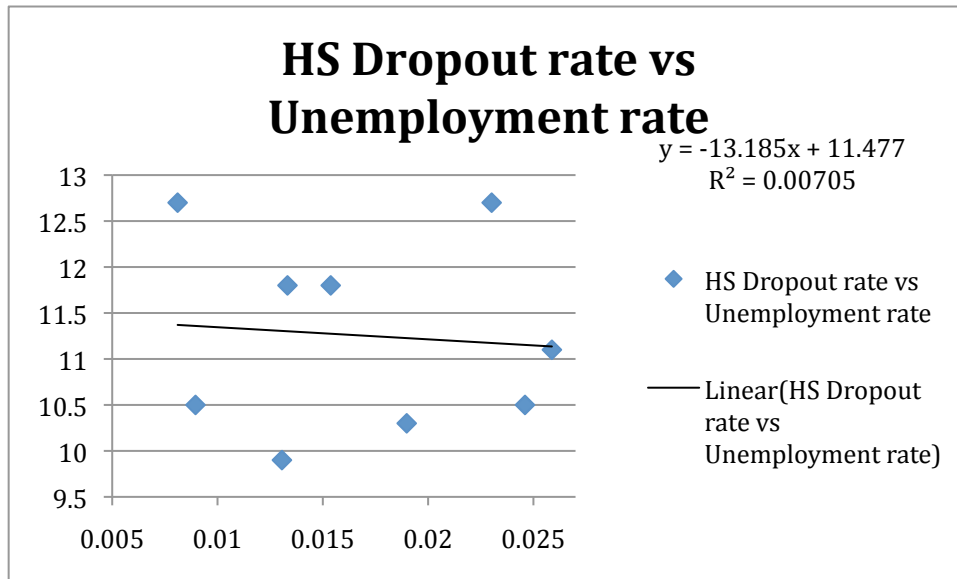

Then, to see if there was a correlation of unemployment rate and graduation rate, we graphed them. The correlation was basically non-existent since the linearization had an r^2 value of 3.8*10^-5.
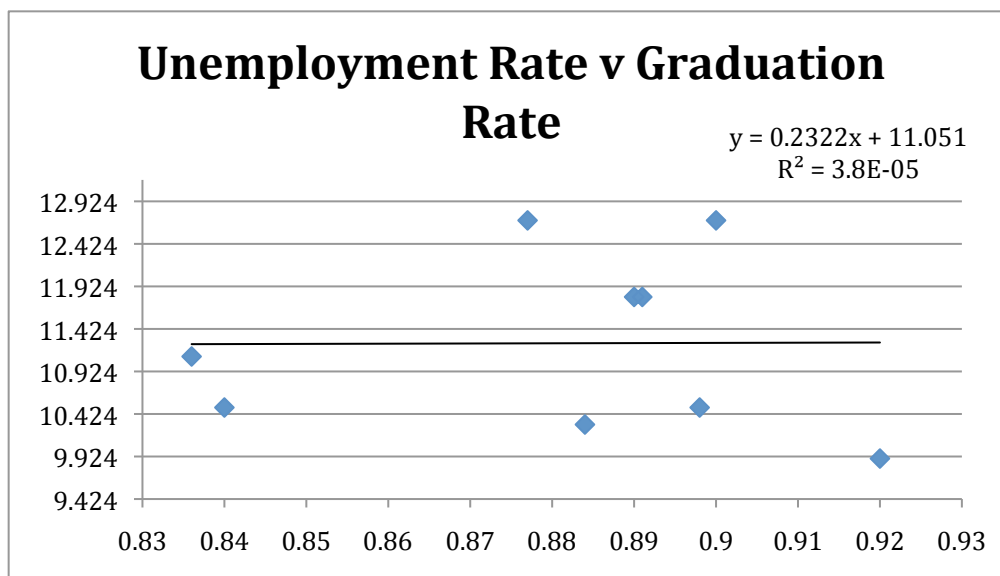

To further confirm the non-existent relationship between unemployment rate and graduating from high school, we graphed unemployment rate vs

dropout rate. With an r^2 value of .00705, this relationship was also not proportional.
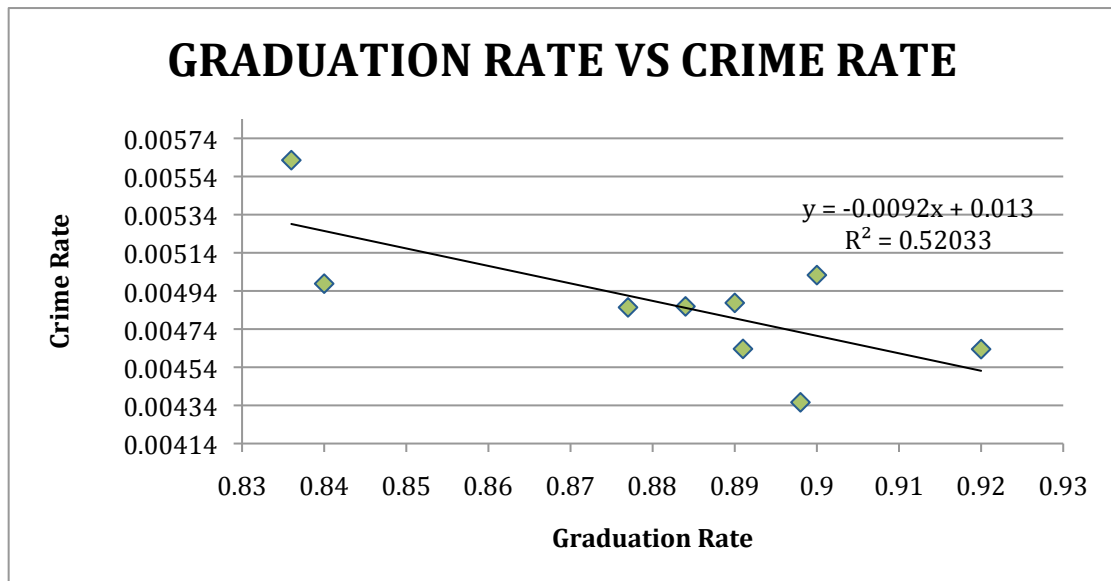
HS Dropout rate vs Unemployment rate

$y = -13.185x + 11.477$
$R^2 = 0.00705$

◆ HS Dropout rate vs Unemployment rate

—— Linear(HS Dropout rate vs Unemployment rate)

Then, we focused our attention onto the implications of the graduation rate.

This is the correlation between **Juvenile inmates vs graduation** rate. The correlation here was very strong as the r^2 value was .77014 for this equation: **y= -3*10^5x + .9447**

Juvenile inmates vs Graduation rate

$y = -3E-05x + 0.9447$
$R^2 = 0.77014$

◆ Juvenile inmates vs Graduation rate

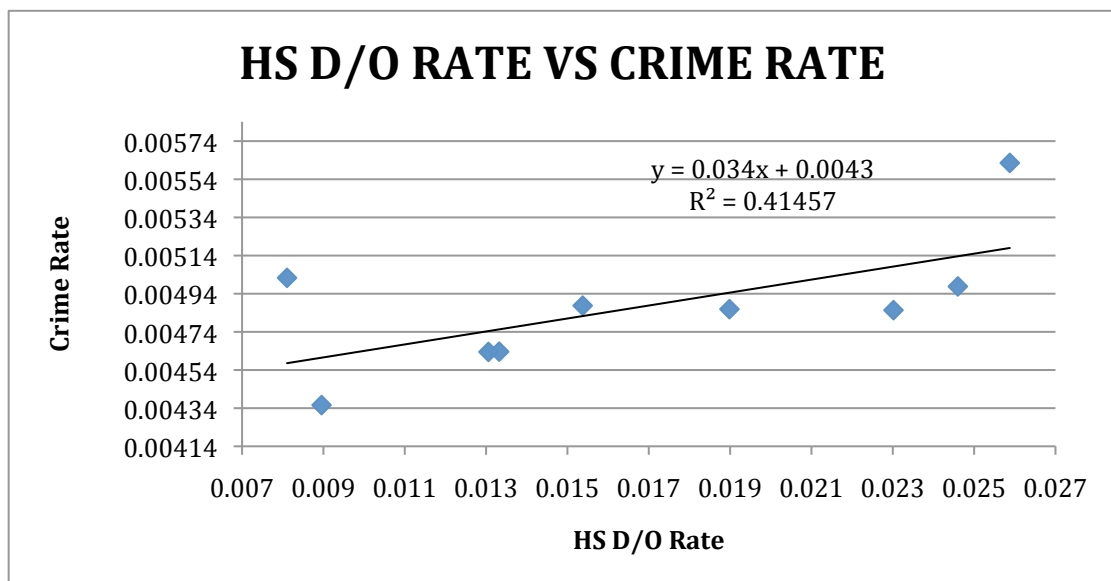—— Linear(Juvenile inmates vs Graduation rate)
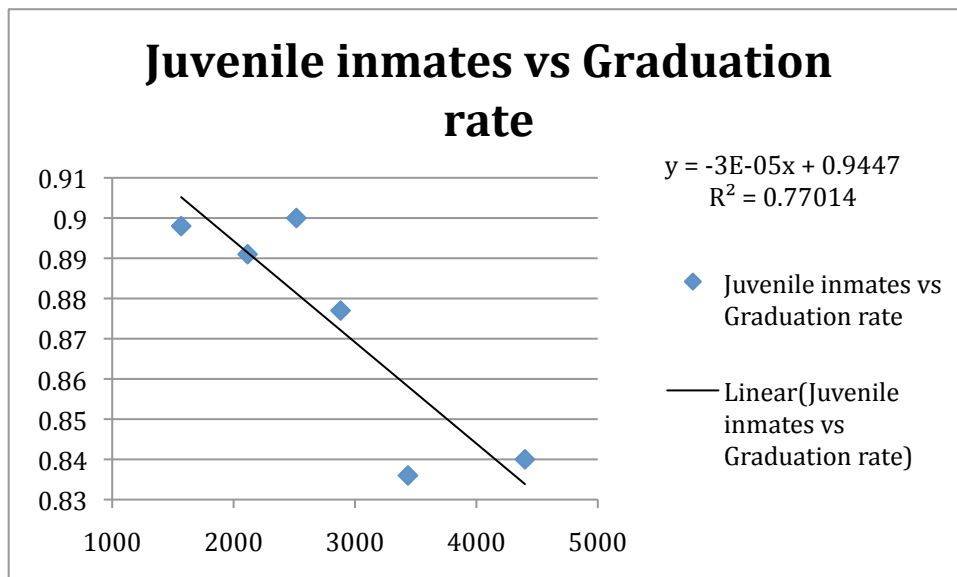
The high school rate has a very minimal correlation with the unemployment rate. The equation is: **y= -13.185x + 11.477** with a r^2 value of .00705.

