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Head Start and Parental Mental Health: Differentiated Impacts of Head Start by Cohort and Comparison Group

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Abstract

The burden of childcare can affect parental mental health, an important determinant of early childhood environmental quality. This is especially true for low-income households. Head Start provides free and public childcare for low-income families that can potentially ameliorate the burdens of childcare by improving parental health. This paper uses random assignment under the Head Start Impact Study to test for Head Start's causal impact on parental mental health. Head Start's impact is found to differ across cohorts, with positive results found only for the three-year-old cohort in 2003, the first year of the study and this cohort's only year in the program. Further, this paper examines differences in childcare-seeking behavior to identify changes between cohorts and across time, and identifies contamination of the control group as a possible explanation for these mixed results.

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Introduction

Child psychology research has demonstrated the importance of the early childhood family environment in shaping child development, with diverse effects in the near- and long-term (Heckman 2008; Shonkoff and Phillips 2000).Observing substantial disparities in early childhood environments along racial and class lines, research has identified that interventions that attempt to level the playing field for children entering school may have substantial returns (Heckman 2011). As a result, early childhood interventions are potentially important tools in combating issues such as poverty and income inequality.

The primary federal early childhood education program is Head Start, which provides free, public childcare to low-income families. Born under President Lyndon Johnson's Great Society, Head Start was envisioned as a holistic intervention to decrease early childhood environmental disparities through academic programs and support services to the communities and families it serves (Gibbs, Ludwig and Miller 2013).Having grown and evolved significantly since its inception, Head Start now serves about one million children from birth to age five with over 120,000 staff members (Aguiar 2012; U.S. Department of Health and Human Services 2010).

Head Start's scale, in addition to the importance of early childhood education, has prompted researchers to attempt to evaluate its impact throughout its existence. Evaluation studies thus far have arrived at different conclusion, primarily because these evaluations have utilized methodological techniques, such as variance in choice of comparison group and choice in which outcomes are measured. Consequently, findings have shown results ranging from slightly positive short-term gains in test scores that quickly fade out (U.S. Department of Health and Human Services 2010) to significant long-term improvements in graduation and incarceration rates (Ludwig and Phillips 2007; Deming 2009).While Head Start is mandated primarily with providing an enriching environment to children during their participation in the program, these studies, especially those that focus on short-term academic outcomes, often ignore how Head Start interacts with children's home environments.

Childcare may be a significant burden for low-income parents. The provision of free childcare could remove this source of stress, which benefits both parents, via reduced anxiety, and children, via less-burdened parents. This study examines Head Start's impact on *parental mental health*. The paper hypothesizes that Head Start improves parental mental health by providing reliable, low-cost public childcare to families, an effect that improves the home environment for the children it serves. This study posits that through this additional channel of parental mental health, research may better explain and predict how Head Start benefits its participants in the long-term.

Using data from the Head Start Impact Study (HSIS), this paper tests Head Start's causal impact on parental mental health. HSIS was a congressionally mandated study of Head Start that randomized access to Head Start across a nationally representative sample of programs, and collected a variety of data, such as test scores and parent and teacher questionnaires, over five years. The randomization of access allows researchers to estimate the causal impact of Head Start. Whereas previous studies have analyzed academic and health outcomes, this paper examines nine self-reported measures of mental health taken from the parent questionnaires while the children were potentially enrolled in Head Start

This paper finds a positive and significant impact of Head Start on a composite measure of parental mental health for children age three who entered Head Start in 2003, the first year of HSIS. However, for the four-year-old cohort in 2003, as well as the three-year-old cohort in 2004, the results are imprecise. Furthermore, after disaggregating the composite mental health measure into its individual components and testing Head Start's impact on each of these mental health component outcomes, the results are similar between cohort and year to those of the generalized composite measure, but are not statistically significant. This paper then analyzes differences in child-care seeking behavior between these groups as a possible explanation for the different findings among the cohorts. The data show households in the four-year-old cohort in 2003 within the control group were both more likely to pay for care and to seek out center-based childcare, suggesting that introducing comparable childcare into the control group might have reduced Head Start's observed impact.

This paper proceeds in six parts. First, I summarize the existing literature on Head Start, childcare, and parental mental health in Section I. Section II outlines the theoretical framework from which this paper derives its hypothesis of a positive impact of Head Start on parental mental health. The methods of analysis and empirical specifications used to estimate Head Start's impact are provided in Section III. This paper's findings are presented in Section IV; these findings are discussed in Section V. and its conclusions are detailed in Section VI.

