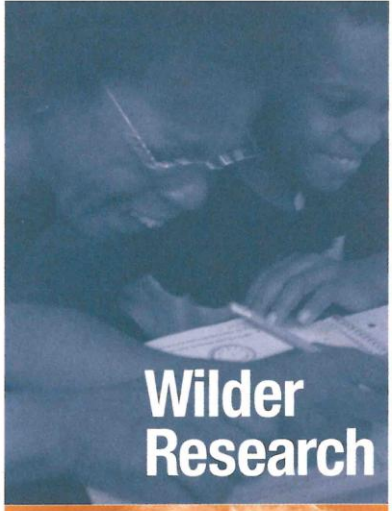

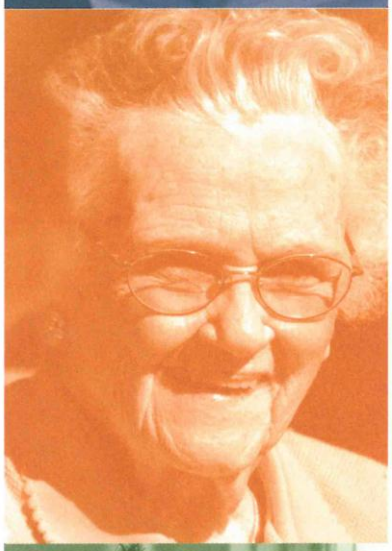

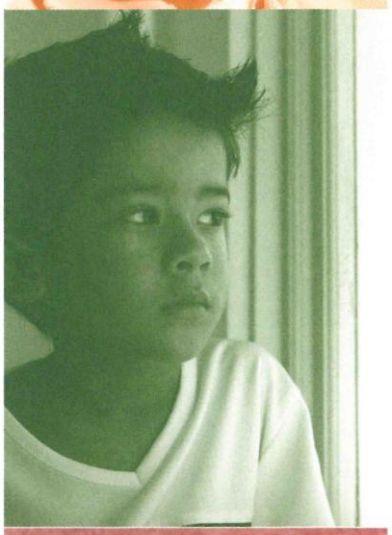

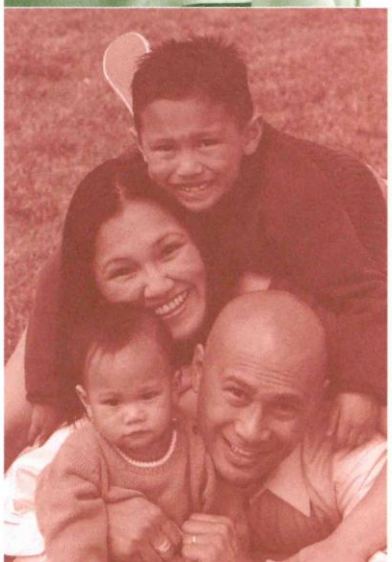

Cost savings analysis of school readiness in Illinois

Prepared for the Ounce of Prevention Fund, Illinois Action for Children, and Voices for Illinois Children

MAY 2011

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Background

Research studies have demonstrated that investing in programs that prepare young children for success in school – particularly low-income, at-risk children – also prevents needless public spending on remedial education and other social services later in life. Conversely, cutting spending on programs that produce school readiness will result in increased spending in other budget categories as well as adversely affect the economy because of lost wages and other beneficial contributions.

Early childhood education programs reduce expenditures for special education, grade repetition and teacher turnover in the K-12 school systems. They also reduce costs throughout the social services and criminal justice systems for juveniles and adults. And they increase state revenues by lowering drop-out rates and insuring a skilled workforce that contributes to the tax base.

Beginning in the late 1980s, Illinois began making investments in early education programs to prepare young children for school. Nearly 90,000 at-risk children ages 3 to 5 are served each year through Illinois' Early Childhood Block Grant (ECBG) programs. These programs seek to: 1) improve children's school readiness and outcomes, 2) support at-risk families, and 3) provide quality early childhood services. ECBG programs serve all 102 counties and operate within school districts, community-based organizations, and other entities.

This study estimates the current cost savings and revenues generated from the state's investments in school readiness for 3-to 5-year-olds over the past 23 years. It also estimates the additional cost burdens to schools and taxpayers when children are not fully prepared when they enter kindergarten, and it quantifies the additional economic benefits that could be realized if Illinois were to expand its investment in school readiness to all educationally disadvantaged children.

Current cost savings and revenue

The current combined cost savings and annual revenue generated in Illinois that can be attributed to Illinois' 23-year investment in school readiness was an estimated $353 million to $530 million. This amount can be expected to grow each year as the number of school children who received education services through the state's ECBG program continues to be successful in school, graduates, and goes on to find jobs and pay taxes.

The cost savings categories include:

Schools

$27 million to $40 million in K-12 savings:

- $21.9 million to $32.9 million in reduced spending on special education related to disabilities that were prevented or ameliorated through early intervention. This includes mild or moderate speech or language problems, cognitive and emotional impairment, specific learning disabilities and other health problems
- $2.5 million to $3.7 million in reduced spending because fewer children repeat a grade in K-12
- $2.3 million to $3.4 million in reduced costs traced to lower teacher turnover as fewer teachers leave jobs due to dissatisfaction with working conditions related to poor student behavior or performance issues stemming from a lack of school readiness

Taxpayers

$172 million to $259 million in reduced government spending and increased tax revenues:

- $97.9 million to $146.8 million in juvenile corrections, including costs to arrest, adjudicate and detain juvenile offenders
- $37.1 million to $55.7 million in reduced cases of substantiated child abuse and neglect, including the costs of out-of-home placement
- $30.8 million to $46.2 million in adult criminal justice, including costs to arrest, process and incarcerate adult offenders
- $5.2 million to $7.8 million in increased income tax and sales tax revenue from higher wages for disadvantaged children who reach adulthood as well as the taxes on the higher productivity of their parents while those children were enrolled in early education programs
- $1.1 million to $2.9 million in reduced unemployment benefits due to improved employment outcomes for disadvantaged children who have reached adulthood

Savings in adult criminal justice and unemployment costs and tax revenues from higher wages will grow substantially as more early education graduates reach adulthood.

Other social costs

$154 million to $231 million in reduced social costs to the public:

- $79.1 million to $118.7 million in reduced tangible losses to victims of violent crimes and property offenses committed by juveniles
- $35.7 million to $53.5 million in reduced tangible losses to victims of violent crimes and property offenses committed by adults
- $34.4 million to $51.6 million in increased earnings of employed parents while their children are enrolled in early education programs
- $4.7 million to $7 million in health savings due to reduced alcohol and drug abuse among teens and adults who benefited from school readiness programs when they were children

The economy

Using past participation and success rates of early education programs in Illinois, an estimated 4,470 adults, age 18 to 29, are high school graduates in the labor force today who otherwise would have dropped out of school had Illinois not invested in their school readiness. These workers' contributions to state coffers exceed any benefits they receive from state-supported services; however, had they dropped out, they would represent a net fiscal drain on the state.

The estimated economic impact of these adults is about $72 million annually in increased wages and tax revenues, a sum that will grow substantially as more early education graduates become young adults.

Ongoing costs when children are not fully-prepared at kindergarten entry

The ongoing cost burden of not investing in school readiness for all disadvantaged children is an estimated $155 million a year.

