The Economic Impact of Early Childhood Education in Colorado Springs

Economic Forum

COLLEGE OF BUSINESS

UNIVERSITY OF COLORADO
COLORADO SPRINGS

Analyses conducted by Tatiana Bailey, Ph.D., Executive Director
and Rebecca Wilder, Assistant Program Director
of the UCCS Economic Forum in April 2019

Families in the City of Colorado Springs

Introduction

A study was commissioned by the Legacy Institute to assess the economic impact of an early childhood education (ECE) program in Colorado Springs. Denver instituted an ECE program called the Denver Preschool Program (DPP) in 2006, and it has met great success. The Legacy Institute coalesced several individuals who worked on passing legislation for DPP, but also wished to include an economic impact study to provide information around the economic benefits of accessible childcare for the Colorado Springs region.

The primary mechanism by which early childhood learning impacts the local economy is via the improvement on workforce quality and quantity in both the short and long-term. In the short-term, more parents can work because they have affordable early education for their three and/or four year-old child(ren). More working parents means higher labor participation rates, an increase in the local and state tax base, and, for lower-income groups, a decrease in transfer payments such as Medicaid or food stamps. More workers also boosts the local measurement of output for all goods and services, gross metropolitan product (GMP). GMP is the local equivalent to national GDP, or gross domestic product—the primary measure of economic growth.

In the long-term, early learning opportunities for children have a plethora of academic and therefore (downstream) economic benefits for the children who directly participate in the programs. As in the case of short-term ECE benefits, both the quality and quantity of workers is impacted. In the case of children, however, those benefits are over a much longer time horizon since they occur over the course of K-12 in the form of cost savings and then after the child enters the workforce.

This report provides details on these economic short and long-term benefits. This enables residents and city leaders to have a holistic view not only of the costs of subsidized preschool, but also of the return on investment for children, households and the economy as a whole.

Target Population & Income Levels

The U.S. Census Bureau does an annual survey of households to supplement the decennial Census, and it is called the American Community Survey (ACS). According to the 2017 ACS, the city of Colorado Springs had 49,569 families with children under age 18. Sixty-nine percent of these were married-couple families, and 31% were single-parent families. A subset of 21,938 families included children under age 6, which is our target population.

The steering committee formed by The Legacy Institute looked at various ECE scenarios. The committee decided to focus upon an ECE program for four-year olds only leaving open a potential longer-term plan to expand the program to younger age groups in the future.

With that in mind, Brodsky Research, a commissioned consultant, estimated that a subsidized preschool program offered to four-year olds in the city of Colorado Springs would have 3,730 children enrolled. These participating families would have a weighted average annual income of $63,370 based on the expected participation in Table 1 below as provided by Brodsky Research. An economic impact of an ECE program in Colorado Springs was then conducted using these estimated participation rates and income levels.

Table 1. ECE Participation by Income Levels in the City of Colorado Springs

Income Levels	Expected Participation Rate
<$39,000	49.4%
$39,000—$74,999	22.5%
$75,000—$119,999	10.9%
>$120,000	17.2%

Source: Brodsky Research and ECE Committee commissioned by The Legacy Institute.

Short-Term Annual Benefits for Colorado Springs

Increase in Taxes due to Increase in Labor Participation

When parents have access to affordable childcare, they are more likely to participate in the labor force. The Center for American Progress analyzed the effects of universal preschool in Washington DC and found that there was an increase labor force participation rate of approximately 10% when women have access to preschool childcare compared to a 2% national increase in the absence of increased childcare access. For low-income mothers, they found the participation rate increased by 15%. A study by the UC Berkeley Labor Center on the impacts of early care and education in California similarly found an increase of up to 10% in maternal employment with full government funding of early childhood education. There are a plethora of benefits to increased work participation in the short and long-term. At a minimum in the short-term and in strictly financial terms, increased work participation translates to increased household income, an increase in the tax base, and an increase in productivity and output for the region.

With the calculated number of participating children and the income and subsidy distributions, it was found that the average family will save $3,644 in child care costs. If we apply this to the calculated weighted average income for ECE participating families, household income increases from $63,370 to $67,014 (up 6%).

