

# Early Childhood Education

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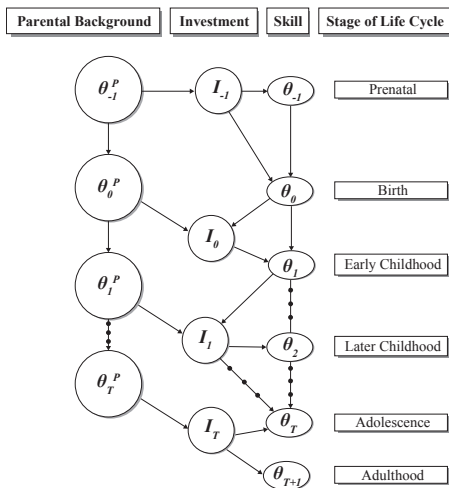
# Overview of the Programs

		Eligibility					Content		
		Means-tested	High Disadvantage	Low Income	Criteria Narrowly Defined	Homogeneous Treatment	Medical Services	Home Visiting	Parent Involvement
Demonstration Programs	ABC	✓	✓	✓	✓	✓	✓	-	✓
	PPP	✓	✓	✓	✓	✓	-	✓	✓
	ETP	✓	✓	✓	✓	-	-	✓	✓
	IHDP	*	-	-	-	✓	✓	✓	✓
Head Start	HSIS	✓	-	✓	-	- **	✓	✓	✓
	NLSY79/CNLSY	✓	-	✓	-	-	✓	✓	✓
Universal Programs	State Pre-K: OK	-	-	-	-	-	-	-	-
	State Pre-K: GA	-	-	-	-	-	-	-	-
	Local Pre-K: Boston	-	-	-	-	-	-	-	-
	Reform in Norway	-	-	-	-	-	-	-	-
Other Programs	TN-VPK	✓	-	✓	-	-	-	-	-

# Overview of the Programs

		Sample Characteristics				Measures Available								
		Randomized Control Trial	Small Sample	Control Contamination	Age of Follow-ups	IQ	Achievement	Non-Cognitive	Parenting Skills	Subject Employment	Educational Attainment	Use of Public Transfers	Crime	Health
Demonstration Programs	ABC	✓	✓	✓	34	✓	✓	✓	✓	✓	✓	✓	✓	✓
	PPP	✓	✓	-	40	✓	✓	✓	-	✓	✓	✓	✓	-
	ETP	✓	✓	-	20	✓	✓	-	-	-	✓	-	-	-
	IHDP	✓	-	✓	18	✓	✓	✓	✓	-	✓	-	-	-
Head Start	HSIS	✓	-	✓	8	✓	✓	✓	-	-	-	-	-	-
	NLSY79/CNLSY	-	-	✓	21	-	✓	✓	-	✓	✓	✓	✓	✓
Universal Programs	State Pre-K: OK	-	-	-	9	-	✓	-	-	-	-	-	-	-
	State Pre-K: GA	-	-	-	9	-	✓	-	✓	-	-	-	-	-
	Local Pre-K: Boston	-	-	- ****	6	-	✓	✓	-	-	-	-	-	-
	Reform in Norway	-	-	-	33	-	✓	-	✓	✓	-	-	-	-
Other Local Programs	TN-VPK	✓	-	✓****	6	-	✓	✓	-	-	-	-	-	-

# The Technology of Skill Formation



*Note:* This figure illustrates the technology of skill formation, where links in the technology are represented by arrows. Dots represent periods that are not depicted in the diagram.

# Summary of Demonstration Programs

	PPP	ABC
<b>Program Overview<sup>1</sup></b>		
Years Implemented	1962–1967	1972–1982
Site	Ypsilanti, Michigan	Chapel Hill, North Carolina (UNC)
# Cohorts	5	4
N (Treatment:Control)	123 (58 : 65)	111 (57 : 54)
Age of Entry	3–4	0
Duration	1–2 years	5 years
<b>Treatment</b>		
Home visits <sup>2</sup> (per month)	4	0
Center care (weeks per year)	30	50
Center care (hours per week)	12–15	45
Parent Involvement	✓	-
Nutrition	-	✓
Diapers/Child Care Goods	-	✓
Well-child Health Care	-	✓
Ill-child Health Care	-	✓
Counseling	-	✓
Parenting Instruction	✓	-