This is the correlation between graduation rate and crime rate. With an r^2 value of .52033, there is a moderately good inversely proportional relationship between these two data sets.
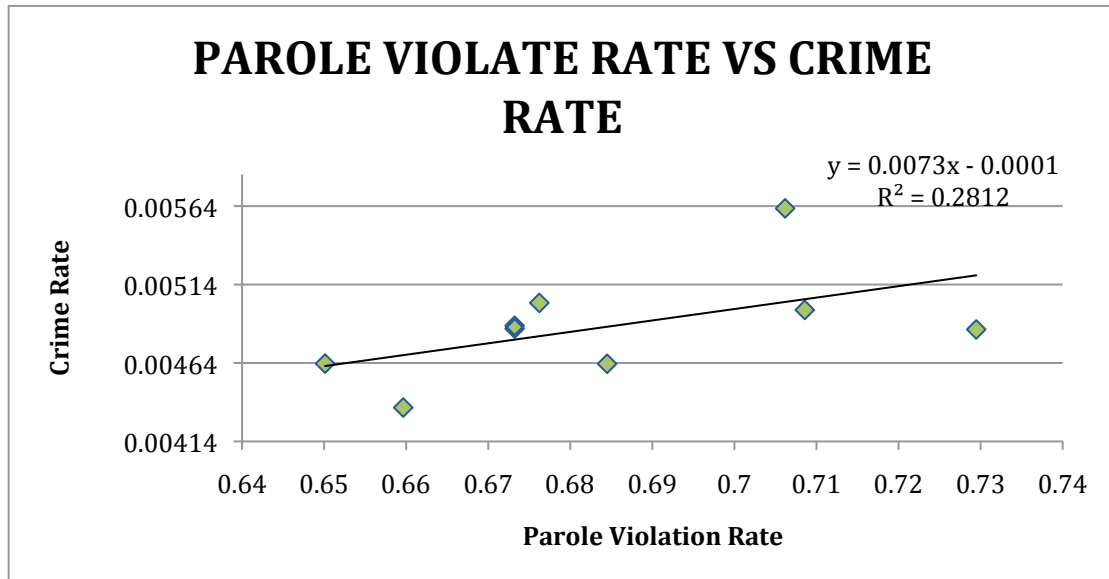
GRADUATION RATE VS CRIME RATE

$y = -0.0092x + 0.013$
$R^2 = 0.52033$

Crime Rate (y-axis: 0.00414, 0.00434, 0.00454, 0.00474, 0.00494, 0.00514, 0.00534, 0.00554, 0.00574)

Graduation Rate (x-axis: 0.83, 0.84, 0.85, 0.86, 0.87, 0.88, 0.89, 0.9, 0.91, 0.92, 0.93)

This is confirmed by comparing HS dropout rate with crime rate as the r^2 value is .41457.

HS D/O RATE VS CRIME RATE

$y = 0.034x + 0.0043$
$R^2 = 0.41457$

Crime Rate (y-axis: 0.00414, 0.00434, 0.00454, 0.00474, 0.00494, 0.00514, 0.00534, 0.00554, 0.00574)

HS D/O Rate (x-axis: 0.007, 0.009, 0.011, 0.013, 0.015, 0.017, 0.019, 0.021, 0.023, 0.025, 0.027)
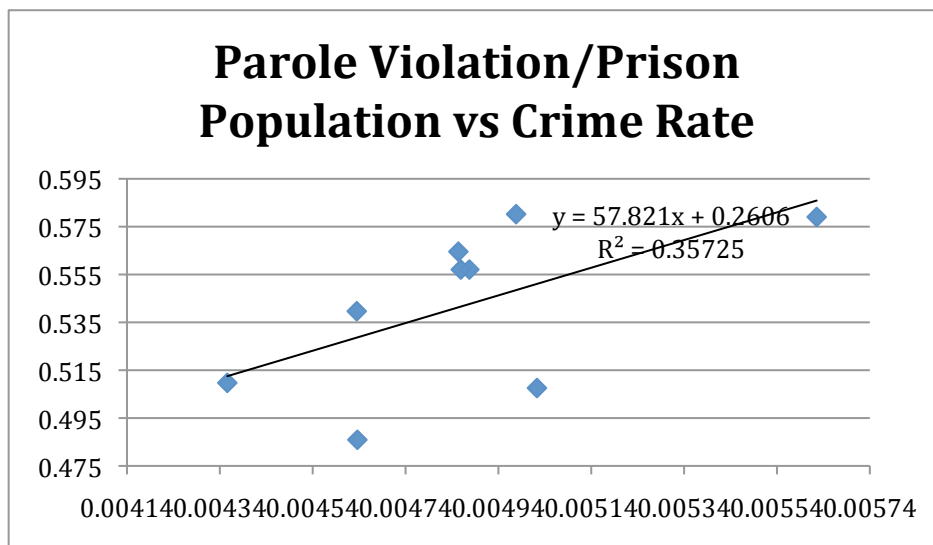
Finally, we considered the effects of parole violation rates.

The correlation between parole violation rate and crime rate is moderately directly proportional. With an r^2 value of .2812, it's not overly impactful but still has some effect.

PAROLE VIOLATE RATE VS CRIME RATE

$y = 0.0073x - 0.0001$
$R^2 = 0.2812$

Crime Rate (y-axis): 0.00564, 0.00514, 0.00464, 0.00414

Parole Violation Rate (x-axis): 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.7, 0.71, 0.72, 0.73, 0.74

If the parole violation is taken as a percentage of total prison population though, the correlation becomes higher, as shown by the graph below with an r^2 value of .35725.

Parole Violation/Prison Population vs Crime Rate

$y = 57.821x + 0.2606$
$R^2 = 0.35725$

(y-axis): 0.595, 0.575, 0.555, 0.535, 0.515, 0.495, 0.475

(x-axis): 0.00414, 0.00434, 0.00454, 0.00474, 0.00494, 0.00514, 0.00534, 0.00554, 0.00574

We can conclude from these graphs that unemployment rate does not affect crime rate, but graduation rates (and therefore high school dropout rates) as well as parole violation rates correlate with the crime rate.
These are the two factors we will be attempting to fix.

Factor 1: Increasing Graduation Rates

This part of the model will focus on raising graduation rates to decrease crime rates. Studies have shown that when asked why they left school, about half of dropouts responded that they did not find school interesting, and over two-thirds reported that school did not motivate or inspire them.

There are several methods that we will be implementing: developing school-to-work programs, providing access to stimulating after-school and summer programs, and mentoring to high-risk teens.

1. School-to-work Programs

School-to-work programs integrate technical and practical curricula into relevant high school programs to prepare students for future careers. Since this is mostly directed towards students who are not headed to college, these programs do not need to be implemented as a mandatory source of education.

The main source of funding for these programs will be from federal government grants, as provided for in the "School-to-Work Opportunities Act of 1994." The only restrictions, or "strings attached" are that the city must propose a business plan.

These school-to-work programs will be implemented in persistently low-performing schools, defined by high schools with graduation rates of below 70%. This is because there is a significant portion of students from these schools that are not planning to attend college and go on to white-collar jobs, but rather need more technical or vocational training which will be more useful to them.

The programs will be implemented as separate "streams" to the ordinary academics of high school during the last two years of high school (since secondary education in the US is only mandatory till 16 years of age).

The investment that the public sector needs to put into these programs include training teachers to be effective. Part of the problem is being able to recruit enough high-quality teachers and retaining them. The graph below shows the shockingly growing unbalance between teachers entering the field and leaving the field.
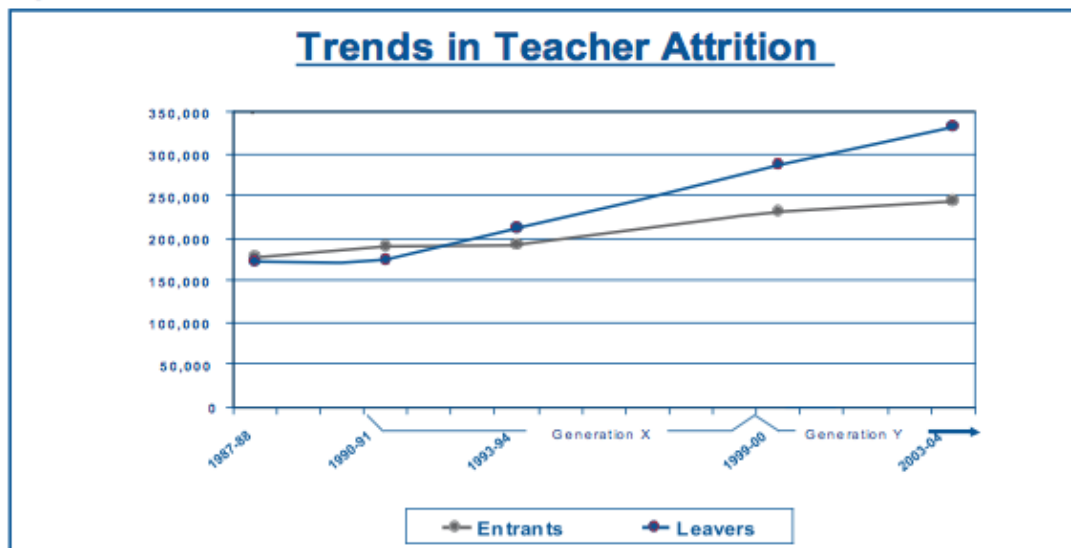
How to deal with this problem of teacher attrition? This city must at once take advantage of the Academic Improvement and Teacher Quality Program's discretionary grant on using incentives to induce teachers to perform. A school with great teachers will further become a school that is learning-focused, one where teachers will enjoy teaching.

Teaching incentives is a controversial topic. Currently, without education reform, it is very difficult to fire a poorly performing teacher after that teacher has been in a typical public school for a brief probationary period. Salaries are also determined by the teachers' educational attainment and experience. However, merit pay has been making a comeback – some states such as Florida now mandate the notion of merit pay as 5% of the teacher salary pool must be earmarked for teacher performance awards.

A controversial question arises from merit pay – do these kind of incentives work? A study performed by Professor Figlio at UFlorida shows that there is a correlation between incentives and higher student performance. Below is a graph showing the correlation found between high, medium or low incentives and significant (10 points or higher) increases in test scores.

Student achievement regressions: results for high, medium and low salary incentives using various subsamples and results for SASS incentive measure (absolute t-statistics in parentheses)

	(1) Full sample	(2) Public sample	(3) SASS-NELS public sample	(4) Early charter state	(5) Later charter state
Any high incentive	1.702 (1.78) R^2=0.76	1.074 (1.69) R^2=0.76		1.422 (0.89) R^2=0.77	1.759 (1.56) R^2=0.76
Any medium incentive	2.118 (2.38) R^2=0.76	1.373 (1.77) R^2=0.76		2.434 (1.88) R^2=0.77	1.184 (1.77) R^2=0.76
Any low incentive	1.275 (1.60) R^2=0.76	1.080 (1.79) R^2=0.76		2.238 (1.66) R^2=0.77	1.079 (1.19) R^2=0.76
Salary incentive variable from SASS			0.985 (1.96) R^2=0.75		
Number of schools	502	392	526	120	382
Number of students	4515	3617	5517	1038	3477

Note: Standard errors are adjusted for clustering at the school level. All the covariates in Table 1 and their missing value dummies, where necessary, are included as other independent variables.
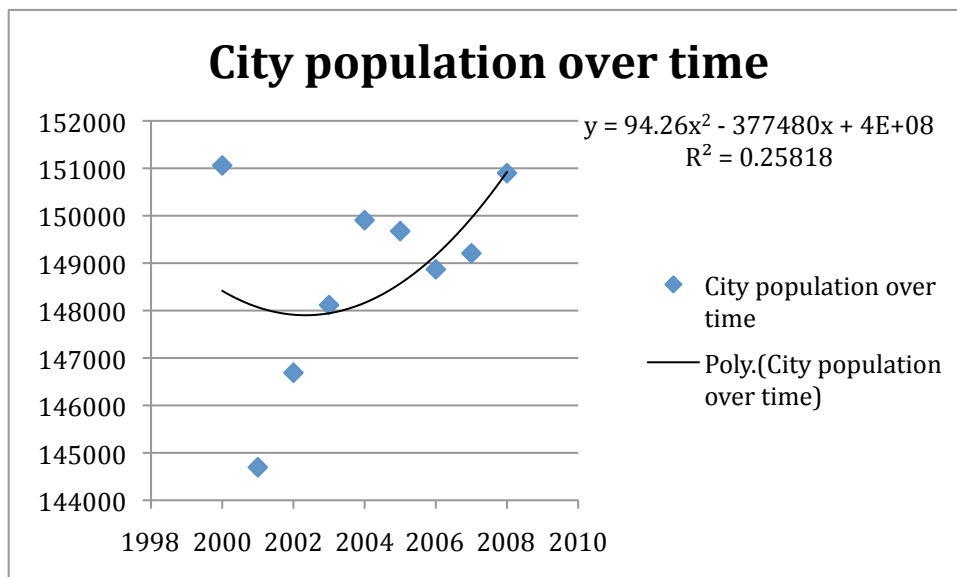
The incentives that are proposed in this model are like the ones in Florida, teacher "awards," that they become eligible for by raising their students' test scores. Even though this is a very empirical way of measurement, it is the only objective criterion that can be used that has a good correlation with increased academic performance, since that is very vague.