If we assume half of our participating families will have a 15% increase in labor force participation and half will have a 10% increase assuming our participation levels by income (see Table 1), we will have approximately 466 parents join the labor force. Using the projected participation by income level from

Table 2. Increased Labor, Income Levels and Taxes

Income Levels*	New Workers	CO State Taxes Paid By Income Group	Increased City Sales Tax	TOTAL New State & Local Taxes
$39,000	230	$1,806	$287	$481,654
$57,000*	105	$2,639	$287	$307,506
$97,500*	51	$4,514	$287	$243,397
$120,000	80	$5,556	$287	$469,222
TOTAL	**466**	**$1,368,041**	**$133,738**	**$1,501,779**

*See Table 1 for details on income ranges and the two middle income levels are the midpoint of the corresponding ranges.
Sources: Center for American Progress; UC Berkeley Labor Force Center; Smart Asset, CO Income Tax Calculator; Living Colorado Springs; Economics Help; Equitable Growth; UCCS Economic Forum

Table 1 and the income levels seen in Table 2, we can calculate that Colorado state taxes paid by each income group will increase by $1,368,041 *annually*. Estimating the increase in Colorado state taxes is relatively straightforward because state income taxes are a flat 4.63% of gross income earned.

New household income also means ECE participating families will be able to increase their purchasing power. In order to calculate increased local sales taxes emanating from purchases made, we assume a conservative marginal propensity to consume of 0.91 and a sales tax rate of 8.65%. This would lead to an increase of $287 in tax revenue to the city of Colorado Springs per new worker each year. This would provide an additional $133,738 in sales tax to the city of Colorado Springs *annually*. That brings the total new state and local taxes to $1.5 million per year (Table 2). Some households may transition from renters to homeowners with their new income source, but this analysis does not incorporate this possible impact and therefore does not include the additional property tax revenue implicit in homeownership.

Additional workers will also have to pay federal taxes. If we incorporate federal taxes paid, the total taxation benefit from 466 new workers jumps dramatically to $3.2 million in new taxation revenue. However, for the purposes of this analysis, only state and local taxes were included in the total benefits shown on page 4. The focus of the ECE steering committee was to measure and disseminate information about the local and state benefits of early childhood education because funding for the initiative would emanate from local taxation.

Increase in Gross Metropolitan Product (GMP)

Gross Metropolitan Product (GMP) is the monetary value of all finished goods and services produced in a metropolitan area during a specific time period, usually a year. The Colorado Springs MSA (metropolitan statistical area) is made up of El Paso and Teller counties. GMP measurements are not available for cities—only metropolitan statistical areas.

In 2017, the U.S. Bureau of Economic Analysis found that the Colorado Springs MSA had a nominal GMP of $32.7 billion. The U.S. Census Bureau's American Community Survey of 2017 found that the Colorado Springs MSA had 331,679 working adults (ages 16 and older) in 2017. This would mean that the GMP per worker was $98,538. If we apply this amount to our 466 new workers, they would contribute an additional $45.9 million to GMP *annually* (in 2017 dollars).

Table 3. Increased Labor and GMP in the Colorado Springs MSA

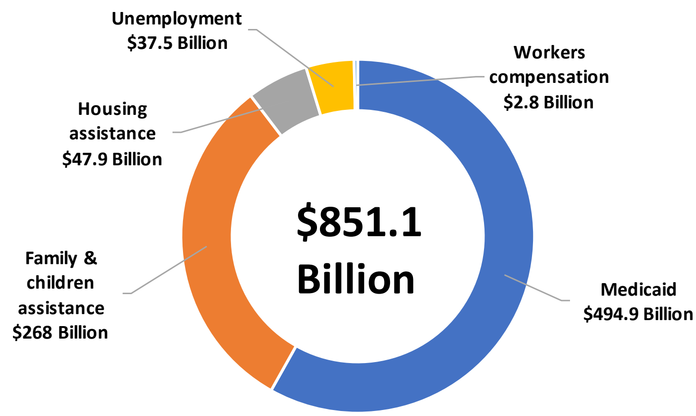
GMP per Worker	New Workers	Increase in GMP per Year (in 2017 $)	Annual % Increase in GMP
$98,538	466	$45,943,504	0.14%

Sources: U.S. Bureau of Economic Analysis; U.S. Census Bureau, American Community Survey 1-year estimates; UCCS Economic Forum