Literature Review

Evaluations of early childhood interventions tend to focus on the child. Research has focused on a program's ability to close the gaps in child test scores or health, especially for low-income children from disadvantaged backgrounds, as they enter school. James Heckman (2008) surveyed existing research on gaps in academic outcomes, such as in test scores and skills of sociability and self-regulation, and these academic gaps emerge early and often before children enter school. These gaps between advantaged and disadvantaged children persist and grow through the child's lifetime. They reflect the differential circumstances under which children are brought up and diverse socioeconomic or household conditions (Shonkoff and Phillips 2000; Heckman 2008).Through these studies, there appears to be a role for early childhood interventions in mediating the adverse effects of the conditions in which some children grow up.

Head Start is one such intervention. The literature is inconclusive as to Head Start's true impact and the extent to which it succeeds. The Head Start Impact Study (2010), a federal study that utilized random assignment of qualifying families[1] to identify a causal relationship between Head Start and a variety of outcomes, identified significant initial gains for Head Start-participating children relative to other children. In terms of cognitive test scores, the study found these gains faded out entirely within a few years of schooling, casting doubt on Head Start's lasting impact.

Focusing on cognitive test scores and the immediate impact of Head Start may miss the many ways in which Head Start impacts children, however. Longitudinal studies on early cohorts of

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[1] The study identified qualifying families from the waitlists of the nationally representative sample of Head Start programs chosen for the study.

Head Start have identified the program's favorable long-term effects on life outcomes, such as increasing educational attainment and decreasing incarceration rates (Ludwig and Phillips 2007, Deming 2009).This evidence is limited by the fact that the program has evolved over its lifespan; thus, a longitudinal study of historical participants may bear less relevance for children enrolled in Head Start today. However, these findings suggest Head Start's effects may not be captured solely through cognitive test scores and may indicate a need to explore other channels through which Head Start impacts students.

Some research indicates that parenting and quality of a child's early relationships may be one such channel. Herbst and Tekin (2012) examined the relationship between federal childcare subsidies, which have included a work requirement for parents, and parental health and behavior since 1996.Using three nationally representative datasets and regression analyses, Herbst and Tekin identified a correlation between an individual's ability to receive these subsidies and the individual's poorer maternal physical and mental health, as well as detrimental impacts on parental interactions with children. While successful at promoting maternal employment, this research identified that requiring maternal employment may bring an added burden on a child's home life, an unintended consequence of these work mandates.

These policy interventions into childcare may have important impacts on children, primarily through their impacts on parental interactions and health. Research in the field of child development and economics reveal the critical importance of early life environments for children. Parenting plays a fundamentally important role in developing skills, such as conscientiousness and self-control, which have been shown to predict higher earnings (Heckman 2008, 2011).Similarly, parental mental health, including episodes of depression, anxiety, and stress, is an important determinant of the responsiveness and quality of parental behavior. Additionally, these mental health conditions contribute independently to the quality of environment in which a child develops.

As a result, parental mental health is a critical component of the early childhood environment, which has been shown to shape a child's stress responsiveness, self-control, and social competence (Anthony et al 2005, Champagne and Curley 2005). In a sweeping review of the existing literature on childhood development, Shonkoff and Phillips of the National Research Council (2000) found that households that already face chronic stressors like poverty and crime are particularly at risk. Maternal depression and anxiety compounded with the difficultly of raising a child have been shown to correlate highly with reporting a child as difficult, distanced and inconsistent parenting, and even child-abuse.

It is critical then, to understand the impact early childhood interventions have on parental behavior and mental health. Little research has been done on this aspect of Head Start's impact. One recent study by Gelber and Isen (2013) used data from the Head Start Impact Study to identify the impact of Head Start on parental behavior. They found significant evidence that Head Start had a positive impact on the quality of parental interactions, measured as self-reported parenting style and other productive behaviors (e.g., the number of times reading with the child).The researchers, however, did not test Head Start's impact on the parental mental health factors included in the dataset.