Even though this will require an investment to implement, it will pay off as if more students complete their high school degree with job skills, they are more likely to perform to higher standards in the workforce, which will boost the economy of the city since there will be more ongoing purchasing and selling of goods. Even lowering the bottom-line salary of teachers is feasible, as it will turn into more competition for the bonuses. The previously referred to study by Professor Figlio of UFlorida surveyed teachers from all different kinds of schools, and it was shown that they approved of a meritorious system.
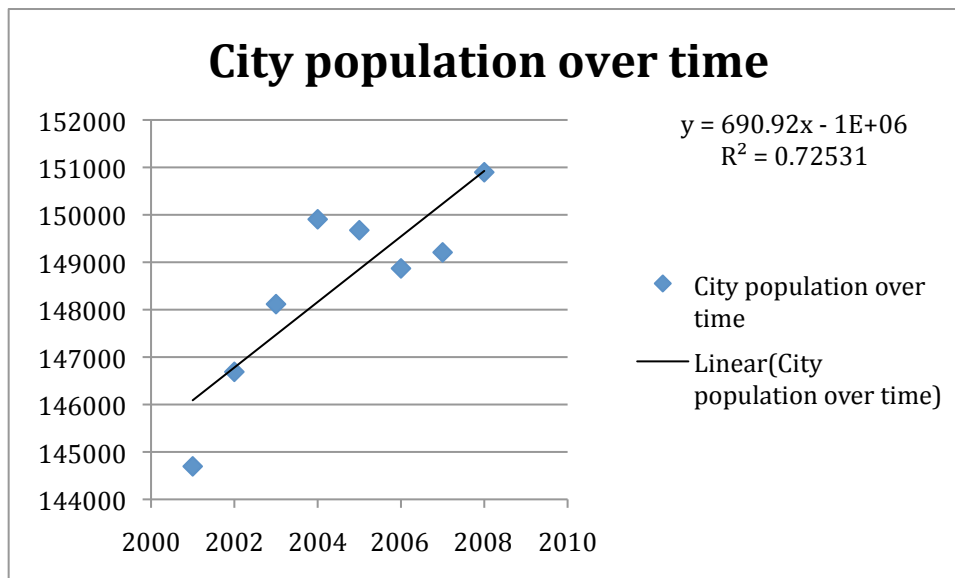
How will this be funded? The average bonus to a teacher is **$3000**, a number arbitrarily chosen for this model but which is close to average bonuses given over the 10 states that do implement merit pay. If the bonus is too low, it

can be given to a spread of nearly all or even all teachers, which totally undermines the fundamental purpose of teacher pay – competition – and will not show a rise in academic achievement. This **$3000** will be given to teachers who improve ALL the kids in their class' score on a national academic achievement test (the specific one must be determined as per which state this city in) by at least 4%. Even though these teachers may not be specifically in the vocational program that the persistently low-performing school now offers, an improvement in teaching will spread throughout the school.

Around 10 percent of teachers in these low-performing schools will probably receive these merit rewards. For this model's purpose, we need to find out the amount of teachers who will be receiving it. The city had a population 150898 in 2008. To find out the current population in 2010, we need to graph the population growth and extrapolate.

City population over time

$y = 94.26x^2 - 377480x + 4E+08$
$R^2 = 0.25818$

♦ City population over time

— Poly.(City population over time)

A linear equation has the best r^2 value line of fit. If we disregard the first point, where the population is 151000 in 2000, this is the graph we get.

City population over time

$y = 690.92x - 1E{+}06$
$R^2 = 0.72531$

♦ City population over time

—— Linear(City population over time)

The r^2 value to calculate how good of a fit it is increases by about .5, suggesting that the other point can be considered an outlier. To find the population in 2010, we use the equation.

y = 690.92(2010) – 1*10^6 =152697

The population of the city currently should be around 152697. Since the number of teachers in the whole of the US is 3.5 million out of a population of 307 million, this is 1.14% of the population. 1.14% of the city's population means that city X's teacher population is 1741 teachers. Since City X does have a graduation and juvenile delinquency problem, the percentage of schools that are persistently low-performing should be around 30% since the graduation rate is 89%. That means that 522 teachers work for low-performing schools. Since around 10% (as previously explained) of these teachers will receive bonuses, that amounts to 53 teachers. 53*3000 = $159,000 is the total cost of all these teacher merit bonuses.

This really isn't very sizable when compared to the tax contributions of the population of City X as a whole. We suggest in this model that a portion of city public funds be earmarked for this, as it will increase economic efficiency of the city in the long-term by improving teenagers' future job opportunities.

To broadcast this model into the future, we can use the model equation:

y = (690.92x-(1*10^6))(.014)(n)(3000)

y = total cost for City x
x = year
n = percentage of schools that are consistently underperforming.

After that little interlude on how to increase the effectiveness of school-to-work programs by improving teaching standards, we will now address some more specific details about these school-to-work programs.

The vocational training will include very specific courses focused on career paths such as car mechanics, agriculture, construction, and repairing. This will be supplemented by more general job skill programs such as technology literacy and basic math. The program will include students from time to time (perhaps monthly, but this is to the discretion of the school based on its location) spending unpaid days at work sites based on the courses they are taking, to get a real feel of their future jobs.

In terms of cost effectiveness, one single merit incentive can provide the incentive for a teacher to improve their teaching standards to maybe 4 classes of 30 kids, improving the likelihoods slightly of 120 kids staying in school. Though there is no tangible way to predict this benefit, a decrease in high school dropouts is directly correlated to a lower crime rate.

Since existing school facilities can be utilized to implement these school-to-work programs, new buildings do not have to be built. Any additional costs incurred can be covered by the grant previously referred to under the "School-to-Work Opportunities Act of 1994."

Total cost to the city of this portion of our model is **$159,000**.

2. Youth Mentoring Programs

Young people are a great factor in the increase of crime in the regional city, as we have seen the relationship between high school dropouts and crime. Therefore, mentoring is a proven effective method of preventing delinquency among juveniles. These mentors provide the extra support and guidance needed in order to prevent the young children from being subdued into participating in gangs, drinking alcohol, using drugs, and committing acts of violence.

Mentors volunteer to spend at least 67 hours with these young people every year or at least an hour each week, giving them advice and helping them become responsible and respectable individuals who make the right choices. This allows for these young people to develop their own sense of morality and choices that can help to reduce criminal tendencies. By helping these young people through a challenging period of time where they are vulnerable to unhealthy influences, these mentoring programs can help to reduce high school drop out rate and improve high school graduation rate. High school drop out and graduation rate are correlated to crime rates. Therefore, reducing the high school drop our rate and increasing the high school will help to reduce the rate of crime in the regional city.

There are different types of mentoring programs:

1. One-to-one Programs:
   The mentoring takes place between one adult and one juvenile. This allows for a close relationship to develop in which the young person can develop learn to respect themselves and make the right choices.

2. Group Mentoring:
   The mentoring takes place between one adult who chose to work with a small group of young individuals. This will often take place if there is not enough recruitments or funding for mentors.

3. School-based
   These mentoring programs focus on working with the young people only during school hours. It aims to improve overall school performance, attendance, and behavior modification.

4. Career-based
   These mentoring programs help provide different avenues for exploring various educational and career possibilities. It helps students to transition from school to work, and the students are paired with professionals, meet with role models, and encouraged to experience various work environments.

5. Internet Mentoring
   Using the Internet or phone to connect an adult with a youth is increasingly being used as a way for mentoring. Although it prevents a

deeper relationship from forming, it is useful especially between mentors and mentees who were in a traditional mentoring relationship during the year, but are disrupted by the summer holidays.

Benefits

The federal government of the United States has administered a program called the Juvenile Mentoring Program (JUMP) that supports the development of one-to-one relationships between two unrelated individuals, an adult and a juvenile, which takes place periodically for a extended period of time. This program hopes to reduce juvenile delinquency and gang participation, improve school performance, and reduce high school dropout rates. Since its inception in 1992, Congress has allocated $19 million for the funding of this program. These JUMP projects have reported of 7,422 youths enrolled, assisting a wide range of young people from different socio-economic backgrounds.

Figure 2: Average Age at Enrollment
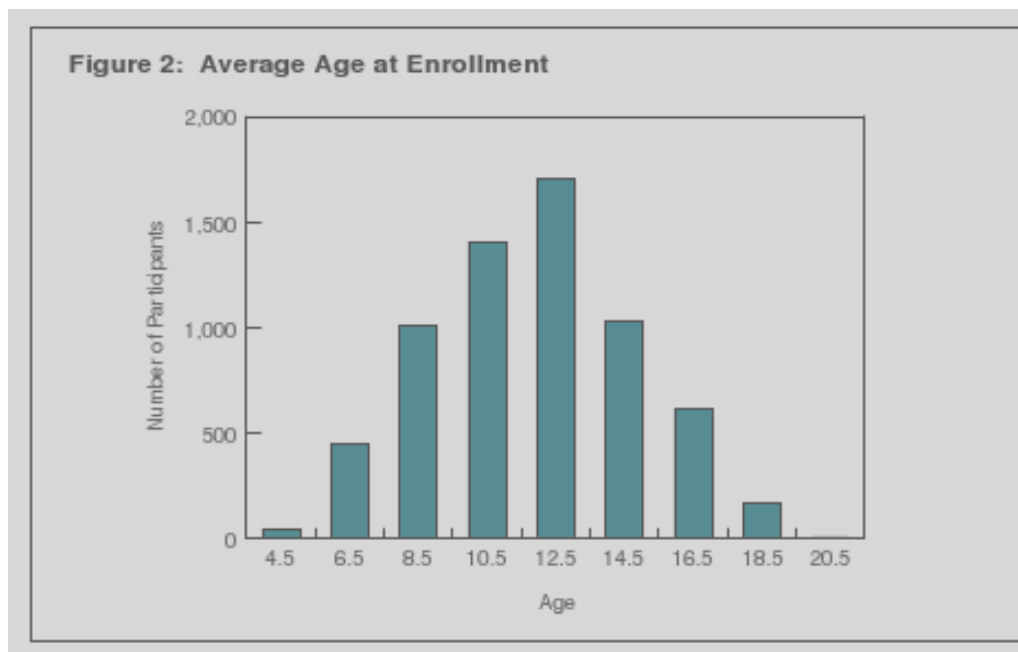
From the graph, a majority of the young people that are involved in these mentoring programs, funded by the federal government and other private donors are from when they are young children to when they are adolescents. This age range is very crucial period of time in many of these young people's lives, because that is when they are most vulnerable to peer pressure and neglect from parents or guardians. During this period of time, youth may lose interest in school and become involved in activities such as alcohol, drugs, and violence. Therefore, offering these mentoring services to youths can help them stay in school for a longer period of time, become more focused in improving their performance at school, and to avoid alcohol, drugs, and violence. This will improve the high school graduation rate while lowering the high school drop out rate, which will thus decrease the crime rate.

