Age 21 Cost-Benefit Analysis of the Title I Chicago Child-Parent Centers

Technical Report

Revised May 2007

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PREFACE

This document provides details of the methods employed by Reynolds, Temple, Robertson, & Mann (2002) in deriving the costs and benefits arising from participation in the Chicago Child-Parent Center (CPC) program, a high quality early childhood education program attended primarily by at risk African American children living in inner-city Chicago. In this technical report, the estimated discounted costs and benefits related to three levels of intervention (preschool, school-age, and extended) are described. Program costs were incurred for up to six years after program entry at age 3, and program benefits are projected using information from the Chicago Longitudinal Study (CLS) on the effects of participation in the Child-Parent Centers. For additional information on the CPC intervention and a discussion of the costs and benefits associated with the Chicago CPC program see Reynolds et al. (2002).

I. Discounting future benefits and costs

The net present value (NPV) of benefits minus costs as of program entry at age 3 is calculated using the following formula for real inflation-adjusted benefits (*B*) and costs (*C*) in time (*t*). To adjust for inflation, estimates are converted to 1998 dollars using the Consumer Price Index for All Urban Consumers (CPI-U). Benefits and costs are discounted by the real annual discount rate (*r*), assumed to be 3%. Certain benefits (e.g., lifetime earnings and tax contributions) are projected through age 65 which is equivalent to t = 62 (*t* = 0 at age 3).

$$\text{NPV} = \sum_{t=0}^{62} \frac{B_t}{(1+r)^t} - \sum_{t=0}^{62} \frac{C_t}{(1+r)^t}$$

II. Estimating the Cost of the Chicago CPC Program

The number of years of program participation varied across students. Students were able to enroll in one or two years of the preschool intervention and one, two or three years of the school-age intervention from grades 1 through 3. In 1998 dollars, the cost for one year of the preschool program in 1986 was $4,425 per student. The annual per pupil cost of the preschool program has also been reported as $4,400; however, this disparity proves to be non-significant in the overall analysis of the CPC program. The undiscounted cost in 1998 dollars for one year of the school-age program was $1,580. Students could have up to two years of preschool and up to three years of school-age intervention.

II A. The cost of the preschool program

In calculating the present value of the cost of the preschool program, 100% of the preschool participants had one year of preschool and 55% had two years. Assuming that the students with only one year of preschool intervention entered the program in 1984 (age 4) rather than 1983 (age 3), the present value of the average cost of the preschool program per participant is:

(.55)(4,425) + (1.00)(4,425/1.03) = $6,730[1]

[1] Employing the alternative annual cost estimate of $4,400, the present value of the average cost for 1.55 years of the preschool program is $6,692.

II B. The cost of the extended program

Students that participated in the extended program had 4-6 years of intervention services. In calculating the present value of the extended program, 100% of the program participants had at least one year of preschool and 55.7% had two years. All of the extended program participants had at least two years of the school-age intervention (in first and second grade) while 31.3% had a third year. With an annual cost of $4,425 in 1998 dollars for the preschool program and $1,580 for a year of the school-age program, the cost of the extended program is:

$(.557)(4,425) + (1.00)(4,425/1.03) + (1.00)(1,580/1.03^3) + (1.00)(1,580/1.03^4) + (.313)(1,580/1.03^5) = \$10,038$

II C. The cost of the less-extended program

Students with less-extended intervention had at least one year of intervention (either in preschool or school-age) but fewer than 5 years of intervention. There are a variety of combinations of intervention experiences for students in this group. For example, 50.7% of these students had one or two years of preschool but no participation in the school-age program. Approximately 27.6% had zero years of preschool but 1 to 3 years of the school-age program. The frequencies of the various combinations of 1 through 4 years of intervention are presented in table 1.

TABLE 1

Rates of Participation for Various Combinations of Intervention

Years of Intervention	Preschool 0 years	Preschool 1 year	Preschool 2 years	Total
School-age 0 years	0%	24.3%	26.4%	50.7%
School-age 1 year	6.3%	10.6%	10.8%	27.7%
School-age 2 years	8.0%	0%	0.3%	8.3%
School-age 3 years	13.3%	0%	0%	13.3%
Total	27.6%	34.9%	37.5%	100%

Employing the various participation rates, the present value of the average cost of the less-extended program is:

$(.375)(4,425) + (.349+.375)(4,425/1.03) + (.277+.083+.133)(1,580/1.03^3)$
$(.083+.133)(1,580/1.03^4) + (.133)(1,580/1.03^5) = \$5,970$

The marginal cost of the extended program, above and beyond less extensive participation is equal to the present value of the average cost of the extended program minus the present value of the less-extended program. The marginal cost of the extended program is:

$10,038 – 5,970 = \$4,068$

In calculating the present value of the school-age program, 100% of the students in that intervention group had one year of the school-age program, 80.4% of the students had a second

year, and 29.8% were enrolled in the third year of the program. The present value of the average cost of the school-age program is:

$(1.00)(1{,}580/1.03^{3}) + (.804)(1{,}580/1.03^{4}) + (.298)(1{,}580/1.03^{5}) = \$2{,}981$