Conceptual Framework

This paper builds upon the framework of Gelber and Isen's (2013) work to investigate the causal impact of Head Start on parental mental health. As in their paper, this analysis takes advantage of the fact that the HSIS utilizes random assignment in determining access to Head Start. While compliance is not perfect,[2] this randomization allows researchers such as the original HSIS (2010) and Gelber and Isen (2013) to use intent-to-treat (ITT) analysis to identify Head Start's causal impact on outcomes of interest

The success of a child's development is a function of many inputs, including schooling, resources, and parental investment. Focusing on parental mental health, this paper adds to previous research by suggesting parental investment is influenced, in part, by early childhood interventions. Parents are the primary providers of their children's early life environment and relationships, which have been found to be crucial in developing and predicting a child's success both early on and throughout life (Heckman 2008).Early childhood interventions, by impacting parental investment, can modify the quality of a child's early life environment in both positive and negative ways. Through this channel of parental mental health, parents may influence child outcomes that are traditionally the focus of analyses in these interventions.

This paper posits that parental stress and mental health are critical contributing factors to the early life environment of children, especially in low income and vulnerable families. To that effect, this paper tests the following hypothesis:

H1: If a parent has a child participating in Head Start, the parental mental health composite score will increase.

Furthermore, this paper will disaggregate the parental mental health composite score to see if there is a change in any of the individual component measures of parental mental health. This allows the paper to test Head Start's impact on specific contributing factors of parental mental health. Consequently, this paper also tests:

H2: If a parent has a child participating in Head Start, the individual component outcome score will increase.

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[2]Compliance with the results of randomization was about 84% in the first year of the study and 61% in the second year.61% in the second year.

Methods

Data

The dataset employed by this study's analysis is taken from HSIS (U.S. Department of Health and Human Services 2010). Mandated by Congress to examine Head Start's causal impacts on a variety of outcomes, this study was carried out from 2002 to 2006. From a nationally representative sample of Head Start programs, HSIS researchers randomly assigned access to Head Start for families of three- and four-year-old children. In particular, the randomization enables the estimation of the causal effect of being offered a position in the Head Start program.

HSIS gathered information on its respondents from a variety of sources, including test scores, parental and teacher surveys, and researcher observations. In fall of 2002, baseline survey data were collected from the participants, and subsequent data were collected each spring from 2003 through 2006. The three-year-old cohort attended Head Start in 2003 and 2004, while the four-year-old cohort attended in 2004. As a result, the study includes observations during and after the child's time in Head Start, recording student test score performance, family income, and a variety of other student and family factors. This paper focuses on outcomes related to parental mental health, which are taken from the parent questionnaires. The specific measures of parental mental health used in this study are listed in the top row of Table 3, and their responses are recorded as categorical variables taking on values between one (least healthy) and four (most healthy).

For the purposes of this study, the sample is restricted to respondents with non-missing values for the outcome variables at baseline as well as in the first wave of questionnaires (2003). This subsample includes 2,920 respondents out of the original 4,667, of which 1,616 are in the three-year-old cohort and 1,304 of are in the four-year-old cohort. The randomization utilized in the study suggests there is no asymptotic bias toward non-responses in between the test groups. Therefore, despite the omitted observations, this paper still does not expect to find systematic differences between the treatment and control group, which is supported by Table 1.

Table 1 presents a balancing table of means of eleven key baseline characteristics between the treatment and the control groups for this subsample. While the difference between the proportion of White mothers in the control and treatment group was found to be statistically significant, the remaining differences in key demographic variables were not found to be statistically different from zero. While this significant difference should be considered while viewing the results, the results in this table show this difference does not translate into any systemic differences between treatment and control, especially in key characteristics like income or single motherhood. This suggests that despite the omitted observations, the randomization remained largely successful and observed differences between the treatment and control groups are mostly absent.

This study focuses on parents' mental health outcomes collected only while the child is possibly in Head Start. Consequently, for the three-year-old cohort, outcomes for 2003 and 2004 are included, while for the four-year-old cohort, only outcomes for 2003 are included. These years are when Head Start could be expected to influence parental mental health for each cohort.

