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Cost-Effective Crime Prevention: Economic Analysis of the Chicago Child-Parent Centers Early Education Program

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COST-EFFECTIVE CRIME PREVENTION: ECONOMIC ANALYSIS OF THE CHICAGO CHILD-PARENT CENTERS EARLY EDUCATION PROGRAM

by **Judy A. Temple, Barry A. White & Arthur J. Reynolds**

Early intervention or prevention programs may be intended to improve the lives of youth, but increasingly their appeal is based on their high rate of return to the public. The developing consensus is that early intervention programs targeted toward economically-disadvantaged children are an important component in promoting educational success and reducing crime. Numerous authors have discussed the relationship between early intervention and juvenile and/or adult crime,[1] and the economic benefits are remarkable.

This article summarizes a recent cost-benefit analysis of the Chicago Child-Parent Center (CPC) early childhood intervention with a focus on the effect of the CPC preschool program on reductions in juvenile and adult crime. The CPC program is an established preschool program that has been offered to children residing in high-poverty Chicago neighborhoods for over 40 years. Funded by Title I of the Elementary and Secondary Education Act of 1965 and established in 1967, the CPC is, after Head Start, the nation's oldest federally-funded preschool program.

Because the CPC program is described in detail in previous reports,[2] here we summarize the main features. Located in or close to public elementary schools, CPCs provide child education and family-support services to children between the ages of 3 and 9. Within a structure of comprehensive services, the intervention emphasizes the learning of basic skills in language arts and math through relatively structured but diverse experiences that include teacher-directed, whole-class instruction, small-group activities and frequent field trips. Literacy experiences such as word analysis, oral communication and listening skills are emphasized.[3] Parents were encouraged to participate at the centers, and a staff member facilitated a variety of activities in the parent resource room.

The recent cost-benefit analysis of the CPC program indicated that the economic benefits of the program far exceeded the initial costs. Specifically, the CPC preschool program provided a total return to society of $10.83 per dollar invested and a net benefit (excess of benefits over costs) of $83,708 per participant. Benefits to the public (other than program participants and families) were $7.20 per dollar invested. The primary sources of benefits were increased earnings and income tax revenues, averted criminal justice system and victim costs, and reduced expenditures for child welfare services, special education and grade retention. Importantly, reductions in the costs of crime accounted for almost 70 percent of the returns to the public (or $4.99 of $7.20). Due to the importance of these public benefits, the promise of targeted high-quality preschool programs as a cost-effective tool for preventing crime has caught the attention of youth advocates, policymakers and taxpayers alike.

Cost-benefit analysis (CBA) of interventions or prevention programs enhances the policy use of research for promoting the well-being of children in several ways. First, by combining information on the dollar value of program effects or outcomes with relevant cost information, the CBA framework assists in determining whether the expected returns from a policy or program are worth the

initial costs of investment, which aids in the efficient allocation of limited resources (e.g., tax dollars). Returns in excess of costs indicate investment potential. Second, the CBA framework allows for the calculation of benefits and costs for different stakeholders. Returns to program participants can be estimated separately from returns to the rest of society. Importantly, the estimation of the returns to the public may enhance voter interest in supporting particular policies or programs. Finally, the CBA framework allows for a comparison of the returns from alternative policies or programs. Not only does CBA assist in identifying which programs generate benefits in excess of costs, CBA aids in the ranking of alternative policies.

Previous Estimates of the Returns from Early Intervention

The most well-known preschool program with demonstrated cost-effectiveness is the High/Scope Perry Preschool Program. The Perry Preschool Program began in 1962 with a cohort of 123 three- and four-year-old low-income African-American children randomly assigned to a high quality preschool program with a parental home visiting component. Program enrollment was associated with improvements in cognitive skills, school achievement and performance, economic status, and reductions in criminality.[4] Researchers have conducted comprehensive cost-benefit analyses at ages 19, age 27, and most recently as of age 40. Findings showed that total economic benefits of the program substantially exceed program costs, which for the two years totaled $18,261 per child in 2007 dollars. Most of the benefits were due to increased earnings and reduced crime costs. Roughly two-thirds of the total benefits came from criminal justice system savings and reduced victim costs. Depending on the assumptions used in the cost-benefit analyses, estimated social rates of return vary from 7 percent to 16 percent per year. The age 40 study calculated that the benefit-cost ratio was as high as $17.07 per dollar invested, while a recent reanalysis suggested a somewhat lower but still substantial ratio ranging from approximately $7 to $12 per dollar invested.[5]