III. Estimating the Economic Returns to Chicago CPC Participation

The present value of the program effect is calculated for the following categories: (A) reductions in expenditures for child care services, (B) reductions in expenditures for school remedial services, (C) reductions in criminal justice system expenditures, (D) reductions in tangible expenditures to the victims of crime, (E) reductions in expenditures for the child welfare system and for victimization from child abuse or neglect, (F) increases in the projected earnings and compensation of program participants and associated increases in government tax revenues, and (G) increases in expenditures for post-secondary education (college or university). Monetary benefits and costs associated with CPC program participation are estimated by multiplying the program effect (Table 4; Reynolds, et al., 2002) by the present value of the outcome (Appendix B; Reynolds et al., 2002). See Appendix A in this document for a break down of the costs and benefits.

III A. Reductions in expenditures for child care services

The estimate for child care services is calculated assuming an average of 540 hours per year over 1.5 years, assuming that the value of parents' time was equal to the minimum wage of $3.35 per hour in 1986 (adjusted for inflation). In estimating the reduction in expenditures for child care services, we account for the proportion of control group participants that attended an alternative preschool program (e.g. Head Start), thus, the estimates presented below represent marginal benefits. In evaluating the childcare effect associated with the extended intervention, three children were removed from the intervention group and placed in the comparison group because they were no longer able participate in the CPC intervention. Of the three children removed from the program group, one student had one year of the CPC preschool intervention and two students had two years of the CPC preschool intervention.

TABLE 2

Preschool Participation for Assessing the Childcare Savings from the Preschool Intervention

Preschool Participation	CPC Program Group	Control Group
Original sample size	989	550
Number of cases 1 year (%)	455	37
Number of cases 2 years (%)	534	47

TABLE 3

Preschool Participation for Assessing the Childcare Savings from the Extended Intervention

Preschool Participation	CPC Program Group	Control Group
Adjusted sample size	986	553
Number of cases 1 year	454	38
Number of cases 2 years	532	49

Child care services

Estimated benefit of the preschool program

Preschool participation, % 1 year (Program = .460, Control = .067, diff. = .393)
Preschool participation, % 2 years (Program = .540, Control = .085, diff. = .455)

The present value of reduced expenditure for child care services associated with the preschool program is:

(1.00)(.393)(540)(5.00) + (.5)(.455)(540)(5.00/1.03) = $1,657

Estimated benefit of the school-age program

The effect of the school-age program is assessed by comparing students that participated in the school-age program for one or more years with those who did not attend the school-age program regardless of their preschool experience. Because all study participants were eligible for participation in a full-day kindergarten program, the present value of reduced expenditures for child care services associated with the school-age program is $0.

Estimated benefit of the extended program

Preschool participation, % 1 year (Program = .460, Control = .069, diff. = .391)
Preschool participation, % 2 years (Program = .540, Control = .089, diff. = .451)

The present value of reduced expenditures for child care services associated with the extended program is:

(1.00)(.391)(540)(5.00) + (.5)(.451)(540)(5.00/1.03) = $1,646

III B. Reductions in expenditures for school remedial services

The estimate for school remedial services includes grade retention by age 15 and special education placement from ages 6 to 18. The estimate for grade retention ($7,211 in 1998 dollars) is average per pupil annual expenditures in Chicago for general education (Illinois State Board of Education, 1997). The estimate for special education services ($7,791 in 1998 dollars) is the weighted average annual cost per pupil reported by the Chicago Public Schools for specific learning disabilities, emotional or behavioral disturbances, speech and language impairment, and mental retardation (Chicago Public Schools, 1995).

Grade retention

Assuming that addition years of schooling occur at an average age of 19, the present value of expenditures for an additional year of school is:

$7,211/1.03^{16}$ = $4,494

Estimated benefit of the preschool program

Grade retention by age 15 (Program = .230, Control = .384, diff. = .154, p <.001, N = 1281)

The present value of reduced expenditures for grade retention associated with the preschool program is:

(.154)(4,494) = $692

Estimated benefit of the school-age program

Grade retention by age 15 (Program = .238, Control = .343, diff. = .105, p = .001, N = 1281)

The present value of reduced expenditures for grade retention associated with the school-age program is:

(.105)(4,494) = $472

Estimated benefit of the extended program

Grade retention by age 15 (Program = .219, Control = .323, diff. = .104, p = .001, N = 971)

The present value of reduced expenditures for grade retention associated with the extended program is:

(.104)(4,494) = $467

Special education

Assuming that special education placements occur at an average age of 12, the present value of expenditures for special education services is:

$\$7,791/1.03^{9} = \$5,971$

Estimated benefit of the preschool program

Number of years of special education from ages 6 to 18 (Program = .73, Control = 1.43, diff. = .70, p = .06, N = 1281)

The present value of reduced expenditures for special education services associated with the preschool program is:

(.70)(5,971) = $4,180

Estimated benefit of the school-age program

Number of years of special education from ages 6 to 18 (Program = .76, Control = 1.24, diff. = .48, p = .08, N = 1281)

The present value of reduced expenditures for special education services associated with the school-age program is:

(.48)(5,971) = $2,866

Estimated benefit of the extended program

Number of years of special education from ages 6 to 18 (Program = .56, Control = 1.23, diff. = .67, p = .080, N = 971)

The present value of reduced expenditures for special education services associated with the extended program is:

(.67)(5,971) = $4,001

III C. Reductions in expenditures for the criminal justice system

The estimate for reduced criminal justice system (CJS) expenditures includes reductions in juvenile and adult CJS expenditures.