In addition to this federal program for mentoring, the Big Brother or Big Sister program consists of over 500 agencies that work with children and adolescents as they strive to make a difference in the lives of young people, offering them opportunities to stray away from participating in illicit activities. The individuals who mentor these young people focus on how their guidance can change and improve their attitude, such as staying away from violence, improving academic performance, stabilizing family and friends, and raising self-esteem.

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How Youth Benefit From Big Brothers/Big Sisters Relative to Similar Nonprogram Youth 18 Months After Applying

Outcome	Change
Antisocial Activities	
Initiating Drug Use	−45.8%
Initiating Alcohol Use	−27.4%
Number of Times Hit Someone	−31.7%
Academic Outcomes	
Grades	3.0%
Scholastic Competence	4.3%
Skipped Class	−36.7%
Skipped Day of School	−52.2%
Family Relationships	
Summary Measure of Quality of the Relationship	2.1%
Trust	2.7%
Lying to Parent	−36.6%
Peer Relationships	
Emotional Support	2.3%

Note: All impacts in this table are statistically significant at least at a 90 percent level of confidence.

The support and guidance that mentors offer young people allow them to be less likely to be involved in illicit activities such as alcohol, drug use, or violence. Studies have shown that mentored students are 27% less likely to being using alcohol and 46% less likely t begin using drugs. In addition to that, young people who were mentored became more dedicated to their schoolwork, skipped school at least 50% less frequently, and showed a significant increase in their school grade point averages. In comparison to children who are not mentored, those who are mentored as significantly less violence, ad 3% less likely to commit an act of violence towards another person.

Costs

The funding from the federal government is not sufficient to fund all the necessary costs for the mentoring program. Annually, the Department of Justice, through the Second Chance Act, awards over $25 million dollars to states, local governments, and non-profit organizations, which is divided up over five programs: adult mentoring, adult demonstrations, juvenile mentoring, juvenile

demonstration, and the National Reentry Resources Center. Around $4-5 million is awards to juvenile mentoring, which is then again divided amongst 12 organizations, such as the Big Brother Big Sister, Serve Our Youth, and others.

With this money granted to these organizations and youth mentoring initiatives, each organization or program must cover administration and operation costs, along with costs to implement a youth mentoring program to reach out to as many young people as possible. Thus, on average, the cost for each juvenile that is mentored is $1,000 to $1,500 per year. However, there are around 15 million young people who can benefit from mentoring in the United States if given the access. To implement such youth mentoring programs requires other sources to fund these programs, to help implement, expand, and sustain these programs.

In the regional city, the mentoring service should be offered to every single high school student. Giving access to every single student enrolled in high school will ensure that every student who may be vulnerable to being involved in gangs, using alcohol or drugs, and committing acts of violence can been offered support and guidance by a responsible adult. This will help reduce the number of high school that drop out and the increase the number of high school students who graduate. Because of the correlation between the decreasing high school drop out rate and rise of the high school graduation rate, the crime rate will decline as well. High school is a time in which these young people are very susceptible to dropping out because they have lot interest in school and found something outside of school, such as joining a gang that appeal to them instead. Therefore the total cost of the mentoring program for the city will include the costs of administration and other incidental occurrences that are related to mentoring for every student that attend high school every year.

The function of the number of students that are enrolled in high school every year can be represented by the function $y=621.43\ln(x)+8271.8$. The cost for every student that is mentored is around $1,250, which includes the administration costs and those reimbursed to the mentors for transportation and mentor related activities.

Since mentoring is offered to every student that is enrolled in high school, then the total cost for implementing, expanding, and sustaining the youth mentoring program will be represented by the function of:

$C(x)=1,250(621.431\ln(x)+8271.8)$
$C(x)=776788.75\ln(x)+10,339,750$

The total cost of implementing the youth mentor program in the current year, 2010, would be:

$C(11)=776788.75\ln(11)+10,339,750$
$C(11)=1862658.07+10,339750$
$C(11)=12,202,408.07$

Therefore, the estimated cost for implementing the youth mentor program would be **$12,202,408.07** in the year 2010.

Recommended Solution

As the cost for implementing the youth mentoring program is $12,202, 408.07 and number of students that are enrolled in high school has an upward trend, the total cost that the government of the city will need to allot is rising. In funding these youth mentoring programs, the government hopes to reduce the rate of high school dropouts and increase the rate of graduation in order to reduce crime rate as well. Promotion and implementation of this mentoring program is necessary to further utilize the benefits of this program on youth and the safety of the city.
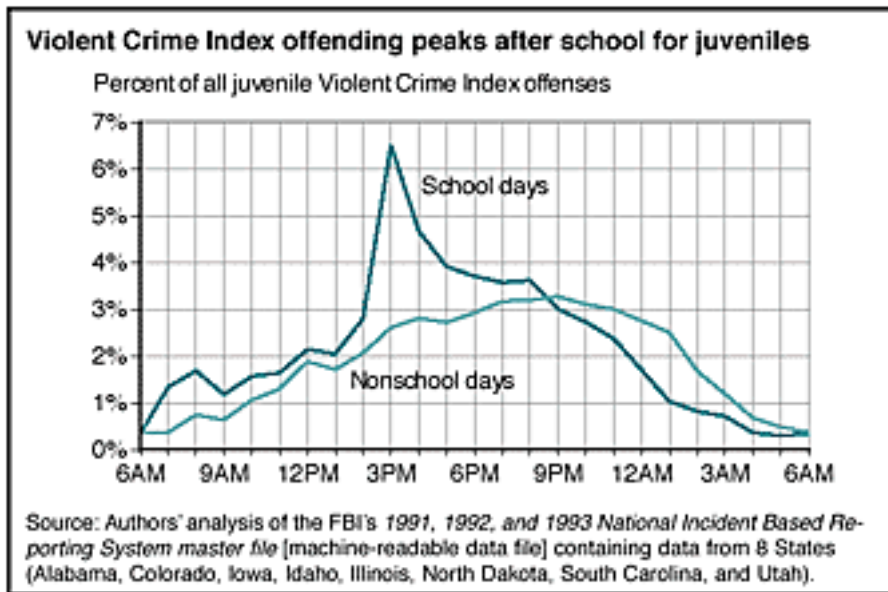
Two problems that this program faces is the recruitment of mentors and funding and grants (aside from the funds allotted by the government). Mentors are adults who volunteer their time and are each given $75 to cover all costs that are associated with the activities or transportation costs that may be incurred. Recruitment of mentors has become a huge problem in many of these mentoring projects, as thus in order to address this problem, partnerships with local business or any business entity and foundations, along with recruitment from church groups could help draw more people in serving as mentors for the enrolled youth.

Partnerships with businesses and foundations can help provide support to implement, expand, and sustain these mentoring programs. These partnerships are beneficial to both parties. They can attract contributions, leverage additional funding, increase the visibility of these youth mentoring programs, and raise awareness towards these youth mentoring initiatives. Youth mentoring programs can engage these business organizations by highlighting the benefits that can be gained from such partnerships. Business through these partnerships with youth mentoring organizations are able to create a sense of benevolence and community that will help foster good employees, a strong image, and contribute positively to the future workforce as well. When they support these youth mentoring groups, they are also helping to ensure these young people obtain a proper and full education, and become law-abiding citizens and members of their community. In addition that, local businesses can also promote these youth mentoring initiatives and attract more people to volunteer in mentoring these youths, which will ultimately benefit their community as well. Charitable foundations or non-profit organizations often are able to provide support and funding to a wide array of activities or specific programs. Youth mentoring programs are able to demonstrate that their work benefits the lives and thus the future of the youth population. Through these partnerships, additional funding can been raised to support these youth mentoring programs and recruit more people who are willing to offer their time to mentor these young people, who are the future of our world as well.
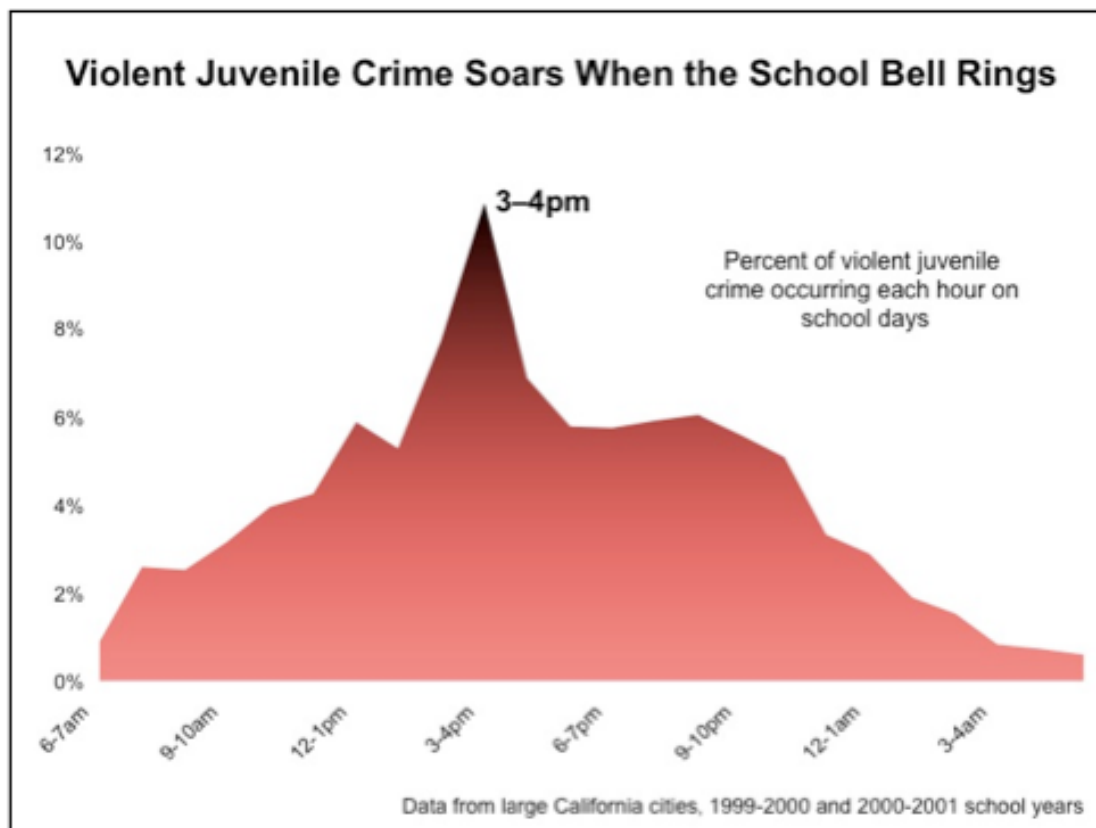
Total cost for this section: **$12,202,408.07.**
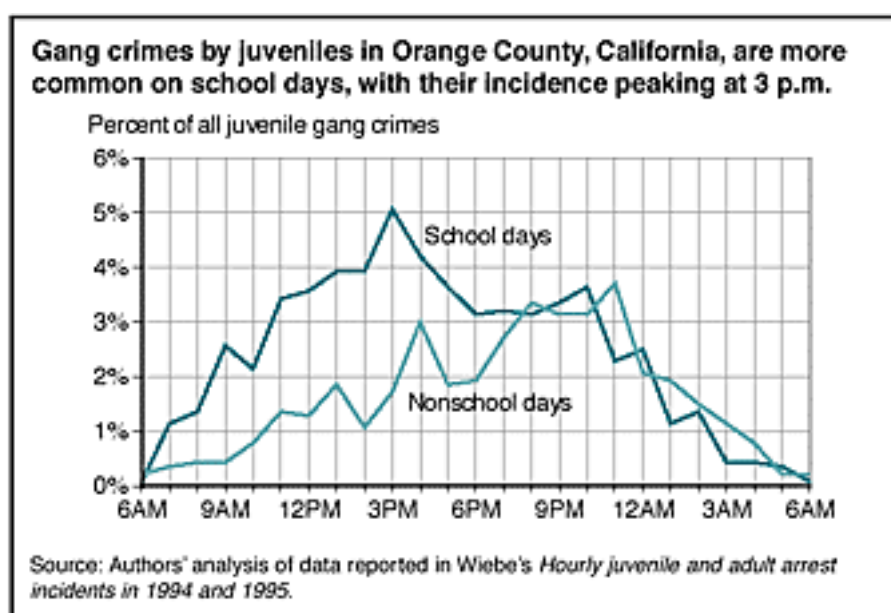
3. Afterschool Programs