## Summary of Demonstration Programs Cont'd

	IHDP	ETP
<b>Program Overview<sup>1</sup></b>		
Years Implemented	1985–1988	1962-1968
Site	8 sites selected after competitive review	Segregated black schools in Abbottsfield, Tennessee
# Cohorts	1	2
N (Treatment:Control)	985 (377 : 608)	88 (43 : 45)
Age of Entry	0	4–5
Duration	3 years	2–3 years
<b>Treatment</b>		
Home visits <sup>2</sup> (per month)	4 (up to age ), 1–2 (after age 1)	4
Center care (weeks per year)	50	10
Center care (hours per week)	20+	20
Parent Involvement	✓	-
Nutrition	-	-
Diapers/Child Care Goods	✓	-
Well-child Health Care	✓	-
Ill-child Health Care	✓	-
Counseling	✓	-
Parenting Instruction	✓	✓

# Summary of Demonstration Programs Cont'd

	PPP	ABC
<b>Control<sup>3</sup></b>		
Home Visits (per month)	-	-
Center Care (weeks per year)	-	-
Center Care (hours per week)	-	-
Nutrition	-	✓ (Formula up to 15 mo)
Diapers (No other health care goods)	-	✓ (up to 15 mo)
Well-child Health Care	-	✓ (Cohort 1, up to Age 1)
Ill-child Health Care	-	-
Counseling	-	-
Parenting Instruction	-	-
<b>Randomization Protocol</b>		
Steps	<ol style="list-style-type: none"> <li>1. Rank by initial IQ of child</li> <li>2. Group evens and odds</li> <li>3. Balance gender, SES, etc.</li> <li>4. Randomize whole group</li> </ol>	<ol style="list-style-type: none"> <li>1. Match on HRI *</li> <li>2. Adjust by gender, maternal IQ, siblings</li> <li>3. Randomize pairs</li> </ol>
<b>Compromises</b>	<p>Enrolled siblings receive same assignment</p> <p>Working moms switched to control</p>	<p>2 extremely needy switched to treatment</p> <p>4 refused random assignment</p> <p>4 abandoned treatment</p> <p>2 considered ineligible after randomization</p>
<b>Counterfactual</b>	<p>Stay at home or with friends or relatives</p> <p>(Few substitutes)</p>	<p>Stay at home or childcare</p> <p>Alternative programs available</p>

## Summary of Demonstration Programs Cont'd

	IHDP	ETP
<b>Control<sup>3</sup></b>		
Home Visits (per month)	-	-
Center Care (weeks per year)	-	-
Center Care (hours per week)	-	-
Nutrition	-	-
Diapers (No other health care goods)	-	-
Well-child Health Care	✓	-
Ill-child Health Care	-	-
Counseling	-	-
Parenting Instruction	-	-
<b>Randomization Protocol</b>		
Steps	<ol style="list-style-type: none"> <li>1. Stratify on birthweight and site</li> <li>2. Randomize</li> </ol>	Simple randomization into 2 treatment and 1 control groups
<b>Compromises</b>		
	17 families refused to participate in the study after assignment	N/A
<b>Counterfactual</b>		
	Stay at home or childcare Alternative programs available	Stay at home or with friends or relatives (Few substitutes)



## Summary of Demonstration Programs Cont'd

	PPP	ABC
<b>Program Eligibility<sup>4</sup></b>	Cultural Deprivation Scale < 11 Low IQ (< 85) African American No physical handicap	HRI $\geq$ 11 Biologically healthy No signs of mental retardation
<b>Curriculum<sup>6</sup></b>		
Adult-Child Ratio	1:5–1:6	1:3 (Age 0–1); 1:4-5 (Age 1–4); 1:5-6 (Age 4–5)
Staff & Certifications		
Teachers	B.A. <sup>⊕</sup>	HS grads, mixed <sup>∘</sup>
Specialists	Special Ed. Teachers <sup>⊕</sup>	Physician, Nurse M.A. <sup>∘</sup>
Language Development	✓	✓
Motor Development	-	✓
Cognitive Development	✓	✓
Socio-Emotional Development	✓	✓
Task Orientation	-	✓
High-Risk Behavior	-	✓
School Readiness	✓	✓

