

DYNAMIC ANALYSIS OF MATERNAL EMPLOYMENT, CHILD CARE, QUALITY AND
EARLY CHILDHOOD DEVELOPMENT

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ABSTRACT

Didem Pekkurnaz: Dynamic Analysis of Maternal Employment, Child Care, Quality and Early Childhood Development
(Under the direction of David Guilkey)

This dissertation analyzes the effects of maternal employment and non-parental child care on early childhood developmental outcomes (i.e., health, cognitive achievement and behavioral problems). For this purpose, hybrid production functions are estimated within a dynamic framework using a two-step system Generalized Method of Moments (two-step system GMM) estimator. Nationally representative data, the Early Childhood Longitudinal Study-Birth Cohort (ECLS-B), provide information on parenting style as well as both home and child care environments. Using this information, non-parental child care and home quality indices are created from the first principal components derived from a factor analysis and included in the models. My model also allows for an estimation of the causal effects of health variables (obesity and acute health conditions) on both cognitive achievement and behavior problems.

The results show that a high quality home environment reduces the risk of childhood obesity, being overweight, and behavior problems and also improves a child's general health status and cognitive achievement in children. In addition, high quality out-of-home child care improves cognitive development and reduces behavior problems. High quality non-parental in-home child care significantly reduces a child's risk of being overweight. More maternal hours of works, particularly combined with child care, increases the obesity risk while decreasing behavior problems and improving general health status. Center-based child care also improves cognitive achievement of children. Another important finding is that childhood obesity

significantly reduces cognitive achievement and emotional development. Including quality variables in the estimations alters the magnitude and significance of maternal employment and child care variables. Additionally, the quality variables have theoretically expected signs when the GMM estimator is used to control for unobserved heterogeneity.

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CHAPTER 1: INTRODUCTION

The purpose of this research is to analyze the effects of maternal employment and non-parental child care on developmental outcomes during early childhood using the quality of the home environment and child care as inputs in the production process. Improving child health has been an important public health issue since it has been shown that poor health in childhood is associated with lower educational outcomes, worse adult health and lower socioeconomic status (Currie and Almond, 2011; Case, Fertig and Paxson, 2005; Currie, Stabile, Manivong and Ross, 2010). Apart from the monetary and time costs of childhood illnesses such as ear infections, respiratory illnesses and obesity, there may be adverse effects on cognitive achievement and behavior in children, even during early childhood. Because a child's cognitive development is more strongly affected by parental inputs at early rather than later ages and these early achievements predict later educational and labor market outcomes, it is important to invest in the cognitive development of children as early as possible (Carneiro and Heckman, 2003; Cunha and Heckman, 2008; Currie and Thomas, 1999;). In addition, both cognitive skills and non-cognitive traits such as emotions, personality, social interaction, attention and concentration impact economic outcomes, e.g., schooling, wages and earnings (Heckman, Stixrud and Urzua, 2006; Lindqvist and Vestman, 2011; Eren and Ozbeklik, 2013).¹

Since parents and child care providers play an influential role in the early stages of a child's life, understanding how parental time and non-parental child care affect a child's health,

¹I use the phrase 'behavior problems' to refer to non-cognitive skills throughout this dissertation. A high behavior problems index in my analysis indicates lower non-cognitive skills.

cognitive development and behavior in early childhood is extremely important. The literature on child care and child outcomes is dominated by studies on maternal child care and employment and there has been very little focus on paternal child care and employment. This is likely due to the fact that between 1975 and 2008, labor force participation rates of mothers with children under age 6 (ages 6 to 17) rose from 39% to 63.6% (54.9% to 77.5%).² This large increase in labor force participation rates by mothers has raised questions about the impact of maternal employment on child outcomes as well as the importance of non-parental child care. Although fathers contribute to child rearing, most mothers bear the majority of the burden apart from non-parental child care providers. As shown by Cawley and Liu (2012), fathers contribute only a small percentage of time to housework and child-rearing activities when mothers are working outside the home. In addition, past studies have not found a significant relationship between paternal employment and child health outcomes. For example, a study by Ruhm (2004) considers the effect of both paternal and maternal employment on child cognitive development. However, the sign of the coefficient estimate for maternal employment remains the same and its magnitude is almost the same when controlling for paternal employment. Hence, considering the discussion above, I have focused on maternal employment (instead of paternal employment) in my dissertation.