Estimated juvenile CJS expenditures are based on per person annual costs for juvenile institutions from the Illinois Department of Corrections (IDOC) and include administrative costs associated with juvenile arrests. A national rate of adjudication for juvenile arrests of 58% is employed (Stahl et al., 1999). 19% of juvenile arrests are assumed to result in residential treatment and 39% are assumed to result in community treatment or probation services. The remaining 42% of juvenile arrests are assumed to result in release (Bureau of Justice Statistics, 1997; Cohen, 1988; Illinois Department of Corrections, 1999). In 1998 dollars, the cost for juvenile residential treatment is assumed to be $32,237 (Illinois Department of Corrections, 1999), and the annual per person costs for community treatment and probation services are $17,649 and $7,017, respectively. CJS costs per case for trail and processing are assumed to be $4,512 and $2,170 ($1,466 in adjudication costs and $704 in police costs), respectively (Greenwood et al., 1994, Table 3.1). Based on the above values, weighted annual per person criminal justice system expenditures, including administrative costs for trail and processing, associated with a juvenile court petition are estimated to be $18,950, in undiscounted 1998 dollars.

Residential treatment: $4,512 + $2,170 + $32,237 + $7,017 = $45,936
Community treatment and probation: $4,512 + $2,170 + .50($17,649 + $7,017) = $19,015
Release: $4,512 + $2,170 = $6,682

Weighted annual expenditure per case: .19($45,936) + .39($19,015) + .42($6,682) = $18,950

The estimate for adult CJS expenditures is based on juvenile arrests. The estimate assumes a 10% rate of desistance per year through age 44, a target population crime rate of 30%, and an incidence of arrest equal to 80% of juvenile arrests (Greenwood et al., 1998, Model, Rydell, & Chiesa, 1998; Karoly et al., 1998). Estimated expenditures per juvenile crime (ages 10 to 18) are $18,950 in 1998 dollars, and the estimated cost of an adult criminal career (ages 19 to 44) is $69,038 in 1998 dollars.

Juvenile CJS expenditures

Assuming the average juvenile offense in the CLS sample occurred at age 14 years, the present value of CJS expenditures for juvenile delinquency is:

$18,950/1.03^{11} = \$13,690$

Estimated benefit of the preschool program

Number of petitions to juvenile court by age 18 (Program = .45, Control = .78, diff. = .33, $p = .02$, N = 1404)

The present value of averted CJS expenditures associated with the preschool program is:

(.33)(13,690) = $4,518

Estimated benefit of the school-age program

Percentage of petitions to juvenile court by age 18 (Program = 19.8, Control = 19.8, diff. = 0.00 $p = .99$, N = 1404)

The present value of averted CJS expenditures associated with the school-age program is:

(.00)(13,690) = $0

Estimated benefit of the extended program

Number of arrest by age 18 (Program = .48, Control = .62, diff. = .14, $p = .320$, N = 1067)

The present value of averted CJS expenditures associated with the extended program is:

(.14)(13,690) = $1,917

Adult CJS expenditures

Assuming that the large majority of adult arrests occur over the ages 19-44, the present value of adult CJS expenditures is:

$69,038/1.03^{25} = \$32,973$

Estimated benefit of the preschool program

Number of petitions to juvenile court by age 18 (Program = .45, Control = .78, diff. = .33, p = .02, N = 1404)

The present value of averted CJS expenditures associated with the preschool program is:

(.33)(.80)(.30)(32,973) = $2,611

Estimated benefit of the school-age program

Percentage of petitions to juvenile court by age 18 (Program = .198, Control = .198, diff. = .000, p = .99, N = 1404).

The present value of averted CJS expenditures associated with the school-age program is:

(.00)(.80)(.30)(32,973) = $0

Estimated benefit of the extended program

Number of arrest by age 18 (Program = .48, Control = .62, diff. = .14, p = .320, N = 1067)

The present value of averted CJS expenditures associated with the extended program is:

(.14)(.80)(.30)(32,973) = $1,108

III D. Reductions in tangible expenditures to the victims of crime

The estimates for tangible expenditures to the victims of juvenile and adult crime are based on national estimates of the amount and proportion of tangible losses to crime victims for violent and property offenses (Barnett, 1996; Karoly et al., 1998; Miller, Cohen, & Wiersema, 1996). It's assumed that expenditures to the victims of crime are 4.5 times CJS expenditures and that 23.3% of expenditures to the victims of crime are tangible. The national estimates are applied to the estimated juvenile and adult CJS expenditures in III C. To determine the amount of savings to victims of juvenile crime, the mean number of arrest for violent and property charges in the sample is multiplied by tangible expenditures to the victims of juvenile crime. Projected savings to victims of adult crime are estimated from the cost of an adult criminal career ($69,038 in 1998 dollars), based on a target population crime rate of 30% and an incidence of arrest equal to 80% of juvenile arrest.