As it is clear that the city's youth are behind the recent increase in violent crime in 2007 and 2008, we set out to research more about the nature of this type of juvenile crime. Research done by the Office of Juvenile Justice and Delinquency Prevention (OJJDP) show that juveniles are more 57% likely to commit crimes on school days than on nonschool days. Further, data from the FBI' s National Incident-Based Reporting System show that most crime takes place four hours following the end of the school day, from 3 PM to 7 PM (see below).

Violent Crime Index offending peaks after school for juveniles

Percent of all juvenile Violent Crime Index offenses

Source: Authors' analysis of the FBI's *1991, 1992, and 1993 National Incident Based Reporting System* master file [machine-readable data file] containing data from 8 States (Alabama, Colorado, Iowa, Idaho, Illinois, North Dakota, South Carolina, and Utah).

Additional information shows that 1 in 5 violent crimes committed by juveniles occur during this period of the day – a staggering amount. More recent research confirms this finding. Data gathered by *Fight Crime: Invest in Kids* California show that violent juvenile crime peaks at 3-4 PM, immediately after school (see below).

Violent Juvenile Crime Soars When the School Bell Rings

3–4pm

Percent of violent juvenile crime occurring each hour on school days

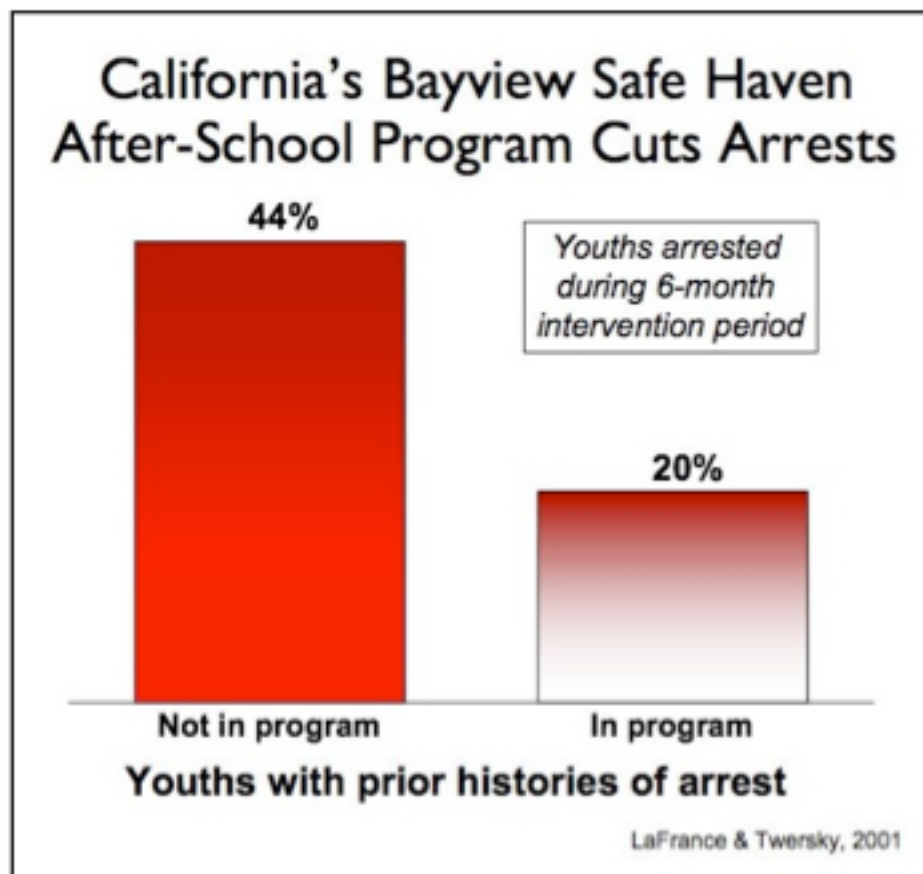Data from large California cities, 1999-2000 and 2000-2001 school years

Juvenile gang crime, as opposed to simply individual, perhaps spontaneous, acts of violence, also shows a similar time-of-day trend according to a study conducted by researchers at the University of California-Irvine focusing on Orange County Street Gangs. Gang violence peaks at 3 PM right after school, and violence during school days is significantly higher than on nonschool days (see below).

Gang crimes by juveniles in Orange County, California, are more common on school days, with their incidence peaking at 3 p.m.

Percent of all juvenile gang crimes

School days

Nonschool days

Source: Authors' analysis of data reported in Wiebe's *Hourly juvenile and adult arrest incidents in 1994 and 1995.*
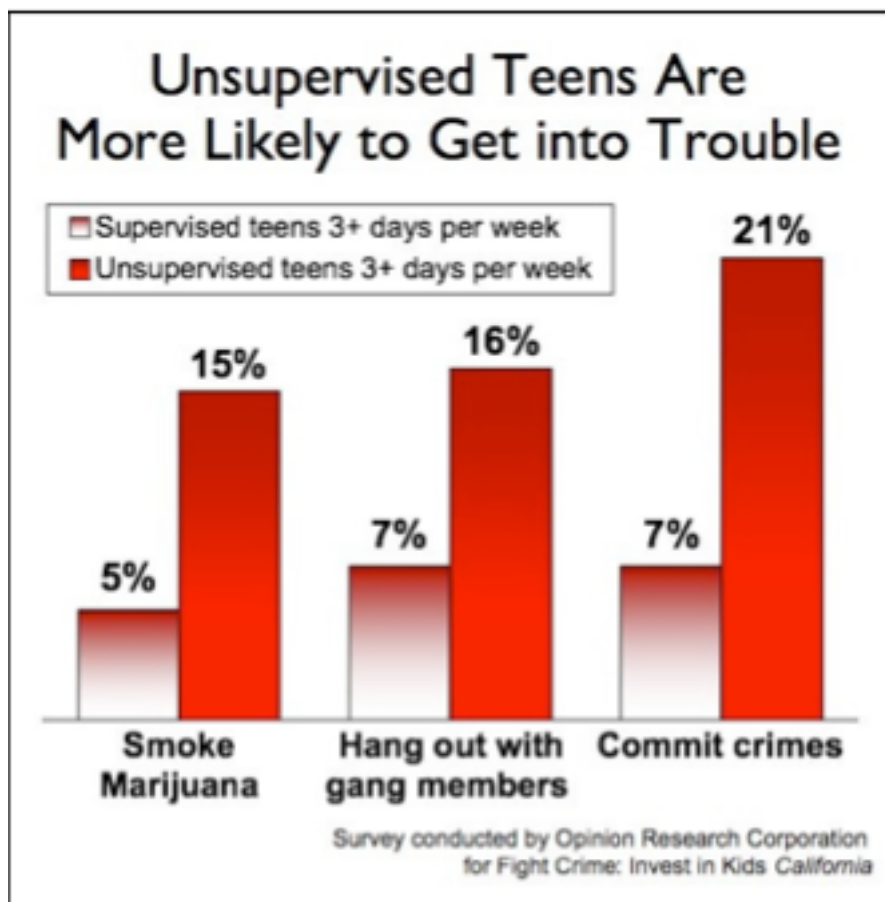
As such, it is clear that most juvenile crime activity, organized or otherwise, occurs during the immediate three to four hours after school. The most effective way to lower violent juvenile crime, therefore, is to engage students immediately afterschool. Afterschool activity programs do this.

In another study conducted by *Fight Crime: Invest in Kids* California, students in the Bayview Safe Haven afterschool program in San Francisco were found to be two to three times less likely to be arrested in a six-month intervention period (see below).

California's Bayview Safe Haven After-School Program Cuts Arrests

Youths arrested during 6-month intervention period

44%

20%

Not in program   In program

Youths with prior histories of arrest

LaFrance & Twersky, 2001

There are two, reinforcing, explanations for this dramatic decrease. One is that afterschool programs take up students's time, making them simply unable to participate in juvenile criminal activity. This explanation is quite easy to prove empirically, as was done in a 2006 survey of over 600 California 12- to 17-year-olds. It found that children unsupervised for more than three days a week are twice as prone to engage in gang activity and three times as prone to be engaged in criminal behavior (see below).

Unsupervised Teens Are More Likely to Get into Trouble

Survey conducted by Opinion Research Corporation for Fight Crime: Invest in Kids *California*

Thus, providing afterschool programs in which children are supervised simply means that they cannot run free to engage in criminal behavior, in groups or otherwise.

The other explanation is that the afterschool programs serve to build students's character by exposing them to educational and productive activities that draw their interest away from criminal activities and towards a more fulfilling life. This explanation is a bit harder to validate using empirical evidence, as students need to actually exhibit interest in whatever afterschool activity they participate in for this explanation to hold. Indeed, forcing teens to participate in afterschool activities that they do not find meaningful may even have a negative effect on preventing crime. Teens uninterested in afterschool programs can easily return to engaging in criminal activities once such afterschool programs are done, and bad experiences with afterschool programs may drive teens even farther away from the help they need to turn back from a life of crime. That said, effective afterschool programs have been shown, empirically, to dramatically change the life trajectories of students. In the *Youth Together: 2002 annual evaluation report*, 92-93% of teen participants in the Youth Together afterschool program in Oakland, California reported improved leadership skills, while 94-100% of members reported they felt a "greater sense of unity with people from other cultures or ethnic groups" from participating in the program. As such, it is clear that the right kind of afterschool programs can develop the character of teen participants as well as foster an awareness for

their community, both factors that drive conscious decisions to stay away from criminal activity.

As such, the evidence for both explanations clearly shows that having afterschool programs that build character and foster a sense of community can drastically cut violent juvenile crime rates.

