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# How Does Child Participation in Early Head Start Programs Affect Their Mother's Employment and Educational Attainment?

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# **How Does Child Participation in Early Head Start Programs Affect Their Mother's Employment and Educational Attainment?**

by

Pamela Barcelona

Submitted in partial fulfillment  
of the requirements for the degree of  
Master of Arts in Economics, Hunter College  
The City University of New York

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# **How Does Child Participation in Early Head Start Programs Affect Their Mother's Employment and Educational Attainment?**

## **I. Introduction**

Early Head Start (EHS) is a federally funded program in the United States that focuses on engaging parents in their children's lives to enhance their children's social and learning abilities. The reauthorization of the Head Start Act in 1994 established these programs to provide services for low-income children under the age of three and pregnant women. Similar to Head Start programs that offer services for preschool-aged children, Early Head Start programs give early childhood education, care, and other services to promote parent involvement in their children's education. Additionally, these programs provide parents services that help them improve upon their own employment opportunities and educational attainment.

Most studies on Early Head Start programs focus on how parent-child relationships affect children's cognitive skills and development instead of their effects on parent development. The exception is Sabol and Chase-Lansdale (2015), which analyzes the effect of children's participation in Head Start programs on their parent's educational advancement and employment. Many studies overlook that these programs also provide services that benefit families' overall well-being. The services help and encourage parents to create and achieve their own goals by continuing their education or providing job training to better their future along with their children's future. Therefore, this present thesis based on Sabol and Chase-Lansdale study analyzes whether children's participation in Early Head Start affects their mothers' employment and educational attainment.

The data from this thesis come from the national Early Head Start Research and Evaluation (EHSRE) study. Data were collected at baseline in 1995 to evaluate and improve upon Early

Head Start programs. Participants were assigned to treatment or control groups at baseline in which participants from the control group were allowed to receive other services for their children but were not allowed to accept Early Head Start services.

In this thesis, I examine how child's participation in Early Head Start programs affects their mother's educational attainment or employment for the follow-up at 26 months after the initial interview and the follow-up when the focus child entered Grade 5 or their sixth year of schooling. I also control for certain factors such as the parent's age, race, and the household structure to observe whether they have an effect on mothers' education and employment.

Results from this study vary depending on which outcome variable from the different follow-ups is tested. From the follow-up at 26 months after the initial interview, Early Head Start programs have a significant effect on mothers' educational attainment rather than employment. From the follow-up when the child entered Grade 5, Early Head Start programs have a significant effect on mothers finding part-time employment differing from the findings from the previous follow-up.

Unlike previous studies that focus on children's cognitive development or how parent characteristics and involvement affect children's growth, this thesis considers the effects of participation in Early Head Start on parents' education and employment.

## **II. Literature Review**

Previous studies regarding Early Head Start programs focus on the development and growth of children participating in such programs. They include studies concerning children and parent interaction, children's school readiness, and children's cognitive outcomes after participation. Other studies discuss the impact of parent characteristics on involvement in their

children's lives. There are only a few studies regarding educational attainment and employment of the focus child's parents after participating in these programs such as Sabol's and Chase-Lansdale's 2015 study.

One of the main initiatives of Early Head Start is to promote child growth as early as possible. Researchers usually use the Bayley Scales of Infant Development (BSID) Mental Development Index (MDI) to measure infants' and toddlers' cognitive development. Psychologist Nancy Bayley developed the scale for children ages 1-42 months in which a higher score indicates a lower risk of poor development. Using the EHSRE Study and the MDI, researchers from Mathematica find that "Early Head Start children score higher on a standardized assessment of the infant and toddler cognitive development" with an MDI of 90.1 for the treatment group and 88.1 for the control group (Mathematica Policy Research, 2001, p.10). Children in the treatment group also "have larger vocabularies and use more grammatically complex sentences at age 2" (Mathematica Policy Research, 2001, p.10). Results from this research show the positive impacts of child participation in Early Head Start.

Child care use and quality is an additional factor that helps determine which environments are suitable for children's growth and development. Love, et al. (2004) report how quality by hours of care, quality by child-adult ratio, and hours in care by child-adult ratio influence the behavior of children in Early Head Start programs. They find that "children in centers with higher child-adult ratios...[and] more hours in care [are] related to more behavior problems at 24 months" (Love, et al., 2004, p. 97). However, the effect of children in centers with more-favorable child-adult ratios and more hours in child care is negatively related to behavior problems at 24 months (Love, et al., 2004). As a result, child care quality is positively related to children's intellectual growth.

Further studies show that the effects of Early Head Start may not continue in the long run unless the magnitude of their impacts from previous follow-ups is large. For example, Vogel, et al. (2010) find that participation in Early Head Start programs has a large and positive impact on African American children's social-emotional and cognitive development due to a positive home environment in their study. Due to the large impact, they find more significant impacts "when African American children were in fifth grade...than for other racial/ethnic groups" (Vogel, et al., 2010, p. 23).

Parent involvement in their children's lives is another Early Head Start initiative. Parents can engage with their child more by providing stimulating toys and books at home, reading to their children at bedtime, talking to their children, and playing with their them outside. These examples of proper parent engagement, in turn, create an environment that stimulates growth and development in children's lives. Mathematica reports that Early Head Start mothers display "more supportive parenting behaviors" and show "greater enjoyment, greater sensitivity, and less detachment, created more structure, and extended play to stimulate cognitive and language development" than mothers in the control group (Mathematica Policy Research, 2001, p.11). They also are "more emotionally responsive, displaying greater warmth, praise, and affection toward their children" (Mathematica Policy Research, 2001, p.11). Furthermore, parents in the treatment group are less likely to spank their child than parents in the control group creating a more positive environment for their families.

Other relative parent research focuses on the effects of parent involvement of specific groups of parents on their children's development. Berlin, et al. (2002) "indicate that teenage child-bearers [are] significantly less supportive, more detached, more intrusive, and more negative with their infants than older child-bearers" (Berlin, et al., 2002, 118). This creates less of a

healthy and welcoming environment at home for growth. Additionally, fathers are “rated as more involved, both with their infants and with the EHS program, when they were better educated, less depressed, more likely to use social support especially spiritual support, and more active in their religion” (Roggman, et al., 2002, p.70). These fathers, therefore, are more engaged with their infants creating a more positive environment to grow and learn. These few studies show that various parent characteristics can have a significant effect on children’s development.

Sommer et al. (2012) study the effects of the quality of early childhood education centers. They find that these centers provide parents with informational and material resources allowing them to increase their educational attainment or attain better job opportunities. These resources include community action programs and social groups that gather participating families together. Such community action programs offer parents parenting classes and programs to learn English, earn a GED or high school diploma, obtain a postsecondary education, provide help with mental health problems, and provide training for employment (Chase-Lansdale and Brooks-Gunn, 2014). Additionally, parents that enter their child in high-quality early childhood centers may “make a difference in mothers’ view of their potential” when they see their children thrive participating in these centers (Sommer et al., 2012, p.32).

Sabol and Chase-Lansdale (2015) publish the only study, so far, that analyzes the effects of children’s participation in Head Start programs on parent education and employment. They use the Head Start Impact Study (HSIS), a trial with more than 4,000 families randomly selected and placed into treatment and control groups. The trial examined cohorts of three- and four-year-old children “to test the hypothesis that program impacts may differ by age of entry into Head Start” (Sabol and Chase-Lansdale, 2015, p. 141). In their study, 1,203 three-year-olds were placed in



the treatment group and 701 three-year-olds were in the control group. For the four-year-old study, 958 children were in the treatment group and 574 children were in the control group. They provide weights in the control group to balance out the sample sizes. They then use an intent-to-treat (ITT) and treatment-on-the-treated (TOT) approach to analyze their data. The ITT approach analyzes the effects of offering Head Start services to families while the TOT approach analyzes the effects of actually accepting and participating in Head Start.

Sabol and Chase-Lansdale (2015) find that participation in Head Start has a significant impact on parents in the three-year-old cohort rather than the four-year-old cohort. For the three-year-old cohort, “a significantly higher percentage (9 percent) of parents whose children attended Head Start increased their education compared to parents whose children did not attend Head Start. The coefficient is slightly smaller for the TOT approach ( $\beta = 0.064$ ), but still statistically significant” (Sabol and Chase-Lansdale, 2015, p. 149). Additionally, participation in Head Start programs “led to an increase in employment by child age six (ITT,  $\beta = 0.110$ ; TOT,  $\beta = 0.142$ )” (Sabol and Chase-Lansdale, 2015, p. 156). However, there are no significant effects on parental education or employment for the four-year-old cohort.