## Summary of Demonstration Programs Cont'd

	IHDP	ETP
<b>Program Eligibility<sup>4</sup></b>	Live within 45 min from center Birth weight < 2500g Gestational age < 37 weeks No severe illnesses or neurological defects	Home environment Education of parents Parent occupation semi- or unskilled African American  Parent edu ≤ high school
<b>Curriculum<sup>6</sup></b>		
Adult-Child Ratio	1:3–1:4	1:4–1:6
Staff & Certifications		
Teachers	College grads	○
Specialists	College grads <sup>○</sup>	Teaching Assistants, college & PhD students
	Clinical staff	Home visitors <sup>⊕○</sup>
Language Development	✓	✓
Motor Development	✓	-
Cognitive Development	✓	✓
Socio-Emotional Development	✓	✓
Task Orientation	-	✓
High-Risk Behavior	-	-
School Readiness	✓	✓

## Demonstration Programs Population

**Table 1:** Control Group Background Characteristics at Baseline, All the Programs (Mean Outcomes)

	PPP		ABC		IHDP		ETP	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Black	100%	0%	97%	16%	53%	50%	100%	0%
IQ, Ages 2–4	79.02	6.44	90.42	11.46	88.00	20.16	87.29	11.88
Mother's Age	29.10	6.57	19.89	4.82	24.87	6.00	30.11	8.84
Mother's Education	9.42	2.20	10.23	1.84	12.40	2.42	8.96	2.62
Mother Works	20%	40%	73%	45%	34%	47%	40%	49%
Father at Home	53%	50%	29%	46%	56%	50%	87%	34%
Father's Age	32.81	6.88	23.21	5.91	27.64	6.67	32.82	10.10
Father's Education	8.60	2.40	10.95	1.76	13.16	2.89	9.59	2.75
Father Works	86%	35%	87%	34%	51%	50%	97%	17%
Household Income	N/A	N/A	7,653.18	10,049.44	41,868.45	32,623.21	N/A	N/A
Siblings	4.28	2.59	0.64	1.10	1.02	1.17	3.59	2.21
Treatment	47%	50%	52%	50%	39%	49%	48%	50%

Source: Authors' calculations. Note: Household Income in 2014 USD.

**Table 2:** Treatment Effects on Early-life Skills Pooled Samples, All Programs

		Treatment Effect	<i>p</i> -values (adjusting for multiple hypothesis testing)
Perry	Early IQ, Age 5	11.422	0.000
	School Age Achievement, Age 5–10	0.394	0.000
	School Age Conscientiousness, 4–7	0.273	0.042
	Adulthood Achievement, Age 27	0.281	0.044
ABC	Early IQ, Age 5	6.398	0.018
	School Age Achievement, Age 5–10	0.544	0.004
	School Age Conscientiousness, Age 4–7	0.047	0.476
	Adulthood Achievement, Age 21	0.422	0.008
IHDP	Early IQ, Age 3	8.475	0.000
	School Age Achievement, Age 5–10	-0.012	0.412
	School Age Conscientiousness, 4–7	0.075	0.100
	Adulthood Achievement, Age 18	0.108	0.502
ETP	Early IQ, Age 4	6.296	0.058
	School Age Achievement, Age 5–10	0.336	0.066

Source: Authors' calculations.

Table 3: Treatment Effects on Early-life Skills Females, All Programs

		Treatment Effect	<i>p</i> -values (adjusting for multiple hypothesis testing)
Perry	Early IQ, Age 5	12.666	0.000
	School Age Achievement, Age 5–10	0.564	0.126
	School Age Conscientiousness, Age 4–7	0.515	0.308
	Adulthood Achievement, Age 27	0.407	0.140
ABC	Early IQ, Age 5	3.051	0.028
	School Age Achievement, Age 5–10	0.822	0.292
	School Age Conscientiousness, Age 4–7	0.110	0.536
	Adulthood Achievement, Age 21	0.737	0.226
IHDP	Early IQ, Age 3	9.877	0.000
	School Age Achievement, Age 5–10	-0.034	0.560
	School Age Conscientiousness, Age 4–7	0.089	0.194
	Adulthood Achievement, Age 18	0.517	0.570
ETP	Early IQ, Age 4	8.536	0.054
	School Age Achievement, Age 5–10	0.717	0.128

Source: Own calculations.