Empirical Strategy

This paper focuses on nine self-reported outcomes for parental mental health related to depression and anxiety. The outcomes in the study are often related to similar symptoms of negative mental health (feeling depressed vs. feeling "the blues), which suggests a need to create a method for aggregating the outcomes in a way that allows the measurement of overall mental health. To that end, this study creates a summary index for mental health, similar to the summary indices created in Kling, Liebman and Katz (2007) and Gelber and Isen (2013).The process went as follows: the outcome variables of interest were first recoded so that increases in the recorded values of each variable correlate with positive mental health outcomes. For instance, a question asking parents to indicate how often they experience restless sleep with a response of 1 indicates the highest frequency of restless sleep, while a 4 indicates the lowest frequency. Next, the z-scores of each outcome variable were created by subtracting the control group mean in each respective year and cohort from each observation and dividing it by the control group's standard deviation. These z-scores were then summed into the mental health index. This strategy enables this analysis to draw more general inferences about Head Start's impact on mental health; it also improves statistical power. For comparison, Head Start's impact on individual outcomes is also estimated.

Table 1: Balancing Table of Key Demographic Characteristics at Baseline (2002)

Variables	Observations	Treatment	Control	Difference	p-value
Black	2920	0.306	0.289	0.017	0.331
Hispanic	2920	0.376	0.355	0.021	0.265
White	2920	0.292	0.330	-0.039	0.029**
Single mother	2920	0.496	0.476	-.02	0.299
Working mother	2920	0.485	0.493	0.008	0.674
Mother age	2920	28.63	28.63	-0.001	0.976
Father age	2920	31.66	31.48	0.177	0.542
Child age	2920	3.73	3.73	-0.001	0.969
English at home	2920	0.687	0.697	0.01	0.589
Mother born in USA	2920	0.679	0.681	-0.002	0.894
Monthly income	2920	1427.08	1436.50	-9.38	0.806

Notes: This table shows the means for various key demographic categories within the treatment and control group (columns 3 and 4), the differences between them (column 5), and the p-value of the two-tailed t-test of statistical significance of the difference (column 6).The race variables are for the mother. All variables are measured at the baseline interview from fall 2002.The table shows there are generally no statistically significant differences between the treatment and control group, with the lone exception being a statistically significant greater percentage of white mothers in the control group. ** indicates statistical significance for p = 0.05.

Further, this study seeks to account for differences between programs and cohorts throughout its analyses. To accomplish this, the analysis begins by clustering standard errors at the program level in each regression. This enables the estimates to account for unobserved correlations between individuals at the program level. Further, the analyses account for differentiated effects between cohorts by running regressions both pooled across cohorts and for each individual cohort. Given the differences in circumstances between a three-year-old with two years of potentially participating in Head Start before school starts, and four-year-old in his or her last year of potentially participating in Head Start before entering school, it is reasonable to infer that the compliance with the outcome of the randomization and alternative childcare options would differ in families between these cohorts.

The primary analysis focuses on estimating the ITT effects of Head Start access on mental health outcomes using ordinary-least-squares (OLS). The utilization of a randomized controlled trial by HSIS (2010) enables this study to use ITT analysis to find unbiased estimates for the causal effects of Head Start on the outcomes of interest using the model detailed below.

$$Y_{ipt} = \alpha_0 + \alpha_1 T_{ipt} + X_{ipt}\alpha + \varepsilon_{ipt} \quad (1)$$

Y_{ipt} represents the positive mental health summary index for each individual, i, observed in the relevant year, t, in the program in which the individual's child was enrolled, p. X_{ipt} is a vector of control variables, including baseline measurements of the outcome variable, mother's age and educational attainment as well as dummy variables for teen mothers, immigrant mothers, mother's employment status in year t, and whether English is spoken at home. These are the same control variables as were used in HSIS. T_{ipt} is a dummy variable equal to 1 for respondent's randomly assigned into the treatment group and 0 for the control group; α_1 is the expected point estimate of the ITT effect of Head Start access on the positive mental health index. It is important to note that since the outcome variable is a normalized summary index, the values it assumes represents standard deviations from the mean.

Estimating the ITT effect allows this analysis to take full advantage of the randomization in HSIS. However, a number of members of the control group were able to enroll in some Head Start program, and some members of the treatment group did not ultimately enroll in Head Start. Thus, the ITT effect, while unbiased, does not capture the entire effect of Head Start on individuals who enrolled.