A 2004 report by *Fight Crime: Invest in Kids* California, a bipartisan, nonprofit, anti-crime organization established in 2000, lays out the key elements of quality afterschool programs based on evaluating crime prevention strategies in relation to education. They are:
- Meaningful Relationship with Adults
  - "Teens gain a sense of responsibility and self-worth through healthy expectations and guidance from adults. They also learn and enjoy the value of a trusting relationship with adults rather than seeing them as authoritative or antagonistic figures."
- Youth Input and Leadership
  - "Offering leadership opportunities can both attract and sustain teen interest, while effectively instilling skills in planning, conflict resolution, decision making, and communication."
- Skill Building
  - Young people will "be better prepared for their chosen career path and the workforce in general, but they will also experience feelings of competence, productivity, and direction and gain a sense of purpose and inclusion in the real world."
- Community Involvement
  - "Young people will develop greater social responsibility and will experience a greater sense of belonging."
  - Young people "can gain a broader understanding of their communities and other segments of society, as well as learn the value of becoming invested in their communities and contributing to the lives of others."
- Safety
  - "Young people will have little incentive to leave the dangers of the streets if they will face those same dangers at a[n afterschool] program."
- Supporting Diversity
  - "Programs also should increase awareness of [ethnic, racial and cultural] diversity in order to help prepare students to succeed in a multicultural society."

Concrete framework for afterschool programs

With these key elements in mind, we have developed a basic, concrete framework for afterschool programs that will be offered to teens in the city to reduce violent juvenile crime. Of course, the specifics of each individual afterschool program will vary according to the needs of local community, but each afterschool program should have these basic aspects:

- Programs should maintain a low staff-to-teen ratio where possible, ideally having some time for one-to-one contact.
- Staff members should be committed to understanding and helping teens by encouraging and initiating contact with teens.
- Youth should be actively involved throughout the organization and implementation of afterschool programs by being a part of planning committees, youth advisory boards, as well as in leadership positions within individual programs.
- Individual programs should center around a specific skill or skill set, like performing arts, computer training, or sports.
- Programs should offer opportunities for teens to learn about the community they live in by engaging in community service, going on field trips or simply interacting with other members their community.
- There should be transportation to and from the program venue that is easily accessible and safe.
- That any form of physical and emotional harassment within programs will not be tolerated should be a matter of policy set in stone.
- Staff should be trained in conflict mediation to deal with any potential conflicts.
- Clear rules designed to promote safety should be enforced consistently.
- Program venues should have a regular police presence to help teens feel a sense of security.
- Staff should come from diverse cultural and language backgrounds.
- Staff should be trained to work with diverse populations
- Coordinators should actively seek and promote their program to families of diverse communities.

This basic framework for afterschool programs will ensure that teens who participate will be able to live a life free from criminal activity by not only taking up their afterschool time to engage in such activity, but to also build their character, hone their skills and interact with their community in order to provide positive benefits to their later life.

Although it is clear that the afterschool programs themselves provide benefits and can engage students, there is no guarantee that teens will willingly participate in the first place. At the end of the day, afterschool programs need to benefit teens in order to be cost-effective, so participation is crucial. One way to encourage greater teen participation is to offer incentives.

The most obvious incentive is financial. Quantum Opportunities, a successful afterschool program with programs all around the United States in Philadelphia, Oklahoma City and Saginaw, Michigan, attributed its success in part to its financial incentives. The program offered a $1 to $1.33 stipend to participants, culminating in up to $300 in bonuses for completing 100 hours in its three program components. Its success nationwide is proof that even a small financial incentive, when coupled with a strong afterschool program, can lead to massive gains in participation and thus success in reducing violent juvenile crime.

Another effective incentive is offering school credit to participants, which has been used by the Young Women's Leadership Alliance in Santa Cruz and the Creekside High School YMCA Youth Leadership Academy in Orange County. This should be implemented in the city's afterschool programs, as it will further improve High School graduation rates, which have been shown to correlate strongly with decreasing violent crime rates.

These incentives are key drawing in teens from underprivileged backgrounds who are most prone to committing crimes, and as such the afterschool programs implemented by this city as a whole should utilize these two incentives in order increase teen participation and decrease violent juvenile crime.

Costs

We used information from the *After School Education and Safety Program Act of 2002* enacted by the California state legislature to estimate the total cost of afterschool programs for the city in question. Analysis of the Act shows that the estimated cost for afterschool programs is $7.50 per student per day. Adjusted for inflation, this amount is:

$$\$7.50 * \frac{218.711}{181.3} = \$9.05$$

Where 218.711 is the current CPI and 181.3 is the CPI from 2002, the year in which the Act was passed. From this, we calculated the total annual cost per student to be:

$$\$9.05 * 180 = \$1628.57$$

Where 180 is the number of school days in a year. Although it is unreasonable to expect all High School students in the city in question to attend afterschool programs, nationwide studies have shown that afterschool programs are in extremely high demand. In fact, a survey conducted by the US Department of Education as part of a study titled *After-School Programs: Keeping Children Safe and Smart* found that almost 100 percent of people polled "agreed that it is important for children to have an after-school program that helps them develop academic and social skills in a safe and caring environment." As such, the city council should be adequately equipped for 100% participation in afterschool programs by High School students. Unlike school-to-work programs, afterschool programs benefit all students regardless of economic background. Teens from well-off families that do not engage in criminal activity can also benefit greatly from the character-building and skill-developing aspects of such programs, even though teens from underprivileged backgrounds who engage in criminal activity will have the added benefit of being supervised during the immediate afterschool hours. As such, the estimation that the city should be equipped for the full participation of High School students is a reasonable one.

To develop a model for the cost of afterschool programs, we first found a model for High School enrollment over time, as High School students are the targets of these programs (see below).

HS ENROLLMENT OVER TIME

$y = 621.43\ln(x) + 8271.8$
$R^2 = 0.97048$
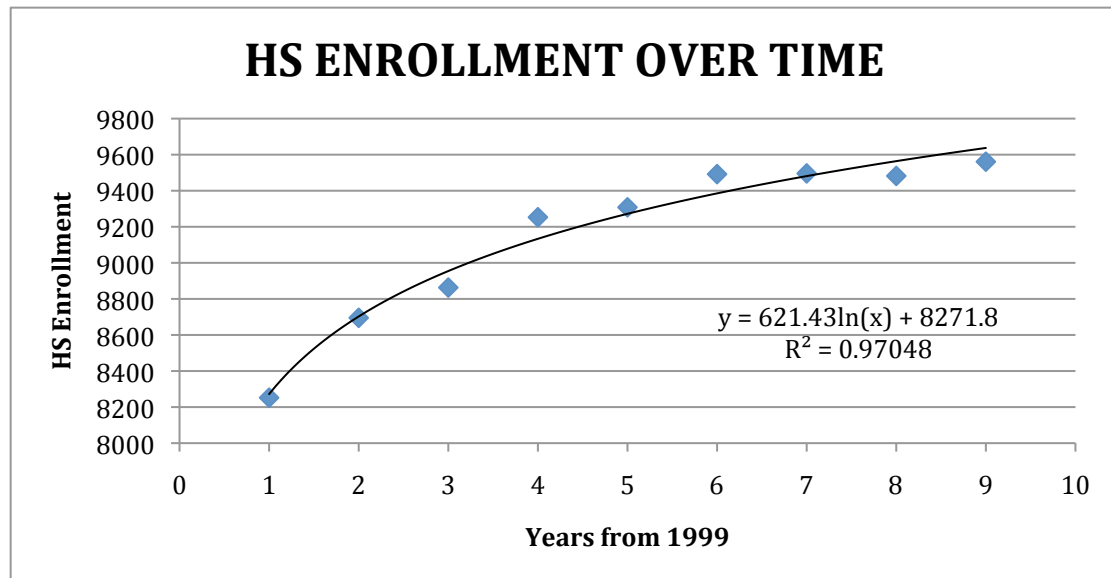
We found that a logarithmic function best fit the data of High School enrollment over time, and the high R^2 value of 0.97048 indicated that it was a good fit.

From this, we developed a model for the total annual cost simply by multiplying the entire function by the annual cost of afterschool programs per student.

$$C(x) = 1628.57y$$
$$C(x) = 1012042.26\ln(x) + 13471205.33$$

Where x is the number of years from 1999 and C(x) is the total annual cost of afterschool programs in terms of 2010 dollars.

The estimated total cost for the year 2010, therefore, would be $15,897,976.68.

This cost can be cut further with grants from the federal government. The 21st Century Community Learning Centers Federal (21stCCLC) Afterschool Initiative is a federal funding source dedicated solely to afterschool programs that benefit low-income students. The fund provides nearly 3,000 grants funding afterschool programs for around one million youth. The average grant size has been around $311,000. From this information, we calculated the average funding per student.

$$\frac{\$311000 * 3000}{1000000} = \$933$$

The average funding from 21stCCLC for a student in an afterschool program, therefore, is $933. Of course, this is only if the city actually manages to obtain funding in the first place. "Low income" households number around 30% of total population according to the US Census Bureau, so in the case of the city in question that would number around 2868 students. If the city were to successfully obtain grant money on behalf, so to speak, of *all* the low income teens in High School, they would be able to incur savings of around:

$$\$933 * 2868 = \$2675844$$

This is just for 2010, however. We also developed a second equation modeling the cost of afterschool programs for the city if maximum funding has been obtained.

$$C_2(x) = 1628.57y - 933(0.30)y$$
$$C_2(x) = 1348.67y$$

$$C_2(x) = 838104.00\ln(x) + 11155928.51$$

Graphing these two functions together, we were able to visualize the amount of potential saving incurred as a result of grant money, giving a more accurate prediction of the range of costs.
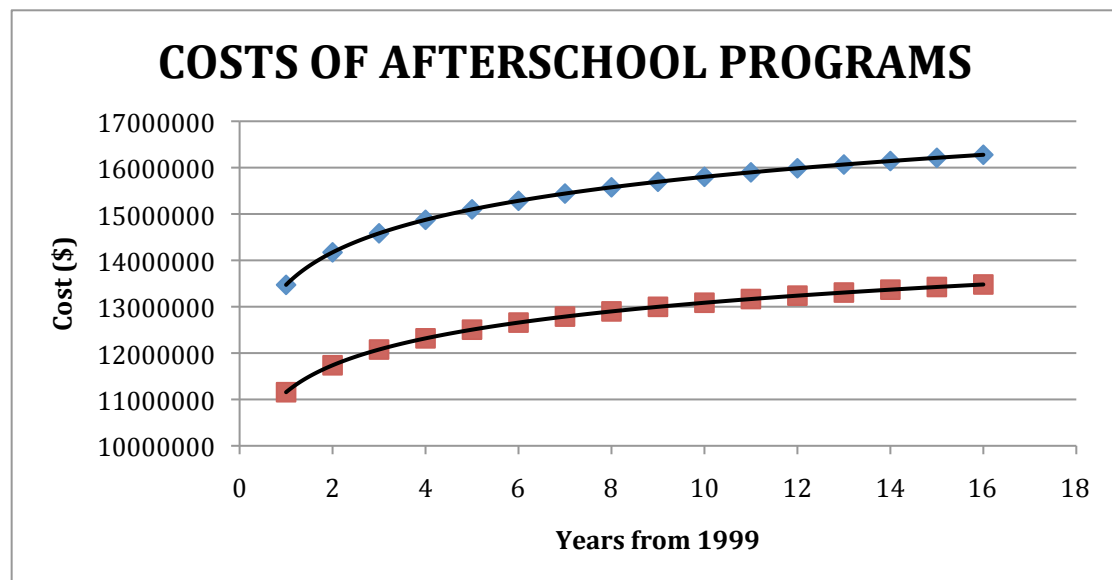
Where the top function is *C(x)* and the bottom function is *C₂(x).* Both functions are projected into the year 2015 in terms of 2010 dollars. Thus, the range of expenditure for the city government in 2010 would be $13,165,614.13 to $15,897,976.68, depending on the amount of grant money received from the 21st Century Community Learning Centers Federal Afterschool Initiative.