Note: See note in Table 2.

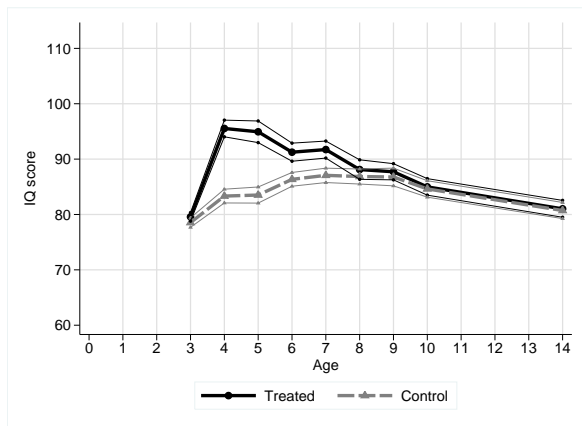
Table 4: Treatment Effects on Early-life Skills Males, All Programs

		Treatment Effect	p-values (adjusting for multiple hypothesis testing)
Perry	Early IQ, Age 5	10.607	0.000
	School Age Achievement, Age 5–10	0.269	0.008
	School Age Conscientiousness, Age 4–7	0.087	0.018
	Adulthood Achievement, Age 27	0.214	0.090
ABC	Early IQ, Age 5	9.962	0.514
	School Age Achievement, Age 5–10	0.277	0.012
	School Age Conscientiousness, Age 4–7	0.009	0.498
	Adulthood Achievement, Age 21	0.095	0.064
IHDP	Early IQ	6.988	0.000
	School Age Achievement, Age 5–10	0.012	0.656
	School Age Conscientiousness, Age 4–7	0.065	0.116
	Adulthood Achievement, Age 18	-0.456	0.390
ETP	Early IQ, Age 4	7.819	0.108
	School Age Achievement, Age 5–10	0.289	0.014

Source: Own calculations.

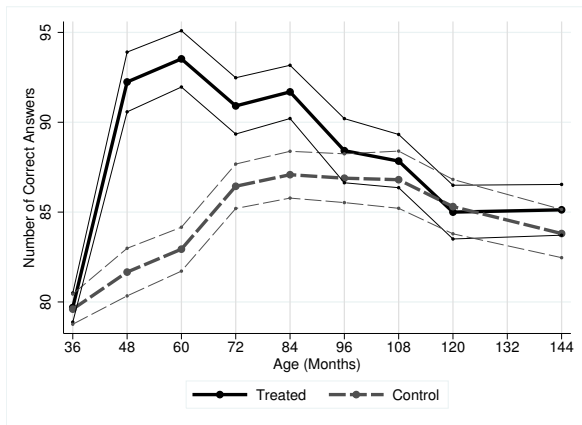
Note: See note in Table 2.

**Figure 1:** Dynamics of Standardized IQ in the Perry Preschool Project



Source: Reproduced from Hojman (2015).

Figure 2: Dynamics of Raw IQ in the Perry Preschool Project



Source: Reproduced from Hojman (2015).