This study attempts to provide suggestive evidence, in light of imperfect compliance with randomization, of the impact of Head Start among "the enrollers" by following Gelber and Isen's (2013) model of an instrumental variable (IV) procedure to find the treatment-on-the-treated (TOT) effect:

$$HS_{ipt} = \delta_0 + \delta_1 T_{ipt} + X_{ipt}\delta + \varepsilon_{ipt} \quad (2)$$
$$Y_{ipt} = \beta_0 + \beta_1 HS_{ipt} + X_{ipt}\beta + u_{ipt} \quad (3)$$

where (2) is the first-stage equation and (3) is the second stage equation. HS_{ipt} is a dummy variable indicating Head Start enrollment; δ_1 is the first-stage coefficient of random assignment on the likelihood of enrollment in Head Start; β_1 is the two-stage leastsquare estimate of the impact of Head Start among children who enrolled, or the people in the treatment group that attended Head Start relative to the people in the control group who did not attend. This is the TOT effect of Head Start on the mental health index. The other variables are as described above. Results from these analyses will address hypothesis 1.

Finally, this paper includes analyses of the individual mental health component outcome variable (refer to first row of Table 3). This paper estimates the effect of treatment on these ordered categorical outcomes through the use of ordered probit regressions. The estimated equation is identical to equation (1), however the outcome variables are the nine individual mental health categories that comprise the positive mental health index. These ordinal categorical outcome variables are recoded so that positive gains are associated with positive mental health outcomes. The coefficients on treatment for each variable indicate the ITT effects of randomization into Head Start access on the probability of the respondent attaining the next highest category. Results from these analyses will address hypotheses 2.

Results

Head Start's Effect on Overall Mental Health

The primary analysis of this paper tests the hypothesis that Head Start has a beneficial impact on overall parental mental health (hypothesis 1). By providing reliable, public childcare with a range of services to the families and communities it serves, this paper posits that Head Start reduces the stresses and demands childcare would normally place on low-income families and improves their overall mental health. Consequently, this paper expects to find positive coefficients on the OLS estimate of Head Start's impact and slightly larger positive coefficients for the two-stage-least-squares estimates in support of hypothesis (1).

Table 2, shown below, presents the findings for the effects of treatment on these summary indices. For outcomes measured in 2003, the end of the first year of treatment, this paper finds a positive ITT effect of almost 0.25 standard deviations for the sample pooled across both the three- and four-year-old cohorts. The two-stage-least-squares estimate of the treatment-on-treated (TOT) effect is even larger, above 0.35 standard deviations. However, these coefficients are not statistically different from zero. These findings are potentially economically significant such that they suggest a positive trend for the potential effects of Head Start on the mental health of its participating children's parents, which could translate beneficially to the early childhood environment. Positive effects of this magnitude, if found conclusively, would be expected to contribute to improvements in a variety of long-term outcomes for their children through this improvement in early childhood environment.

Interesting results emerge, however, when cohorts are broken down in the 2003 findings. It is important to remember that for the three-year-old cohort, the children have another year until

they enter school, and for the control group, they have the renewed possibility of entering Head Start the next year. For the four-year-old cohort, however, this is the last year before they enter school and do not have another chance of entering Head Start.

In 2003, the ITT estimate on Head Start randomization solely among the three-year-old cohort finds a larger coefficient on treatment of 0.48, just under 0.5 standard deviations, that is statistically significant at the p = 0.1 level. The TOT estimate is even larger at .685, just below 0.7 standard deviations, and is similarly statistically significant at the p = 0.1 level. These effects are relatively large, showing a distinctly positive and substantial improvement in parental mental health for the parents of the three-year-old cohort, supporting hypothesis (1).This paper would expect distinctly large improvements in long-term outcomes for children within this three-year-old cohort compared to the control group.

The results differ for the four-year-old cohort, however. The ITT and TOT estimates are negative, but are very small (less than -0.05 and -0.07standard deviations, respectively) and statistically insignificant. These results contrast substantially with those of the three-year-old cohort and prompt further analysis into the distinction between the three- and four-year-old cohorts.

In contrast to the 2003 findings, the ITT estimates on treatment for the three-year-old cohort in 2004 are small and statistically insignificant (less than 0.05).By design, members of the three-year-old cohort's control group were able to reapply to Head Start in the second year of the study. While the TOT estimates show a larger effect (at 0.19), the decreased coefficient on treatment in the first-stage equation (to 0.189) indicates that randomization and treatment had a smaller role in determining childcare decisions in 2004. These structural characteristics of HSIS are very influential in shaping the findings for this particular year.