The other side of the issue of lowering crime rates is reducing the rate of parole violation since there is also a proven correlation between increased parole violation and increased crime rate. This leads us to the next step of our model.

4. Improved Parole Programs.

As one of the few given statistical data for the question, parole's connection to city violence has been a peculiar one. Graphically, the two display no significant correlation as shown in the graphs below; theoretically though, the connection should be present.

Unemployment Rate vs. Parole Violation Rate

The reason why as the number of parole violations increases, the unemployment rate should also increase is because parolees often have trouble finding steady good paying jobs and in return, have trouble keeping up with the current financial times. Amongst the extra things that parolees must pay for include:

- Court and probation fees
- Restitution to victims
- Legal expenses
- Fines
- Dependent support
- Cost of drug testing and mandatory treatment

This results in people having to violate their parole sentence in order to sustain their families because they are either unemployed or lack the financial support necessary.

However, in the case of City X, such is not the case either because the data represented is not comprehensive enough or that the connection is indeed not present.

Table 7.8. Characteristics of offenders terminating parole, October 1, 2007–September 30, 2008

Offender characteristic	Number of parole terminations	Percent terminating parole with—				New crime[b]	Administrative case closures
		Technical violations[a]					
		No violation	Drug use	Fugitive status	Other		
All offenders[c]	994	52.5 %	3.9 %	1.2 %	4.4 %	3.4 %	34.5 %
Gender							
Male	972	51.9 %	4 %	1.2 %	4.5 %	3.5 %	34.9 %
Female	22	81.8	0	0	0	0	18.2
Race							
White	457	65.6 %	2.6 %	1.3 %	4.2 %	2.4 %	23.9 %
Black/African American	492	41.3	4.9	1.2	4.9	4.3	43.5
American Indian/Alaska Native	25	40	4	0	4	8	44
Asian/Native Hawaiian/	8	^	^	^	^	^	^
Other Pacific Islander	4	^	^	^	^	^	^
Ethnicity							
Hispanic/Latino	93	69.9 %	4.3 %	0 %	1.1 %	1.1 %	23.7 %
Non Hispanic/Latino	885	51	3.8	1.4	4.9	3.6	35.4
Age							
Under 19 years	0	^	^	^	^	^	^
19-20	2	^	^	^	^	^	^
21-30	152	74.3 %	1.3 %	1.3	2.6 %	1.3 %	19.1 %
31-40	137	54.7	2.9	1.5 %	8	2.2	30.7
Over 40	703	47.4	4.7	1.1	4.1	4.1	38.5

^ Too few cases to obtain statistically reliable data.
[a]Violation of supervision conditions other than charges for new offenses.
[b]Includes both "major" and "minor" offenses.
[c]Total includes offenders whose characteristics could not be determined.
Source: Administrative Office of the U.S. Courts Federal Probation and Supervision Information System (FPSIS).

Either way, reducing parole violation in general would thus also decrease crime rates in City X, regardless of the fluctuating unemployment rate. Parolees account for around 16% of the total population under community supervision. In order to better combat recidivism, there are six main strategic areas that associated with the quality of parole rehabilitation programs:

- Collaboration and partnerships
- Results-driven management
- Re-emergence of rehabilitation
- Specialization
- Technology
- Community justice

Table 5.

Percent and estimated number of parolees who exited supervision, by type of exit, 2006-08

Type of exit	2006	2007	2008
Total	100%	100%	100%
Completion	45%	46%	49%
Incarceration	38	38	36
With new sentence	11	10	9
With revocation	26	27	25
Other/unknown	2	1	1
Absconder	11	11	11
Other unsatisfactory[a]	2	2	2
Transferred to another state	1	1	1
Death	1	1	1
Other[b]	3	2	1

Over the years the rate of parole completion has steadily increased. One of the primary factors for this is through collaboration and partnerships deals with the involvement of specialists and experts in related fields such as professions such as mental health personals, medical professionals, counselors, etc. Projected employment of such professions are expected to rise 19% in the next 10 years, which is faster than the average for all other occupations. Currently, the caseload of parole officers hovers around 70 to 100 parolees, which could attribute to the extremely high demand of such occupations in the near future.

Mandatory sentencing guidelines are beginning to call for longer sentences and reduced parole for inmates have resulted in a sizable increase in current prison population. With an increase in prison population, the demand for future parole officers will no doubt increase as well to supervise the large number of currently incarcerated people.

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2008	Projected Employment, 2018	Change, 2008-18		Detailed Statistics	
				Number	Percent		
Probation officers and correctional treatment specialists	21-1092	103,400	123,300	19,900	19	[PDF]	[XLS]

NOTE: Data in this table are rounded. See the discussion of the employment projections table in the *Handbook* introductory chapter on *Occupational Information Included in the Handbook*.

As of May 2008, median annual wages for probation officers and correctional treatment specialists employed by the State government were $46,580 but this number is expected to increase significantly due to a shortage of workers.

One way to increase number of workers in this field is to promote and raise awareness for potential opportunities like this. Currently, the minimum

qualifications for such job opportunities are a bachelor's degree in social work, criminal justice, psychology, or a related field or some form of work experience. Probation officers and some correctional treatment specialists are also required to complete a training program sponsored by their State government or the Federal Government. By continuing to sponsor programs as such and promoting majors related to criminal justice and other specialist areas, City X would also be improving the quality of its parole and rehabilitation programs, thus leading to a decrease in the number of parole violators.

Similar to what was proposed above, results-driven management is the emphasis of the need for probation and parole officer accountability. A range of aspects of community supervision are scrutinized from time management to different programs to employee participation. An improvement in results-driven management would require better administrators and supervisors of the officers. This would be reflected by the quality of the education that the administrators have received. Investments towards education related activities are advisable.

Rehabilitation is the mentality that people can change and that parole would be able to assist in the change. An extremely successful program implemented in 1989 was the Drug Court Program which allowed for people to talk about addiction issues. Currently there is a total of over 2,400 Drug Courts in the 50 states combined. The focus of these courts was now targeted at what was at the core of the problem rather than punishment of the criminal. Recidivism rates for criminals coming out of the Drug Courts have been consistently lower than the recidivism rates of those who did not partake in a Drug Court program. Recidivism rate for those who did do a Drug Court Program ranged between 4% to 29%, in contrast to 48% of those who did not.

A propensity score analyses study of 4 adult Drug Court in Suffolk County, MA discovered that its participants were 13% less likely to be re-arrested, 34% less likely to be re-convicted and 24% less likely to be re-incarcerated than other similar probationers. The parole board of City X should consider progressing with more counseling programs that tackle the heart of the problem should be used in lieu of tedious and often ineffective punishments such as day fines, community service restitution, home confinement, etc.

Exhibit 4
Reducing Crime With Evidence-Based Options: What Works, and Benefits & Costs

| Washington State Institute for Public Policy Estimates as of October, 2006 Notes: "n/e" means not estimated at this time. Prevention program costs are partial program costs, pro-rated to match crime outcomes.	Effect on Crime Outcomes Percent change in crime outcomes, & the number of evidence-based studies on which the estimate is based (in parentheses) (1)	Benefits and Costs (Per Participant, Net Present Value, 2006 Dollars)			
		Benefits to Crime Victims (of the reduction in crime) (2)	Benefits to Taxpayers (of the reduction in crime) (3)	Costs (marginal program cost, compared to the cost of alternative) (4)	Benefits (total) Minus Costs (per participant) (5)
Programs for People in the Adult Offender System					
Vocational education in prison	-9.0% (4)	$8,114	$6,806	$1,182	$13,738
Intensive supervision: treatment-oriented programs	-16.7% (11)	$9,318	$9,369	$7,124	$11,563
General education in prison (basic education or post-secondary)	-7.0% (17)	$6,325	$5,306	$962	$10,669
Cognitive-behavioral therapy in prison or community	-6.3% (25)	$5,658	$4,746	$105	$10,299
Drug treatment in community	-9.3% (6)	$5,133	$5,495	$574	$10,054
Correctional industries in prison	-5.9% (4)	$5,360	$4,496	$417	$9,439
Drug treatment in prison (therapeutic communities or outpatient)	-5.7% (20)	$5,133	$4,306	$1,604	$7,835
Adult drug courts	-8.0% (57)	$4,395	$4,705	$4,333	$4,767
Employment and job training in the community	-4.3% (16)	$2,373	$2,386	$400	$4,359
Electronic monitoring to offset jail time	0% (9)	$0	$0	-$870	$870
Sex offender treatment in prison with aftercare	-7.0% (6)	$6,442	$2,885	$12,585	-$3,258
Intensive supervision: surveillance-oriented programs	0% (23)	$0	$0	$3,747	-$3,747
Washington's Dangerously Mentally Ill Offender program	-20.0% (1)	$18,020	$15,116	n/e	n/e
Drug treatment in jail	-4.5% (9)	$2,481	$2,656	n/e	n/e
Adult boot camps	0% (22)	$0	$0	n/e	n/e
Domestic violence education/cognitive-behavioral treatment	0% (9)	$0	$0	n/e	n/e
Jail diversion for mentally ill offenders	0% (11)	$0	$0	n/e	n/e
Life Skills education programs for adults	0% (4)	$0	$0	n/e	n/e
Programs for Youth in the Juvenile Offender System					
Multidimensional Treatment Foster Care (v. regular group care)	-22.0% (3)	$51,828	$32,915	$6,945	$77,798
Adolescent Diversion Project (for lower risk offenders)	-19.9% (6)	$24,328	$18,208	$1,913	$40,623
Family Integrated Transitions	-13.0% (1)	$30,708	$19,502	$9,665	$40,545
Functional Family Therapy on probation	-15.9% (7)	$19,529	$14,617	$2,325	$31,821
Multisystemic Therapy	-10.5% (10)	$12,855	$9,622	$4,264	$18,213
Aggression Replacement Training	-7.3% (4)	$8,897	$6,659	$897	$14,660
Teen courts	-11.1% (5)	$5,907	$4,238	$936	$9,208
Juvenile boot camp to offset institution time	0% (14)	$0	$0	-$8,077	$8,077
Juvenile sex offender treatment	-10.2% (5)	$32,515	$8,377	$33,064	$7,829
Restorative justice for low-risk offenders	-8.7% (21)	$4,628	$3,320	$880	$7,067
Interagency coordination programs	-2.5% (15)	$3,084	$2,308	$205	$5,186
Juvenile drug courts	-3.5% (15)	$4,232	$3,167	$2,777	$4,622
Regular surveillance-oriented parole (v. no parole supervision)	0% (2)	$0	$0	$1,201	-$1,201
Juvenile intensive probation supervision programs	0% (3)	$0	$0	$1,598	-$1,598
Juvenile wilderness challenge	0% (9)	$0	$0	$3,085	-$3,085
Juvenile intensive parole supervision	0% (10)	$0	$0	$6,460	-$6,460
Scared Straight	+6.8% (10)	-$8,355	-$6,253	$58	-$14,667
Counseling/psychotherapy for juvenile offenders	-18.9% (6)	$23,126	$17,309	n/e	n/e
Juvenile education programs	-17.5% (3)	$41,181	$26,153	n/e	n/e
Other family-based therapy programs	-12.2% (12)	$15,006	$11,231	n/e	n/e
Team Child	-10.9% (2)	$5,759	$4,131	n/e	n/e
Juvenile behavior modification	-8.2% (4)	$19,271	$12,238	n/e	n/e
Life skills education programs for juvenile offenders	-2.7% (3)	$6,441	$4,091	n/e	n/e
Diversion progs. with services (v. regular juvenile court)	-2.7% (20)	$1,441	$1,034	n/e	n/e
Juvenile cognitive-behavioral treatment	-2.5% (8)	$3,123	$2,337	n/e	n/e
Court supervision vs. simple release without services	0% (8)	$0	$0	n/e	n/e
Diversion programs with services (v. simple release)	0% (7)	$0	$0	n/e	n/e
Juvenile intensive probation (as alternative to incarceration)	0% (5)	$0	$0	n/e	n/e
Guided Group Interaction	0% (4)	$0	$0	n/e	n/e

Average cost of an adult program - $3003

In regards to cost, numerous studies have shown that Drug Courts are highly cost effective, estimated for every $1 in cost, the program produces approximately $2.21 in benefits, totaling up to a net benefit of about $624 million. Every client that goes through the program saves $3000 to $12000 alone, which just goes to prove the cost effectiveness of such counseling and educational programs in comparison to others such as intensive surveillance.