### **III. Motivation**

Low-income parents with young children are economically disadvantaged as they have low levels of education “with over 70 percent having no more than a high school degree” (Sabol and Chase-Lansdale, 2015, p. 137). Parents have, however, become interested in increasing their educational attainment which will give them opportunities to obtain higher paying jobs. Nevertheless, balancing family responsibilities with employment hinder parents from completing a higher education. Parents will most likely choose to allocate their time between taking care of

their children and going to work instead of going to school. Therefore, they may not attain a higher education preventing them from receiving a higher paying job. Taking into account the various services that Early Head Start offers such as center-based child care and socialization groups, participation in Early Head Start can assist parents in attaining a higher education or better employment opportunities.

Participating in Early Head Start can change how parents allocate their time as a result of the resources and services that they receive. Relative to men, women are more likely to work shorter hours and less likely to work full-time even before they have children (Paull, 2008). After a first birth, women are more likely to reduce their employment from full-time to part-time and may even exit the labor market while a first birth has little impact on men's hours of work (Paull, 2008). Kimmel and Connelly (2007) use the 2003 and 2004 American Time Use Survey to examine how mothers allocate leisure, home production, paid work, and caregiving. They find that an additional child aged zero to two "results in 80 extra minutes of childcare time" during the weekdays while "teenagers seem to have no effect on mothers' time during the week" (Kimmel and Connelly, 2007, pp. 662-667). On weekends, an additional infant in families reduces mother's leisure time by 29 minutes (Kimmel and Connelly, 2007, pp. 665). With the presence of and enrollment in Early Head Start programs, mothers may be able to change how they allocate their time to perform other activities that benefit themselves.

To help parents allocate their time, these programs offer center-based care that provides parents a safe place to leave their child. Folk and Beller (1993) use the 1987-1988 National Survey of Families and Household (NSFH) finds the combinations of part-time and full-time employment with formal and informal child care. Formal child care is care provided by nurseries, centers, nannies, or even preschools while informal child care is care provided by

grandparents, other relatives, friends, or neighbors. They find that mothers with young and many children are less likely to be employed than mothers with older and fewer children. Having a child less than a year old also decreases a mother's odds of choosing part-time work and informal care over unemployment (Folk and Beller, 1993; Connelly, 1992). This shows that even though more women are entering the labor market, the presence of young children in families continues to hinder women's labor force participation as families depend on women's household production time. Involvement in Early Head Start programs permits mothers to leave their children in participating centers so that they can use their time for other activities such as work or education.

Early Head Start programs may further motivate mothers to enter the labor market due to their low to no costs. Factors that influence a mother's willingness to pay for child care are income and child care costs. Families with higher income are more likely to use formal child care services than informal care. "In 1990, only 8 percent of nonworking poor families, compared with 27 percent of working poor, 32 percent of working-class, and 43 percent of middle-class households (with working and nonworking mothers) paid for child care" (Hofferth, 1999, p. 25). However, if a mother's willingness to pay for child care is less than the market costs, she will choose to either reduce her working hours from full-time to part-time or choose to exit the labor market (Blank, 1989; Maume, 1991). Therefore, higher child care costs reduce a woman's probability of choosing to work (Powell, 2003; Lokshin & Fong, 2004; Blau and Robins, 1988). Since Early Head Start programs have low to no costs for those who are enrolled, low-income mothers will definitely choose to participate in such programs as they do not have to worry about the payments. As a result, child care costs do not have to impede mothers' labor force participation.

Another resource that lowers the costs of child care and can monetarily help low-income families is subsidies. Michalopoulos and Robins (2002) analyze the effect of tax-free cash transfers in Norway. Families that use more than 32 hours of daycare per week are not eligible for the home care allowance. They predict “that mothers reduce their labor supply by about 9%” after receiving cash transfers home care allowances (Michalopoulos and Robins, 2002, p. 799). A reason is that women may prefer to personally care for their child rather than place them into formal care. Another reason is that if women work more than 32 hours a week, they will not qualify for the cash transfer. With this restriction, women may choose to reduce her hours of labor or exit the labor market. Unlike subsidies, Early Head Start can provide services to parents that help them decrease their dependence on welfare programs by helping parents obtain jobs or attend school (Chase-Lansdale and Brooks-Gunn, 2014).

Early Head Start programs can further help families better allocate their time if they are more available to them. For example, Hofferth and Collins (2000) find that that the availability of programs, not wage, has a significant and negative effect on the probability of job exits. “The hourly wage obtained for the job was not found to significantly impact the odds of exiting work” (Hofferth and Collins, 2000, p. 380). Additionally, Du and Dong (2013) study simulates the effect of adding day cares in communities that previously did not have them. The data they used reflect the time period of China’s economic transition which reduced government support for child care programs. They find that “introducing a day care to the community that did not have such a program would increase the mother’s labor force participation by 10.5%, her total work time by 5.3–6.7 hours per week, and her time spent on wage employment by 5.8–7.1 hours per week” (Du and Dong, 2013, p. 144). This shows that as care become less available and more expensive, women may have to exit the labor force to care for their child.

Previous studies do not acknowledge that Early Head Start provides services that help parents' educational attainment and employment prospects. Therefore, I study whether participation in Early Head Start influences educational and employment outcomes of mothers.

## **IV. Data**

### **Description of the Early Head Start Research and Evaluation Study**

The Early Head Start Research and Evaluation (EHSRE) study was created to evaluate whether or not participating in Early Head Start has an impact on child and family development. Mathematica Policy Research (MPR) conducted the study and the Administration on Children, Youth and Families (ACYF) funded it. The reauthorization of the Head Start Act in 1994 implemented this study and allowed for programs to cater to children under three years old and pregnant women of low-income families. Previous Head Start programs only provide care and help for families with children aged three to four years old. Most of these programs are based in child care centers and family child care centers. Participants, however, may choose to receive home-based services in which staff visit participating families at home on a weekly basis to work as the child's primary teacher.

Enrollment and random assignment began July 1996 and ended September 1998. For the research, only families with children up to 12 months old and pregnant women were eligible for the study. Early Head Start programs, however, also recruited and accommodated families they normally would if they were not part of the study. These programs further require participants to either be homeless, be in foster care, or receive public assistance such as TANF or SSI or their family income is below the poverty line (ACYF, 1996-2010).

The EHSRE Study includes three phases (Birth to Three Phase, the Pre-Kindergarten Follow-up Phase, and the Elementary School Follow-up Phase) combined together in one

dataset. The Birth to Three Phase (1996-2001) comprises of the baseline data including the different characteristics of the families participating in the study and the program impacts on the participants. This study conducted various follow-up interviews and assessments; however, this thesis focuses on the Parent Service Follow-up interviews (PSI) as they have information on participants' advancement to economic independence such as educational attainment and employment.

### **Pre-Treatment Variables**

After families were recruited and deemed eligible for Early Head Start, a computer program randomly assigned eligible families to treatment and control groups. The only difference between the groups should be that the treatment group was allowed to participate in Early Head Start while the control group was not. Participants in the control group were not completely turned away from receiving child care services. They simply did not receive the special services, such as home visits, health care, and parental support, provided by Early Head Start programs. 1,513 families were assigned to the treated group and 1,488 families were assigned to the control group totaling into 3,001 families randomly assigned for the study. 24 cases were excluded from the dataset due to confidentiality concerns resulting in a sample of 2,977 observations. An additional 17 observations were dropped for this study so that the data can centralize on the focus child's mother totaling to a sample size of 2,960 observations.

Most control variables correspond to those Sabol and Chase-Lansdale use in their 2015 study. All control variables used were collected at baseline and are listed in Table 1. Some of the control variables used are age, highest grade completed, primary occupation, race, English as the primary language, living arrangement, focus child's age, focus child's gender, number of children in the household ages 0-5 and ages 5-17, and income as a percentage of the poverty

level. Binary variables were created for the different categories of the highest level of education, primary occupation, living arrangement, and the focus child's gender so that the results can be analyzed easier. Binary variables indicating whether the mother is pregnant, a teen mom, single, receiving welfare, and previously in a Head Start program or Child Development Program were also included. If the individual was previously in a Head Start program or Child Development Program, an older child and not the focus child at the time of the study would have previously received services. Lastly, an indicator showing whether the individual is in the treatment group or control group is included.

Generally, the percentage of participants who completed baseline and follow-up interviews did not fluctuate.<sup>1</sup> Among the PSI follow-ups from the Birth to Three Phase, response rates range from 80% for the 6-month follow-up to 70% for the 26-month follow-up (ACFY 1996-2010). The Pre-Kindergarten Follow-up Phase has a 70.4% response rate and the Elementary School or Grade 5 Follow-up Phase has a response rate of 54.4% (ACYF 1996-2010). The drop between the two follow-ups from 70.4% to 54.4% may be due to the fact that many years have passed between program implementation and follow-up interviews. Other reasons for nonrespondents may be because the focus child passed away, families relocated, participants refused follow-up interviews or assessments, or surveyors did not attempt to interview the previous participants. The difference among the response rates may result in an attrition bias, a bias resulting from withdrawals from the study. To account for this bias, Table 1

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<sup>1</sup> Interviews were completed if participants either finished a child assessment or parent interview. Response rates for the treatment group were generally 2 to 6 percentage points higher than the control group. The difference is statistically significant but small (ACYF 1996-2010).

and Table 2 in the Appendix test for differential attrition for both the treatment and control group.