Head Start's Effects on Individual Outcomes

An important limitation of this study is the possible mismatch between the outcome variables and the method of analysis. The constructed mental health index is an aggregate of normalized outcome variables, however the outcome variables used in this study are ordered categorical variables, making this functional form and the interpretation of its results awkward since the outcome variables are not continuous. However, this method benefits from increased statistical power and a greater sensitivity to overall impacts in one direction. Thus, while these results are suggestive of an *impact* on overall mental health, the *interpretation* of this effect is made difficult by the method employed.

Table 3 presents the ordered probit coefficients on Head Start randomization on each individual outcome variables in an attempt to match the measured ordered categorical outcome variables with a more fitting functional form of estimation. Through this analysis, these results may shed light on the specific channels, if any, through which Head Start primarily impact overall parental mental health. These ordered probit coefficients represent the ITT impact of Head Start on the probability of attaining the next highest category in each respective outcome. In other words, they signify the probability of attaining a more positive result in the respective outcome. For instance, a positive estimate of Head Start's impact on the measure of feeling less depressed would

Table 2: ITT and TOT Effects of Treatment on Summary Index of Positive Mental Health

	TT	2nd Stage Least Squares (TOT)	First Stage	Observations
Positive Mental Health Summary Index –Both cohorts (2003)	0.243 (0.215)	0.354 (0.310)	0.686*** (0.014)	2920
R^2	0.2387	0.2386	398.5	
Positive Mental Health Summary Index – 3-year-old cohort (2003)	0.481* (0.270)	0.685* (0.376)	0.702*** (0.018)	1616
R^2	0.2440	0.2433	247.3	
Positive Mental Health Summary Index – 4-year-old cohort (2003)	-0.045 (0.287)	-0.067 (0.425)	0.666*** (0.022)	1304
R^2	0.2353	0.2352	158.0	
Positive Mental Health Summary Index – 3-year-old cohort (2004)	0.042 (0.036)	0.199 (0.189)	0.189*** (0.026)	1458
R^2	0.1503	0.1409	10.85	

Notes: This table shows coefficients of regressions of the summary index of mental health, constructed as an aggregate of z-scores for nine mental health variables, on randomized Head Start access. Rows 1 – 4 indicate the subsample (meaning the specific year and cohort) on which the regression is run. Measurements are taken in the spring of 2003 and 2004, meaning at the end of the program year. Only the three-year-old cohort is eligible for the program in 2004. Values reported as coefficient on Head Start treatment indicator, standard error in parenthesis, and R² below. Column 1 represents the OLS estimate of the ITT effect of randomization on the mental health index from equation (1). Column 2 represents the two-stage-least-squares estimate of the TOT effect on randomization on the mental health index among the compliers from equations (3). Column 3 provides the first stage results of the instrumental variable procedure, with the first-stage coefficient of treatment on Head Start participation listed at the top, the standard error of this estimate in the second row, and the F-statistic listed on bottom. Standard errors are clustered at the program level.* indicates statistical significance for $p = 0.1$, *** indicates statistical significance for $p = 0.01$. These findings provide economically significant support for the hypothesis that Head Start has a beneficial impact on parental mental health, though the pooled estimates in 2003 are statistically insignificant. Estimates of Head Start's impact for the three-year-old cohort, however are large and statistically significant.

indicate a positive likelihood that Head Start participation reduces self-reported feelings of depression. In doing so, however, this method sacrifices the increased statistical power associated with pooling these measurements into a summary index, which makes detecting any statistically significant impact difficult. For comparison, the ITT effects on the summary index are repeated in the first column.

The coefficients reported in Table 3 are broken down similarly to the coefficients for the summary indices: by cohort and year as presented in Table 2. Pooled across cohorts in 2003 (row 1), the coefficients are small and statistically insignificant. Broken down by cohort (row 2 and 3), the findings in 2003 differ in a manner similar to the previous analysis. Coefficients on treatment for the three-year-old cohort are generally greater than those for the pooled sample and for the four-year-old cohort, often much more so. For this cohort, the coefficient on treatment for feeling less fearful is statistically significant at the $p < 0.1$ level.