In addition to economic analysis of the Perry Preschool Program, the knowledge base on the long-term benefits and costs of preschool participation includes two studies of the Chicago Child-Parent Center program. The first cost-benefit analysis of the CPC program used information on preschool participation and school success at the end of adolescence and involvement in juvenile crime[6] to estimate the benefits and costs associated with the program as of age

21. The preschool program in particular demonstrated the greatest social benefits–$7.14 to $10.15 per dollar invested, as measured by increased life-time earnings potential, lower rates of delinquency and crime, and reduced need for remedial education and child welfare services. Also assessed was the school-age component of the CPC program, in which children experienced small class sizes and additional resources up to second or third grade. The benefit of the school-age component was smaller but still exceeded the costs.

One significant limitation of the first cost-benefit analysis was that the estimated life-time earnings benefit and the reduction in adult crime costs were projected from educational attainment by age 20 and juvenile delinquency by age 18, respectively. While conventional methods were used to project life-time earnings and reductions in adult crime associated with CPC preschool participation, obviously estimates based on information observed further into adulthood are valuable.

Furthermore, due to excluded program effects or outcomes, the economic benefits of the CPC program reported in the earlier study appear to have been underestimated. Recently, researchers in the Chicago Longitudinal Study (CLS) completed an updated and more thorough cost-benefit analysis of the CPC program based on data through age 26.[7] This study incorporated additional information on educational attainment and adult crime, and included a discussion of the potential benefits associated with health and well-being, including substance use and related health-compromising behaviors, mental health, public aid receipt and utilization of health care services. In a study of the impact of CPC preschool participation using data from early adulthood,[8] researchers found that preschool program participation was associated with higher rates of educational attainment and health insurance coverage and lower rates of depressive symptoms, felony arrest, incarceration and of out-of-home placement in the child welfare system.

Sample and Design

The CLS is an investigation of the life-course of a cohort of 1,539 children (93 percent African-American, 7 percent Hispanic) from low-income families born in 1979-1980 who attended kindergarten in 1985-1986. The original sample included the complete cohort of 989 children who completed preschool and kindergarten in 20 CPC sites and 550 well-matched low-income children who

did not attend the program in preschool but instead participated in a full-day kindergarten intervention program in five randomly selected schools and in schools affiliated with the CPCs. Prior to kindergarten entry, 15 percent of the comparison group attended Head Start preschool with the remaining children in home care. Thus, the comparison group enrolled in the usual early childhood interventions available to low-income children. School-age services were provided in first to third grades in affiliated schools regardless of children's preschool or kindergarten experience. To understand the long-term effects of CPC program participation on youth in Chicago's most disadvantaged neighborhoods, the CLS has followed the majority of program and comparison group participants from school entry through age 26.

Since 1985, academic performance and achievement data as well as information on the well-being of program and comparison group participants have been collected from school records, participant and family surveys, and administrative records through age 26. Table 1 shows the distribution of program and comparison group participants for which educational attainment and criminal justice system involvement by age 26 is known. Arrest and incarceration information is known for 96 percent of the original program group and 95 percent of the comparison group with no evidence of selective attrition.[9]

TABLE 1
Patterns of Participation of Original Intervention and Comparison Groups in the CLS

Study category	Total Sample	Preschool Intervention Group*	Comparison Group
Program Participants' Characteristics at Start of Study			
Original Sample	1539	989	550
No. of Lost cases in Post-program Years			
Moved**			
From ages 6-10y	69	41	28
After age 10y	52	30	22
Other	11	4	7
Child death	18	12	6
Follow-up Study Characteristics of Participants at Age 24-26, No. of cases with data			
Educational attainment	1373	893	480
Arrest and incarceration	1473	950	523

**Preschool intervention group refers to students who had one or two years of participation in the Child Parent Center preschool program. **These categories account for attrition from the original study sample of 1,539. Cases were lost during post-program years because they moved from Chicago and could not be located, were deceased, or either did not have sufficient identifying information to track, refused to participate or were incarcerated (other). At age 24, the total number of deceased cases in the study was 41.*

Group Comparability

In order to estimate the causal effect of preschool on the longer-term outcomes of high school completion and criminal behavior, it may be important to understand how the characteristics of the CPC preschool participants and the comparison group participants compare on a range of socio-economic characteristics known to be associated with school success and involvement in crime. Table 2 shows the characteristics of the program and comparison groups at age 26. The age 26 sample includes the 1,373 CLS participants with known educational attainment. Child and family characteristics were measured from administrative records (birth records, public aid receipt) and family surveys assessing preprogram characteristics from birth to age 3. The p-values show the significance of the group differences at follow up and at the beginning of the study (original sample). The p-values above 0.50 generally suggest that the program and comparison groups are similar on those characteristics.