It is estimated that an additional 67,000 eligible, 3- to 5-year-old children are currently not being served through Illinois' ECBG programs – children whose parents likely want but cannot access services. Annual cost burdens associated with the potential lack of school readiness of this group of children are estimated as follows:

$7.1 million in K-12 spending:

- $3.7 million in preventable special education spending
- $3 million in teacher turnover
- $0.4 million in grade repetition

$66.8 million in increased government spending and decreased tax revenues:

- $41.2 million in juvenile corrections
- $19.4 million in adult criminal justice
- $3.8 million in child welfare
- $1.5 million in lost income and sales tax revenue
- $0.85 million in unemployment benefits

$81.5 million in increased social costs:

- $31.1 million losses to victims of juvenile crime
- $15.1 million losses to victims of adult crime
- $31.8 million in decreased productivity of employed parents
- $3.5 million in reduced health costs (alcohol, drug abuse)

Methods

To make these estimates, we relied on the best available research data from longitudinal studies of early childhood education programs in the country. We used both current and historical expenditure and enrollment data for Illinois schools, as well as data from early education programs in the state. In some cases, we made conservative assumptions using Minnesota, Michigan, or national data as guides for our calculations when current Illinois data was limited or unavailable.

The estimates presented here, based heavily on studies of early childhood education, represent conservative estimates of the value conveyed by the school readiness produced by just one set of programs – pre-K services for 3- to 5-year-old children – within the total array of early childhood investments in Illinois. Other programs and services for children and parents also enhance school readiness, including many that have not yet been studied from a cost-benefit basis.

Conclusions

Illinois has made substantial investments in school readiness over the past 23 years, and those investments not only have prepared children for success in school, but have produced annual savings and revenues of up to half a billion dollars.

If the state's current investments were reduced or discontinued, these annual savings would erode and cause significant negative impact on future State of Illinois' budgets and the overall economy.

If the state sustains or increases its investments in the Early Childhood Block Grant (ECBG) programs and other high-quality early education programs aimed at school readiness, we can expect to see savings, revenues, and overall economic benefits to the state and public significantly increase.

The estimated annual cost of extending the ECBG programs to all eligible 3- to 5-year-old children is about $257 million. That cost would be offset by the annual savings that would eventually be realized by schools, taxpayers, society as a whole, and the overall economy.

School success is a critical issue for our nation and for states such as Illinois that are facing short- and long-term economic challenges. Failing to invest in school readiness bears a substantial cost burden. Of equal importance, by not preparing more young children for school success, Illinois will lack the educated and skilled workforce it needs to be economically competitive and positioned for economic growth.

Introduction

Purposes of this study

This study demonstrates the economic value of investing in school readiness in Illinois. Much of this value takes the form of savings. Because hundreds of thousands of Illinois children have already attended preschool, Illinois is saving a significant amount of money right now. For example, children who attend preschool repeat grades less, have fewer behavioral problems in school, graduate at a higher rate than others, and have less involvement in the very expensive criminal justice system as both juveniles and adults. As adults they earn higher incomes, contribute more in taxes and are more likely to be employed. They will be more employable in the new economy. In these and other respects, Illinois is saving money in its K-12 educational system, its criminal justice system, and its social welfare system.

If a higher proportion of Illinois children attend comprehensive preschool in future years, moreover, the state's annual savings will grow. Conversely, by not investing more fully in the early education of young children, the annual cost burdens, lost earnings, and lost tax revenues will grow.

This study of the economic benefits of fully preparing children for kindergarten has three parts:

- First, it estimates the savings Illinois achieves today due to investments in school readiness in the past. We can also think of these as savings that would be lost and avoidable costs that would be added to K-12, public services, and the private sector if the state discontinued its current investment in early education.

- Second, it estimates the costs Illinois faces right now when children do not arrive at the kindergarten door ready for school. This analysis examines additional savings that could be realized and costs that could be avoided in coming years if Illinois were to expand its investment in early education in two ways: by serving more children at risk of entering kindergarten unprepared and by expanding the program to be a two-year, comprehensive early childhood education experience.

- Third, the study estimates the current and potential impacts of school readiness on the overall vitality of the state's economy, including increased incomes and tax revenues paid to the state due to an enhanced workforce.

Beyond the costs that Illinois incurs for failing to invest in school readiness, the state could improve the current level of school readiness. Without that, Illinois will lack a more educated and skilled workforce, and the state's economic competitiveness, and ultimately, its economic growth will suffer.

This study replicates models and methods used in recent studies in Minnesota and Michigan. It translates the best research on the returns associated with comprehensive early childhood education (ECE) into usable estimates of the actual cost burdens to be expected from reducing or not expanding such investments that support school readiness. The Minnesota study, commissioned by the Bush Foundation, focused solely on the K-12 school system as a whole. The Michigan study expanded the focus to include estimated costs and savings to additional state departments, state-funded programs, and an estimation of the implied future gains in economic activity in Michigan.

Overview of early childhood education cost/benefit literature

Many studies show that high-quality early learning experiences pay off in the long run (Ehrlich and Kornblatt, 2004; Karoly, Kilburn, & Cannon, 2005; Friedman, 2004; Lynch, 2007; Temple and Reynolds, 2005; Reynolds, 2007; Rolnick and Grunewald, 2003). Most of the return on investment is in reduced public costs associated with child welfare, public assistance, crime and incarceration, and benefits related to increased education and earnings.

Several studies focus specifically on measuring the effects of early childhood interventions and quality early care and education on school systems and time spent in K-12 special education and special education spending (Barnett, 1995; Belfield, 2004; Conyers, Reynolds, and Ou, 2003; Harvey, 2006; Reynolds, 2007).

Other studies focus on the impact of early childhood education programs on additional areas of government spending, including criminal justice, public assistance, Medicaid, unemployment, child welfare, health care, and child care (Aos et al., 2004; Mann and Reynolds, 2006; Nores et al., 2005; Oppenheim and MacGregor, 2002; Reynolds et al. 2002).

Finally, some studies have illustrated the effect of early childhood education on increased tax revenues from increased earnings of participants themselves and from future generations due to higher educational attainment that can be attributed to early childhood interventions (Campbell et al., 2002; Nores et al., 2005; Oppenheim and MacGregor, 2002; Sum et al., 2008).

Estimates of potential cost savings from reviewed studies

The Appendix describes the studies used in this analysis and the estimated cost savings in different categories generated per dollar of investment in school readiness.

These estimates show that the potential returns range from $2.36 to $16.14 per dollar of investment. These are present dollar values of the stream of benefits and reduced costs received over the lifetime of a student.

Assumptions in the analyses

The analyses in this study estimate benefits and cost savings for various Illinois government systems, including K-12 education, criminal justice, unemployment, child welfare, health care, and child care.

- Estimates of saved costs are based on actual data from Illinois whenever possible, with appropriate proxies either from Minnesota, Michigan, or national averages only when Illinois data are not available.
- The study focus is on at-risk children ages 3 to 5 served each year through the state's Early Childhood Block Grant (ECBG) programs and on the estimated number of children ages 3 to 5 classified as 'at risk' that have not been served by these ECBG programs.
- Estimated benefits of the ECBG programs for children ages 3 to 5 are discounted to account for differences in the level of intensity of services with respect to those impact effects found within the research literature.

Estimated current cost savings to Illinois

This section estimates the current annual cost savings to Illinois resulting from children being adequately prepared for kindergarten through previous and existing school readiness investments. Nearly 90,000 at-risk children ages 3 to 5 are served each year through the state's preschool component of the Early Childhood Block Grant (ECBG) programs. The ECBG funds one preschool and two birth-to-3 initiatives, with the following objectives: 1) improving children's school readiness and outcomes, 2) supporting at-risk families, and 3) providing quality early childhood services. These programs are implemented across Illinois' 102 counties and operate within many different school districts, community-based organizations, and other entities.

The following cost savings associated with the state's current school-readiness investments in the ECBG preschool programs are calculated by estimating the total cost savings to the Illinois K-12 education system; criminal justice systems and crime victims; child welfare system and child abuse victims in Illinois – all as a result of improved school readiness. All of these savings would be lost, and additional costs would be accrued over the coming years, if the state's current investment in early education were reduced or discontinued. These estimates are based on actual expenditure and enrollment data (see figure below) from Illinois and program effect sizes and parameters from the existing research on effects of early childhood education.