<u>Victimization expenditures associated with juvenile crime</u>

The estimate for tangible expenditures to the victims of juvenile crime is:

(4.5)(.233)(18,950) = $19,869

Assuming that juvenile arrests occur at an average age of 14, the present value of tangible expenditures to the victims of juvenile crime is:

$19{,}869/1.03^{11} = \$14{,}354$

Estimated benefit of the preschool program

Mean number of juvenile arrest = .236

The present value of averted tangible expenditures to the victims of juvenile crime associated with the preschool program is:

(.236)(14,354) = $3,388

Estimated benefit of the school-age program

Mean number of juvenile arrest = .019

The present value of averted tangible expenditures to the victims of juvenile crime associated with the school-age program is:

(.019)(14,354) = $273

Estimated benefit of the extended program

Mean number of juvenile arrest = .165

The present value of averted tangible expenditures to the victims of juvenile crime associated with the extended program is:

(.165)(14,354) = $2,368

Victimization expenditures associated with adult crime

The estimate for tangible expenditures to the victims of adult crime is:

(4.5)(.233)(69,038) = $72,386

The present value of tangible expenditures to the victims of adult crime is:

$72{,}386/1.03^{25} = \$34{,}572$

Estimated benefit of the preschool program

The present value of averted tangible expenditures to the victims of adult crime associated with the preschool program is:

(.33)(.80)(.30)(34,572) = $2,739

Estimated benefit of the school-age program

The present value of averted tangible expenditures to the victims of adult crime associated with the school-age program is:

(.019)(.80)(.30)(34,572) = $158

Estimated benefit of the extended program

The present value of averted tangible expenditures to the victims of adult crime associated with the extended program is:

(.165)(.80)(.30)(34,572) = $1,369

III E. Reductions in expenditures for the child welfare system and for victimization from child abuse and neglect

The measure used to indicate child maltreatment is referrals to juvenile court by the Department of Child and Family Services or others between the ages of 4 and 17. These petitions are substantiated reports of child abuse or neglect. One third of all reports of maltreatment to child welfare agencies are substantiated (U.S. Department of Health & Human Services, 1997).

Child welfare system expenditures

The weighted average per child welfare services expenditure for a substantiated report of child abuse or neglect is estimated to be $9,051 in 1998 dollars. The estimate assumes that 70% of substantiated cases receive in-home services, while the remaining 30% of cases are placed in foster care. The costs employed for in-home services and foster care are, respectively, $2,890, and $23,425 in 1998 dollars, exclusive of investigation costs (American Humane Association, 1994; Courtney, 1998; Larner, Stevenson, & Behrman, 1998). Adding investigation expenditures of $870 and administrative costs of $1,466 for judicial processing associated with referrals, the estimate for child welfare system expenditures is:

(.70)($2,890) + (.30)(23,425) + (870) + (1,466) = $11,387

Assuming that referrals occur at an average age of 10, the present value of the average cost is:

$11,387/1.03^7 = \$9,259$

Estimated benefit of the preschool program

Indicated reports of abuse/neglect from ages 4 to 17 (Program = .050, Control = .103, diff. = .053, $p <$. 001, N = 1408)

The present value of reduced expenditures for the child welfare system associated with the preschool program is:

(.053)(9,259) = $491

Estimated benefit of the school-age program

Indicated reports of abuse/neglect from ages 4 to 17 (Program = .063, Control = .077, diff. = .014, p = .35, N = 1408)

The present value of reduced expenditures for the child welfare system associated with the school-age program is:

(.014)(9,259) = $130

Estimated benefit of the extended program

Indicated reports of abuse/neglect from ages 4 to 17 (Program = .036, Control = .069, diff. = .033, p = .024, N = 1070)

The present value of reduced expenditures for the child welfare system associated with the extended program is:

(.033)(9,259) = $306

Expenditures for victimization from child abuse and neglect

Child abuse and neglect victim costs ($6,916 in 1998 dollars) are based on the tangible losses associated with child abuse and neglect as estimated by the National Institute of Justice (Miller, Cohen, & Wiersema, 1996). The estimate includes medical care/Ambulance services, mental health care, police/fire services, and lost productivity of victims and their families, with respective average costs of $488, $3,847, $35, and $2510 in 1998 dollars. In addition, the estimate includes administrative costs equal to 7.5% of medical care/Ambulance services costs (Miller et al., 1996).