Table 3: Ordered Probit Coefficients on Individual Positive Mental Health Outcome

	Positive Mental Health Index	Felt the "Blues" Less	Felt Bothered Less	Felt Depressed Less	Felt Fearful Less	Felt Lonely Less	Had No Appetite Less	Had Restless Sleep Less	Felt Sad Less	Daily Tasks an "Effort" Less
Both cohorts (2003)	0.243 (0.215)	0.006 (0.056)	-0.002 (0.052)	0.007 (0.058)	0.036 (0.061)	0.055 (0.051)	0.006 (0.052)	0.029 (0.044)	0.04 (0.051)	0.029 (0.05)
Pseudo-R^2	0.2387	0.0616	0.0381	0.0897	0.0476	0.0871	0.0611	0.0703	0.0721	0.093
3-year-old cohort (2003)	0.481 (0.270)*	0.045 (0.072)	0.019 (0.069)	0.051 (0.078)	0.126 (0.074)*	0.108 (0.074)	0.008 (0.062)	0.094 (0.059)	0.046 (0.079)	0.046 (0.061)
Pseudo-R^2	0.2440	0.0607	0.0403	0.0913	0.0419	0.0929	0.0622	0.068	0.0647	0.0923
4-year-old cohort (2003)	-0.045 (0.287)	-0.053 (0.073)	-0.022 (0.07)	-0.043 (0.074)	-0.083 (0.087)	-0.011 (0.073)	0.021 (0.072)	-0.053 (0.068)	0.037 (0.062)	0.008 (0.074)
Pseudo-R^2	0.2353	0.0647	0.0379	0.0928	0.0573	0.0835	0.0641	0.0748	0.0857	0.0941
3-year-old cohort (2004)	0.042 (0.036)	0.05 (0.074)	0.049 (0.072)	0.075 (0.078)	-0.047 (0.094)	0.058 (0.072)	-0.004 (0.086)	0.069 (0.063)	0.024 (0.075)	0.015 (0.069)
Pseudo-R^2	0.1503	0.0427	0.0321	0.0741	0.0202	0.0665	0.0305	0.0721	0.0485	0.0730

Notes: This table reports the ordered probit estimates of causal effects of assignment to Head Start on self-reported measures of mental health. Outcome variables are the column headings and are ordinal categorical variables, taking on values from 1 – 4, that have been re-coded so that increases in the number correspond to positive outcomes, where the lowest value reflects "always feeling bad" and the highest indicates "never feeling this symptom." Coefficients are interpreted as the causal impact of treatment on the likelihood of reporting original outcomes less often. The ITT effect of treatment on summary index from Table 2 is repeated for reference. The top value is the point estimate on treatment, with the standard error below it, and the pseudo-R^2 on bottom, except in the case of the summary index, which is just an R^2. The observations are omitted from the table because they are identical to those in the previous table (2,920 respondents for both cohorts in 2003; 1,616 respondents for the 3-year-old cohort in 2003; 1,304 respondents for the 4-year-old cohort in 2003; 1,458 respondents for the 3-year-old cohort in 2004). * indicates statistical significance for p = 0.1.

For the four-year-old cohort, the findings are generally negative and statistically indistinct from zero. The mixed results persist in 2004 for the three-year-old cohort for in their second year of the study (row 4). These results are not statistically distinct from zero. In general, the differentiated results by cohort and year are similar to those of the pooled analyses and are consistent with the observed contamination of the control group.

Discussion

A common question raised by these results is why Head Start's impact appears to be differentiated between the two cohorts? The two-stage-least squares estimates on the TOT effects, which in the long run would control for differences in the success of randomization between the cohorts, only provides further support, though statistically insignificant, for the existence of mixed results. This paper offers the following explanation of the mixed results: differences in the behavior of the control group *between the cohorts* may create two distinct comparison groups for Head Start.

Specifically, the mixed results suggest that parents in HSIS of children closer to school-age, the four-year-olds in this case, are more inclined to seek out center-based care than to allow their children to stay at home. Hypothesis (1) tests whether Head Start uniquely offers positive mental health benefits, and it is possible that parents in the control group for four-year-olds are selecting into alternative forms of center-based childcare that provide positive mental health benefits in the same direction as Head Start. This differential contamination of the control group by respondents gaining similar benefits to those of treatment reflects the distinct circumstances and pressures faced by families as their child approaches school age.

However, the four-year-old cohort's parents would be expected to pursue center-based childcare more rigorously, and possibly be more willing to pay for this service, as this year is their last opportunity to find this support for their kids before they enter school. The parents of the three-year-old cohort in its first year would be expected to face less of these pressures, both because they have an additional year until their children enroll in school, and the study allows them to reapply for enrollment in Head Start the following year. Consequently, the three-year-old cohort in the following year would be expected to enroll in Head Start, in addition to pursuing alternative center-based childcare, at a greater rate than in the previous year.