Table 2 suggests that at the age 26, program and comparison groups were similar on most attributes including low birth weight, race, child welfare history, single-parent status, mother's employment, financial problems, family conflict and economic disadvantage (i.e., TANF receipt and eligibility for subsidized meals). These characteristics can be thought of as factors that affect developmental risk or reduce the probability of school success. It is common to add up all the indicators of risk to create a risk index. Here the risk index, which is the sum of eight dichotomous family risk indicators, indicates that the preschool group and comparison group faced similar numbers of developmental risks. Each group experienced an average of 4.3 risk factors early in life. However, the program group had a higher proportion of females, a higher proportion of parents who completed high school, and a higher rate of enrollment in high-poverty schools. The latter difference is the result of the centers being located in the most economically disadvantaged areas. Although the groups are similar, the estimates of intervention effects are obtained through regression analysis to account for any observable background differences between groups.

TABLE 2
Equivalence of CPC Preschool Intervention and Comparison Groups on Pre-Program Attributes for the Adult Follow-up Study

	Adult Follow-up Sample (n = 1373)*			
Child/Family Characteristics**	**Preschool Intervention Group (N=893)**	**Comparison Group (N=480)**	***p*-value**	**Original Sample *p*-value**
Sample recovery, %	90.3	87.3	-	-
African American child, %	93.4	93.1	.85	.59
Female child, %	54.1	48.3	.04	.11
Low birth weight (<2500g), %	11.5	14.7	.10	.11
= 60% low income families in school attendance area, % [x]	77.6	72.9	.05	.04
= 40% of persons living in poverty in area of residence, %	69.9	54.0	.000	.000
Child welfare case history by age 4, %	2.9	5.0	.05	.08
Parent under age 18 at child birth, % [x]	16.4	18.2	.40	.29
Mother did not complete high school, % [x]	50.5	58.7	.004	.001
Single parent family status, % [x]	76.3	74.9	.58	.59
Mother not employed, % [x]	64.5	59.6	.09	.11
Child eligible for subsidized meals, % [x,y]	83.1	82.4	.76	.39
Participate in TANF program, % [x]	62.4	60.4	.48	.59
Four or more children in family, % [x]	16.4	19.7	.14	.27
Frequent family conflict, %	6.2	5.2	.48	.48
Family financial problems, %	7.5	6.2	.41	.40
Undesirable early home environment, % [z]	13.9	11.3	.91	.72
Missing 1 or more risk factors, %	12.4	15.2	.15	.03
Risk index (0 to 8), mean (SD)	4.32 (1.74)	4.28 (1.79)	.73	.39

**The adult follow-up sample had known educational attainment by August 2005. P values show the significance of mean (or percentage) group differences for age 25-26 and the original samples. The preschool comparison group participated in an alternative full-day kindergarten but had no CPC preschool participation. School-age and extended intervention groups had similar profiles as the CPC preschool group. **Data on child and family characteristics were collected from birth to age 3 based on multiple administrative records and parent surveys. Data on TANF (Temporary Assistance for Needy Families) and subsidized meals were collected up to age 8. Sample sizes ranged from 1234 to 1373 (follow up sample). They ranged from 1342 to 1539 for the original sample. x Variable included in the risk index. y Eligibility defined at <130% of the federal poverty level. z Defined as frequent family conflict, financial problems, or parental substance abuse from age 0 to 5 years.*

Child-Parent Center Program

CPCs are located in the poorest neighborhoods in Chicago. The mean rate of family poverty in 1989 for the community areas serving the CPCs was 41 percent versus 17 percent for other areas. These relatively high poverty neighborhoods were not being served by other preschool programs including Head Start when CPC location decisions were made. At the time of the CLS sample's participation, each of the CPCs served approximately 100 to 150 children aged 3 to 5 years. Each center is directed by a head teacher and two coordinators. The parent-resource teacher coordinates the family-support component.