Welfare Dollars Saved

Welfare expenditures are typically reduced when workers move from unemployment to employment and when they earn a higher income level. There are at least 126 government welfare programs in the U.S. funded from a combination of local, state and federal taxes. Approximately $445 billion was spent on these welfare programs in 2018, and most welfare spending is for Medicaid and TANF, or temporary assistance for needy families. The expenditures represent 5.6% of total government spending or 2.0% of total U.S. gross domestic product (GDP) according to the Office of Management and Budget. Spending on welfare programs increased significantly under Presidents G.W. Bush and Barak Obama – but poverty rates have stayed roughly the same. Poverty is a multi-faceted and complicated generational issue, but the high level of spending without measurable changes in poverty begs the question of whether workforce training and participation may potentially offer some families a way out of poverty that is sustainable over time. Increases in labor participation increase household income and improve the chances of positively impacting generational poverty. Early childhood education also provides academic benefits to the children, which is another mechanism to possibly break the pattern of generational poverty.

Figure 1. Estimate of 2018 U.S. Welfare Spending



Source: https://www.lexingtonlaw.com/blog/finance/welfare-statistics.html

Many Americans participate in one or more welfare programs. In 2012, Census data showed that 52.2 million (or 21.3%) of Americans participate in some form of government, welfare assistance. Twenty four percent, or roughly one of four Americans, participated in the Medicaid program in 2016. About 39% of children received some kind of assistance and about 50% of welfare recipients are women in female-led households according to the Census Bureau and the Cato Institute. Over a quarter of individuals who receive any kind of welfare benefit do not work. Labor participation reduces welfare outlays by providing income to households and by increasing access for some workers to employer-sponsored benefits.

Estimates for the “average welfare” amount per family in the U.S. ranges from $14,000 to $35,000. A Cato study from 2013 found that Colorado ranked relatively low at $20,750 per year for the “average welfare amount” for a single mother with two children. This would include TANF, SNAP (supplemental nutrition assistance program), housing assistance, Medicaid, WIC (Women Infants and Children food subsidies), LIHEAP (heating assistance), and TEFAP (emergency food assistance). If we translate that amount to 2017 dollars, the “average welfare” amount for a Colorado family comes to $21,833.

The conservative estimate for the proportion of families that receive some form of social assistance in our ECE scenario is 49.4% (Brodsky Research Scenario 4.4 has 49.4% of ECE participating families at <130% of the federal poverty level, or FPL). This is likely an underestimate because many benefits have much higher income thresholds (e.g. 200% or 400% of the FPL). Under this conservative estimate and with the 31% of households being single-parent households, total welfare savings would come to $12.5 million. Table 4 on the next page summarizes the results.

Table 4. Welfare Savings from Increased Labor Participation			
Average Welfare Spending 2017	**Number of Single House-holds**	**Number of Single Households <130% of FPL**	**Total Welfare Savings for Single, Low-Income HHs**
$21,833	1,156	571	$12,471,276

Sources: Cato Institute and UCCS Economic Forum
Note: The average welfare spending was for a single parent with 2 children according to the Cato Institute. Total welfare spending in this analysis only included those ECE families at <130% of the FPL (49%) and those households who are single (31%).

Savings in K-12 Spending

Early childhood education has a positive impact on children throughout their academic journey. Some research seems to indicate that this early education only boosts intellectual abilities for the first few years and then fades as a child is further removed from the preschool experience. However, several longitudinal studies indicate that this is not necessarily accurate. "The Economic Consequences of Early Childhood Education on the School System" published in 2006 examined what happened when preschool for all four-year olds was made available on a part-day basis for the school year. They found the national average per pupil spending went down 6% *per year per pupil* throughout the thirteen academic years (kindergarten through 12th grade). These savings came from the following (see Appendices A and B for additional details):

- Reduced special education costs
- Lower grade-retention rates
- Lower teacher turnover and lower teacher absenteeism
- Reduced teacher-recruitment and retention costs
- Instructional time gained due to reduced drug education requirements
- Reduced spending on violence prevention and security
- Reduced in-school health and mental services costs

Colorado Springs District 11 spent $10,781 per student in the 2016-17 school year. Based on the Colorado Financial Transparency website, 91% of that funding, or $9,811, came from state and local sources. Applying the 6% savings to the $9,811, District 11 would save $589 per child per year, which would mean a total savings of $2.2 million each year once the 3,730 four-year olds in the program transition into K-12.