The estimate for tangible expenditures to the victims of child abuse and neglect is:

(488) + (.075)(488) + (3,847) + (35) + (2510) = $6,916

Assuming that referrals occur at an average age of 10, the net present value of the average costs for child abuse victimization is:

$6916/1.03^{7}$ = $5,623

Estimated benefit of the preschool program

Indicated reports of abuse/neglect from ages 4 to 17 (Program = .050, Control = .103, diff. = .053, $p < .001$, N = 1408)

The present value of averted tangible expenditures to the victims of child abuse and neglect associated with the preschool program is:

(.053)(5,623) = $298

Estimated benefit of the school-age program

Indicated reports of abuse/neglect from ages 4 to 17 (Program = .063, Control = .077, diff. = .014, $p = .35$, N = 1408)

The present value of averted tangible expenditures to the victims of child abuse and neglect associated with the school-age program is:

(.014)(5,623) = $79

Estimated benefit of the extended program

Indicated reports of abuse/neglect from ages 6 to 17 (Program = .036, Control = .069, diff. = .033, $p = .024$, N = 1070)

The present value of averted tangible expenditures to the victims of child abuse and neglect associated with the extended program is:

(.033)(5,623) = $186

III F. Increases in the projected earnings and compensation of program participants and associated increases in government tax revenues

Increases in lifetime earnings and compensation are projected from differences in high school completion between the program and control groups, where high school completion is defined as graduating from a regular high school or earning an equivalent diploma (e.g., GED).Using 1999 data from the Current Population Survey (CPS) March Supplement for African American full-time employees aged 25-29 (U.S. Census Bureau, 2000), lifetime earnings are projected across four categories of educational attainment (less than high school, high school completion, some college, and 4 years of college or more). Estimates are derived for both males and females. The annual earnings data reported in table 2 represent weighted averages for those with less than a high school education (where the original CPS categories “less than 9th grade” and “9th to 12th grade” are combined) and for those with some college (where the CPS categories “some college - no degree” and “associate degree” are combined).

There are different methods of predicting lifetime earnings given data on educational attainment and earnings in a particular year. In Barnett (1996), similar cross-sectional data on educational attainment and earnings for African Americans of different ages are used to generate information

on the lifetime pattern of earnings for a particular individual. One might argue, however, that the current earnings of a 60 year old man or woman are not an accurate predictor of the future earnings of an individual who is currently a young adult. Certainly, the career opportunities available to young African Americans are different from the opportunities faced by members of older generations.

We employ an alternative method of projecting lifetime earnings. Instead of using information on the current earnings of individuals of different ages, we focus solely on the earnings of the age 25-29 cohort. We use this age group to compute the lifetime earnings of the CLS students with differing levels of educational attainment because these individuals were fairly close in age to the students in the intervention so they might be assumed to face similar career opportunities, but were old enough so that many of them had completed their educations.

The increase in lifetime earnings associated with high school completion was computed employing the following assumptions:

1. 1999 earnings are converted to 1998 dollars. Using the CPI-U, the 1999 figures are multiplied by 0.98.
2. Because the earnings of individuals aged 25-29 represent not only their educational attainment but the return to experience, these earnings are discounted by a real rate of 2% a year in order to represent the earnings of the students in the sample at the time they entered the workforce. For dropouts assumed to be starting work at age 17, the earnings of the 25-29 cohort are discounted by 2% a year for 10 years (age 27 to age 17). For high school graduates and GED completers, the earnings of the age 25-29 cohort are discounted back 9 years (age 27 to age 18). For those with some college, the age 25-29 cohort earnings are discounted back 7 years (age 27 to age 20) and for those with 4 years of college or more, the 25-29 cohort earnings are discounted back 4 years (age 27 to age 23). In other words, the earnings of the 25-29 cohort are multiplied by $1/(1+r)^t$ where r is 0.02 and t is 10, 9, 7, or 4. This multiplication factor is equal to 0.8203, 0.8368, 0.8706, and 0.9238 for dropouts, high school graduates, those with some college, and those with 4 years of college or more respectively. The adjusted earnings figures in table 2 below represent the 1999 earnings converted to 1998 dollars and discounted for years of experience assumed to be inherent in the age 27 data.
3. Students with less than a high school education are assumed to have started work at age 17. Students with some college education are assumed to have graduated from high school on time and then completed two years of college. Students with 4 years of college or more are assumed to have spent five years in college. Students are assumed to have worked part time in college earning one-fourth of a high school graduate's earnings with no fringe benefits.
4. The present values of earnings from each of the four different levels of educational attainment are calculated assuming that individuals work continuously through age 65.
5. Income taxes are assumed to be 33.3% (15% Federal, 3% State, and 15.3% FICA). Employers and employees each paid 50% of FICA or 7.65% FICA.
6. Fringe benefits are assumed to be 20% of earnings.

7. Earnings are assumed to grow at a real rate of 2% per year.
8. Accounting for the growth rate of earnings, annual after-tax earnings plus fringe benefits are discounted to age 3 using an annual discount rate of 3%.