The school-community representative provides outreach to families. All of the teachers have bachelor's degrees and are certified in early childhood.

CBA Conceptualization and Methods

The CPCs have the potential to significantly influence the current and future well-being of participants. As a public investment in the human capital of children and as an intervention that offers support to families, the CPC program is expected to positively affect school performance and attainment, social-emotional functioning, health behaviors and economic self-sufficiency. Based on ecological or human capital views of the importance of early childhood experiences on later life-course development,[10] the economic benefits of the CPCs are potentially sizeable.

The most recent cost-benefit analysis of the Child Parent Center program follows standard economic procedures[11] to estimate the present value of program benefits for six main categories:

- Reductions in expenditures for K-12 remedial education, including special education and additional schooling for retained students.
- Reductions in criminal justice system expenditures for juvenile and adult arrest and treatment.
- Reductions in child welfare system expenditures associated with maltreatment.
- Averted tangible and intangible costs to crime victims as a result of lower rates of arrest and to victims of child maltreatment.
- Reductions in expenditures for mental health and substance abuse treatment associated with depressive symptoms and substance misuse.
- Increases in projected earnings and income tax revenues as a result of higher educational attainment.

We also monetized the estimated effects of the CPC program on daily tobacco use because smoking is known to result in significant costs to the individual smoker and costs to society. However, because of the uncertainty of costs associated with tobacco use, the estimated benefit assessed by reduced mortality is not included in the primary analysis. However, the benefit is considered as part of the sensitivity analysis.

Consistent with the previous study, the calculations in the cost-benefit analysis of CPC participation followed a number of commonly-used steps. First, program costs and benefits are calculated in dollar terms and then dollar values are converted to 2007 dollars to adjust for inflation. Second, the present values of future costs and benefits are computed by applying a 3 percent annual discount rate to age 3 for all levels of participation, and finally the present value of program costs is subtracted from the present value of program benefits to obtain the net present value of the program per participant. Alternatively, program benefits are divided by costs to obtain the dollar return for every 1 dollar invested (benefit-cost ratio). Because it is common to estimate life-time earnings from educational attainment, future earnings were projected through age 65.[12]

Data Analysis

We estimated the effects of preschool participation on various outcomes including high school completion and juvenile and adult crime. Our regression estimates reflect the difference in outcomes between the treatment and comparison groups in percentage points or levels of performance while holding constant other individual and family characteristics. The amount of economic benefit was estimated by multiplying this effect by the monetary estimate of the outcome (such as the benefit in terms of the expected increase in life-time earnings from completing high school or the cost-savings associated with a given reduction in crime). The other variables included in the regression models are race/ethnicity, gender, receipt of child welfare services, parent education, single parent family status, teen parenthood, mother's employment status, four or more children in the family and school-poverty rate of the kindergarten sites and whether or not the child participated in the school-age component of the CPC program. When possible, these variables were measured during the period of birth to age 3.

Results

Summary of Main Effects of CPC

Table 3 summarizes the primary and economically-important effects of CPC preschool participation. Outcomes included in the economic analysis are emphasized. Detailed results on the relationship between the educational inter-

ventions and additional adult outcomes and K-12 school adjustment and achievement are available in various reports.[13]

TABLE 3
Estimated Effects for Preschool Participation in the Child-Parent Centers

Domain and Measure	Preschool Group (n=950)	Comparison Group (n=523)	Difference
School remedial services			
Grade retention by age 15, %	23.0	38.4	-15.4***
Special education by age 18, %	14.4	24.6	-10.2***
Number of years of special ed. from ages 6 to 18	0.73	1.43	-0.70^{+}
Child maltreatment			
Any indicated abuse or neglect from ages 4 to 17, %	9.9	17.4	-7.5***
Any out of home placement, %	5.2	8.5	-3.3*
Juvenile arrest by age 18			
Petition to juvenile court, %	16.9	25.1	-8.2**
No. of petitions to juvenile court	0.45	0.78	-0.33*
Educational attainment by age 25			
High school completion, %	79.7	72.9	6.8**
Highest grade completed	12.08	11.80	0.28**
Completed .5 credits at a 4-year college, %	10.9	7.1	3.8*
Adult crime by age 26			
Any felony arrest, %	13.3	17.8	-4.5*
No. of felony arrests	0.32	0.44	-0.12*
Health and mental health			
Reported any depression symptom, %	12.8	17.4	-4.6^{+}
Substance misuse, %	14.3	18.8	-4.5*
Daily tobacco use, %	17.9	22.1	-4.2
Health insurance by age 26			
Any health insurance, %	76.7	66.6	10.1***
Economic status			
Number of months of Food Stamps, ages 18 to 24	17.50	18.78	-1.28*
Occupational prestige by age 24	2.79	2.55	0.24**