Most of the effect sizes and parameters on the effects of early childhood education refer to two-year, comprehensive programs, while Illinois' current early childhood program is a half-day program for up to two years. Consequently, the effect sizes are discounted to account for this difference in the intensity of the interventions. Since no evidence exists on the sensitivity of the outcomes to changes in the intensity of the interventions, we discount the savings assuming two extreme values for the discount rate: 50 percent and 25 percent. In the first case, the discount rate implies that a 50 percent reduction in the intensity of the program reduces the benefits of early childhood by half; that is, children participating in a half-day program for two years generate half the savings of children in full-day programs for two years. The second scenario assumes the relationship between the intensity of the program and the savings is not linear; a 50 percent reduction in the intensity of the program would reduce savings by less than 50 percent. We present a range of the savings for each outcome, the lower value using the 50 percent discount rate and the upper bound assuming a discount rate of 25 percent.

Early childhood program enrollment

The following figure shows the number of children ages 3 to 5 served by the preschool component of the ECBG programs, and the number entering the K-12 system after participating in the those programs used to perform the calculations in this study. The last column shows the age of the oldest children during that fiscal year. This last column is important since many of the savings generated by early childhood education are accrued as the children get older; for example, unemployment insurance savings or adult crime savings are only realized after the children reach adulthood. Thus, many of the children served by the preschool component of the ECBG programs are not currently old enough to generate these adult-related savings.

1. Enrollment in preschool component of Illinois' Early Childhood Block Grant programs, FY1987-FY2009

	ECBG TOTAL Pre-K children served	Children served (unduplicated)	Children served (accumulated)	Maximum age in 2009	Children from ECBG entering K-12 system
FY87	6,953	6,953	6,953	26	
FY88	5,394	1,918	8,871	25	3,477
FY89	10,411	7,714	16,585	24	7,912
FY90	17,176	11,971	28,555	23	14,466
FY91	23,372	14,784	43,339	22	25,657
FY92	27,269	15,583	58,922	21	41,637
FY93	29,814	16,180	75,102	20	61,114
FY94	33,204	18,297	93,399	19	82,838
FY95	35,057	18,455	111,854	18	106,894
FY96	38,034	20,506	132,359	17	132,723
FY97	45,854	26,837	159,196	16	160,505
FY98	49,934	27,007	186,203	15	192,940
FY99	49,934	24,967	211,170	14	229,371
FY00	53,386	28,419	239,589	13	266,821
FY01	52,637	25,944	265,533	12	302,521
FY02	55,960	29,642	295,175	11	337,751
FY03	55,984	28,004	323,179	10	372,336
FY04	59,652	31,660	354,839	9	403,127
FY05	67,000	37,174	392,013	8	430,969
FY06	75,000	41,500	433,513	7	459,905
FY07	85,186	47,686	481,199	6	492,431
FY08	90,435	47,842	529,041	5	529,718
FY09	90,435	45,218	574,258	4	570,403

* *Assumes even distribution of 3- and 4-year-old children, full-year participation, and attrition only due to older children leaving the program to enter Kindergarten.*

Estimated current cost savings for K-12 education

Special education

During fiscal year 2009, 318,461 children with disabilities were enrolled in the Illinois K-12 education system, nearly 15 percent of all children enrolled in K-12 education in the state. The total appropriations for special education grants in the state for that year reached $1.7 billion.

For this analysis, we assume that while special education can assist in some non-normative areas of special education, such as emotional or behavioral disorders, it cannot assist in normative areas, such as deafness or blindness. Therefore, researchers expect school readiness efforts to impact six primary disabilities areas: speech or language impaired (2.7% of all students), mild to moderate cognitive impairment (0.8%), specific learning disability (4.7%), emotional impairment (0.9%), other health impairment (1.0%), and early childhood delay (0.1%).

A literature review performed by the Task Force on Community Preventive Services of the Centers for Disease Control and Prevention found the incidence of special education decreased 6 percent to 48 percent due to early education, with an average impact of 12 percent (Anderson, 2002). For this analysis, we used the average effect size, reducing the incidence rates in the disabilities that can be prevented (non-normative) by 12 percent.

These costs of special education are considered to be in addition to regular track costs. Accordingly, benefits include the reduction in special education costs but do not net-out potential added costs of returning the students to regular classrooms.

2. Illinois Special Education enrollment, by type of disability, 2008-2009

Primary disability	Number of students	Percent of all students
Non-normative disability		
Specific learning disability	130,813	6.32%
Speech/Language	71,307	3.44%
Emotional disturbance	24,969	1.21%
Other health impairment	26,219	1.27%
Developmental delay	17,719	0.86%
Total non-normative disabilities	271,027	13.09%
Normative disability		
Mental impairment	23,510	1.14%
Orthopedic impairment	2,203	0.11%
Visual Impairment	1,199	0.06%
Hearing impairment	3,385	0.16%
Deafness	707	0.03%
Deaf-Blind	35	0.00%
Multiple disabilities	1,827	0.09%
Autism	13,764	0.66%
Traumatic brain injury	804	0.04%
Total children with disabilities	318,461	15.40%
Total Enrollment	2,070,125	100%

Source: *Illinois State Board of Education.*

The estimated savings for K-12 are calculated using student numbers from the Illinois State Board of Education (see Figure 3) and the total costs of funds allocated to special education. The average costs of special education per student during the 2008-2009 academic year were $5,596. This average cost is then applied to the number of children whose disabilities were attenuated because they received early childhood education (12% reduction of the incidence of each disability). Using this average assumes the costs of special education services per student are the same for all types of disabilities. This assumption oversimplifies the cost structure associated with the provision of special education services; however, there are no direct data to estimate specific per-pupil costs by each type of disability that can be assisted by early childhood education, leaving the average costs as the main source of information.

Based on the estimated per pupil cost of special education and an average 12 percent reduction in the incidence of non-normative disabilities resulting from early childhood education, Illinois' K-12 education system saved $21.9 million to $32.9 million annually in special education. The accumulated savings between 2005 and 2009 may reach at least $86 million.

Estimated annual special education savings: $21.9 million to $32.9 million

Grade repetition

The literature review also found that quality early childhood education reduced the incidence of grade repetition 2 percent to 25 percent with an average impact of 21 percent (Anderson, 2002).

To estimate the savings in grade repetition we use the average impact of early childhood education on grade retention and apply it to the number of children in the K-12 system in FY2009 who have received early childhood education. The resulting number of children who would not have repeated a grade in that year is then multiplied by the estimated cost of a regular-track education, per student.

A linear prediction model based on percentage of youth ages 16 to 19 who were retained in a grade in 1995, 1999, and 2004 was used to estimate the number of students who would have repeated a grade in FY2009 in Illinois, 5 percent to 8 percent. It is assumed that early childhood education can reduce this rate by 21 percent. Using the number of children in the K-12 system who received early childhood education (162,632), we estimate that the number of these early childhood education children who are not retained in a grade in that year alone is 1,708.

The cost of each student repeating a grade level was assumed to be the cost of an additional year of regular-track education ($10,834 per pupil in 2008-09), yielding an estimated annual savings between $2.5 million and $3.7 million in costs associated with reduced grade repetition among previous participants of Illinois' current ECBG school-readiness programs for 3- to 5-year-olds. The accumulated savings in the period 2005-2009 is nearly $12 million.

Estimated annual grade repetition savings: $2.5 million to $3.7 million

Teacher turnover

Illinois had nearly 120,000 public school teachers during the 2008-09 school year. A recent report by the National Center for Education Statistics (NCES) found that the national teacher turnover rate averages about 16 percent annually, with half of teachers

moving to different schools and half leaving the teaching profession altogether (Marvel et al., 2006). About 60 percent of teachers express leaving their jobs for reasons that are potentially related to dissatisfaction with working conditions due to student behavior or performance that could be influenced by improved school readiness. We assume that the turnover rate due to student behavior is approximately 9.6 percent (60% of 16%).