# Long-Term Outcomes, PPP and ABC

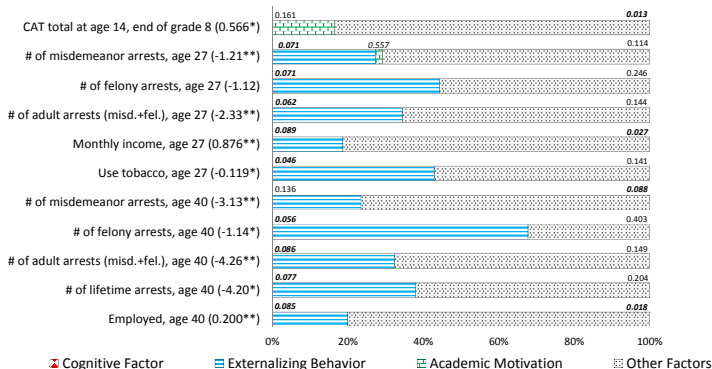
	Age	PPP		Age	ABC	
		Female	Male		Female	Male
<b>Cognition and Education</b>						
<b>Adult IQ</b>	-	-	-	21 <sup>⊖</sup>	10.275 <b>(0.005)</b>	2.588 <b>(0.130)</b>
<b>High School Graduation</b>	19 <sup>⊗</sup>	0.56 <b>(0.000)</b>	0.02 <b>(0.416)</b>	21 <sup>⊖</sup>	0.238 <b>(0.090)</b>	0.176 <b>(0.100)</b>
<b>Economic</b>						
<b>Employed</b>	40 <sup>⊗</sup>	-0.01 <b>(0.615)</b>	.29 <b>(0.011)</b>	30 <sup>⊖</sup>	0.147 <b>(0.135)</b>	0.302 <b>(0.005)</b>
<b>Yearly Labor Income, 2014 USD</b>	40 <sup>⊗</sup>	\$6,166 <b>(0.224)</b>	\$8,213 <b>(0.150)</b>	30 <sup>⊖</sup>	\$ 3,578 <b>(0.000)</b>	\$17,214 <b>(0.110)</b>
<b>HI by Employer</b>	40 <sup>⊗</sup>	0.129 <b>(0.055)</b>	0.206 <b>(0.103)</b>	31 <sup>⊕</sup>	0.043 <b>(0.512)</b>	0.296 <b>(0.035)</b>
<b>Ever on Welfare</b>	18–27 <sup>⊗</sup>	-0.27 <b>(0.049)</b>	0.03 <b>(0.590)</b>	30 <sup>⊖</sup>	0.006 <b>(0.517)</b>	-0.062 <b>(0.000)</b>

Source: PPP results taken from Heckman et al. (2010a) and Conti et al. (2015). ABC results taken from Campbell et al. (2014) and Elango et al. (2015).

# Long-Term Outcomes, PPP and ABC Cont'd

	Age	PPP Female	Male	Age	ABC Female	Male
<b>Crime</b>						
<b># of Arrests*</b>	≤40⊗	-2.77 <b>(0.041)</b>	-4.88 <b>(0.036)</b>	≤34⊖	-5.061 <b>(0.051)</b>	-6.834 <b>(0.187)</b>
<b># of Non-Juv. Arrests</b> <i>One-sided permutation</i>	≤40⊗	-2.45 <b>(0.051)</b>	-4.85 <b>(0.025)</b>	≤34⊖	-4.531 <b>(0.061)</b>	-6.031 <b>(0.181)</b>
<b>Lifestyle</b>						
<b>Self-reported Drug User</b>	-	-	-	30⊖	0.031 <b>(0.590)</b>	-0.438 <b>(0.030)</b>
<b>Not a Daily Smoker</b>	27⊗	0.111 <b>(0.110)</b>	0.119 <b>(0.089)</b>	-	-	-
<b>Not a Daily Smoker</b>	40⊗	0.067 <b>(0.206)</b>	0.194 <b>(0.010)</b>	-	-	-
<b>Physical Activity</b>	40⊗	0.330 <b>(0.002)</b>	0.090 <b>(0.545)</b>	21⊕	0.249 <b>(0.004)</b>	0.084 <b>(0.866)</b>
<b>Health</b>						
<b>Obesity (BMI &gt;30)</b>	-	-	-	30-34⊖	0.221 <b>(0.920)</b>	-0.292 <b>(0.060)</b>
<b>Hypertension I</b>	-	-	-	30-34⊖	0.096 <b>(0.380)</b>	0.339 <b>(0.010)</b>