TABLE 4
Unadjusted and Adjusted Mean Annual Earnings by Educational Attainment for African Americans Employed Full-time Year-round

	Male	Male (adj.)	Female	Female (adj.)
Less than high school	16,462	13,234	14,851	11,939
HS graduate including GED	26,938	22,091	20,402	16,731
Some college	28,654	24,447	23,680	20,203
4 years of college or more	41,460	37,534	32,261	29,207

TABLE 5
Projected Present Value of Lifetime Earnings and Compensation by Educational Attainment for African Americans Employed Full-time Year-round

	Male	Female
Less than high school	323,098	291,477
HS graduate including GED	515,266	390,251
Some college	525,002	433,506
4 years of college or more	707,415	548,252

TABLE 6
Projected Present Value of Taxes by Educational Attainment for African Americans Employed Full-time Year-round

	Male	Female
Less than high school	114,039	102,886
HS graduate including GED	181,850	137,722
Some college	185,794	152,010
4 years of college or more	250,019	194,430

Lifetime earnings and compensation

Projected lifetime earnings for high school dropouts are compared to the weighted average lifetime earnings for those with a high school diploma including GED, some college, and 4 years of college or more. Employing CPS weights for male and female African Americans, ages 25-29, with at least a high school education, the proportion of high school completers with high school only, some college, and 4 years of college of more are .53, .30, and .17, respectively.

The estimated present value of the difference in lifetime earnings between male African American high school dropouts and high school graduates is:
[(.53)(515,266) + (.30)(525,002) + (.17)(707,415)] – (323,098) = $227,754

The estimated present value of the difference in lifetime earnings between female African American high school dropouts and high school graduates is:
[(.53)(390,251) + (.30)(433,506) + (.17)(548,252)] – (291,477) = $138,611

The present value of the average difference in lifetime earnings between male and female African American high school dropouts and high school graduates is:

(227,754 + 138,611) / 2 = $183,183

Estimated benefit of the preschool program

High school completion by age 20 (Program = .497, Control = .385, diff. = .112, *p* = .01, N = 1233)

The present value of the increase in lifetime earnings and compensation associated with the preschool program is:

(.112)(183,183) = $20,517

Estimated benefit of the school-age program

High school completion by age 20 (Program = .460, Control = .456, diff. = .004, *p* = .91, N = 1233)

The present value of the increase in earnings and compensation associated with the school-age program is:

(.004)(183,183) = $732

Estimated benefit of the extended program

High school completion by age 20 (Program = .487, Control = .440, diff. = .047, *p* = .193, N = 937)

The present value of the increase in earnings and compensation associated with the extended program is:

(.047)(183,183) = $8,610

Tax revenues

The estimated present value of the difference in taxes on lifetime earnings between male African American high school dropouts and high school graduates is:

[(.53)(181,850) + (.30)(185,794) + (.17)(250,019)] – (114,039) = $80,583

The estimated present value of the difference in taxes on lifetime earnings between female African American high school dropouts and high school graduates is:

[(.53)(137,722) + (.30)(152,010) + (.17)(194,430)] – (102,886) = $48,763

The present value of the average difference in taxes on lifetime earnings between male and female African American high school dropouts and high school graduates is:

(80,583 + 48,763) / 2 = $64,673

Estimated benefit of the preschool program

High school completion by age 20 (Program = .497, Control = .385, diff. = 112, *p* = .01, N = 1233)

The present value of the increase in tax revenues associated with the preschool program is:

(.112)(64,673) = $7,243

Estimated benefit of the school-age program

High school completion by age 20 (Program = .460, Control =.456, diff. = .004, *p* = .91, N = 1233)

The present value of the increase in tax revenues associated with the school-age program is:

(.004)(64,673) = $259

Estimated benefit of the extended program

High school completion by age 20 (Program = .487, Control = .440, diff. = .047, p = .193, N = 937)

The present value of the increase in tax revenues associated with the extended program is:

(.047)(64,673) = $3,040

III G. Increase in expenditures for post-secondary education

Estimated expenditures for college tuition ($7,741 in 1998 dollars) are based on the average tuition for two and four years at the three most frequently attended colleges in Chicago (Northern Illinois University, Southern Illinois University, and City Colleges of Chicago). In estimating the monetary value of the program effect, the discounted present value of the estimated college tuition rate was multiplied by the difference in high school completion rates between program and control group participants. Therefore, the following estimates assume that all participants that completed high school by age 20 enroll in post-secondary education for at least two years. This method likely overestimates expenditures for post-secondary education.

2/3 of expenditures are allocated to taxpayers and the remaining 1/3 are allocated to program participants.

College tuition

Assuming that the average age of college entry is 18, the present value cost of attending college for two years is:

$(7{,}740/1.03^{15}) = \$4{,}968$

Public and private expenditures are, respectively, $3,313 and $1,656.

Estimated benefit of the preschool program

High school completion by age 20 (Program = .497, Control = .385, diff. = .112, p = .01, N = 1233)

The present value of the increase in expenditures for college tuition associated with the preschool program is:

(.112)(4,968) = $557

Public and private expenditures for two years of college are, respectively, $371 and $186.

Estimated benefit of the school-age program

High school completion by age 20 (Program = .460, Control =.456, diff. = .004, p =.91, N = 1233)

The present value of the increase in expenditures for college tuition associated with the school-age program is:

(.004)(4,968) = $20

Public and private expenditures for two years of college are, respectively, $13 and $7.