For this analysis, we assume the turnover rate for teachers in Illinois is lower because 3- to 5-year-old children who were enrolled in the existing Illinois ECBG preschool programs are better-prepared for school and thus less likely to fuel turnover of instructors. We use the estimates developed by Belfield (2004) that ECE children who enter the K-12 student population reduce the net turnover of teachers by 24 percent. We choose to discount this rate by 70 percent (to reach 7.2%) because: 1) this estimated impact is based on specific groups of children who may not be comparable to Illinois' ECBG participants, and 2) the individual impacts that one early childhood education graduate can have in the decision of a teacher of leaving her job are unknown. This yields an assumption that Illinois loses 74 fewer teachers each year as a result of existing school readiness.

To calculate the costs of teacher turnover, we use a model developed by the U.S. Bureau of Labor Statistics which assumes that the cost of turnover is 33 percent of the teacher's salary plus benefits at a rate of 30 percent of salary. The average salary plus benefits for a public school teacher in Illinois is $61,022. Using the Bureau of Labor Statistics model, we estimate the average cost per teacher leaving his or her position in Illinois is about $20,137. Therefore, improved school readiness as a result of ECBG programs for 3- to 5-year-old children yields an estimated savings between $2.3 million and $3.4 million in costs related to teacher turnover, with accumulated savings of at least $16 million in the last five years.

Estimated annual teacher turnover savings: $2.3 million to $3.4 million

Summary of estimated K-12 savings due to increased school readiness

Figure 3 shows the estimated savings that Illinois' current ECBG preschool programs for children ages 3 to 5 generate annually.

3. Estimated K-12 annual savings due to increased school readiness

Cost category	In millions
K-12 Special education	$21.9 – $32.9
K-12 Grade repetition	$2.5 – $3.7
K-12 Teacher turnover	$2.3 – $3.4
Total K-12 annual savings	$26.7 – $40.0

High school dropouts and per pupil aid

Early childhood education also reduces the dropout rate, increasing the per-pupil aid that is received by the schools. In the HighScope/Perry Preschool study, the rate of high school graduation was 71 percent for children who participated in a comprehensive early education program compared with 54 percent for non-participants, a 17 percent difference. Furthermore, the Chicago Parent Child Study shows that participants in early education attend school 0.35 more years, on average, than non-participants. These results may imply that the children attending the ECBG preschool programs in Illinois since 1997 will be more likely to remain in school and graduate from high school, generating additional financial aid to schools. However, since this analysis is being done from the point of view of the state of Illinois as a whole, the loss of per-pupil aid that is prevented due to school readiness is not included in the savings from school readiness since the dollars are transferred from taxpayers to school districts, thus netting to zero.

While dropouts do not, in technical financial sense, burden taxpayers and actually reduce the cost of the educational system in the near term, their ultimate cost to the state is far greater than the cost of another year of schooling. The negative effects of dropouts may include increased unemployment rates, increased use of cash assistance, Medicaid and other forms of public assistance, and increased likelihood of incarceration (Sum, et al., 2008).

Beyond even these statistics, the biggest cost that dropouts impose on the state is the loss of economic output that results from having a less skilled workforce. More is presented on this point in the next section.

Additional considerations and issues

We believe these cost savings estimates to be conservative for three reasons:

First, where we had a choice of effect sizes from among several studies showing a range of effects, we chose the average effect or an effect size from the lower part of the range.

Second, there are additional cost savings to the K-12 education system that could result from quality early childhood education that were not included in this analysis, including: 1) reduced use of remedial education programs, 2) reduced non-instructional and health costs related to special education and preventable health problems, 3) reduced costs for alternative schools, 4) increased per pupil aid from parents, and 5) reduced costs of having to provide education to students in juvenile detention. While there is reason to believe that improved school readiness through early childhood education would affect these categories of expenditures, these savings could not be included because there has been no research to measure or monetize the impact of improved school readiness in these areas. To the extent that savings might be realized in all or some of these areas, the

estimates presented here understate the total savings – and the potential lost savings – to the K-12 system.

Third, due to the lack of sufficient data and previous evidence, we did not include estimates of savings due to teacher absenteeism, reduced school safety spending in higher grades, and reduced costs associated with English language learners.

Estimated current cost savings to other state-supported services

This section estimates the annual cost savings to other parts of the Illinois state government (beyond the K-12 education system) attributable to school readiness based on actual expenditures in Illinois and program effect sizes and parameters from the research literature.

Note that some of the savings to other state-supported services resulting from state ECBG preschool programs accumulate through the adult life of children who succeed in school. Children who participated in ECBG preschool programs after 1995 are under age 18 (see Figure 1 above) and, therefore, we are not able to estimate savings associated with adulthood, such as receiving TANF, committing adult crimes, or being unemployed. However, it can be assumed additional savings will likely result in these areas of the Illinois state government in the future as the children who participated in ECBG preschool programs grow older. We present a set of potential future benefits in a separate section.

Juvenile justice

As cited above, research clearly indicates that children participating in comprehensive early childhood education programs are less likely to commit crimes later on, resulting in reduced costs to both the juvenile justice and adult justice systems.

Previous studies estimated the costs to the juvenile justice system are reduced $5,869 to $13,200 per participant in early childhood education. For our estimates, we assume that juvenile crimes are committed by children ages 12 to 17, or those born between 1992 and 1997. Thus, the $5,869 average cost includes estimated crimes and arrests of a child for the entire six-year period when they are between the ages of 12 and 17.

The 3- to 5-year-old children who participated in Illinois EBBG preschool programs between 1996 and 2001 were ages 12 to 17 in 2009. Every year, these children save the juvenile justice system $986 (one-sixth the $5,918 per participant average savings during their possible juvenile crime life between ages 12 and 17). Applying the estimated cost per participant per year to Illinois' early childhood education participation data, we estimate the juvenile justice system would save $97.9 million to $146.8 million annually. The state of

Illinois may have saved nearly $489 million in the last five years due to reduced criminal behavior of individuals who attended the ECBG programs for 3- to 5-year-olds.

Estimated annual juvenile justice savings: $97.9 million to $146.8 million

Adult criminal justice

Participants in comprehensive early childhood education programs also show a reduction in the number of arrests when they are adults compared with non-participants. Previous studies show that this reduction can save the adult criminal justice system between $3,450 and $5,855 per participant. In our estimation of the cost savings for the adult justice system, we assume that the costs per participant can be spread across 10 years, which is approximately $345 per participant for each year.

For this estimation, we use participation data on the cohorts of participants in early childhood education in Illinois from 1987 to 1995 corresponding to individuals who were 18 years old or older in 2009. The total savings for the adult corrections system in 2009 attributable to ECBG programs for 3- to 5-year-olds is approximately $30.8 million to $46.2 million. This includes both the costs of arresting and processing adult offenders, and those associated with their incarceration. Between 2005 and 2009 the savings were at least $154 million.

Estimated annual adult corrections system savings: $30.8 million to $46.2 million

Child welfare (abuse, neglect, and out-of-home placements)

Comprehensive early childhood education programs that promote school readiness also contribute to reductions in child abuse and neglect. The studies we analyzed all showed significant savings in costs associated with child abuse and neglect, averaging $1,559 per participant in early childhood education.

As of 2009, approximately 253,000 children had participated in ECBG programs for 3- to 5-year-olds in Illinois. Using this data on program participation and the savings in costs associated with child abuse and neglect, we estimate that between $37.1 million and $55.7 million per year is being saved as a result of the positive impacts of existing ECBG preschool programs. The accumulated savings between 2005 and 2009 in child welfare costs were nearly $186 million.

Estimated annual child welfare savings: $37.1 million to $55.7 million

Unemployment

If students drop out before finishing high school, they are more likely to be unemployed, and even those who find employment are likely to find lower-paying and less stable jobs. Thus, they are more likely to collect unemployment insurance from the state during the periods of unemployment that interrupt their work careers. A recent study (Sum et al., 2008) showed the unemployment rate among those who did not finish high school to be 19.6 percent compared with 10.9 percent for those who had only completed high school but have no further education.