Table 5. K-12 Savings from Early Childhood Education Participants		
D 11 Per Pupil Savings Per Year	**Number of ECE Participants**	**Total Annual K-12 Savings (Assuming D11 Spend for 2016/17)**
$589	3,730	$2,195,637

Sources: Sources: *From Dollars and Sense: A Review of Economic Analyses of Pre-K, May 2007; CO Department of Education; UCCS Economic Forum;* https://coloradok12financialtransparency.com/#/organizations/2402

Annual Economic Summary

In sum, it is possible to tabulate the short-term, total annual benefits of an ECE program. It is important to remember that the short-term benefits described here have been calculated in the most conservative way. For example, federal tax revenue accrued through the (modestly calculated) increases in labor participation were not included. Only state and local tax revenue was included. Welfare savings were only calculated for the proportion of families at 130% of the federal poverty level or lower even though we know that individuals and families can qualify for various social programs at higher income thresholds.

Hence, total economic benefits including new state and local taxation from increased labor participation, reductions in welfare spending and decreases in K-12 spending accrue to $16.2 million per year. This results in a return on investment (or ROI) of 19% per year assuming that the Colorado Springs ECE programmatic costs would be $13.5 million per year. If we include the benefit of new federal tax revenue from the incremental increase in labor participation, the ROI increases to 31%.

Note that these calculations do not include the annual increase in GMP of $45.9 million (discussed on page 5).

Table 6. Annual State & Local Economic Benefits of a ECE Program	
State & Local Taxes	$1.5 million
State & Local Welfare Savings	$12.5 million
State & Local K-12 Savings	$2.2 million
TOTAL ANNUAL SAVINGS	**$16.2 million**
The ROI in the short-term is 19% per year.	

Sources: See Tables 1-5.
Note: The ROI is calculated assuming a programmatic cost of $13.5 million per year as provided by Brodsky Research.

Downstream Annual Benefits for Colorado Springs

Increase in Labor Participation and Lifetime Earnings for ECE Participants

An ECE program is an early intervention in the life-long learning process impacting adult social behavior, career options and earning potential. For this reason, there are also significant downstream benefits to early childhood education. Based on a meta-analysis, there is a 4% increase in graduation rates for children who have had pre-school education. This means that as the 3,730 four-year olds in the universal preschool program reach the end of 12th grade, an additional 149 of them will receive a high school diploma who would not otherwise have one. If we use Colorado Springs District 11 five-year graduation rates from the 2016-17 school year , the overall graduation rate for all income levels would increase from 76.8% to 80.8% for those students who had been in the universal preschool program. For those from economically disadvantaged families who participate in the ECE program, graduation rates would increase from 70.9% to 74.9%. Graduation rates for the 2016-17 academic year for all income levels and economically disadvantaged students were obtained through the Colorado Department of Education.

Obtaining a high school diploma increases the labor force participation rate. Based on the 2017 U.S. labor force participation rates by educational attainment, 20 of the 149 new high school graduates each year will participate in the labor force who would not be in the labor force if they had not received their diploma. Some of these 20 future workers may also go on to receive higher education. Table 7 shows the income levels and how much they increase based on educational attainment. The current intra-family benefit of going from no high school diploma to getting some college or an associate degree is an additional $18,111 annually or a $814,995 increase in lifetime earnings assuming a career that spans from ages 22 to 67. The modest increase in education attainment was used to gauge the household monetary benefit of higher educational attainment due to participation in a local ECE program. It is definitely possible that some ECE participants who obtain high school diplomas will obtain even higher education credentials.

Table 7. Median Earnings by Educational Attainment, Colorado Springs, 2017

Educational Attainment	Median Earnings	Increase in Earnings from No High School Graduation
All Levels of Education	$37,995	N/A
Less than high school graduate	$17,631	N/A
High school graduate (includes equivalency)	$27,818	$10,187
Some college or associate degree	$35,742	$18,111
Bachelor's degree	$49,257	$31,626
Graduate or professional degree	$66,336	$48,705

Sources: U.S. Census Bureau, American Community Survey 1-year estimates

Table 8. Annual State and Local Tax Revenue from New High School Graduates (in 2017 Dollars)				
Change in Educational Attainment & Labor Participation	Number of New Workers	Additional CO State Taxes Paid with Increased Income	Increased City Sales Tax	TOTAL New State & Local Taxes
Gain high school diploma and join workforce	9	$12,117	$20,600	$32,717
Gain some college or higher and join workforce	11	$18,227	$30,984	$49,211
Remain in workforce with new high school diploma	74	$34,855	$59,215	$94,070
Remain in workforce with some college or higher	55	$46,089	$78,313	$124,402
TOTAL	**149**	**$111,288**	**$189,113**	**$300,401**
Sources: Colorado Department of Education; Brodsky Research; Center for American Progress; UC Berkeley Labor Force Center; Smart Asset, CO Income Tax Calculator; Living Colorado Springs; Equitable Growth; UCCS Economic Forum				

If we apply these graduation rates from Colorado Springs District 11's class of 2017, we can also calculate the increases in state and local tax revenue (see Table 8). The annual gain in state and local taxes in 2017 dollars is $300,401. This does not include the potential home buying and property taxes that may emanate from increased work and earnings.