**** p= .001 ** p= .01 * p= .05 $^{+}$p= .10. The sample size for the preschool intervention measures ranges from 1281 for school remedial services to 1473 for adult crime by age 26. Coefficients are from linear, probit, or negative binomial regression analysis. Coefficients for school remedial services and juvenile delinquency measures are adjusted for sex of child, race/ethnicity, the risk index, program sites, and earlier/later program participation. All other coefficients are adjusted for the 8 indicators of preprogram risk status, gender, race/ethnicity, child welfare history, and a dummy-coded variable for missing data on risk status. Sample comparisons are based on published studies whenever possible. Occupational prestige in the CLS sample ranges from 1 to 8, with 4 indicating moderate prestige.*

CPC preschool participation was consistently associated with measures of well-being in early adulthood, including educational attainment, occupational prestige and reduced criminal behavior. Preschool participants had significantly higher rates of high school completion (79.7 percent vs. 72.9 percent) and completed more years of school. In addition, preschool participants had lower rates of felony arrest by age 26 (13.3 percent vs. 17.8 percent), which was also consistent with other measures of involvement in the criminal justice system such as number of felony arrests, incarceration, and conviction. CPC preschool participants also had lower rates of depressive symptoms in early adulthood

and had higher rates of health insurance coverage, lower rates of substance misuse and fewer months receiving food stamps by age 26.[14]

Among K-12 outcomes, preschool was associated with significantly lower rates of grade retention, special education placement, child maltreatment and out-of-home placement and juvenile arrest. Although not displayed, differences in reading and math achievement were also found up to ninth grade.[15]

Cost-Benefit Estimates

The present value of costs and benefits of the CPC preschool program are reported in Table 4. Each value is the average per program participant. Benefits are either measured by age 26 or projected through adulthood (age 65) using conventional methods employed in the CBA literature. We distinguish among societal, general public and individual participant benefits. Society includes participants and the general public.

TABLE 4
Costs and Benefits of the Chicago Child-Parent Center Preschool Program per Participant (2007 dollars, 3% real annual discount rate)

Benefit or Cost	Participants	General Public	Society (Participants and General Public)
Preschool Program			
Measured effect			
Child care	4,387		4,387
Child abuse and neglect	4,240	3,090	7,330
Education			
Grade retention	-	880	880
Special education	-	5,317	5,317
College tuition	(98)	(196)	(294)
Earnings/compensation	22,445	6,399	28,844
Criminal behavior			
Ages 10-18	-	24,240	24,240
Ages 19-44	-	18,222	18,222
Health			
Depression	-	494	494
Substance misuse	-	2,800	2,800
Total benefits	30,974	61,246	92,220
Program costs	-	8,512	8,512
Net present value	30,974	52,733	83,708
Benefit-cost ratio for the public and for society	**-**	**$7.20**	**$10.83**
Benefit-cost ratio for crime benefits only	**-**	**$4.99**	**$4.99**

At an average cost of $8,512 per participant, participation in CPC preschool was associated with an average economic return to society of $92,220. The

largest benefit category was crime related savings, which was 46 percent of the benefits ($42,462). Estimated crime savings from age 10 through 65 consisted of savings from reduced juvenile delinquency ($24,240) and reduced adult criminal behavior ($18,222). Saving from reduced adult crime included reduced criminal justice system expenditures for arrest, trail and processing, and treatment of offenders ($3,313) and reduced tangible and intangible criminal victim costs ($3,474 and $11,435, respectively). Tangible victim costs include the costs of property loss and damage from crime and intangible costs include the costs of pain and suffering or the loss in quality of life from being a victim of a crime. Projected increases in life-time earnings and associated income tax revenues constitute 31 percent of societal benefits, followed by savings associated with reduced child maltreatment (8 percent), special education (6 percent) and substance misuse (3 percent). The many details involved in generating these monetary benefits, especially for crime reduction, are described in two recent reports.[16]

As a ratio of benefits to costs, CPC was associated with a return of $10.83 per dollar invested in the program. Savings from reduced juvenile and adult crime were $4.99 per dollar invested. Benefits to the general public, which exclude benefits to participants and their families, totaled $61,246. The ratio of public benefits to costs was $7.20 per dollar invested. Crime savings were by far the largest category, representing 69 percent of public benefits.