To estimate the current impact of improved school readiness through previous participation in ECBG preschool programs for 3- to 5-year-olds we used our estimate of the number of additional high school dropouts there would have been in the Illinois labor force today without these early learning investments. We estimated the cost savings since they are high school graduates and, hence, the state has fewer unemployed workers. Since those workers are likely to be employed in below-average-wage jobs, we assumed those unemployed workers would receive 80 percent of the average weekly benefit for all workers. We estimated there were about 389 fewer unemployed workers who would have received benefits of $239 per week for 52 weeks as a result of early education.

Estimated annual unemployment savings: $1.1 million to $2.9 million

Illinois tax receipts

The potential gains in income tax revenues for the state of Illinois as a result of more children exhibiting school readiness due to their participation in ECBG preschool programs depend on three parameters. The first element is the difference in mean annual income of adults between high school graduates and individuals without a high school diploma, approximately $9,550 (2009 dollars) (Sum et al., 2008). This amount can be multiplied by the estimated number of individuals who participated in early childhood education programs, did not drop out of school, and were at least 18 years old in 2009. The estimated percentage of non-dropouts is 4 percent fewer participants in early childhood education (Nores et al., 2005). The last parameter needed to estimate the tax savings for each cohort of participants is the marginal tax rate for Illinois taxpayers. Nearly 4,474 individuals finished high school, due, in part, to their early childhood education. Each of them earns approximately $9,550 more than their non-graduate counterparts. Applying the marginal tax rate in Illinois of 9.3 percent to the aggregated additional income of high school graduates yields an estimated range between $1.9 million and $2.9 million in additional annual tax revenue from participants. Between 2005 and 2009, the state of Illinois received an additional total $10 million in taxes that

was generated by ECBG preschool program participants who otherwise would likely not have graduated high school.

In addition, parents see their income increased due to their child's participation in these programs either through increased work hours or the ability to obtain training more easily. The additional tax revenues generated by this increased productivity and incomes of parents plus the additional taxes paid by participants reaches $5.2 million to $7.8 million.

Estimated annual additional revenues from income taxes: $5.2 million to $7.8 million

Summary of estimated Illinois state-supported public service savings and revenue due to increased school readiness of students entering kindergarten

Figure 4 shows the estimated potential savings and tax revenues that Illinois state-supported services would lose due to inadequate school readiness is about $172 million to $259 million annually.

4. Estimated annual savings and revenue for the Illinois budget due to increased school readiness

Cost category	In millions
Juvenile justice system	$97.9 – $146.8
Adult justice system	$30.8 – $46.2
Child welfare	$37.1 – $55.7
Unemployment	$1.1 – $2.9
Revenues from taxes	$5.2 – $7.8
Total savings and revenue	$172.1 – $259.4

Estimated current social cost savings in Illinois

This section estimates current social cost savings based on actual expenditures in Illinois and program effect sizes and parameters from research literature.

Crime victimization

The present value of juvenile justice crime victim savings per participant in early childhood education programs is $4,475 (Reynolds et al., 2002). These are private costs consisting of tangible losses paid by the victims of violent crime and property offenses. Following the rationale used in the estimation of crime costs and using this estimation and the number of participants, we obtain an estimated annual savings in costs associated

with juvenile crime victimization between $79.1 million and $118.7 million per year for all living participants of Illinois ECBG preschool programs for 3- to 5-year-olds as of 2009.[1] The accumulated savings between 2005 and 2009 reach at least $155 million.

Estimated annual crime victim savings – juvenile system: $79.1 million to $118.7 million

Similarly, Reynolds et al. (2002) estimates the annual cost saving for adult crime victims per participant in early childhood education to be approximately $3,618. The total estimated annual savings for the state in adult crime victim costs is between $35.7 million and $53.5 million.

Estimated annual crime victim savings – adult justice system: $35.7 million to $53.5 million

Health (alcohol abuse and drug use)

Children who participate in comprehensive early childhood education programs are less likely to present problems of alcohol and illicit drug abuse (Aos et al., 2002). The savings in terms of program participants, taxpayers, and non-taxpayers can reach up to $311 per participant. We estimate that the total savings for program participants (private savings) in costs related to alcohol and drug abuse for children who benefited from these ECBG preschool programs in 2009 is between $4.7 million and $7 million. In this estimation, we include participating children who are as young as age 8 in 2009.

Estimated annual health-related savings: $4.7 million to $7 million

Productivity of employed parents

Studies have shown that parents of children in early childhood education programs have increased earnings (Campbell et al., 2002). They are more likely to participate in the labor force; establish more stable, work-related relationships; and spend more quality time with their children during non-work hours. Previous research demonstrated that these additional earnings may reach $4,471 (2009 dollars) per participant in five-year programs. Our estimate includes parents who are receiving additional income in 2009 because of their children's program participation.

Estimated annual productivity savings: $34.4 million to $51.6 million

[1] Neither this nor the following item includes estimates of the intangible losses suffered by victims of crime, namely, pain and suffering, death, or reduction in quality of life. Even though economists have sought to estimate the value of these outcomes, we have chosen to exclude them from this analysis.

The total annual social cost savings to Illinois as a result of greater school readiness due to ECBG preschool programs for 3- to 5-year-old children is an estimated $154 million to $231 million, as summarized in the following figure.

5. Estimated annual social cost savings due to increased school readiness

Cost category	In millions
Crime victim saving – juvenile system	$79.1 – $118.7
Crime victim saving – adult system	$35.7 – $53.5
Health (alcohol abuse and drug use)	$4.7 – $7.0
Productivity of employed parents	$34.4 – $51.6
Total savings	$153.9 – $230.8

Summary of existing savings and revenue to Illinois from increased school readiness

The total savings to Illinois from increased school readiness generated by existing ECBG preschool programs for 3- to 5-year-olds is summarized in Figure 6. It consists of the savings to the Illinois K-12 system, the savings in other state-supported services, and other social cost savings. We estimate the total savings as a result of participation by Illinois at-risk children in ECBG preschool programs for 3- to 5-year-olds to be about $353 million to $530 million per year.

6. Estimated total annual savings and revenues in Illinois due to increased school readiness

Cost category	In millions
Education (K-12 system)	$26.7 – $40.0
Other Illinois state department budgets	$172.1 – $259.4
Social cost savings	$153.9 – $230.8
Total	$352.7 – $530.2

Estimated potential cost savings to Illinois through providing more preschool education to more at-risk children

This section estimates the additional savings that could be realized and costs avoided in coming years if Illinois were to invest more in early education in two ways: first by serving a greater number of children ages 3 to 5 who could be categorized as being at risk and, second, by strengthening the half-day program into a full-time comprehensive program.

Potential savings from increased number of children served

The cost savings outlined in the preceding section are all based on the existing preschool component of the state's ECBG programs for children ages 3 to 5. But such efforts do not reach all of the Illinois students who could benefit from such programs. The screening and eligibility criteria currently used by ECBG preschool providers primarily identify *at-risk* children and their need for services. However, it is estimated that as many as ***67,000*** children who may need early childhood programs are not identified or are currently not being served.[2] If preschool education services were extended to these 67,000 additional children who could benefit from early education, Illinois would see additional cost savings as those students moved through the school system and became more productive adult members of society. The fact that many of these students may not be adequately prepared for kindergarten imposes an additional cost burden on the K-12 system, state-supported public services, and to Illinois citizens.