Downstream Increase in Gross Metropolitan Product (GMP) as a Result of Increase in Labor Participation

Gross Metropolitan Product (GMP) is the monetary value of all finished goods and services produced in a metropolitan area during a specific time period, usually a year. The Colorado Springs MSA (metropolitan statistical area) is made up of El Paso and Teller counties. This measurement is not made for cities.

In 2017, the U.S. Bureau of Economic Analysis found that the Colorado Springs MSA had a nominal GMP of $32.7 billion. The U.S. Census Bureau's American Community Survey in 2017 found that the Colorado

Table 9. Increased Labor and GMP in the Colorado Springs MSA			
GMP per Worker (in 2017)	New Workers	Increase in GMP per Year (in 2017 $)	Annual % Increase in GMP
$98,538	20	$1,970,767	0.01%
Sources: U.S. Bureau of Economic Analysis; U.S. Census Bureau, American Community Survey 1-year estimates; UCCS Economic Forum			

Springs MSA had 331,679 working adults (ages 16 and older) in 2017. This would mean that the GMP per worker was $98,538. If we apply this amount to our 20 new workers who would not otherwise be in the labor force, they would contribute an additional $1.97 million to GMP *annually* (in 2017 dollars). While there are another 129 workers who have higher educational attainment and earnings due to ECE, we cannot calculate their impact on GMP and therefore do not include it in any of the tabulations. Table 9 summarizes these results.

Reduced Arrests & Incarceration

Comprehensive research has shown significant downstream benefits in the avoidance of incarceration for children who participate in ECE programs. Preschool program participants have shown lower incarceration rates, lower overall arrest rates, including arrests for felonies, drug-related, and violent crimes. Returns on investment (ROI) from crime savings have been calculated in "Dollars and Sense: A Review of Economic Analyses of Pre-K". The study demonstrated a 66% ROI in crime savings of the 75%

Table 10. Reductions in Crime Related to ECE Participation		
Study	ROI for ECE Pro-gram	Component of ROI from Savings in Crime-Related Expenditures
High/Scope Perry Preschool Program	75%	66%
Chicago Child-Parent Centers	54%	28%
Pre-K for All In California	33%	8%
Sources: U.S. Census Bureau, American Community Survey 1-year estimates		

overall ROI to the general public from participation in the High/Scope Perry Preschool Program. For program participants of the Chicago Child-Parent Centers, a 28% ROI was calculated for crime savings of the overall 54% return to the general public of an ECE program. For the Pre-K for All in California program, a 33% ROI to the government was calculated with 8% of that benefit emanating from crime savings.

Lower rates of crime, including significantly lower levels of violent offenses, drug-related crime, and felony arrests have real impact for individuals and the community. A current analysis of the local homeless population at Homeward Pikes Peak shows that homeless individuals overwhelmingly have family histories of alcohol and drug abuse, exposure to violence, and incarceration. We can make a logical assumption that any early-intervention programs that reduce incarceration would likely reduce homelessness.

Summary Including the Downstream Benefits

Although there is no question that ECE downstream benefits could easily include savings from averted incarceration, increased property taxes from new homeowners who are able to purchase a home because of their higher educational attainment, and increased purchasing power due to higher income levels, only the increased state and local taxation of new workers who graduate from the ECE program is included. Likewise, this approach does not incorporate the normative value of increased household income for ECE graduates who have obtained more education than they would have in the absence of early education. Nor does this approach include the community-wide benefit of increased gross metropolitan product emanating from new workers.