Possible mechanisms by which maternal employment positively affects child development are through an increase in family income, improved self-esteem of the mother, information gained from coworkers, and employer provided child care subsidies. On the other hand, working mothers have less time to spend on house work, child rearing and food preparation, as shown in time-use studies (Bianchi, Milkie, Sayer and Robinson, 2000; Cawley

²Bureau of Labor Statistics, U.S. Department of Labor, *The Editor's Desk*, Labor force participation rates among mothers. http://www.bls.gov/opub/ted/2010/ted_20100507.htm.

and Liu, 2012; Nock and Kingston 1988). Having less time available for activities with children may negatively influence their cognitive development and behaviors. Thus, the quality of a mother's time with her child should be taken into account in order to improve our understanding of how important maternal time is for child development. Non-parental child care arrangements are very important for working mothers since not only do they provide a learning environment to stimulate cognitive development and improve behaviors of children when they are in care but they also provide nutrition and physical activities for children which affect their physical health. However, it is imperative to control for the quality of child care when analyzing its impact on child outcomes since child care arrangements differ markedly in quality measures such as group size and frequency of activities in child care settings.

There are three main issues in the literature regarding maternal employment, child care and child development. First, employment and child care decisions are not examined as joint decisions in most studies. Working mothers typically use some amount of child care when they are not available to care for their children, so analyzing the impact of only one will confound the effect of other. Thus, it is important to look at the effects of both decisions jointly instead of analyzing the impact of only a single variable. Second, there may be an omitted variable bias problem resulting from ignoring quality variables, home quality and child care quality, and the unobserved inputs (to the researcher). Net household income and determinants of unobserved inputs should be controlled to the extent that bias might be caused by unobserved inputs. The studies mentioned in Chapter 2 neither consider heterogeneity in child care quality nor incorporate home quality into the models. Some models from existing literature include quality measures, but they are treated as exogenous.³ Moreover, most of them ignore unobserved inputs

³Griffen (2011) and NICHD and Duncan (2003) include quality variables as explained in Chapter 2.

such as medical care, nutrition, and quality of child care or include only total household income. In addition to unobserved inputs, such as quality, there may be permanent and/or time-varying unobservable (to the researcher) child and/or mother characteristics that are correlated with both the mother's choice variables and the child's outcome variables. For instance, a child's health endowment which is correlated with his/her health might affect a mother's decision to work and use child care. Similarly, if a mother suffers from depression or the child's health worsens over time, she may be more likely to have an unhealthy child and work less. Most past studies either include too many child-family controls, which are potentially endogenous, or employ only fixed effects (FE) models. However, if there are time-varying unobservables that affect both choice variables studied and child outcomes, FE results may still not estimate a causal model.

All of these aforementioned points will be considered in my research in order to analyze the impact of maternal employment and child care on child development. This research estimates health, cognitive achievement and behavior problems production functions within a dynamic framework using a nationally representative data set, Early Childhood Longitudinal Study-Birth Cohort (ECLS-B). One of my contributions to the literature is an estimate of the effects of maternal employment and child care decisions together by including home quality and child care quality measures derived from information on child nutrition, parenting style, and home and child care environments in the ECLS-B data set. This research makes contributions to the estimation of obesity/overweight risk and behavior problems for children including child care quality chosen by the parent. I estimate the production functions using a two-step system GMM estimator which, to my knowledge, has not been used in previous studies, to control for unobserved heterogeneity.⁴ Since all inputs are not observed, I also control for determinants of

⁴See e.g., Ng, Norton, Guilkey and Popkin (2012) for an application of system GMM method on modeling the dynamic weight changes for adult men in China.

unobserved inputs in the production functions. Finally, I analyze the relationship between developmental outcomes (i.e., health, cognitive and behavior problems) in early childhood controlling for their endogeneity in the production functions. Thus, this research also makes contributions to the literature about the impact of early health conditions on cognitive development.

The results suggest that a high quality home environment has the potential to yield important benefits by reducing both childhood weight and behavior problems; as well as improving their general health status and cognitive achievement. In addition, high quality out-of-home child care improves both cognitive development and reduces behavior problems, and high quality non-parental in-home child care significantly reduces a child's risk of being overweight which, to my knowledge, has not been demonstrated in past studies. A structural child care quality measure, group size, has detrimental effects on a child's risk of having an ear infection and a respiratory illness. More maternal hours of works, particularly combined with child care, increases obesity risk while improving cognitive achievement and decreasing behavior problems in children. Center-based child care is shown to be beneficial for cognitive development. Those results imply that significant impacts of maternal work and child care on developmental outcomes might be misleading and incomplete since some or all of these factors were either omitted or their endogeneity was not properly modeled in past studies. An important final point is that childhood obesity significantly reduces cognitive achievement and emotional development of children, which may imply discrimination against obese children and/or obesity itself (as a physically unhealthy state) may have adverse effects on cognitive functioning and emotional development.