Estimated cost burden attributable to inadequate school readiness

This investment would begin to pay some dividends immediately in certain savings in K-12 education and in saved child care subsidies. Other savings would be realized as the children who are more adequately prepared for kindergarten grow up and have less involvement with the juvenile justice system, graduate from high school at increased rates, earn better wages and contribute more in taxes, and commit fewer crimes as adults. The total potential savings from this enhanced school readiness, because they have not been activated and are not being accrued, represent the additional annual costs attributable to

[2] Using U.S. Census data, the Ounce of Prevention Fund determined that there were 177,584 three-year-olds and 180,715 four-year-olds that could be served by Illinois' Preschool For All (PFA) program. We applied a take-up rate of 50% for three-year-olds and 60% for four-year-olds to get to a total of 197,221. From that amount, we subtracted the number of children already being served in PFA and in Head Start (130,164) to get to 67,057.

the lack of sufficient school readiness in Illinois. In other words, for these calculations we assume that all potential costs (immediate and future) associated with the total number of un-served children are realized in a given year.

We estimate the total potential annual savings from enhancing school readiness through stronger preschool education efforts – or the cost burden attributable to inadequate school readiness – to be $155 million. As shown in Figure 7, the largest portions of the public costs are to juvenile justice ($41.2 million) and corrections ($19.4 million). More than half of the cost burden due to children being unready for school is accrued by Illinois government programs, and more than 44 percent of the cost is paid by the rest of society in terms of costs to victims of crime and loss of productivity.

Even these statistics do not present the entire case for enhanced school readiness. Continuing existing investments in ECBG preschool programs and, if possible, strengthening them will increase the total amount of economic activity and enhance Illinois' future economic growth, subjects we consider in the next section.

7. Costs attributable to inadequate school readiness for un-served at-risk children

Cost category	Annual savings (millions)
Education (K-12)	**$7.1**
K-12 Special Education	$3.7
K-12 grade repetition	$0.4
K-12 teacher turnover	$3.0
Other Illinois state departments	**$66.8**
Juvenile justice system	$41.2
Corrections (adult justice) system	$19.4
Unemployment insurance	$0.85
Child welfare	$3.8
Lost revenues from taxes	$1.5
Social costs	**$81.5**
Losses to victims of juvenile crime	$31.1
Losses to victims of adult crime	$15.1
Health (Alcohol abuse and drug use)	$3.5
Lost productivity of employed parents	$31.8
Total cost burden	**$155.4**

Estimated potential additional cost savings from strengthening half-day preschool programs into full-time programs

Figure 8 shows the estimated additional savings that Illinois would have realized if the current preschool education ECBG programs for children ages 3 to 5 would have been full-time, comprehensive programs. Without increasing the number of at-risk children served, the total savings amounts to $158 million more than the savings generated by the current half-day programs.

8. Costs attributable to inadequate school readiness due to half-day programs rather than full-time programs

Cost category	Additional annual savings (millions)
Education (K-12)	**$13.2**
K-12 Special Education	$10.9
K-12 grade repetition	$1.2
K-12 teacher turnover	$1.1
Other Illinois state departments	**$85.7**
Juvenile justice system	$48.9
Corrections (adult justice) system	$15.3
Unemployment insurance	$0.5
Child welfare	$18.5
Lost revenues from taxes	$2.5
Social costs	**$58.9**
Losses to victims of juvenile crime	$39.5
Losses to victims of adult crime	$0.01
Health (Alcohol abuse and drug use)	$2.3
Lost productivity of employed parents	$17.1
Total cost burden	**$157.8**

Current and future impacts of school readiness on the Illinois economy

Current impact on economic activity in Illinois

What is the impact on economic activity in Illinois from increased school readiness? One of the main benefits of early childhood education is the impact school-ready children have on the state's labor force. School-ready children are less likely to drop out of school than their peers. Increased education levels are highly correlated with higher productivity and income. Thus, the state's economy benefits from the enhanced labor force generated by early childhood education in at least three ways.

First, a more educated labor force is more productive. The economy is able to produce more goods and services with an educated work force than it can with the same number of less-educated workers.

Second, more educated and productive workers usually earn higher lifetime incomes than their less-educated counterparts. The increased income translates into more tax revenues paid to the state. Moreover, Sum (2008) has estimated that, based on taxes paid in to the state and transfer payments paid out, high school dropouts are a net annual *cost* to the state of $3,269, while those who have a high school diploma annually pay in, on average, $4,201 more than they receive. This implies a potential difference of $7,470 per participant in the state's ECBG preschool programs for 3- to 5-year-olds.

Finally, the difference in income between high school graduates and drop-outs that is not paid in taxes also goes into the economy in the form of consumption expenditures. Sum (2008) estimates the average annual earnings of high school dropouts in 2006 at roughly $13,000, compared to $21,800 for high school graduates and $30,600 for workers with some college education.

Since 1987, approximately 4,470 more children graduated from high school in Illinois due to the impact of the state's ECBG preschool programs for children age 3 to 5. If we assume that none of these participants received any type of higher education, the net contribution to the state's budget of these individuals ranges from $25 million to $33 million. In addition, using the increased earnings of high school graduates, we estimate the additional after-tax income spent by this group of Illinois graduates is roughly $29 million to $39 million if none of them pursued additional training. Using this alternative method of estimating economic impact and totaling these two estimates, we arrive at an estimated increase of $53 million to $72 million in economic activity in Illinois courtesy

of previous and existing school readiness investments in ECBG programs for 3- to 5-year-old children. This range represents nearly 1.3 percent of Illinois' Gross Domestic Product in 2009.

Future impact on economic activity in Illinois

The contribution that school readiness will make to the future economy of the state is likely to rise as the economy demands a more educated and skilled labor force. The current impact on Illinois' economy is generated by early education programs of 15 or more years ago. In like manner, changes in the level of early education and school readiness spending today will have impacts in the future. If investment is decreased, losses will accumulate over time.

Conversely, if investment is increased, economic benefits will accrue over time. Additional savings in school expenditures will be felt in the near term, but most of the impact of the added productivity of the workforce, reduced crime, and reduced social spending will be seen in future years.

Increased and sustained school readiness investments today at the rate described earlier in this report would produce additional economic benefits of about $72 million per year when all of those benefits are realized. Put differently, the cost burden of failing to invest the additional resources in early education and school readiness will mount in the future until it reaches the annual equivalent of roughly $72 million in today's dollars.

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Appendix

Research on potential cost savings

Research on potential cost savings

The research literature on school readiness investments documents potential savings in K-12 spending, crime-related costs, and government health, public assistance, and child care programs. Cost-benefit studies of comprehensive early education programs have also documented potential benefits to society in increased personal earnings and tax revenues.

K-12 cost savings

According to the research literature, the largest *potential* savings to K-12 educational systems due to improved school readiness is in special education spending. A portion of these costs could be reduced or prevented if more low-income 3- and 4- year-olds participated in early education and were fully prepared for kindergarten.

Nationally, approximately 20 percent of children are identified as having special educational needs (High, 2008). Two percent have normative disabilities – blindness, deafness, autism, moderate/profound mental retardation, or significant language impairment. Eighteen percent have non-normative disabilities such as learning disabilities, speech and language delays, mild hearing loss, mild mental retardation, and social/ emotional/behavioral maladjustments that are preventable or ameliorated with early intervention.

Of those with non-normative disabilities (90% of the students in special education), research shows that anticipatory guidance, such as parenting education provides, can reduce social and emotional risks and build protective factors in young children (Edwall, 2008) and quality early care and education can reduce the amount of time spent in K-12 special education (Reynolds, 2007). In addition, research on children with mild hearing loss shows they have more academic difficulties and are more likely to repeat a grade than their peers with normal hearing, which could be prevented with earlier detection and treatment (Tharpe, 2006).

Tables A1 and A2 in the Appendix summarize the estimated effects and net benefits of early childhood education with regard to special education and grade repetition. Based on the outcomes of three major early childhood education studies (High/Scope Perry Preschool, The Abecedarian Project, and Chicago Child-Parent Centers) and a meta-analysis of 48 other studies, the return to each K-12 dollar invested in early childhood education ranges from 4 cents to 73 cents.