### **Outcome Variables**

The Parent Service Follow-up at 26 months mostly focuses on mothers' educational attainment and training rather than employment. Most of the binary variables used indicate different levels of schooling. The other binary variables indicate whether the participant received education or job training or whether the participant worked between the baseline interview and the first follow-up. The continuous variables indicate average hours per week worked or in educational programs. This data show that half the mothers have a high school diploma (49.7% for the treatment group and 48.6% for the control group). The data also show that the percentage of mothers who have a vocational diploma or GED is greater than the percentage of mothers who completed more than 12 years of schooling for both control and treatment groups. Furthermore, most mothers have worked with 86.0% of the treatment group and 83.1% of the control group having worked between the baseline interview and the 26-month follow-up. However, the average hours per week worked is only about 17 hours indicating that most participants only have part-time employment.

The Pre-Kindergarten Follow-up Phase (2001-2005) follow the participants from the original study to build on previous research. The mother's educational attainment and employment status are not evaluated for this follow-up as the EHSRE study did not provide any variables for the mother's educational attainment and employment status at that time. A possible reason for this is that the main purpose of the follow-up is to assess the long-term effects of receiving or not receiving Early Head Start services and other community services on child



development. This phase is more concerned about the readiness of the focus child to enter a more formal schooling than it was on parental development.

The mother's educational attainment and employment status, however, are collected for the Elementary School Follow-up Phase (2005 – 2010). This follow-up was conducted when the focus child entered their sixth year of formal education or the fifth grade. The follow-up both assesses the focus child's cognitive, physical, and social development and conducts parent interviews regarding mother's educational attainment and employment. For this follow-up, binary variables are generated for each level of educational attainment and employment from the categorical variables included in the dataset. From the first follow-up to the last follow-up, the percentage of the sample who completed more than 12 years of schooling increased. 32.3% of the treatment group and 29.3% of the control group have some post-secondary education but do not attain a degree while 19.5% of the treatment group and 21.1% of the control group receive a degree. Many more mothers also have full-time than part-time employment as 49.5% of the treatment group and 50.3% of the control group are working full-time differing from the data from the first follow-up.

## **V. Empirical Method**

To examine the effect of children participation in Early Head Start programs on mothers' employment and educational attainment, I first find the mean differences and standardized mean differences of each baseline variable. If these differences are insignificant, I fail to reject the hypothesis that participants within the treatment and control groups are the same regarding their unobserved and observed characteristics. I then use an intent-to-treat (ITT) approach to analyze the regression-adjusted differences among the outcome variables.

I first find the difference to compare the similarities between the treatment and control groups at baseline. I calculate the difference by finding the percent of participants that satisfies the corresponding binary variable for each treatment and control group then subtracting them, respectively. For the continuous variables, I find the average of each variable tested for each treatment and control group then subtracted them, respectively. The equation:

$$(1) \quad \text{Difference} = T - C$$

illustrates this in which T is the percent of participants in the treatment group and C is the percent of participants in the control group for each outcome variable. Since the difference is under a normal distribution, I reject the hypothesis that the treatment and control groups are equal when the difference is under the five percent significance level.

I then test for the standardized mean difference using the effect size index, Hedges' g, for both the continuous and binary variables. What Works Clearinghouse<sup>2</sup> adopted Hedges' g to test the comparability of the variables used in studies (Institute of Education Sciences (IES): National Center for Education Evaluation and Regional Assistance (NCEE), 2014). The What Works Clearinghouse reviews research to determine whether studies meet statistical standards ensuring quality research and findings of whether educational programs are effective or not. I include standards from the What Works Clearinghouse to further test that the difference between the control and treatment groups is small.

Hedges' g is defined as the difference between the mean outcome of the treatment and control group divided by the pooled standard deviation of both groups (IES: NCEE, 2014). The following equation illustrates this:

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<sup>2</sup> What Works Clearinghouse is under the U.S. Department of Education's National Center for Education Evaluation and Regional Assistance (NCEE) within the Institute of Education Sciences (IES).

$$( 2 ) \quad g = \frac{w(z_t - z_c)}{\sqrt{\frac{[(n_t - 1)s_t^2 + (n_c - 1)s_c^2]}{n_t + n_c - 2}}}$$

in which  $z_t$  and  $z_c$  are the mean outcomes,  $n_t$  and  $n_c$  are the sample sizes,  $s_t$  and  $s_c$  are the standard deviations, and  $w$  is the sample size correction (IES: NCEE, 2014). The subscripts  $t$  and  $c$  indicate the treatment and control groups, respectively. The sample size correction puts weights on the sample groups if the sample sizes are not close together. Since the sample sizes for the treatment and control groups are fairly similar, I do not need to include weights among the sample groups. Since weights are not included,  $w$  equals to 1. With similar sample sizes, the main difference between Hedges'  $g$  and the mean difference is that Hedges'  $g$  accounts for unequal variances between the two groups.

If the absolute standardized difference between the groups at baseline is less than or equal to 0.05, the variable satisfies baseline equivalence. If the standardized difference is between 0.05 and 0.25, statistical adjustment is required so that the variable satisfies baseline equivalence. Finally, if the standardized difference is greater than 0.25, the variable does not satisfy baseline equivalence (IES: NCEE, 2014).

After testing for the similarities of the variables, I use an intent-to-treat (ITT) approach to analyze the effect of Early Head Start programs on mothers' educational attainment and employment. I use the ITT approach instead of the treatment-on-the-treated (TOT) approach because families first had to apply to be part of the program before they were assigned to the treatment or control group. Therefore, all families participated in the study at baseline. The TOT approach is required only if some of the families did not end up participating in the program after they were assigned to their group.

The model I use regresses mothers' educational attainment or employment at different follow-ups,  $f$ , on whether they were in the treatment or control group ( $X$ ), and on the control variables at baseline ( $V$ ). Error terms ( $\vartheta_f, \varepsilon_i$ ) account for changes in time and unobserved individual characteristics.  $f = 1$  indicates the follow-up after 26 months after the initial interview and  $f = 2$  indicates the follow-up when the child entered Grade 5 or their sixth year of schooling.  $\beta_1$  is the regression-adjusted difference of Early Head Start participation on the mothers' education and employment. The following equation displays this:

$$(3) \quad Y_{if} = \beta_0 + \beta_1 X_i + \beta_2 V_i + \vartheta_f + \varepsilon_i; f = 1, 2$$

I use Ordinary Least Squares (OLS) as the method of analysis to test the outcome differences between the treatment and control group after program participation. OLS is a sufficient statistical tool as it minimizes the sum of squared residuals of the observations to produce the best linear unbiased estimator. Since data on individual characteristics were not collected before the study was conducted nor were data about changes in their lifestyle collected, using OLS is sufficient to test whether there is a difference between the two groups. Including control variables in the regression further reduces residual variance and reduces possible bias between the treatment and control groups.

When testing for certain educational outcomes, variables that indicate that participants have at least that level of education at baseline are not controlled for in the regression. For example, when testing for the regression-adjusted difference for having a high school diploma between the two groups, the variables, completed 12 years of school or has a GED and completed more than 12 years of school, are excluded from the regression. Otherwise, all the other control variables are included in all the regressions.

## **VI. Results**

### **Outcome Variables - Difference**

Column 4 of Table 2 shows the differences between the treatment and control group for the follow-up at 26 months after the initial interview. These results are significant for many of the education variables. These variables which are significant under a 1% significance level include whether the mothers were attending a high school, attending a high school or alternative school, receiving education or job training, and the average hours per week in an education program. This data show that mothers in the treatment group are 3.7 percentage points more likely to be attending a high school and 3.1 percentage points more likely to be attending a high school or alternative school than mothers in the control group. Mothers in the treatment group are also 29.5 percentage points more likely to have received education or job training services and spend 1.2 more hours per week, on average, in educational programs than the control group. Furthermore, the average hours per week in education or employment is significant under a 5% significance level and having worked between the baseline interview and the first follow-up interview is significant under a 10% significance level. Mothers in the treatment group are 2.9 percentage points more likely to work and spend 1.8 more hours per week, on average, in education or employment than mothers in the control group.

Data from the follow-up about ten years later when the focus child entered Grade 5 show that the differences between the two groups regarding education are statistically insignificant, but employment is significant. Part-time employment, however, is significant under a 1% significance level and unemployment is significant under a 10% significance level. Mothers who are originally in the treatment group are 5.1 percentage points more likely to be working part-time than mothers in the control group. Additionally, mothers in the control group are 4.4

percentage points more likely to be unemployed than mothers who are in the treatment group at baseline. The difference between mothers working full-time among the two groups is statistically insignificant.