Estimated benefit of the extended program

High school completion by age 20 (Program = .487, Control = .440, diff. = .047, p = .193, N = 937)

The present value of the increase in expenditures for college tuition associated with the extended program is:

(.047)(4,968) = $234

Public and private expenditures for two years of college are, respectively, $156 and $78

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Appendix A

Breakdown of Benefits and Costs for Estimating Economic Returns of the Chicago Child-Parent Centers

Category of Benefits and Cost	Year of Original Estimate	Estimate in $1998	Average Age When Benefit or Costs Occurred	Present Value in $1998	Effect of the Preschool Program	Estimated Benefit of Preschool Program in $1998	Effect of the School-age Program	Estimated Benefit of School-age Program in $1998	Effect of the Extended Program	Estimated Benefit of Extended Program in $1998
Program Benefits										
Grade retention (ages 5-14)										
Expenditure for one additional year of school	1996	7,211	19	4,494	.154	692	.105	472	.104	467
Special education (ages 6-18)										
Expenditure for one year	1995	7,791	12	5,971	.70	4,180	.48	2,866	.67	4,001
Projected lifetime earnings/compensation										
High school completion vs. non-completion	1998	285,393	18	183,183	.112	20,517	.004	732	.047	8,610
Projected taxes on earnings (ages 18-65)										
High school completion vs. non-completion	1998	100,758	18	64,673	.112	7,243	.004	259	.047	3,040
Justice system (ages 10-44)										
Expenditures per crime (ages 10-18)	1998	18,950	14	13,690	.33	4,518	NA	NA	.14	1,917
Expenditures per crime (ages 19-44)	1993	69,038	NA	32,973	.33*.80*.30	2,612	NA	NA	.14*.80*.30	1,108
Crime victims (ages 10-44)										
Tangible costs per victim (ages 10-18)	1998	19,869	14	14,354	.236	3,388	.019	273	.165	2,368
Tangible costs per victim (ages 19-44)	1993	72,386	NA	34,572	.33*.80*.30	2,739	.019*.80*.30	158	.165*.80*.30	1,369
Child abuse and neglect										
Tangible victim costs per report (ages 4-17)	1993	6,916	10	5,623	.053	298	.014	79	.033	186
Expenditures to child welfare system	1995	11,387	10	9,259	.053	491	.014	130	.033	306
Child care										
Average per child (1.5 years of preschool)	1986	1,675	3-4	1,657	NA	1,657	NA	NA	NA	1,646
College tuition (ages 18-22)										
Public expenditures for two years (2/3)	1998	-5,161	18	-3,313	.112	-371	.004	-13	.047	-156
Personal expenditures for two years (1/3)	1998	-2,580	18	-1,656	.112	-186	.004	-7	.047	-78
Program Costs										
Preschool (ages 3-4)										
One year per child	1986	4,425	4	4,296	NA	NA	NA	NA	NA	NA
Average per child (1.55 yr.)	1986	6,859	3-4	6,730	NA	NA	NA	NA	NA	NA
School-age (ages 6-9)										
One year per child	1987	1,580	6	1,446	NA	NA	NA	NA	NA	NA
Average per child (2.14 yr.)	1987	3,381	6-9	2,981	NA	NA	NA	NA	NA	NA
Extended intervention (ages 3-9)										
Average per child (3.87 yr.)	1987	10,565	3-9	10,038	NA	NA	NA	NA	NA	NA
Total Program (ages 3-9)										
Average per child (3.69 yr.)	1987	10,201	3-9	9,673	NA	NA	NA	NA	NA	NA
Net Present Value	NA	NA	NA	NA	NA	41,048	NA	1,968	NA	20,716
Benefit-Cost Ratio	NA	NA	NA	NA	NA	7.10:1	NA	1.66:1	NA	6.09:1

Notes: Original Estimates were converted to 1998 dollars using the Consumer Price Index for All Urban Consumers (CPI-U). The CPI-U for 1986, 1987, 1993, 1995, 1996, and 1998 are respectively, 109.6, 113.6, 144.5, 152.4, 156.9, and 163.0. The benefits of program participation were estimated by multiplying the program effect by the present value of the outcome. For program benefits or costs, "average age when benefit or cost occurred" represents the average age at which the relevant program effect occurred.

Appendix B

Primary Sources and Original Estimates for Estimating Economic Returns of the Chicago Child-Parent Centers