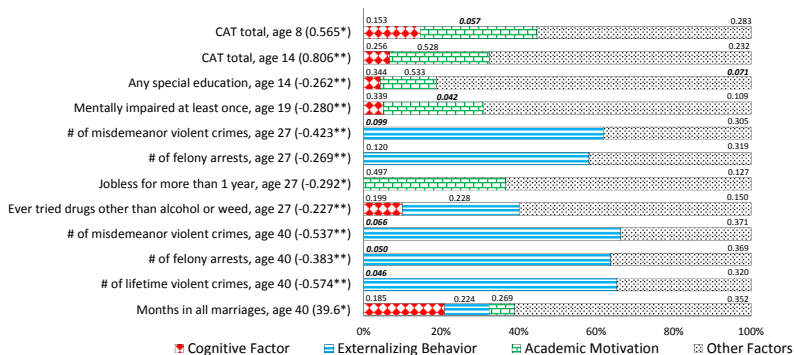
**Figure 3:** Decompositions of Treatment Effects of the Perry Preschool Project on Male Adult Outcomes



Source: Reproduced from Heckman et al. (2013).

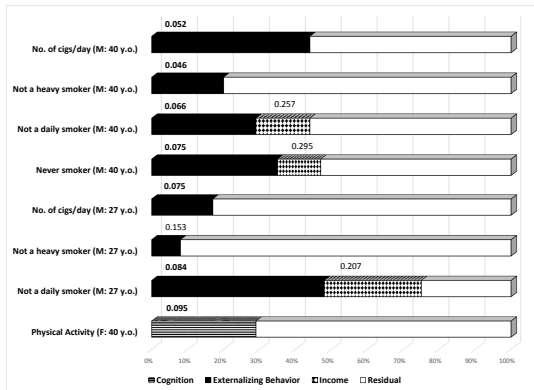
# Connecting Short-Term and Long-Term Effects

**Figure 4:** Decompositions of Treatment Effects of the Perry Preschool Project on Female Adult Outcomes



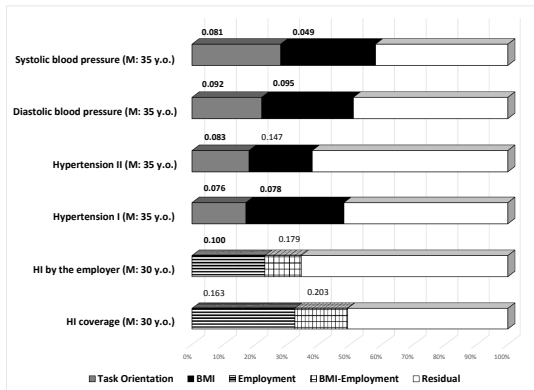
Source: Reproduced from Heckman et al. (2013).

**Figure 5:** Dynamic Mediation Analysis of Treatment Effects on Male Adult Outcomes, PPP



Source: Reproduced from Conti et al. (2015).

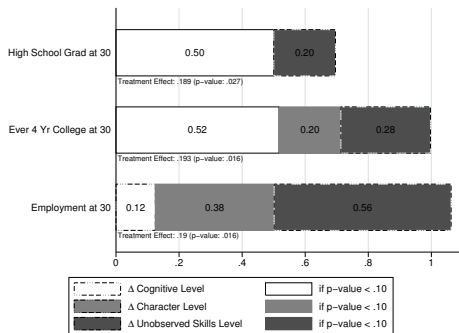
**Figure 6:** Dynamic Mediation Analysis of Treatment Effects on Male Adult Outcomes, ABC



Source: Reproduced from Conti et al. (2015).

## Connecting Short-Term and Long-Term Effects

**Figure 7:** Cognitive and Non-Cognitive (Character) Skills as Education and Employment Mediators of Treatment Effects, ABC All



Source: Reproduced from García (2014).

## Costs and Benefits of PPP

Net Present Value	PPP		
	Female	Male	Pooled
Parent Income	-	-	-
Control Group Preschool Program Cost per Recipient	\$20,778	\$20,778	\$20,778
Education Costs	\$6,490	\$13,242	\$5,060
Subject Labor Income	\$149,157	\$50,269	\$91,283
Subject Transfer Income	\$6,437	-\$2,833	\$4,327
Medical Expenditures	-	-	-
Savings in Crime	\$20,082	\$119,251	\$78,133
Subject QALY	-	-	-
Net Benefit	\$126,846	\$140,868	\$135,054
Benefit-Cost Ratio	8.1:1	8.9:1	8.6:1
s.e.	(5.0)	(4.3)	(3.9)
Internal Rate of Return	0.116	0.104	0.083
s.e.	(3.2)	(2.8)	(2.6)

Source: Estimates from Heckman et al. (2010b).