### **Outcome Variables – Regression-Adjusted Difference**

Aside from displaying the differences between the two groups among the outcome variables, the last column of Table 2 shows the regression-adjusted difference. Note that these regression-adjusted differences reflect the Treatment Group Indicator from both Tables 3 and 4. Similar to the results seen from the differences, variables indicating that mothers were receiving education services are statistically significant under a 1% significance level. According to the regression-adjusted differences, mothers in the treatment group are 3.3 percentage points more likely to be attending a high school, 2.7 percentage points more likely to be attending a high school or alternative school, and 29.2 percentage points more likely to receive education or job training than mothers in the control group. Furthermore, mothers in the treatment group spend 1.1 more hours per week, on average, in educational programs and 1.4 more hours per week, on average, in education or employment than mothers in the control group. Unlike the results from the differences, the regression-adjusted difference of having ever worked from baseline to the follow-up at 26 months is insignificant but produces a similar coefficient with mothers in the treatment group 2.3 percentage points more likely to having ever worked among the time period than mothers in the control group.

These results indicate that Early Head Start is more likely to help mothers increase their educational attainment than obtaining employment. This is consistent with the findings of Sabol's and Chase-Lansdale's (2015) study in which children's participation in Head Start programs leads to increases in parents' education. Additionally, as the statistically significant

variables reveal that the program help mothers increase their education, these programs may be more effective in helping and motivating younger moms complete 12 years of schooling or more.

The regression-adjusted differences for the follow-up when the child entered Grade 5 show similar results from the differences between the two groups. Early Head Start programs have a statistically significant effect on mothers' part-time employment (under a 5% significance level) and on unemployment (under a 10% significance level). Results show that mothers from the treatment group are 4.9 percentage points more likely to be in part-time employment than mothers in the control group. Mothers in the control group are also 4.2 percentage points more likely to be unemployed than mothers in the treatment group. The regression-adjusted difference between mothers working full-time among the two groups is statistically insignificant.

Although these findings are consistent with the differences and regression-adjusted differences, they are not consistent with Sabol's and Chase-Lansdale's (2015) study. Their study shows that child participation in Head Start programs does not lead to changes in their parents' employment. This inconsistency may be due to the fact that the data in this thesis account for a longer time period than the data from the 2015 study.

Additionally, the results found from the follow-up when the focus child entered Grade 5 contrast with the results from the previous follow-up. Data from the last follow-up show that Early Head Start's effect on educational attainment is statistically insignificant. This may be due to the fact that mothers in the control group could have increased their educational attainment on their own between the ten-year gap of the follow-ups regardless of whether their child was in the program or not. Another possibility may be due to the fact that mothers in the treatment group did not follow through with further increasing their educational attainment after their child's participation in Early Head Start finished.

## **Control Variables**

Column 3 of Table 1 shows the differences, in percentage points, between the treatment and control group for each control variable, respectively. The differences are all insignificant under a 5% significance level.

Column 4 of Table 1 shows the standardized mean differences between the treatment and control group for each control variable. Most of the standardized mean differences are under 0.05 which satisfy baseline equivalence according to What Works Clearinghouse guidelines. The standardized differences for the variables for whether the individual completed 12 years of school or has a GED, whether the individual completed more than 12 years of school, and income is 33-67% of the poverty level indicate that statistical adjustments are required to satisfy baseline equivalence. No statistical adjustments for these variables are made because most baseline characteristics are insignificant in their differences. Therefore, the participants were fairly similar across the treatment and control groups showing that randomization at baseline is successful.

Tables 3 and 4 show the regression estimates of equation 3 for the outcome variables from the follow-up at 26 months and the follow-up when the child entered Grade 5, respectively. As previously mentioned, variables indicating that participants have at least that level of education at baseline are not controlled for in the regression. Most of the control variables not only differed in the magnitude and significance but also in the signs of their coefficients resulting in ambiguous effects on the outcome variables. For example, the effects of race and income as percentages of the poverty level differ depending on the outcome variable resulting in ambiguous results.



The variable indicating whether the mother was a teenage mom at baseline should, however, be taken into account. The indicator for teen mom is mostly insignificant when testing the different outcome variables. This is worth noting as the few outcome variables in which Early Head Start programs have a significant effect, shown in Table 2, are variables indicating that the individual was attending high school or an alternative school during the 26-month follow-up. Mothers who attend high school or an alternative school are generally teenagers trying to complete 12 years of schooling. Therefore, it is peculiar that teenage mothers have an insignificant effect on whether the individual attends an educational program.

## **VII. Summary and Conclusion**

Early Head Start programs not only help children's development and growth, but also their parents' wellbeing. The programs do this by providing families with child care services to help mothers attend school or pursue their career interests, giving a sense of community among parents to help them succeed, and offering information on educational opportunities and job training services. Additionally, these programs may encourage parents to pursue a higher educational degree to serve as role models for their own children.

Data from the EHSRE study show that the programs mostly help mothers increase their educational attainment than increasing their hours spent working. Results also show that certain sample characteristics such as income as a level of poverty, race, and living arrangements do not have a significant effect on educational attainment or employment.

Although the programs help mothers increase their educational attainment, results do not indicate that they received a higher degree in either the follow-up at 26 months after the baseline interview or the follow-up when the focus child entered the 5<sup>th</sup> grade. This brings up the question of how can the program expand to motivate parents to continue their education? Since

Early Head Start programs have a similar effect on parents' educational advancement as the Head Start programs, a possible solution is to automatically enter the focus child into Head Start programs after participation in Early Head Start programs. This may create a lasting effect on educational attainment for mothers. However, this solution creates incentives for families to stay under the poverty level to continue qualifying for these programs. Other, possibly monetary, incentives from the program may be necessary so parents can continue their education even after their child is done participating in such programs.

Some peculiarities from the data show that teenage mothers are statistically insignificant when testing for whether the individual is more likely to attend a high school or not. This displays that we fail to reject the hypothesis that the likelihood that teenage mothers and mothers ages 20 years or older attending high school are equal. This is strange as most people who are specifically attending high school or alternative school, not completing their GED, are teenagers. This oddity may be due to the age range of the mothers in the sample. The mean age of the sample for both treatment and control groups is about 22 years old but the age of the mothers' ranges from 14 to 40 years old. The sample consists mostly of mothers who are not teenagers which may affect the results.

From the data, Early Head Start does not have as a significant effect on mother's employment as it did on their educational attainment. The first follow-up show that child participation in Early Head Start does not significantly affect mother's employment but has significant effects on mothers' part-time employment for the last follow-up. Since the average number of hours spent working at baseline is about 16 hours, participation in the programs may not have a significant effect on parents keeping their job for another 26 months. However, the network parents create from participating in programs may help them maintain their part-time

employment up to the follow-up when the focus child enter Grade 5. Nevertheless, there is no indication that the participation in the program helps mothers find full-time employment for the follow-ups. It may be harder to maintain or find full-time employment during the follow-up at 26 months as these mothers have recently given birth. Therefore, results may change if the focus child is slightly more than a year old when the study was implemented. Future program improvements are required for Early Head Start programs to have a significant effect on mothers finding full-time employment instead of only part-time employment.

This thesis suggests that participation in Early Head Start programs or early childhood education programs may help parents improve their educational attainment in the short run and their part-time employment in the long run. Future program revisions are required to encourage parents to continue their educational attainment passed high school and receive a higher degree. In turn, participation in these early childhood education programs may have a longer effect for both the children and the parents. Higher quality or a greater variety of job training services from these programs may also be helpful for parents to find and maintain full-time employment so that they may alleviate themselves above the poverty level. Overall, Early Head Start has potential to not only facilitate child development and growth but also parental development that lasts even after child participation in such programs are finished.