Category of Benefits and Cost	Year of Original Estimate	Original Estimate	Average Age When Benefit or Costs Occurred	Primary Source
Program Benefits				
Grade retention (ages 5-14)				
Expenditure for one additional year of school	1996	6,941	19	Illinois State Board of Education (1997)
Special education (ages 6-18)				
Expenditure for one year	1995	7,284	12	Chicago Public Schools (1995)
Projected lifetime earnings/compensation				
High school completion vs. non-completion	1998	285,393	18	Barnett (1996); Bureau of the Census (2000)
Projected taxes on earnings (ages 18-65)				
High school completion vs. non-completion	1998	100,758	18	33.3% tax rate on earnings (15% federal; 3% state; 15.3% FICA)
Justice system (ages 10-44)				
Expenditures per crime (ages 10-18)	1998	18,950	14	Bureau of Justice Statistics (1997); Cohen (1988); Greenwood et al. (1998); Illinois Department of Corrections (1999); Karoly et al. (1998); Stahl (1999).
Expenditures per crime (ages 19-44)	1993	61,202	NA	
Crime victims (ages 10-44)				
Tangible costs per victim (ages 10-18)	1998	19,869	14	Barnett (1996); Karoly et al. (1998); Miller et al. (1996); Greenwood et al. (1998)
Tangible costs per victim (ages 19-44)	1993	64,171	NA	
Child abuse and neglect				
Tangible victim costs per report (ages 4-17)	1993	6,131	10	Miller et al. (1996)
Expenditures to child welfare system	1995	10,647	10	Courtney (1998); Larner, Stevenson, & Behrman (1998)
Child care				
Average per child (1.5 years of preschool)	1986	1123	4	U.S Department of Labor (2002)
College tuition (ages 18-22)				
Public expenditures for two years (2/3)	1998	-5,161	18	Northern Illinois University; Southern Illinois University; City Colleges of Chicago
Personal expenditures for two years (1/3)	1998	-2,580	18	
Program Costs				
Preschool (ages 3-4)				
One year per child	1986	2,975	4	Chicago Board of Education (2001); Chicago Public Schools (1986a)
Average per child (1.55 yr.)	1986	4,611	3-4	
School-age (ages 6-9)				
One year per child	1987	1,101	6	Chicago Public Schools (1986a); (1986b)
Average per child (2.14 yr.)	1987	2,356	6-9	
Extended intervention (ages 3-9)				
Average per child (3.87 yr.)	1987	7,363	3-9	Chicago Public Schools (1986a); (1986b)
Total Program (ages 3-9)				
Average per child (3.69 yr.)	1987	7,109	3-9	Chicago Public Schools (1986a); (1986b)

Appendix C

Estimating Averted Intangible Expenditures to the Victims of Juvenile and Adult Crime

The undiscounted Criminal Justice System (CJS) expenditures per juvenile and adult crime are estimated, in 1998 dollars, to be $18,950 and $69,038, respectively (Reynolds et al., 2002). In a typical criminal career, the total cost inflicted on the victims of crime is estimated to be 4.5 times CJS expenditures (Schweinhart, 1993; Karoly et al., 1998). In the following calculations, 23.3% of victim costs are tangible and the remaining 76.7% of victim costs are intangible (Miller et al., 1996). To estimate the savings to victims of juvenile crime, the mean number of arrest for violent and property charges in the sample is multiplied by intangible expenditures to the victims of juvenile crime. Projected savings to victims of adult crime are estimated from the present value cost of an adult criminal career, based on a target population crime rate of 30% and an incidence of arrest that is 80% of juvenile arrest.

Averted intangible expenditures to the victims of juvenile crime

Assuming that juvenile arrests occur at an average age of 14, the present value of intangible expenditures to the victims of juvenile crime is:

$(4.5)(.767)(18{,}950/1.03^{11}) = \$47{,}251$

Estimated benefit of the preschool program

Mean number of juvenile arrests = .236

The present value of averted intangible expenditures to the victims of juvenile crime associated with the preschool program is:

$(.236)(47{,}251) = \$11{,}151$

Estimated benefit of the school-age program

Mean number of juvenile arrests = .019

The present value of averted intangible expenditures to the victims of juvenile crime associated with the school-age program is:

$(.019)(47{,}251) = \$898$

Estimated benefit of the extended program

Mean number of juvenile arrests = .165

The present value of averted intangible expenditures to the victims of juvenile crime associated with the extended program is:

$(.165)(47{,}251) = \$7{,}796$

Averted intangible expenditures to the victims of adult crime

Assuming that the large majority of adult arrests occur over ages 19-44, the present value of intangible expenditures to the victims of adult crime is:

$(4.5)(.767)(69{,}038/1.03^{25}) = \$113{,}806$

Estimated benefit of the preschool program

The present value of averted intangible expenditures to the victims of adult crime associated with the preschool program is:

$(.33)(.80)(.30)(113{,}806) = \$9{,}013$

Estimated benefit of the school-age program

The present value of averted intangible expenditures to the victims of adult crime associated with the school-age program is:

$(.019)(.80)(.30)(113{,}806) = \$519$

Estimated benefit of the extended program

The present value of averted intangible expenditures to the victims of adult crime associated with the extended program is:

$(.165)(.80)(.30)(113{,}806) = \$4{,}507$

Table 1 Appendix C
Intangible expenditures to the victims of juvenile and adult crime

Category of Benefit	Estimate in $1998	Present Value in $1998	Estimated Benefit of Preschool Program in $1998	Estimated Benefit of School-age Program in $1998	Estimated Benefit of Extended Program in $1998
Crime Victims (ages 10-44)					
Intangible cost per victim (ages 10-18)	65,406	47,251	11,151	898	7,796
Intangible cost per victim (ages 19-44)	238,285	113,806	9,013	519	4,507

Notes: Estimates are discounted to program entry (age 3) and reported in 1998 dollars. Including intangible expenditures to the victims of crime increases the benefit-costs ratio for the preschool, school-age, and extended programs by 42.3% (7.10:1 to 10.10:1), 28.9% (1.66:1 to 2.14:1), and 49.8% (6.09:1 to 9.12:1), respectively.