This study also looks at other possible benefits *within* the K-12 system in addition to the actual costs of non-normative special education and grade repetition. Using data from the Early Childhood Longitudinal Study, Belfield (2004) finds that children who participate

in preschool programs nationally have significant behavioral and cognitive gains over those who do not participate in early childhood education. He estimates that when 40 percent more students attend pre-K:

- Teacher turnover is reduced 24 percent.
- Math and reading achievement scores increase by .3 standard deviation.
- Student behavior improves by 32 percent on a comprehensive index of student behavior.

Belfield further finds that a .3 standard deviation increase in student achievement leads to a 19 percent reduction in physical attacks on teachers. The 32-point improvement in student behavior raises the probability that the kindergarten teacher will report "really enjoys current job" or "would choose teaching again." This point is made even more clearly by a survey in nearby Michigan. There, results of a 2009 survey of kindergarten teachers showed that 68 percent of those surveyed agreed that they had "experienced significant frustration as a direct result of needing to address the physical, social-emotional, language, cultural, cognitive, and/or special needs of a kindergarten student or students," and 18 percent said they had "experienced a desire to change professions" based on the same factors.

These findings suggest there are additional teacher-, school-, and school-system-related benefits, beyond the scope of this Illinois analysis, which can be produced by improving school readiness through early childhood education. Belfield (2004) identifies four areas that could potentially be affected by increases in early childhood education enrollment:

- Teacher turnover due to behavior problems, low achievement, or lack of preparation for K-12 education among students
- Teacher absenteeism due to student behavior problems
- Low achievement or lack of preparation for K-12 education among students
- School safety programs (child or adolescent delinquent or criminal behavior increasing the need for spending on school safety programs)

Other potentially avoidable costs to K-12 systems include costs associated with English language learner programs. Research indicates that quality early education may improve the English abilities of English language learners, which could reduce the need for future spending in this area (Barnett, 2007; Gormley, 2007; and Magnuson, Lahaie, and Waldfogel, 2006).

Crime-related cost savings

The relationship between participation in early childhood education (ECE) programs and reduction in crime appears to be direct. Children in ECE programs learn to control their behavior better than their peers who do not receive early education opportunities. ECE and lower crime rates also have an indirect link. ECE contributes to better academic achievement, reduced special education placements, and reduced child maltreatment, which are all associated with a reduction in crime (Mann and Reynolds, 2006). In addition to the negative economic effects that crime has on others, having a criminal history has negative implications for individuals, since a criminal background may affect employability and/or career mobility (Nores et al., 2005).

Crime-related cost savings attributable to ECE interventions result from juvenile justice system savings, adult criminal justice savings, and savings for crime victims. In fact, some believe that "[t]he greatest economic benefit of providing high-quality preschool education to disadvantaged children is a dramatic reduction in crime" (Oppenheim and MacGregor, 2002). Of the studies included in this analysis, only the Abecedarian program in North Carolina has not produced any statistically significant cost savings due to reduced crime. That exception has been attributed to the fact that the Abecedarian program was located in an area with relatively low crime rates compared with the communities served by other well-studied ECE programs, and could also be due to the small sample sizes which reduce statistical power (Campbell et al., 2002).

It appears that the largest cost savings due to crime reduction that ECE programs achieve is in the area of crime victims' savings. Oppenheim and MacGregor (2002) reported that every dollar invested in ECE yields a national average savings of $5.86 to crime victims. Reynolds et al. (2002) reported 90 cents saved by crime victims for every dollar invested in the Chicago Child-Parent Centers ECE program. In addition to victims' outcomes, the costs of administering the juvenile justice system fall between 68 cents and 90 cents for every dollar invested in ECE. Adult criminal justice system cost savings are about 40 cents for every dollar invested.

When including all types of cost savings from crime reduction, a meta-analysis of 58 ECE programs found an average cost savings of nearly 69 cents for every dollar invested (Aos et al., 2004). The Chicago Child-Parent Centers program results indicated a savings of $1.98 due to reduced crime for every dollar invested (Reynolds et al., 2002). Even more significant, the Perry Preschool program produced savings in the range of $4.85 to $11.30 of savings for every dollar invested in ECE (for discount rates of 7 percent and 3 percent respectively). For this program, there was a much more significant effect for male program participants than females (Nores et al., 2005). As previously mentioned, the Abecedarian program did not produce savings in the area of crime. Therefore, the

total benefit-to-cost ratio with regard to crime reduction outcomes of ECE programs is $0 up to $11.30 for every dollar invested.

Cost savings for public assistance programs

Unemployment is reduced by ECE program participation indirectly via impacts on educational attainment. In 2000, individuals with high school degrees recorded an overall unemployment rate of 3.8 percent compared with 7.9 percent for high school drop outs (according to U.S. Census data cited in Oppenheim and MacGregor, 2002).

Nores et al. (2005) found that the cost of administering public assistance is nearly 30 percent of total disbursements. In addition, overpayment and payment to ineligible families is 6 percent of total disbursements. Therefore, for every dollar disbursed in public assistance to individuals, there is an additional cost to society of 38 cents.

Overall, cost savings for public assistance programs (TANF/AFDC) are not large compared with the benefits to other systems (K-12 education and criminal justice system). Most studies found only 1 to 2 cents per dollar invested in terms of cost savings to these programs.

Cost savings for the child welfare system

The literature reviewed here does not explicitly state the causal mechanisms by which ECE programs contribute to a reduction in child maltreatment (also called child abuse and neglect). The national review by Oppenheim and MacGregor (2002) found that 15 cents in cost savings accrue for every dollar invested in ECE. The Chicago Child-Parent Centers produced 12 cents of cost savings for every dollar invested (Reynolds et al., 2002). These cost savings benefit the child welfare system and also the individual children who do not suffer from abuse and neglect.

Cost savings for health care

Cost savings in the area of health care can be attributed to reduced incidence of tobacco use and reduced need for treatment for alcohol or other drug abuse. Citing a 2001 U.S. Department of Education report, Oppenheim and MacGregor (2002) assert that high-quality ECE programs contribute to lower public (i.e., Medicaid) and private health care costs by improving educational attainment, which leads to better health directly and indirectly through higher earnings. Specifically, high school graduates are 50 percent more likely to be in excellent or very good health than those who do not graduate from high school (with rates of 57.8% to 38.7%, respectively).

Masse and Barnett (no year) attribute all differences in health behavior for ECE program participants vs. non-participants to the increased educational attainment among participants and to the better job opportunities that arise when one has more education:

> "Education increases the ability to be an effective consumer of health care services and producer of personal health. Education also increases earning power, the ability to command wages, fringe benefits, vacation time, and the ability to avoid working conditions that may be detrimental to personal health. Education also increases income that allows one to purchase higher quality and quantity of health services and to establish living conditions that are conducive to good health" (p. 22).

These researchers also describe how the tendency to have concern for the future is represented by people who are willing both to invest in more education and engage in behavior that promotes future good health.

In their meta-analysis of benefit-cost research for 58 ECE programs, Aos et al. (2004) reported a cost savings of 4 cents for every dollar invested in terms of a reduction in alcohol and drug abuse. The Abecedarian program participants were 16 percent less likely than control group individuals to be tobacco users, which increased the lifespan of program participants an average of 6.5 years at an estimated value of $161,000 per year, so the return on investment is $3.91 for every dollar invested.

Cost savings for child care

In some states, child care cost savings – which mainly accrue to the parents of participants but can also accrue to the general public in cases in which the participant is eligible for child care subsidy – can be attributed to a reduced need for child care services during the hours in which the child is participating in the ECE program. Oppenheim and MacGregor (2002) reported cost savings related to child care expenses of 19 cents for every dollar invested. Reynolds et al. (2002) found the Chicago Child-Parent Centers program saved 25 cents on child care expenses for every dollar invested. However, because low-income families participating in ECBG preschool programs in Illinois also may use child care aid, these potential savings do not apply.