Direct expenditure by criminal justice function, 1982-2006
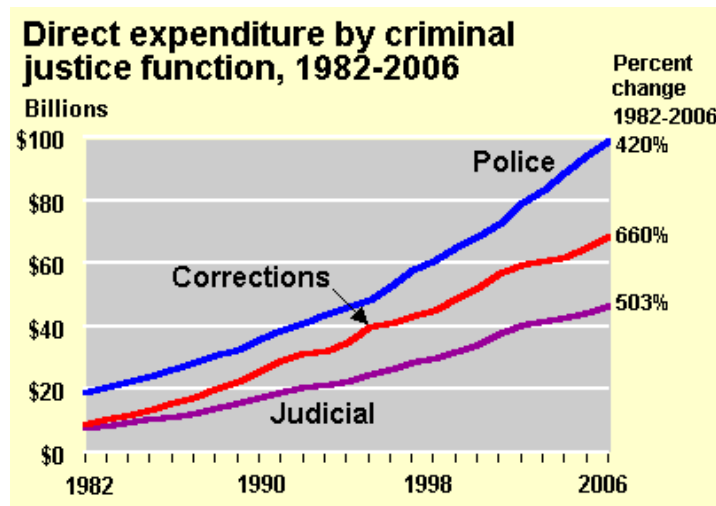
Specialization requires officers to familiarize themselves with the different categories of criminal offenders, including sex crimes, domestic violence, drug or alcohol, mental health, white collar, gang members and juvenile offenders. By familiarizing themselves with these unique groupings, officers will have the chance to better utilize their time and energy on understanding the specific behaviors of each group. This could easily be implemented by subdividing the current officers into seven groups and allocating the different criminal types to their respective supervisors. This plan would simply require a short period time for familiarizing, a little change in the administration process and no resource cost.
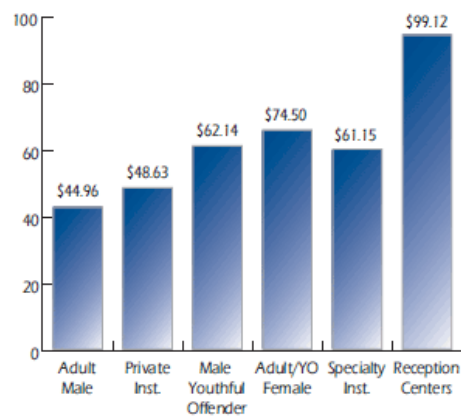
Cost of Imprisonment around Florida

Although technology might not be the best or most effective way in minimizing crime rates or parole violations, it certainly does provide parole officers with a better way of keeping track of their parolees. When compared to the cost of keeping an inmate in jail for a day, the use of computer software, global positioning satellites, ankle bracelets and other advance technologies is much cheaper. Currently the national average cost is $84 per day to keep an inmate in jail. Which is why the Multnomah County has chosen to shorten the sentences of low risk inmates and more towards the utilization of electronic monitoring, which costs only between $8 to $15 a day. With the help of electronic equipment in criminal supervision and the additional counseling programs, not only can City X begin to reduce its criminal and jail upkeep costs but also help create a safer community as a result.

Community justice is the final part in creating a better parole and rehabilitation program. It involves both the community as a whole and the victim of the crime, where the community, and the victims, feel empowered in the process of rehabilitating the offender. The community no longer plays a passive role but an active role such as monitoring offenders and even assist in determining the disposition of a case. Other ways in which the community could be proactive includes organizing outreach programs and volunteering at

treatment centers, both of which could be funded independently, either by individuals or charitable organizations.

Cost

Employment Cost (Probation officers and specialists)
  Average ratio of parolees to parole officers - 1: 85
  Number of parolees (2008) – 137590
  Estimated number of parole officers – 1619
      137590 / 85 = 1618.7
  Projected percent increase of workers - 1.9%/yr (19% in 10 years)
  National average wage (Annual)- $46580
  Increase in employment cost - **$1,432,847.38**
      1619 x 0.019 x 46580 = 1432847.38

Program and Technology Costs
  Average cost of counseling program (Annual) - $1418
  Number of parolees (2008) – 137590
  Target percentage increase of enrolled parolees – 40%
  Target number of parolees enrolled = 55036
  Total cost of program (Annual) - **$78,041,048.00**
      55036 x 3003 = 165273100

Jail Upkeep Costs
  Prison population (2008) – 166277
  Average inmate cost (Annual) - $30660
      84 x 365 = 30660
  Total cost of inmate upkeep - **$5,098,052,820.00**
      30660 x 166277 = 5098052820

Net Benefits
  Average net benefit of counseling program - $50192
  Total net benefit (Lifetime) = **$2,762,366,912.00**
      0.40 x 137590 x 50192 = 2762366912
  Net return on program cost = **350.38%**
      2762366912 / 165273100 = 35.38

  Target number of parolees enrolled = 55036
  Chance of staying clean after program – 58%
  Estimated number of parolees staying clean - 31921
  Average inmate cost (Annual) - $30660
  Total jail upkeep cost saved - **$978,694,180.80**
      31921 x 30660 = 978694180
  Percentage of jail upkeep cost saved = **19.2%**

Strengths

- Our model deals with several factors that are shown to lead to increased crime rate (as is shown by graphical analysis), like graduation rate and parole violation rate.
- There is adjustment for inflation present in our model.
- Our model addresses the root cause of the problem, by creating more engaging schools that will be more interesting to participate in for both students AND teachers.
- Youth mentoring programs are an effective way of addressing the problem of juveniles dropping out of school and participating in illicit activities that have an effect on the rate of crime.
- Although the costs for implementing the youth mentoring programs is very costly, if the youth mentoring programs partner with businesses and foundations, additional funding can be obtained in order to finance the youth mentoring program.
- A strength of implementing afterschool programs is that it is based on extensive and conclusive research conducted by government agencies and universities showing that such programs can drastically cut violent juvenile crime.
- The model also looks at possible sources of saving from federal funding grants.
- Parole violation program encourages change in individuals and saves inmate upkeep cost
- Strengthens community support and administrative structures

Weaknesses

- The huge assumption here is that the city is in the US. Since we are relying on federal grants and US laws, this is necessary for our model to work.
- Some of the percentages chosen were arbitrary, since we didn't know which exact city that city X is.
- Youth mentoring program and afterschool activity programs are expensive.
- Although the youth mentoring program, if implemented it the city, offers mentoring to every student that is enrolled in high school, the youth that are not in high school also may require mentoring as well.
- However, young people from the age of 7 to 18 are still vulnerable for losing interest in school. Even though high school students are receiving mentoring, which should help translate in higher high school graduation rates and lower high school dropout rates (and thus cause crime rates to decline), the young people who are not enrolled in high school yet and don't' receive mentoring.
- The mentoring program only addresses the youth population and doesn't take into account the adult population, who may also require mentoring as well.
- A weakness of the afterschool program model is that it roughly estimates the average funding of 21stCCLC per student and assumes it to be constant without taking into account the financial stability of the federal government (i.e. the ability of the government to grant similar amounts of money in the future)
- Technology costs may increase in the future

Letter to the Mayor

Dear Honorable Mayor,

We are presenting you a model to reduce the crime rate, and hence the incidence of crime in City X. After careful analysis, we have determined that crime rate in your city is correlated not to unemployment rates, but to high school graduation/drop-out rates as well as the rate of parole violation. This model works on improving both these rates by addressing the root causes of the problems.

First we will discuss improving graduation rates. High school dropouts are the most likely demographic group to join gangs, which are the chief perpetrators of violence in cities. Kids who graduate high school are also more likely to have productive jobs and thus contribute to the city's economy. In lieu of this, this model proposes three methods to increase graduation rate.

The first is the development of school-to-work programs. Half to two thirds of all high school dropouts cite their reason as school is boring and irrelevant to their life. This program develops an alternative path in persistently low-performing school: vocational training. This is a relevant pathway for students not aiming to go to college, providing the skill set necessary to work rather than be a member of a gang. To implement this, the model uses teacher incentives as well as funding from federal grants to reach all low-performing schools.

The second factor is to create youth mentoring program is an effective way to prevent delinquency among the young people in the city. We believe that by funding and implementing this program in the city, there will be a significant decline in the crime rate. Mentors are able to provide support and encouragement to these young people that can help them through a difficult period in their life where they are vulnerable to unhealthy influences. Although the costs for implementing the youth mentoring programs is somewhat high, if the youth mentoring programs partner with businesses and foundations, additional funding can be obtained in order to finance the youth mentoring program. This will have a significant influence on reducing the crime rate of the city, along with boosting the high school graduation rate.

Research shows that one in five juvenile crimes are committed during the immediate hours after school, especially from 3 PM to 4 PM. Quality afterschool programs effectively tackle this problem. We have developed a basic, concrete framework for such afterschool programs based on key elements identified by *Fight Crime: Invest in Kids* California which we recommend you implement. We have also modeled the cost of implementing such afterschool programs, taking into account changes in High School enrollment as well as possible savings from federal grants from the 21st Century Community Learning Centers Federal Afterschool Initiative should you choose to apply for funding.

In terms of reducing parole violation, this model addresses the six main areas that are fundamental to an effective parole rehabilitation program which are Collaboration and partnerships, Results-driven management, Re-emergence of rehabilitation, Specialization, Technology, and Community justice. The main point however, is to increase the amount of counseling and therapeutic programs that are available to parolees because data show that these programs have a substantial effect on criminals in comparison to traditional forms of punishment. We seek to employ a more active approach in the reshaping of individuals that are reentering society, encouraging community support for these people and the use of new technologies in assisting the progress that these enrolled parolees make.

The cost-benefit analysis of this model shows that our model is definitely the best way to address the crime problem in City X.

Sincerely,
Team 2544

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