## Costs and Benefits of ABC

Net Present Value	ABC		
	Female	Male	Pooled
Parent Income	\$88,358	\$88,358	\$88,358
Control Group Preschool	\$1,832	\$1,292	\$1,469
Program Cost per Recipient	\$91,519	\$91,519	\$91,519
Education Costs	\$28,715	\$5,083	\$12,586
Subject Labor Income	\$36,270	\$89,417	\$70,798
Subject Transfer Income	\$2,614	\$1,729	\$2,256
Medical Expenditures	\$9,920	\$22,236	\$19,604
Savings in Crime	\$9,924	\$219,911	\$101,726
Subject QALY	\$2,997	\$21,845	\$19,985
Net Benefit	\$31,671	\$358,352	\$200,009
Benefit-Cost Ratio	1.4:1	4.9:1	3.2:1
s.e.	(0.98)	(3.19)	(1.53)
Internal Rate of Return	0.041	0.127	0.110
s.e.	(0.10)	(0.06)	(0.05)

Source: Estimates from Elango et al. (2015).

**Table 5:** Selected Evidence on the Impacts of Head Start

Study	Currie and Thomas (1995)	Garces et al. (2002)	Ludwig and Miller (2007)
Dataset	C-NLSY	PSID	Multiple
Subpopulation	AA	AA, mother edu. $\leq$ high school	
Years of birth	1979-1987	1966-1977	1960-1975
<b>Impacts</b>			
IQ/achievement, ages 3-4	-	-	-
Behavior, ages 3-4	-	-	-
IQ/achievement, ages 5-6	<b>0.46</b>	-	-
	(0.129)	-	-
IQ/achievement, ages 7-21	0.201	-	-
	(NA)	-	-
Grade retention ever	-0.008	-	-
	(0.098)	-	-
High School grad. (no GED)	-	0.00	0.117
	-	(0.071)	(0.080)
Attended some college	-	0.031	<b>0.028</b>
	-	(0.067)	(0.019)

**Table 5:** Selected Evidence on the Impacts of Head Start Cont'd

<b>Study</b>	Deming (2009)	Carneiro and Ginja (2014)	Feller et al. (2014)	Kline and Wal- ters (2014)
Dataset	C-NLSY	C-NLSY	HSIS	HSIS
Subpopulation	AA	Males		
Years of birth	1979-1986	1977-1996	1998-1999	1998-1999
<b>Impacts</b>				
IQ/achievement, ages 3-4	-	-	<b>0.230</b> (0.038)	<b>0.375</b> (0.047)
Behavior, ages 3-4	-	-	<b>0.230</b>	<b>0.375</b>
IQ/achievement, ages 5-6	<b>0.287</b> (0.095)	-	-	-
IQ/achievement, ages 7-21	0.031 (0.076)	-	-	-
Grade retention ever	<b>-0.107</b> (0.056)	-	-	-
High School grad. (no GED)	0.067 (0.044)	-	-	-
Attended some college	<b>0.136</b> 0.049	-	-	-

**Table 5:** Selected Evidence on the Impacts of Head Start Cont'd

<b>Study</b>	Zhai et al. (2014)	Perry Preschool (own calculations) Authors' data	Abecedarian (own calculations) Authors' data
Dataset	HSIS	AA, low child	98% AA, low
Subpopulation		IQ at entry & SES	mother IQ
Years of birth	1998-1999	1959-1964	1972-1977
<b>Impacts</b>			
IQ/achievement, ages 3-4	<b>0.30</b> -	<b>0.696</b> (0.136)	<b>0.866</b> (0.181)
Behavior, ages 3-4	<b>.35-.19</b>	-	-
IQ/achievement, ages 5-6	-	<b>0.297</b> (0.122)	<b>0.359</b> (0.153)
IQ/achievement, ages 7-21	-	-0.109 (0.149)	<b>0.226</b> (0.142)
Grade retention ever	-	-	-
High School grad. (no GED)	-	-	-
Attended some college	-	-	-