**Table 1. Similarities of Treatment and Control Groups at Baseline**

Variables		Treatment Group (T)	Control Group (C)	Difference (T-C)	Standardized Mean Differences
Program Group		50.3%	49.7%	0.54	-
Age		22.54	22.7	-0.14	0.0263
Highest Grade Completed					
	Completed Less than 12 Years of School	47.95%	47.7%	0.28	-0.0057
	Completed 12 Years of School or Has a GED	27.3%	22.4%	4.96	0.0592 ****
	Completed more than 12 Years of School	24.7%	22.4%	2.39	-0.0563 ****
Primary Occupation					
	Employed	22.74%	23.7%	-0.99	0.0236
	In School/Training	22.3%	21.6%	0.70	-0.0170
	Neither employed nor in school/training	55.0%	54.7%	0.29	-0.0059
Race					
	White	37.3%	37.1%	0.18	-0.0037
	African American	34.3%	35.1%	-0.81	0.0169
	Hispanic	23.9%	23.4%	0.51	-0.0119
	Other	4.6%	4.4%	0.12	-0.0058
English is the Primary Language		79.6%	77.8%	1.78	-0.0435
Pregnant		24.3%	26.1%	-1.76	0.0405
Teen Mom		39.2%	39.6%	-0.40	0.0083
Single		75.1%	74.6%	0.54	-0.0125
Living Arrangement					
	Lives with Husband	24.9%	25.4%	-0.54	0.0125
	Lives with Other Adults	38.6%	39.3%	-0.70	0.0144
	Lives Alone with Children	36.5%	35.3%	1.24	-0.0260
Receiving Welfare		54.0%	52.7%	1.36	-0.0274
Previously in Head Start or Child Development Program		12.7%	13.4%	-0.68	0.0204
Average Focus Child's Age (in months)		3.05	2.97	0.08	-0.0168
Focus Child's Gender					
	Female	47.7%	49.2%	-1.46	0.0294
	Male	51.4%	49.7%	1.68	-0.0336
	Unknown	0.9%	1.1%	-0.22	0.0216
Number of Children Aged 0-5 in Household		0.5	0.4	0.02	-0.0277
Number of Children Aged 6-17 in Household		0.54	0.52	0.02	-0.0238
Income is <33% of Poverty Level		25.1%	24.5%	0.67	-0.0157
Income is 33-67% of Poverty Level		26.9%	23.9%	2.97 *	-0.06819****
Income is 67-99% of Poverty Level		20.1%	21.7%	-1.58	0.0388
Income is 100% of Poverty Level or Higher		10.8%	11.6%	-0.80	0.0252
Sample Size		1488	1472		

\*Significant under a 10% significance level, \*\*Significant under a 5% significance level, \*\*\*Significant under a 1% significance level

\*\*\*\*Statistical adjustment required to satisfy baseline equivalence

**Table 2. Educational and Employment Outcomes of Treatment and Control Group at Follow-ups**

Variables	Sample Size	Treatment Group (T)	Control Group (C)	Difference (T-C)	Regression-Adjusted Difference
<b>Follow-up at 26 Months</b>					
Has Vocational Diploma	2604	17.5%	16.4%	1.0	0.9
Has a GED	2070	10.6%	11.3%	-0.7	-0.6
Has HS Diploma	2068	49.7%	48.6%	1.1	0.9
Has an Associates Degree	2071	3.7%	4.4%	-0.7	-0.8
Has a Bachelors Degree	2072	4.1%	5.0%	-0.8	-0.6
Attending a GED Program	2060	10.0%	8.8%	1.3	1.1
Attending a High School	2066	12.7%	8.9%	3.7 ***	3.3 ***
Attending High School or Alternative School	2062	13.5%	10.3%	3.1 ***	2.7 **
Attending a Vocational Program	2057	19.6%	17.1%	2.6	2.3
Attending a Two Year College	2063	10.8%	9.8%	1.0	0.9
Attending a Four Year College	2067	6.0%	5.4%	0.7	0.4
Received Education / Job Training	2075	87.1%	57.6%	29.5 ***	29.2 ***
Ever Worked	2072	86.0%	83.1%	2.9 *	2.3
Average Hours/Week in Education or Employment	1787	21.8	20.0	1.8 **	1.4 **
Average Hours/Week in Educational Programs	1956	4.4	3.2	1.2 ***	1.1 ***
Average Hours/Week Worked	1888	16.9	16.5	0.4	0.1
<b>Follow-up when Child is in Grade 5</b>					
Education	1367				
Less than a High School Completed	313	22.2%	23.7%	-1.5	-1.6
High School Diploma or GED	355	26.0%	26.0%	0.0	-0.1
Some Post-Secondary, No Degree	422	32.3%	29.3%	3.1	2.7
Associates Degree, Bachelors Degree, or Higher	277	19.5%	21.1%	-1.6	-1.8
Employment	1449				
Full Time	723	49.5%	50.3%	-0.8	-0.7
Part Time	253	19.9%	14.8%	5.1 ***	4.9 **
Unemployed	473	30.5%	34.9%	-4.4 *	-4.2 *

\*Significant under a 10% significance level, \*\*Significant under a 5% significance level, \*\*\*Significant under a 1% significance level

**Table 3. Regression Estimates for Control Variables for Educational and Employment Outcomes for Follow-up at 26 Months**

Variables	(1) Has a Vocational Diploma	(2) Has a GED	(3) Has HS Diploma	(4) Has an Associates Degree	(5) Has a Bachelors Degree	(6) Attending a GED Program	(7) Attending a High School	(8) Attending a High School or Alternative School
Constant	-0.0649 (0.0611)	0.1641 *** (0.0504)	0.3231 *** (0.0732)	-0.0143 (0.0313)	0.0073 (0.0320)	0.1953 *** (0.0464)	0.4527 *** (0.0423)	0.4832 *** (0.0434)
Treatment Group Indicator	0.0094 (0.0162)	-0.0066 (0.0136)	0.0093 (0.0198)	-0.0096 (0.0083)	-0.0078 (0.0085)	0.0108 (0.0125)	0.0328 *** (0.0114)	0.0267 ** (0.0117)
Age	0.0102 *** (0.0023)	-0.0028 (0.0019)	0.0069 ** (0.0028)	0.0030 *** (0.0012)	0.0038 *** (0.0012)	-0.0066 *** (0.0017)	-0.0151 *** (0.0016)	-0.0156 *** (0.0016)
Highest Grade Completed								
Completed Less than 12 Years of School	-0.0737 *** (0.0135)	0.0086 (0.0091)	-0.1760 *** (0.01131)	-0.0420 *** (0.0069)	-0.0387 *** (0.0071)	0.0633 *** (0.0083)	0.0318 *** (0.0075)	0.0345 *** (0.0077)
Completed 12 Years of School or Has a GED	0.0343 ** (0.0137)			-0.0397 *** (0.0070)	-0.0598 *** (0.0071)			
Completed more than 12 Years of School	0.0353 ** (0.0145)			0.0777 *** (0.0075)	0.0872 *** (0.0076)			
Primary Occupation								
Employed	-0.0089 (0.0149)	-0.0132 (0.0122)	0.0897 *** (0.0177)	-0.0107 (0.0076)	0.0033 (0.0078)	-0.0349 *** (0.0111)	-0.0635 *** (0.0102)	-0.0695 *** (0.0105)
In School/Training	0.0086 (0.0164)	-0.0193 (0.0136)	0.0507 *** (0.0198)	0.0223 *** (0.0084)	0.0281 *** (0.0086)	-0.0201 (0.0125)	0.1194 *** (0.0114)	0.1347 *** (0.0117)
Neither employed nor in school/training	0.0054 (0.0131)	0.0121 (0.0108)	0.0115 (0.0157)	-0.0049 (0.0067)	-0.0178 *** (0.0068)	0.0057 (0.0099)	-0.0697 *** (0.0091)	-0.0803 *** (0.0093)
Race								
White	-0.0184 (0.0160)	0.0630 *** (0.0133)	0.0804 *** (0.01937)	0.0236 *** (0.0082)	0.0010 (0.0083)	-0.0160 (0.0122)	0.0001 (0.0111)	-0.0037 (0.0114)
African American	0.0412 ** (0.0166)	-0.0026 (0.0139)	0.0577 *** (0.01202)	0.0023 (0.0085)	-0.0016 (0.0087)	-0.0138 (0.0127)	0.0042 (0.0116)	-0.0159 (0.0119)
Hispanic	-0.0135 (0.0179)	-0.0171 (0.0147)	-0.1830 *** (0.0213)	0.0026 (0.0092)	-0.0243 *** (0.0093)	-0.0005 (0.0135)	-0.0143 (0.0123)	-0.0013 (0.0126)
Other	0.0100 (0.0311)	-0.0390 (0.0260)	0.0750 ** (0.0379)	-0.0256 (0.0159)	0.0326 ** (0.0162)	0.0171 (0.0238)	0.0207 (0.0217)	0.0212 (0.0223)
English is the Primary Language	-0.0005 (0.0092)	-0.0010 (0.0077)	0.0235 ** (0.0112)	0.0052 (0.0047)	0.00005 (0.0048)	0.0045 (0.0071)	-0.0157 ** (0.0064)	-0.0154 ** (0.0066)
Pregnant	-0.0252 (0.0290)	0.0239 (0.0244)	-0.0103 (0.0353)	-0.0243 (0.0149)	-0.0006 (0.0152)	0.0467 ** (0.0224)	-0.0151 (0.0204)	-0.0073 (0.0209)
Teen Mom	0.0147 (0.0119)	0.0040 (0.0100)	0.0057 (0.0146)	0.0114 * (0.0061)	-0.0118 * (0.0062)	-0.0015 (0.0092)	-0.0125 (0.0084)	-0.0107 (0.0086)
Living Arrangement								
Lives with Husband	-0.0663 *** (0.0176)	-0.0502 *** (0.0147)	0.0408 * (0.0214)	0.0128 (0.0090)	0.0243 *** (0.0092)	-0.0274 ** (0.0135)	-0.0078 (0.0123)	-0.0173 (0.0127)
Lives with Other Adults	0.0315 ** (0.0158)	0.0204 (0.0133)	-0.0094 (0.0192)	-0.0030 (0.0081)	-0.0280 *** (0.0083)	0.0173 (0.0122)	0.0206 * (0.0111)	0.0182 (0.0114)
Lives Alone with Children	0.0049 (0.0161)	0.0086 (0.0135)	-0.0146 (0.0196)	-0.0058 (0.0083)	-0.0216 *** (0.0084)	0.0133 (0.0124)	0.0138 (0.0113)	0.0199 * (0.0116)
Receiving Welfare	0.0031 (0.0071)	0.0118 ** (0.0059)	-0.0245 *** (0.0086)	-0.0025 (0.0036)	-0.0079 ** (0.0037)	0.0021 (0.0054)	-0.0063 (0.0050)	-0.0020 (0.0051)
Previously in Head Start or Child Development Program	0.0084 (0.0100)	0.0112 (0.0084)	0.0106 (0.0121)	-0.0032 (0.0051)	0.0002 (0.0052)	0.0016 (0.0077)	-0.0094 (0.0070)	-0.0077 (0.0072)
Average Focus Child's Age (in months)	-0.0029 (0.0027)	0.0033 (0.0023)	0.0014 (0.0033)	-0.0019 (0.0014)	0.0004 (0.0014)	0.0030 (0.0021)	-0.0036 * (0.0019)	-0.0030 (0.0020)
Focus Child's Gender: Male	0.0060 (0.0162)	-0.0035 (0.0136)	-0.0179 (0.0198)	-0.0001 (0.0083)	-0.0108 (0.0085)	0.0150 (0.0125)	0.0119 (0.0114)	-0.0003 (0.0117)
Number of Children Aged 0-5 in Household	0.0144 (0.0120)	0.0199 ** (0.0101)	-0.0624 *** (0.0146)	-0.0068 (0.0062)	-0.0102 (0.0063)	0.0085 (0.0093)	-0.0128 (0.0084)	-0.0135 (0.0086)
Number of Children Aged 6-17 in Household	-0.0124 (0.0101)	-0.0139 * (0.0084)	-0.0283 ** (0.0122)	-0.0017 (0.0052)	-0.0087 (0.0053)	0.0003 (0.0077)	0.0864 *** (0.0070)	0.0946 *** (0.0072)
Income is <33% of Poverty Level	0.0205 (0.0270)	-0.0136 (0.0227)	0.0470 (0.0330)	0.0014 (0.0138)	0.0087 (0.0141)	0.0178 (0.0208)	-0.0402 ** (0.0189)	-0.0463 ** (0.0195)
Income is 33-67% of Poverty Level	0.0144 (0.0272)	-0.0330 (0.0228)	0.0863 *** (0.0332)	0.0087 (0.0139)	0.0080 (0.0142)	0.0005 (0.0210)	-0.0419 ** (0.0191)	-0.0429 ** (0.0196)
Income is 67-99% of Poverty Level	0.0326 (0.0287)	-0.0457 * (0.0240)	0.1183 *** (0.0349)	0.0024 (0.0147)	0.0140 (0.0150)	-0.0227 (0.0220)	-0.0213 (0.0201)	-0.0180 (0.0207)
Income is 100% of Poverty Level or Higher	0.0876 *** (0.0326)	-0.0419 (0.0273)	0.1412 *** (0.0396)	0.0100 (0.0167)	0.0115 (0.0170)	-0.0219 (0.0250)	-0.0244 (0.0228)	-0.0164 (0.0235)
R <sup>2</sup>	0.0589	0.0376	0.2083	0.0909	0.1605	0.0773	0.3217	0.3420
Sample Size	2064	2070	2068	2071	2072	2060	2066	2062