Benefits for Child and Family Subgroups

Our age 26 cost-benefit analysis also investigated the net benefits of preschool participation for various child and family subgroups in order to see who benefits most from preschool participation. While the reader is directed to the longer paper[17] for a lengthier discussion, we briefly mention some of those results here.

Length of preschool participation. Approximately half of the preschool participants attended for one year and the other half for two years. Our analysis found that the societal return per dollar invested for one year of preschool was higher than for two years (ratios of $13.58 vs. $8.54 per dollar invested). The main findings on duration of participation indicated that rates of high school completion and delinquency and crime are equivalent for 1- and 2-year participants but the 2-year participants had significantly lower rates of special educa-

tion and child maltreatment. Importantly, participation in one year of preschool was enough to achieve the observed effects of crime reduction.

Gender. Male preschool participants had a comparatively higher return than females ($17.88 vs. $2.67). This occurred because males' educational attainment and criminal behavior were more affected by preschool participation. For example, 75 percent of male preschool participants completed high school compared to 58 percent for comparison counterparts. Most of the crimes were committed by men so it would be expected that preschool would have a greater effect on crime for men versus women.

High family risk status. Children with 4 or more family risk factors (e.g., low parent education, single parent family status; low family income) had greater benefits from preschool than those with fewer family risk factors ($12.81 vs. $7.21). Most of the differences came from educational attainment and child abuse and neglect.

Parent education. Preschool participants whose parents were high school dropouts had higher economic returns than those whose parents were high school graduates ($15.88 vs. $5.33 per dollar invested). Excluding the benefits to preschool participants and focusing solely on the returns to the public, the public economic returns also favored the higher risk group, but to a lesser extent ($10.43 vs. $3.33). The main sources of these differences were earnings and averted crime costs.

High poverty neighborhood. In a comparison of preschool effects between children from the highest poverty neighborhoods (60 percent or more of children residing in low-income families) and the other children in the sample, the children in the poorest neighborhoods had returns from the CPC preschool ($17.92 vs. $4.05) and school-age programs ($7.84 vs. $1.22) that were 4 to 10 times higher than children residing in less disadvantaged areas. These differences were largely accounted for by educational attainment and crime prevention.

Discussion

Economic analysis of the costs and the longer-term benefits of enriched, targeted preschool programs demonstrate that preschool can be a relatively

cost-effective preventative intervention. This article has summarized some of the findings of the recent cost-benefit analysis of the CPC preschool program. The CLS, which focuses on a cohort of mostly African-American children who entered kindergarten in the Chicago's poorest neighborhoods in 1985-1986, finds significant effects of preschool participation on high school completion and involvement in the juvenile and adult justice system. This is an important population to study because urban minority children have some of the highest high school dropout rates in the US. Also, urban African-American men, in particular, face higher probabilities than other demographic groups in the US of being arrested for crimes as juveniles or adults.

Compared to the United States as a whole, students in the CLS were at greater risk of school dropout and involvement in crime because of the impoverished nature of their neighborhoods, but participants in the CPC educational intervention program had notably better education outcomes and a lower probability of involvement in crime.

Approximately 73 percent of the students in the comparison group completed high school or received a GED. For participants in the enriched preschool program offered by the CPCs, their probability of completing high school or obtaining a GED was about 80 percent. Similarly, 25 percent of the comparison groups were involved in juvenile crime as reflected by having petitions written to the juvenile court. The preschool participants' probability of having petitions to the juvenile court for involvement in crime was approximately 17 percent. There also was a significant difference in the percent of individuals who had a felony arrest. Preschool participants had a 13 percent probability of having a record of felony arrest while the other students in the sample had an 18 percent probability.

Economic analysis of these benefits and costs indicate that benefits of the CPC program exceed the costs by a ratio of almost $11 to $1.[18] Clearly investments in quality preschools for children at higher risk of school failure have a tremendous payoff. Participation in the CPC preschool program is associated with significant and sizeable reductions in high school dropout and involvement in juvenile and adult crime. After assigning monetary values to a range of benefits arising from preschool participation including reductions in school remedial services, reductions in child abuse and neglect, improvements in health, increases in earnings and income tax revenues arising from greater educational attainment and reductions in the justice system costs and victim costs associ-

ated with crime, we found that the program costs of $8,512 were more than covered by the estimated program benefits of $92,220.