Increased earnings resulting in increased income tax revenue

Increased income tax revenue due to increased earnings is derived from three sources: increased income for mothers of children who participate in ECE, due to their ability to work more hours while their child is participating in early education; increased income for participants, due to increased educational attainment that can be attributed to ECE enrollment; and increased income for future generations (children and grandchildren of participants), due to the increased educational attainment of participants that is associated

with higher educational attainment for their offspring. Therefore, the primary way in which ECE intervention results in increased earnings and tax revenue is via increased educational attainment among ECE participants. Increased earnings by participants are a benefit of ECE programs that accrue to individual participants and also generate increased income tax revenue, which is a benefit that accrues to the general public (taxpayers).

Cost-benefit studies of the Abecedarian program are the only research reviewed here that included increased maternal earnings and earnings of future generations in calculations of benefits of ECE programs. Campbell et al. (2002) reported that 44 cents in increased income tax revenue for mothers of participating children was obtained for every dollar invested in the program. The same authors reported 13 cents in increased earnings of future generations (children through great-grandchildren, projected) for every dollar invested.

In terms of participant lifetime earnings, the return on investment ranges from $1.23 for every dollar invested (Oppenheim and MacGregor, 2002) to $3.32 for every dollar invested (Nores et al., 2005). In terms of income taxes paid by participants, the return on investment ranges from 17 cents for every dollar invested (Oppenheim and MacGregor, 2002) to $1.08 for every dollar invested (Nores et al., 2005). Results from the Perry Preschool benefit-cost analyses show that increased participant earnings and increased participant income taxes are more significant for female participants than for male participants (Nores et al., 2005).

Overall, increased earnings and taxes that can be attributed to ECE program participation produce a benefit that exceeds program costs from $1.40 to $4.38 for every dollar invested.

Estimates of potential cost savings from reviewed studies

Table A3 summarizes the cost savings in different categories generated per dollar of investment in school readiness through ECE estimated in different studies. In each line the numbers indicate the present value of the dollars and cents saved for each dollar invested.

These estimates show that the range of potential returns estimated in different studies to be from $2.36 per dollar of investment to $16.14. These are present values of the stream of benefits and reduced costs received over the lifetime of a student.

A1. K-12 Effects of Early Childhood Education Programs

Outcome	Perry Preschool Percent difference		Abecedarian Percent difference		Chicago CPC Percent difference		Aos et al. (2004) meta-analysis of ECE Programs Effect Size
Special Education	-12%*	(of years by age 19)	-23.2%*	(by age 15)	-10.2%***	(by age 18)	-0.13
Emotional or behavioral disorder	-		-		0%a	(grades 1 to 8)	-
Mental retardation	-		-		-0.9%a	(grades 1 to 8)	-
Specific learning disability placement	-		-		-3.5%*a	(grades 1 to 8)	-
Speech and language impairment placement	-		-		-1.7%a	(grades 1 to 8)	-
Grade Retention	-0.2	(years by age 27)	-23.3%*	(by age 15)	-15.4%***	(by age 15)	-0.18

Source: *Karoly and Cannon (2005) Table 3.5. Conyers, Ou, and Reynolds (2003); Aos (2004) Table C1.a.*

Notes: *Percent difference refers to the experimental group's figure subtracted from that of the comparison/control group.*

*Statistical significance is indicated by asterisks: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*

A2. K-12 Costs and Benefits of Early Childhood Education (2008 $)

	Perry	Head Start	Chicago CPC	Abecedarian	Aos et al. (2004) meta-analysis of ECE Programs
Special Education (SE)	No data	$2,211.33	$5,498.85	No data	$138.68
Grade Retention (GR)	No data	$207.57	$910.34	No data	$223.75
Grade Retention and Special Education	$16,706.12	$2,418.90	$6,409.19	$8,790.52	$362.43
Cost of Program	$17,282.51	$14,750.75	$8,056.24	$49,960.79	$7,785.87
Ratio of GR and SE benefits to program cost	0.38	0.17	0.73	0.21	0.04

Source: *Karoly and Cannon (2005) Table 4.4; Aos (2004) Appendix E; Masse and Barnett (2002) Table 8.2 ; Reynolds et al. (2002) Table 5A; Currie (2001) Table 3; Isaacs (2007) Table 2; Barnett (1985) Table 3.*

Notes: *K-12 Benefits include grade retention and special education. Values are adjusted using the Consumer Price Index for All Urban Consumers. na=not applicable/available. Benefits and costs are per participant.*

A3. Areas of potential reduced spending in Illinois due to school readiness through ECE investment

	Estimated ranges of returns on investment (ROI)	Programs/Studies
K-12 spending total	0.09 to 0.93	See below
Special education and grade repetition	0.04 to 0.73	Perry Preschool, Chicago CPC, Abecedarian Project, Aos et al. (2004) meta-analysis.
Dropouts and increased high school usage (state aid/revenue)	No estimates	Lynch (2007)
Teacher turnover	0.02 to 0.09	Belfield (2004)
Teacher absenteeism	0.01 to 0.04	Belfield (2004)
School safety programs	0.02 to 0.07	Belfield (2004)
English Language Learner Program usage	No estimates	Magnuson (2006)
Crime	0.00 to 11.30	See below plus Perry Preschool data and meta-analysis from Aos et al. (2004)
Juvenile crime	0.68 to 0.90	Reynolds et al. (2002) Chicago CPC, and national average from Oppenheim and MacGregor (2002)
Adult crime	0.39 to 0.40	Reynolds et al. (2002) Chicago CPC, and national average from Oppenheim and MacGregor (2002)
Crime victims	0.92 to 5.68	Reynolds et al. (2002) Chicago CPC, and national average from Oppenheim and MacGregor (2002)
Public assistance programs	0.00 to 0.03	Aos et al. (2004) meta-analysis, Masse and Barnett Abecedarian, national average from Oppenheim and MacGregor (2002), and Nores et al. (2005) Perry Preschool
TANF/AFDC	Negative ROI to 0.18	National average from Oppenheim and MacGregor (2002), Nores et al. (2005) Perry Preschool, and Masse and Barnett Abecedarian
Unemployment benefits	0.01	National average from Oppenheim and MacGregor (2002)
Medicaid	No estimates	
Child abuse & neglect	0.12 to 0.15	National average from Oppenheim and MacGregor (2002) and Reynolds et al. (2002) Chicago CPC
Health	No estimates	
Alcohol and drug use	0.04	Aos et al. (2004) meta-analysis
Tobacco use	3.91	Masse and Barnett Abecedarian

A3. Areas of potential reduced spending in Illinois due to school readiness through ECE investment (continued)

	Estimated ranges of returns on investment (ROI)	Programs/Studies
Child care	0.19 to 0.25	National average from Oppenheim and MacGregor (2002) and Reynolds et al. (2002) Chicago CPC
Increased earnings & income tax revenues	1.40 to 4.38	See below
Maternal earnings	0.44	Masse and Barnett Abecedarian
Participant earnings	0.87 to 3.32	Masse and Barnett Abecedarian, Reynolds et al. (2002) Chicago CPC, national average from Oppenheim and MacGregor (2002), and Nores et al. (2005) Perry Preschool
Participant taxes	0.17 to 0.93	Reynolds et al. (2002) Chicago CPC, national average from Oppenheim and MacGregor (2002), and Nores et al. (2005) Perry Preschool
Earnings of future generations	0.13	Masse and Barnett Abecedarian
TOTAL PROGRAM IMPACT	2.36 to 16.14	National average from Oppenheim and MacGregor (2002), Nores et al. (2005) Perry Preschool, Reynolds et al. (2002) Chicago CPC, Abecedarian Project, Aos et al. (2004) meta-analysis

Sources: *Isaacs (2007); Belfield (2006).*