**Table 6:** Selected Evidence on the Impacts of Head Start Cont'd

Study	Currie and Thomas (1995)	Garces et al. (2002)	Ludwig and Miller (2007)
Dataset	C-NLSY	PSID	Multiple
Subpopulation	AA	AA, mother edu. $\leq$ high school	
Years of birth	1979-1987	1966-1977	1960-1975
Impacts			
Earnings, ages 23-40	-	0.051	-
	-	(0.357)	-
Idle	-	-	-
	-	-	-
Ever booked crime	-	<b>-0.126</b>	-
	-	(0.05)	-
Behavior Index, ages 12-13	-	-	-
	-	-	-
Depression Scale, ages 16-17	-	-	-
	-	-	-

**Table 7:** Selected Evidence on the Impacts of Head Start Cont'd

<b>Study</b>	Deming (2009)	Carneiro and Ginja (2014)	Feller et al. (2014)	Kline and Wal- ters (2014)
Dataset	C-NLSY	C-NLSY	HSIS	HSIS
Subpopulation	AA	Males		
Years of birth	1979-1986	1977-1996	1998-1999	1998-1999
<b>Impacts</b>				
Earnings, ages 23-40	-	-	-	-
Idle	-0.030 (0.053)	-	-	-
Ever booked crime	0.051 0.050	-	-	-
Behavior Index, ages 12-13	-	-0.647 (0.582)	-	-
Depression Scale, ages 16-17	-	-0.552 (0.489)	-	-

**Table 7:** Selected Evidence on the Impacts of Head Start Cont'd

<b>Study</b>	Zhai et al. (2014)	Perry Preschool (own calculations)	Abecedarian (own calculations)
Dataset	HSIS	Authors' data	Authors' data
Subpopulation		AA, low child IQ at entry & SES	98% AA, low mother IQ
Years of birth	1998-1999	1959-1964	1972-1977
<b>Impacts</b>			
Earnings, ages 23-40	-	\$7,584 (6,299.82)	\$7,249 (6,480.17)
Idle	-	<b>0.204</b> (0.093)	<b>0.273</b> (0.100)
Ever booked crime	-	-	-
Behavior Index, ages 12-13	-	-	-
Depression Scale, ages 16-17	-	-	-

**Table 8:** Results from State and Other Local Programs

State or Local Program	Years of Implementation	Evaluation Design		Age of Evaluation
Tulsa, OK	2000–2001, 2005–2006 (cohorts)	RDD, Matching	Diff-Diff,	Before Kindergarten
Georgia	1995–2011	Diff-Diff		Before Kindergarten
Tennessee	2009–2010, 2010–2011, (cohorts)	Matching		Before Kindergarten
Boston, MA	2008–2009	RDD		Before Kindergarten

*Source:* Cascio and Schanzenbach (2013); Fitzpatrick (2012); Gormley and Gayer (2005); Gormley et al. (2005, 2011); Havnes and Mogstad (2011, 2014); Hill et al. (2012); Lipsey et al. (2015, 2013); Weiland and Yoshikawa (2013).



**Table 9: Results from State and Other Local Programs Cont'd**

State or Local Program	Cognitive Results	Other Results	Fadeout?
Tulsa, OK	Language, Motor Skills, Math	Slight effects on measure of emotional intelligence	Fade out in math but not reading by grade 3
Georgia Tennessee	Reading, Math, Grade Retention Math, Language, Reading	Parental Investment -	By grade 4 By the end of kindergarten
Boston, MA	Language, Literacy, Numeracy, Math	Slight effects on measure of emotional stability	No data available yet

*Source:* Cascio and Schanzenbach (2013); Fitzpatrick (2012); Gormley and Gayer (2005); Gormley et al. (2005, 2011); Havnes and Mogstad (2011, 2014); Hill et al. (2012); Lipsey et al. (2015, 2013); Weiland and Yoshikawa (2013).