Regarding preschool's effect on crime, the CLS has collected comprehensive data on justice system involvement from Cook County, state, and federal sources. The fact that participation in preschool was associated with a 8.2 percentage point reduction in the probability of an individual having a petition to the juvenile court and that preschool is associated with a 4.5 percentage point reduction in the probability of an individual having a record for any felony arrest provides the starting point for the economic analysis of benefits and costs associated with preschool's potential as a cost-effective tool used to prevent crime. While the cost-benefit analysis of the CPC program involves estimating the benefit associated with a range of positive outcomes, a large portion of the benefits, particularly to the public or the nonparticipants, is accounted for by the effect of preschool on crime.

Conclusion

While overall the benefit-cost ratio to society was almost $11 to $1 when taking into account all the estimated benefits associated with preschool participation, the crime benefit by itself accounts for approximately $5 of this return. From this societal perspective (which includes the benefits of preschool to the participants themselves) the reduction in crime accounts for almost half (46 percent) of the social benefit associated with preschool. No other category of benefits plays such an important role in explaining the benefits of this intervention to society.

Importantly, we find that the effect of preschool varies by different characteristics of students and families or neighborhoods. We find that preschool participation has an especially significant effect on criminal behavior for boys, for children of parents with low levels of education, and for participants who lived in the poorest neighborhoods. This pattern of "compensatory" findings suggests that targeting educational interventions to the most disadvantaged children will generate the highest rates of return.

NOTES

1 *See generally* James J. Heckman et al., *The Rate of Return to the High Scope Perry Preschool Program*, 94 J. OF PUB. ECON. 114 (2010); MARY ELLEN O'CONNELL ET AL., PREVENTING MENTAL, EMOTIONAL AND BEHAVIORAL DISORDERS AMONG YOUNG PEOPLE: PROGRESS AND POSSIBILITIES (2009); NAT'L RES. COUNCIL, Committee on the Prevention of Mental Disorders and Substance Abuse among Children, Youth, and Young Adults: Research Advances and Promising Interventions (2009), *available at* http://www.iom.edu/Activities/MentalHealth/YouthMentalDisorders.aspx; Mark Cohen & A.R. Piquero, *New Evidence on the Monetary Value of Saving a High Risk Youth*, 25 J. OF QUANTITATIVE CRIMINOLOGY 225 (2009); Judy A. Temple and Arthur J. Reynolds, *Benefits and Costs of Investments in Preschool Education: Evidence from the Child-Parent Centers and Related Programs*, 26 ECON. OF EDU. REV. 126 (2007); DAVID P. FARRINGTON & BRANDON C. WELSH, SAVING CHILDREN FROM A LIFE OF CRIME: EARLY RISK FACTORS AND EFFECTIVE INTERVENTIONS (2007); PETER W. GREENWOOD, CHANGED LIVES: DELINQUENCY PREVENTION AS CRIME-CONTROL POLICY (2006); LYNN M. KAROLY, M. REBECCA KILBURN & JILL S. CANNON, EARLY CHILDHOOD INTERVENTIONS: PROVEN RESULTS, FUTURE PROMISE (2005); Steve Aos et al., *Benefits and Costs of Prevention and Early Intervention Programs for Youth: Technical Appendix,* WA. STATE INSTIT. OF PUB. POL'Y (2004), *available at* http://courses.washington.edu/pbaf513m/prevention%20tech%20appendix.pdf; Daniel Nagin, *Measuring the Economic Benefits of Developmental Prevention Programs*, 28 CRIME AND JUST. 347 (2001).

2 *See generally* Arthur J. Reynolds et al., *Age 21 Cost-benefit Analysis of the Title I Chicago Child-Parent Centers*, 24 EDU. EVALUATION AND POL'Y ANALYSIS 267 (2002) [hereinafter *Age 21 Cost-Benefit Analysis*]; ARTHUR J. REYNOLDS, SUCCESS IN EARLY INTERVENTION: THE CHICAGO CHILD PARENT CENTERS (2000) [hereinafter CHICAGO CHILD PARENT CENTERS]; Arthur J. Reynolds et al., *Long-term Effects of an Early Childhood Intervention on Educational Achievement and Juvenile Arrest: A 15 year Follow-up of Low-income Children in Public Schools*, 285 J. OF THE AM. MED. ASS'N 2339 (2001) [hereinafter *Long-term Effects*].