The data offer preliminary support for this supposition. Among the control group, 63.3% of parents in the three-year-old cohort reported their children were primarily cared for at their own home during the week, compared with just 55.4% in the four-year-old cohort, a difference that is significant at the $p < 0.05$ level of significance. As expected, parents in the four-year-old cohort used center-based childcare more than parents in the three-year-old cohorts: 32.2% compared with 23.7% respectively, with a difference significant at the $p < 0.01$ level. There is also evidence that the four-year-old cohort was more inclined to pay for childcare in 2003: 56% of parents in this cohort reported paying for childcare, compared to only 42% of the three-year-old cohort, which is also significant at the $p < 0.01$ level.

These preliminary analyses on childcare decisions between the cohorts within HSIS offer an important perspective on the findings in this section. Head Start's effect, pooled between the cohorts, is less significant; when isolating this effect among the four-year-old cohort, the effect appears non-existent or even negative. However, it is reasonable to expect that motivated parents

that select into non-Head Start center-based childcare, as is often the case with four-year-old control parents, would reap significant mental health gains from that decision. Using this comparison group does not appear to support hypothesis (1), that Head Start provides positive mental health gains for its participants. Yet, for parents who would otherwise leave their children at home, as the control parents of the three-year-old cohort in this study appears more inclined to do, there does appear to be evidence of a positive impact from Head Start participation on mental health.

While this paper hypothesizes that Head Start would have general positive mental health benefits, without specifying which precise aspect of parental mental health Head Start impacts, the results of this analysis will remain mixed. The results on individual mental health outcomes suggest Head Start may offer more security to parents in knowing where their child will be, the benefit of a connection to their community, and increased knowledge on the resources available to them due to Head Start. Alternatively, it is possible that for low-income parents with significant obstacles to obtaining high-quality childcare, their children's safety may be a common concern. For parents that keep their children at home or with a neighbor, it is reasonable to expect parents to worry more than if they were with a trusted professional whose sole job was the child's safety. In providing a safe space for childcare, Head Start may alleviate parental fears and positively benefit parents' mental health.

Conclusion

This paper tests the hypothesis that Head Start may benefit its participants through a positive impact on parental mental health. Given its public nature and low-cost, this paper suggested Head Start could uniquely provide low-income families with a sense of security in their childcare source. Through this positive benefit on parental mental health, this paper suggested Head Start contributes to an improved early childhood environment, both in program and at home, which facilitates Head Start's desired long-term outcomes.

This paper used HSIS data to test Head Start's causal impact on a summary index of mental health factors as well as individual mental health outcomes. No evidence of a statistically significant positive impact was found across cohorts in 2003, though the estimated impact on the summary index was positive and potentially economically significant in magnitude. Broken down by cohort, however, Head Start was found to have a statistically significant and large positive impact on the summary mental index, in addition to parents reporting feeling fearful less often within the three-year-old cohort. No statistically significant evidence for an impact was found for the four-year-old cohort, nor for the three-year-old cohort measured in 2004.

Assessing the differences between the control groups in the three- and four-year-old cohorts, this paper finds Head Start has a more positive and significant impact when the comparison group is less likely to seek out other center-based care. In this study, parents in the three-year-old cohort in the control group were found to be more likely to provide their own childcare, rather than seek out alternative center-based care. Head Start's impact was found to be positive and significant in comparison to these families. This study provides evidence that Head Start does provide a positive benefit for those who would not otherwise be likely to take advantage of center-based childcare.

These findings suggest further research be done to test whether Head Start's impacts are large in areas where childcare options are less plentiful. While the impact was largest for the three-

year-old cohort in this study, it may be the case that Head Start has a positive effect regardless of cohort as long as the alternatives to it are either home-based care or difficult to attain center-based care. Head Start's positive impact on mental health for these parents may act through its easing of parents' fears, removing the threats to their children's safety that may exist if the child were given care at home or in a neighbor's home. As state provided pre-K programs rise in numbers, it may be the case that fewer communities exist where families have few affordable options for childcare. However, further research would be beneficial to determine the quality and quantity of childcare options across the nation, as this study suggests that communities with few childcare options and alternatives may benefit disproportionately from Head Start.

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