Table 11. Return on Investment Including Downstream Taxation Benefit	
Short-Term Benefits per Year:	
State & Local Taxes from Increased (Parent) Participation	$1.5 million
State & Local Welfare Savings	$12.5 million
K-12 State & Local Savings	$2.2 million
Long-Term Benefits per Year:	
Future State & Local Taxes (of ECE graduates)	$300,401
TOTAL ANNUAL IMPACT	$16.5 million
The new ROI incorporating the downstream impact is 22% per year	
Sources: U.S. Bureau of Economic Analysis; U.S. Census Bureau, American Community Survey 1-year estimates; UCCS Economic Forum	

Nonetheless, the annual ROI increases to 22% when the future state and local tax revenue of ECE graduates is included (see Table 11). Again, this is assuming a cost of $13.5 million for the implementation of a subsidized ECE program in Colorado Springs. There are two important take-aways from this conservative approach.

One, an annual return on investment of 22% is still highly impressive and easily greater than most public or private investments of any kind could yield in any given year. It shows the ubiquitous benefits of investment in human capital, especially for new workers and their children. The ROI could be significantly inflated with the additional dimensions discussed above. However, this cautious approach enables advocates to market the program with a relatively resilient set of arguments and assumptions.

Two, if an ECE program were to fund, it is recommended that all the parameters included in this assessment be tracked longitudinally. This will be an important safeguard to ensuring that stakeholders have all the information they need to justify the continuation of ECE funding in future years. In addition, it is recommended that incarceration rates also be tracked so that we can hone in on a more precise, local measure of the impact of ECE on local incarceration rates.

The United States, like most developed countries, is in a transformative demographic transition. We are an aging population that will grow increasingly dependent on younger generations. This makes it particularly important for policy makers and citizens alike to invest in the potential intellectual capital of our young children. A participating, qualified and capable workforce will be key to sustainable economic growth in today's highly competitive global arena.

Appendix A

Economic Returns of Pre-K for All Four Year Olds Part Day Pre-School for the School Year (2006 $)	
Reduced special education costs	$600 to $1,600
Lower grade-retention rates	$100 to $120
Lower teacher turnover	$300 to $400
Lower teacher absenteeism	$200 to $250
Reduced teacher-recruitment & retention costs	$935 to $1,000
Instructional time gained due to reduced drug education requirements	$120 to $150
Reduced spending on violence prevention & security	$250 to $290
Reduced in-school health & mental health services costs	$120 to $575
TOTAL K-12 SAVINGS TO THE SCHOOL SYSTEM FOR EACH ADDITIONAL CHILD SERVED IN A PRE-K PROGRAM (13 years)	**$2,625 to $4,385**
Note: At the time of this data, the average K-12 annual spending per pupil was $6,645.	
Sources: "The Economic Consequences of Early Childhood Education on the School System"; *Dollars and Sense: A Review of Economic Analyses of Pre-K,* May 2007	

Appendix B

Impacts of High-Quality Pre-K on Child and Parent Outcomes Results from 3 Longitudinal Studies			
	Chicago Child-Parent Centers	**High/Scope Perry Preschool**	**Carolina Abecedarian Project**
Type of Program	*Targeted pre-K for 3 & 4 year olds; part day; school year; included extra support for parents*	*Targeted pre-K for 3 & 4 year olds; part day; school year; included extra support for parents*	*Comprehensive early care & ed; birth through 5 years; full day; full year; included extra support for parents*
Increased Lifetime Earnings	$20,517 *(1998 $)*	$50,448 *(2000 $)*	$29,274 *(2002 $)*
Increased Tax Revenue	$7,243 *(1998 $)*	$14,078 *(2000 $)*	$8,257 *(2002 $)*
Increased Maternal Earnings	*Not measured*	*Not measured*	$68,728 *(2002 $)*
Child Care Savings	$1,657 *(1998 $)*	$906 *(2000 $)*	$27,612 *(2002 $)*
Special Education Placement	-41%	-26%	-48%
Grade Retention	-40%	-13%	-44%
High School Completion	+20%	+44%	+4%
College Enrollment	+33%	*No difference observed*	+157%
Arrest by Age 19	-32%	-39%	*No difference observed*
Incarceration	*-5%**	-46%	*A reduction was found but it was not statistically significant*
Reliance on Welfare	*Not measured*	-17%	-50%
Incidence of Child Abuse & Neglect	-51%	*Not measured*	*Not measured*

Note: Perry program followed children until they were 40; Abecedarian followed children until they were 21; and Chicago children were followed until age 21, but the study was ongoing at the time of publication. *Please see study specifics since this was an ongoing study at the time of publication. Source: *Dollars and Sense: A Review of Economic Analyses of Pre-K,* May 2007

APPENDIX