3 *See* CHICAGO CHILD PARENT CENTERS, *supra* note 2; *Long-term Effects*, *supra* note 2; *Age 21 Cost-Benefit Analysis*, *supra* note 2; *See generally* LORRAINE SULLIVAN, LET US NOT UNDERESTIMATE THE CHILDREN (1971).

4 *See generally* DAVID P. WEIKART & LAWRENCE J. SCHWEINHART, YOUNG CHILDREN GROUP UP: THE EFFECTS OF THE PERRY PRESCHOOL PROGRAM ON YOUTHS THROUGH AGE 15 (1980); LAWRENCE J. SCHWEINHART ET AL., SIGNIFICANT BENEFITS: THE HIGH/SCOPE PERRY PRESCHOOL STUDY THROUGH AGE 17 (1993); JOHN R. BERREUTA-CLEMENTE ET AL., CHANGED LIVES: THE EFFECTS OF THE PERRY PRESCHOOL PROGRAM ON YOUTHS THROUGH AGE 19 (1984); W. STEVEN BARNETT, LIVES IN THE BALANCE: BENEFIT COST ANALYSIS OF THE PERRY PRESCHOOL PROGRAM THROUGH AGE 27 (1996); Clive Belfield et al., *The High Scope Perry Preschool Program: Cost-benefit Analysis Using Data from the Age-40 Follow-up*, 41 J. OF HUM. RESOURCES 162 (2006); LAWRENCE J. SCHWEINHART, W. STEVEN BARNETT & CLIVE R. BELFIELD, LIFETIME EFFECTS: THE HIGH/SCOPE PERRY PRESCHOOL STUDY THROUGH AGE 40 (2005).

5 *See* Belfield et al., *supra* note 4; Heckman et al., *supra* note 1.

6 *See* CHICAGO CHILD PARENT CENTERS, *supra* note 2; *Long-term Effects*, *supra* note 2; *See generally* Arthur J. Reynolds et al., *Effects of a School-based Early Childhood Intervention on Adult Health and Well-being: A 19-year Follow-up of Low-income Families*, 161 ARCHIVES OF PEDIATRIC AND ADOLESCENT MED. 730 (2007) [hereinafter *School-based Early Childhood Intervention*].

7 Arthur J. Reynolds et al., *Age 26 Cost-Benefit Analysis of the Child-Parent Center Early Education Program*, CHILD DEVELOPMENT (forthcoming in 2010) [hereinafter *Age 26 Cost-Benefit Analysis*].
8 *See School-based Early Childhood Intervention, supra* note 6.
9 *Id.*
10 *See generally* URI BRONFENBRENNER, THE ECOLOGY OF HUMAN DEVELOPMENT: EXPERIMENTS BY NATURE AND DESIGN (1971); James J. Heckman, *Policies to Foster Human Capital*, 54 RES. IN ECON. 3 (2000).
11 *See generally* HENRY LEVIN & PATRICK MCEWAN, COST EFFECTIVE ANALYSIS: METHODS AND APPLICATIONS (2nd ed. 2001).
12 *See* Aos et al., *supra* note 1; BARNETT, *supra* note 4; *See generally* LYNN A. KAROLY, INVESTING IN OUR CHILDREN: WHAT WE KNOW AND DON'T KNOW ABOUT THE COSTS AND BENEFITS OF EARLY CHILDHOOD INTERVENTIONS (1998).
13 *See generally* White et al., *Age 26 Cost-Benefit Analysis of the Title 1 Chicago Child-Parent Centers: Technical Report* (2009); *See* CHICAGO CHILD PARENT CENTERS, *supra* note 2; *Long-term Effects*, *supra* note 2); *School-based Early Childhood Intervention, supra* note 6.
14 *See School-based Early Childhood Intervention, supra* note 6; White et al., *supra* note 13.
15 *See* CHICAGO CHILD PARENT CENTERS, *supra* note 2.
16 *See Age 26 Cost-Benefit Analysis*, *supra* note 7; White et al., *supra* note 13.
17 *See Age 26 Cost-Benefit Analysis*, *supra* note 7.
18 *Id.*