\*Significant under a 10% significance level, \*\*Significant under a 5% significance level, \*\*\*Significant under a 1% significance level  
(Standard errors are in parentheses)

**Table 3 (continued). Regression Estimates for Control Variables for Educational and Employment Outcomes for Follow-up at 26 Months**

Variables	(9) Attending a Vocational Program	(10) Attending a Two Year College	(11) Attending a Four Year College	(12) Received Education / Job Training	(13) Ever Worked	(14) Average Hours/Week in Education or Employment	(15) Average Hours/Week in Educational Programs	(16) Average Hours / Week Worked
Constant	0.2922 *** (0.0642)	0.1742 *** (0.0494)	0.0613 * (0.0370)	0.8521 *** (0.0677)	0.9695 *** (0.0582)	31.8943 *** (2.5703)	10.2708 *** (1.0711)	20.4530 *** (2.2961)
Treatment Group Indicator	0.0230 (0.0170)	0.0094 (0.0133)	0.0043 (0.0100)	0.2920 *** (0.0182)	0.0234 (0.0156)	1.3893 ** (0.6793)	1.0880 *** (0.2815)	0.1068 (0.6116)
Age	-0.0056 ** (0.0024)	-0.0024 (0.0019)	0.0002 (0.0014)	-0.0122 *** (0.0025)	-0.0040 * (0.0022)	-0.3385 *** (0.0966)	-0.3073 *** (0.0399)	0.0226 (0.0866)
Highest Grade Completed								
Completed Less than 12 Years of School	-0.0446 *** (0.0141)	-0.0354 *** (0.0102)	-0.0350 *** (0.0076)	0.0239 (0.0149)	-0.0508 *** (0.0129)	-2.9323 *** (0.5632)	0.0576 (0.2342)	-2.8866 *** (0.5068)
Completed 12 Years of School or Has a GED	0.0295 ** (0.0143)	0.0263 ** (0.0105)	0.0018 (0.0079)	-0.0444 *** (0.0150)	0.0310 ** (0.0129)	0.6278 (0.5707)	-0.7388 *** (0.2362)	1.3498 *** (0.5145)
Completed more than 12 Years of School	-0.0098 (0.0152)			0.0313 *** (0.0160)	0.0349 ** (0.0139)	2.0242 *** (0.6016)	0.5484 ** (0.2506)	1.5095 *** (0.5445)
Primary Occupation								
Employed	-0.0182 (0.0156)	-0.0304 ** (0.0122)	-0.0156 * (0.0091)			6.6310 *** (0.6227)	-1.7677 *** (0.2570)	8.3089 *** (0.5620)
In School/Training	0.0215 (0.0172)	0.0424 *** (0.0133)	0.0886 *** (0.0100)		0.0292 ** (0.0133)	-0.6566 (0.6910)	3.3134 *** (0.2874)	-4.0972 *** (0.6151)
Neither employed nor in school/training	0.0099 (0.0137)	-0.0119 (0.0107)	-0.0439 *** (0.0080)	-0.0211 * (0.0127)	-0.0524 *** (0.0124)	-6.0434 *** (0.5490)	-1.4761 *** (0.2274)	-4.4463 *** (0.4915)
Race								
White	-0.0023 (0.0167)	-0.0016 (0.0131)	-0.0014 (0.0098)	0.0317 * (0.0179)	0.0385 ** (0.0153)	-0.3686 (0.6712)	-0.0720 (0.2786)	-0.1509 (0.6000)
African American	0.0020 (0.0173)	-0.0372 *** (0.0136)	0.0027 (0.0102)	-0.0043 (0.0185)	-0.0380 ** (0.0159)	-0.9958 (0.6926)	0.3178 (0.2901)	-1.4891 ** (0.6179)
Hispanic	-0.0650 *** (0.0187)	-0.0357 ** (0.0136)	-0.0147 (0.0109)	-0.0043 ** (0.0200)	-0.0069 (0.0171)	-0.8533 (0.7469)	-0.6221 ** (0.3142)	-0.1675 (0.6652)
Other	0.0860 *** (0.0323)	0.1030 *** (0.0255)	0.0076 (0.0190)	0.0368 (0.0347)	0.0078 (0.0297)	2.7268 ** (1.2800)	0.8185 (0.5403)	1.9839 * (1.1418)
English is the Primary Language	0.0155 (0.0096)	-0.0137 * (0.0075)	0.0094 * (0.0057)	-0.0031 (0.0103)	0.0086 (0.0089)	-0.1591 (0.3921)	-0.2933 * (0.1632)	0.1868 (0.3485)
Pregnant	0.0129 (0.0304)	0.0094 (0.0237)	0.0184 (0.0178)	0.0241 (0.0325)	-0.0507 * (0.0278)	-3.9263 *** (1.2144)	-0.3122 (0.5034)	-3.8003 *** (1.0942)
Teen Mom	-0.0076 (0.0126)	-0.0004 (0.0098)	-0.0118 (0.0074)	-0.0068 (0.0134)	0.0127 (0.0115)	-0.6028 (0.4928)	-0.5015 ** (0.2066)	0.0184 (0.4472)
Living Arrangement								
Lives with Husband	-0.0249 (0.0184)	-0.0425 *** (0.0143)	0.0295 *** (0.0108)	-0.0199 (0.0196)	-0.0327 * (0.0168)	-2.5690 *** (0.7471)	-0.6686 ** (0.3120)	-1.8992 *** (0.6572)
Lives with Other Adults	0.0180 (0.0165)	-0.0012 (0.0129)	-0.0162 * (0.0097)	0.0312 * (0.0176)	0.0281 * (0.0152)	1.2800 * (0.6659)	0.4285 (0.2808)	0.9686 * (0.5846)
Lives Alone with Children	0.0248 (0.0168)	0.0492 *** (0.0132)	-0.0033 (0.0099)	0.0145 (0.0180)	0.0304 ** (0.0154)	2.4341 *** (0.6842)	0.8031 *** (0.2868)	1.5874 *** (0.5995)
Receiving Welfare	-0.0062 (0.0074)	0.0048 (0.0058)	-0.0098 ** (0.0043)	-0.0016 (0.0079)	-0.0129 * (0.0068)	-0.5091 * (0.2977)	-0.1859 (0.1251)	-0.3369 (0.2610)
Previously in Head Start or Child Development Program	0.0065 (0.0105)	0.0093 (0.0082)	0.0017 (0.0062)	0.0126 (0.0109)	0.0131 (0.0095)	0.4953 (0.4147)	0.0425 (0.1741)	0.4963 (0.3712)
Average Focus Child's Age (in months)	-0.0003 (0.0029)	0.0012 (0.0022)	0.0029 * (0.0017)	-0.0007 (0.0030)	-0.0024 (0.0026)	0.0291 (0.1140)	0.0481 (0.0473)	-0.0408 (0.1026)
Focus Child's Gender: Male	-0.0040 (0.0170)	0.0043 (0.0133)	-0.0210 ** (0.0100)	-0.0119 (0.0181)	-0.0029 (0.0156)	-0.5235 (0.6819)	0.2154 (0.2821)	-0.8848 (0.6129)
Number of Children Aged 0-5 in Household	0.0069 (0.0125)	-0.0058 (0.0098)	-0.0073 (0.0074)	-0.0115 (0.0134)	-0.0233 ** (0.0115)	-0.6743 (0.5046)	-0.3948 * (0.2077)	-0.2658 (0.4542)
Number of Children Aged 6-17 in Household	0.0075 (0.0106)	-0.0065 (0.0082)	-0.0054 (0.0062)	0.0168 (0.0111)	0.00008 (0.0097)	1.0390 ** (0.4266)	1.2047 *** (0.1757)	-0.3079 (0.3838)
Income is <33% of Poverty Level	0.0051 (0.0282)	-0.0012 (0.0221)	0.0154 (0.0166)	-0.0034 (0.0302)	0.0155 (0.0259)	-1.0075 (1.1411)	-0.2268 (0.4730)	-1.0599 (1.0157)
Income is 33-67% of Poverty Level	0.0044 (0.0284)	-0.0002 (0.0222)	0.0217 (0.0167)	-0.0069 (0.0303)	-0.0178 (0.0260)	-1.8361 (1.1378)	-0.1603 (0.4742)	-2.0053 ** (1.0182)
Income is 67-99% of Poverty Level	-0.0040 (0.0299)	0.0293 (0.0234)	0.0310 * (0.0176)	-0.0129 (0.0318)	-0.0100 (0.0273)	1.8155 (1.2040)	0.7275 (0.4990)	0.6007 (1.0782)
Income is 100% of Poverty Level or Higher	0.0440 (0.0342)	0.0357 (0.0266)	0.0165 (0.0200)	0.0200 (0.0363)	0.0189 (0.0311)	2.5757 * (1.3539)	0.3647 (0.5673)	2.0575 * (1.2119)
R <sup>2</sup>	0.0363	0.0387	0.0693	0.1585	0.0597	0.202	0.2445	0.2136
Sample Size	2057	2063	2067	2075	2072	1787	1956	1888

\*Significant under a 10% significance level, \*\*Significant under a 5% significance level, \*\*\*Significant under a 1% significance level  
(Standard errors are in parentheses)

**Table 4. Regression Estimates for Control Variables for Educational and Employment Outcomes for Follow-up at Grade 5**

Variables	(1) Less than High School Completed	(2) Has a High School Diploma or GED	(3) Some Post Secondary, No Degree	(4) Associates Degree, Bachelors Degree, or Higher	(5) Full Time	(6) Part Time	(7) Unemployed
Constant	0.2291 *** (0.0782)	0.5267 *** (0.0904)	0.2211 ** (0.0940)	0.2755 *** (0.0784)	0.7064 *** (0.0995)	0.0796 (0.0777)	0.2140 ** (0.0948)
Treatment Group Indicator	-0.0156 (0.0204)	-0.0011 (0.0235)	0.0272 (0.0245)	-0.0180 (0.0200)	-0.0071 (0.0255)	0.0486 ** (0.0199)	-0.0416 * (0.0243)
Age	0.0026 (0.0029)	-0.0134 *** (0.0033)	0.0038 (0.0035)	-0.0020 (0.0029)	-0.0034 (0.0036)	0.0007 (0.0028)	0.0027 (0.0035)
Highest Grade Completed							
Completed Less than 12 Years of School		0.0033 (0.0159)	-0.1054 *** (0.0189)	-0.1410 *** (0.0167)	-0.1130 *** (0.0213)	0.0148 (0.01667)	0.0982 *** (0.0203)
Completed 12 Years of School or Has a GED			0.0572 *** (0.0192)	-0.0668 *** (0.0166)	0.0366 * (0.0212)	-0.0100 (0.0165)	-0.0266 (0.0202)
Completed more than 12 Years of School				0.2147 *** (0.0177)	0.0067 (0.0224)	0.0156 (0.0175)	-0.0223 (0.0213)
Primary Occupation							
Employed	-0.0499 *** (0.0175)	0.0115 (0.0202)	0.0232 (0.0214)	-0.0129 (0.0177)	0.0571 ** (0.0225)	-0.0053 (0.0175)	-0.0518 ** (0.0215)
In School/Training	0.0160 (0.0200)	-0.0538 ** (0.0238)	0.0183 (0.0248)	0.0537 *** (0.0204)	0.0659 ** (0.0257)	-0.0153 (0.0201)	-0.0506 ** (0.0245)
Neither employed nor in school/training	0.0459 *** (0.0157)	0.0310 * (0.0184)	-0.0123 (0.0194)	-0.0351 ** (0.0159)	-0.0908 *** (0.0203)	0.0192 (0.0159)	0.0715 *** (0.0194)
Race							
White	-0.1175 *** (0.0204)	0.0158 (0.0235)	0.0508 ** (0.0246)	0.0151 (0.0202)	-0.0518 ** (0.0257)	0.0410 ** (0.0201)	0.0108 (0.0245)
African American	-0.0865 *** (0.0215)	0.0310 (0.0247)	0.0402 (0.0258)	-0.0065 (0.0211)	0.0744 *** (0.0266)	-0.0558 *** (0.0208)	-0.0185 (0.0254)
Hispanic	0.2666 *** (0.0221)	-0.0192 (0.0258)	-0.1145 *** (0.0272)	-0.0306 (0.0226)	0.0791 *** (0.0289)	-0.0350 (0.0225)	-0.0441 (0.0275)
Other	-0.1006 ** (0.0407)	-0.0702 (0.0469)	0.0788 (0.0487)	0.0514 (0.0401)	-0.0351 (0.0506)	0.0530 (0.0395)	-0.0179 (0.0482)
English is the Primary Language	-0.0047 (0.0127)	0.0404 *** (0.0147)	-0.0207 (0.0153)	-0.0096 (0.0125)	-0.0316 ** (0.0159)	0.0022 (0.0124)	0.0294 * (0.0152)
Pregnant	-0.0572 (0.0370)	0.0032 (0.0426)	-0.0573 * (0.0443)	0.0742 ** (0.0364)	-0.0533 (0.0464)	-0.0158 (0.0362)	0.0691 (0.0442)
Teen Mom	-0.0177 (0.0154)	-0.0207 (0.0177)	0.0293 (0.0184)	0.0073 (0.0151)	0.0136 (0.0187)	0.0107 (0.0146)	-0.0242 (0.0178)
Living Arrangement							
Lives with Husband	0.0151 (0.0248)	-0.0338 (0.0286)	-0.0189 (0.0297)	0.0242 (0.0244)	0.0117 (0.0317)	0.0347 (0.0247)	-0.0464 (0.0301)
Lives with Other Adults	0.0165 (0.0233)	0.0244 (0.0268)	0.0426 (0.0278)	-0.0671 *** (0.0228)	0.0122 (0.0296)	0.0208 (0.0231)	-0.0330 (0.0282)
Lives Alone with Children	-0.0333 (0.0235)	0.0044 (0.0271)	0.0313 (0.0282)	-0.0075 (0.0231)	0.0708 ** (0.0298)	-0.0108 (0.0232)	-0.0600 ** (0.0284)
Receiving Welfare	0.0027 (0.0088)	0.0140 (0.0102)	0.0006 (0.0105)	-0.0162 * (0.0087)	-0.0013 (0.0109)	-0.0021 (0.0085)	0.0033 (0.0104)
Previously in Head Start or Child Development Program	-0.0129 (0.0126)	0.0126 (0.0145)	0.0146 (0.0152)	-0.0121 (0.0124)	0.0219 (0.0159)	-0.0242 * (0.0124)	0.0023 (0.0152)
Average Focus Child's Age (in months)	-0.0037 (0.0035)	0.0006 (0.0040)	-0.0037 (0.0041)	0.0051 (0.0034)	-0.0038 (0.0043)	-0.0008 (0.0034)	0.0046 (0.0041)
Focus Child's Gender: Male	0.0237 (0.0205)	-0.0346 (0.0237)	0.0214 (0.0246)	-0.0205 (0.0202)	-0.0156 (0.0257)	0.0152 (0.0200)	0.0005 (0.0244)
Number of Children Aged 0-5 in Household	0.0527 *** (0.0156)	-0.0174 (0.0179)	-0.0307 (0.0186)	0.0094 (0.0153)	-0.0139 (0.0198)	0.0137 (0.0154)	0.0003 (0.0188)
Number of Children Aged 6-17 in Household	0.0298 ** (0.0131)	0.0158 (0.0151)	-0.0017 (0.0158)	-0.0119 (0.0130)	0.0077 (0.0165)	0.0016 (0.0129)	-0.0093 (0.0157)
Income is <33% of Poverty Level	-0.0583 * (0.0347)	0.0172 (0.0400)	0.0123 (0.0416)	0.0237 (0.0341)	-0.1434 *** (0.0431)	0.0327 (0.0337)	0.1107 *** (0.0410)
Income is 33-67% of Poverty Level	-0.0616 * (0.0355)	-0.0071 (0.0408)	0.0193 (0.0424)	0.0300 (0.0348)	-0.1258 *** (0.0440)	0.0697 ** (0.0344)	0.0562 (0.0419)
Income is 67-99% of Poverty Level	-0.0961 *** (0.0363)	0.0148 (0.0418)	0.0343 (0.0434)	0.0091 (0.0357)	-0.0286 (0.0455)	0.0116 (0.0355)	0.0170 (0.0433)
Income is 100% of Poverty Level or Higher	-0.1542 *** (0.0399)	0.0039 (0.0460)	0.0149 (0.0478)	0.0879 ** (0.0393)	-0.0378 (0.0498)	0.0134 (0.0389)	0.0244 (0.0474)
R <sup>2</sup>	0.2164	0.0462	0.0744	0.1794	0.0876	0.0351	0.0593
Sample Size	1367	1367	1367	1367	1449	1449	1449

\*Significant under a 10% significance level, \*\*Significant under a 5% significance level, \*\*\*Significant under a 1% significance level  
(Standard errors are in parentheses)



## **Appendix**

To test for differential attrition, I compare the percentages of the participants who stayed in the follow-ups and who did not stay in the follow-ups by baseline characteristics for both the treatment and control groups separately. The denominator is the sample size that indicates the number of participants who responded or did not respond at the time of the follow-up interview. The numerator is the number of participants that satisfy the baseline characteristics. From the data, the percentage of participants who were in the follow-up interviews are consistent throughout the interviews for both treatment and control groups. Therefore, attrition has a minute effect on the data.

**Table 1. Testing for Differential Attrition - Treatment Group**

Baseline Characteristics		Baseline	In 26 Month Follow up	Not in the 26 Month Follow-up	In Grade 5 Follow-up	Not in Grade 5 Follow-up
Sample Size		1488	1066	422	826	662
Highest Grade Completed						
	Completed Less than 12 Years of School	45.3%	44.3%	51.7%	41.5%	52.4%
	Completed 12 Years of School or Has a GED	26.4%	27.5%	23.7%	28.7%	23.6%
	Completed more than 12 Years of School	23.9%	24.8%	21.8%	26.2%	21.1%
Primary Occupation						0.0%
	Employed	22.1%	23.4%	19.0%	25.3%	18.1%
	In School/Training	21.6%	21.7%	21.6%	21.2%	22.2%
	Neither employed nor in school/training	53.5%	51.7%	58.1%	50.2%	57.6%
Race						0.0%
	White	36.8%	36.8%	36.7%	39.5%	33.4%
	African American	33.8%	34.8%	31.3%	33.4%	34.3%
	Hispanic	23.6%	23.2%	24.6%	22.3%	25.2%
	Other	4.5%	3.8%	6.4%	3.8%	5.4%
English is the Primary Language		77.8%	77.3%	78.9%	79.4%	75.7%
Pregnant		24.3%	25.2%	22.0%	25.5%	22.8%
Teen Mom		38.3%	38.1%	38.9%	37.4%	39.4%
Single		75.1%	74.6%	76.5%	74.6%	75.8%
Living Arrangement						
	Lives with Husband	24.9%	25.4%	23.5%	25.4%	24.2%
	Lives with Other Adults	38.6%	38.6%	38.6%	39.1%	38.1%
	Lives Alone with Children	36.5%	35.9%	37.9%	35.5%	37.8%
Receiving Welfare		51.5%	50.0%	55.5%	47.5%	56.6%
Previously in Head Start or Child Development Program		12.3%	11.8%	13.5%	13.1%	11.3%
Focus Child's Gender						
	Female	47.7%	48.9%	44.8%	49.2%	45.9%
	Male	51.4%	51.0%	52.4%	50.8%	52.1%
	Unknown	0.9%	0.1%	2.8%	0.0%	2.0%
Income is <33% of Poverty Level		25.1%	24.5%	26.8%	24.2%	26.3%
Income is 33-67% of Poverty Level		26.9%	26.5%	27.7%	26.6%	27.2%
Income is 67-99% of Poverty Level		20.1%	20.3%	19.7%	20.9%	19.0%
Income is 100% of Poverty Level or Higher		10.8%	11.9%	8.1%	12.5%	8.8%

**Table 2. Testing for Differential Attrition - Control Group**

Baseline Characteristics		Baseline	In 26 Month Follow-up	Not in the 26 Month Follow-up	In Grade 5 Follow-up	Not in Grade 5 Follow-up
Sample Size		1472	1010	462	787	685
Highest Grade Completed						
	Completed Less than 12 Years of School	45.8%	44.4%	48.9%	42.9%	49.1%
	Completed 12 Years of School or Has a GED	28.8%	28.1%	30.3%	28.6%	29.1%
	Completed more than 12 Years of School	21.5%	23.8%	16.5%	24.9%	17.5%
Primary Occupation		0.0%	0.0%	0.0%	0.0%	0.0%
	Employed	22.9%	22.4%	24.0%	25.3%	20.1%
	In School/Training	20.8%	20.3%	21.9%	21.5%	20.0%
	Neither employed nor in school/training	52.8%	53.9%	50.4%	49.8%	56.2%
Race		0.0%	0.0%	0.0%	0.0%	0.0%
	White	36.3%	37.3%	34.0%	37.1%	35.3%
	African American	34.3%	33.5%	36.1%	35.3%	33.1%
	Hispanic	22.9%	22.3%	24.2%	21.1%	25.0%
	Other	4.3%	4.8%	3.5%	4.6%	4.1%
English is the Primary Language		74.3%	74.7%	73.4%	77.3%	70.8%
Pregnant		26.1%	27.5%	22.9%	27.4%	24.5%
Teen Mom		38.6%	37.8%	40.3%	38.1%	39.1%
Single		74.2%	72.8%	77.3%	73.4%	75.0%
Living Arrangement						
	Lives with Husband	25.3%	26.6%	22.3%	26.2%	24.2%
	Lives with Other Adults	39.1%	40.2%	36.8%	40.3%	37.8%
	Lives Alone with Children	35.1%	32.6%	40.5%	33.2%	37.2%
Receiving Welfare		50.0%	48.8%	52.6%	46.9%	53.6%
Previously in Head Start or Child Development Program		12.8%	13.6%	11.3%	13.7%	11.8%
Focus Child's Gender						
	Female	49.2%	49.8%	47.8%	48.3%	50.2%
	Male	49.7%	50.2%	48.7%	51.7%	47.4%
	Unknown	1.1%	0.0%	3.5%	0.0%	2.3%
Income is <33% of Poverty Level		24.5%	23.0%	27.7%	25.2%	23.6%
Income is 33-67% of Poverty Level		23.9%	25.8%	19.7%	23.1%	24.8%
Income is 67-99% of Poverty Level		21.7%	21.8%	21.4%	22.2%	21.0%
Income is 100% of Poverty Level or Higher		11.6%	10.9%	13.2%	12.8%	10.2%

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