The second chapter presents relevant literature on maternal employment, child care and

child outcomes. The third chapter introduces the theoretical model and the fourth chapter describes the data. The estimation procedure is explained in Chapter 5 and estimation results are shown in Chapter 6. Finally, Chapter 7 concludes.

CHAPTER 2: LITERATURE

Although the determinants of child health have long been analyzed by economists, more recently researchers have been interested in the impact of non-parental child care together with maternal employment on health, cognitive achievement and behavior problems in children. 2.1 describes the literature on maternal employment, non-parental child care and child health. 2.2 discusses the literature on maternal employment, non-parental child care and child cognitive development. 2.3 introduces the literature on maternal employment, non-parental child care and child behavior problems (also called ‘non-cognitive skills’) and the final section presents the relationship between child health and cognitive development.

2.1 Maternal Employment, Child Care and Child Health Outcomes

Diverse methods used by researchers have shown contradictory results for the impact of maternal employment and/or child care on child outcomes. Using methods that control for the endogeneity of maternal employment, it has been shown that maternal employment increases the risk of having an adverse health event such as an asthma episode or an overnight hospitalization, decreases the probability of a child being in good health, and increases childhood obesity (Gennetian, Heather, London and Leonard, 2010; Morrill, 2011; Anderson, Buthcer and Levine, 2003). The adverse impact of maternal employment on childhood obesity is not present when ordinary least squares (OLS) with a set of controls is used (Ruhm, 2008; Fertig, Glomm, and Tchernis, 2009) whereas when parametric, semi-parametric, and non-parametric methods are employed, an adverse effect of maternal employment is statistically significant (Liu, Hsiao,

Matsumoto and Chou, 2009).⁵ Anderson et al. (2003) find that maternal employment increases childhood obesity, especially for children from families with a high socioeconomic status (e.g., more educated mothers) using estimation methods such as a simple probit model with controls, sibling differences and instrumental variable (IV) approach in order to control for the omitted variables.

Previous research investigating the impact of child care attendance on the health of children has shown that children in child care settings are more likely to have common communicable illnesses and more bed days due to illness than those cared for at home (Johansen, Leibowitz and Waite, 1988; Hardy and Fowler, 1993; National Institute of Child Health and Human Development (NICHD) Early Child Care Research Network, 2001). NICHD Early Child Care Research Network (2003) shows that children in child care settings with a group size of more than six are more likely to have common communicable illnesses. Gordon, Kaestner and Korenman (2007) do not find a significant effect of maternal employment on infant health, however, increased time spent in center-based care significantly affects the likelihood of respiratory illnesses and ear infection.

In addition, informal child care has been shown to increase the likelihood of being overweight (including obesity) in children at age three although no significant association between formal child care and obesity in children has been found (Pearce, Abbas, Ferguson, Graham and Law, 2010). These studies do not control for the endogeneity of child care (and/or quality) which may arise from the correlation between permanent and time-varying unobservable

⁵Fertig et al. (2009) look at the impact of maternal work on Body Mass Index (BMI) for children by including channels such as TV watching, nutrition, child care in OLS/probit regressions for the child's BMI. They find that more maternal hours of works are likely to decrease child BMI by increasing the amount of time spend in child care.

characteristics of the child and mother and child care use.⁶ A study by Baker, Gruber and Milligan (2008) show that universal child care leads to worse child outcomes including health for children by exploiting the impact of a universal child care subsidy program in Quebec in the late 1990s using the National Longitudinal Survey of Children and Youth (NLSCY), a Canadian data set. The purpose of the study is to investigate the impact of the program on various child and parent outcomes using the difference-in-difference estimation technique. However, it is argued that their results show the impact of access to child care not the impact of using child care. Kottelenberg and Lehrer (2013) support the findings of Baker et al. (2008) that the reform results in negative effects on various outcomes including health (such as having an ear infection or a nose/throat infection) for children based on the same data set for a longer time period.

Herbst and Tekin (2011) examine the impact of child care subsidies on weight outcomes for kindergarten children of single mothers and find that center-based care increases the likelihood of childhood obesity. However, since they focus only on children of single mothers, their results may not be generalized to other children if single mothers (and their children) differ in some characteristics from those of married mothers (and their children). Using the same data and controlling for the endogeneity of employment and child care choices, Hubbard (2009) shows that formal child care with full-time employment reduces the likelihood of being overweight but informal child care increases the likelihood of obesity and being overweight for children whose mothers worked full-time. My dissertation improves upon the aforementioned papers (particularly for the prevalence of obesity/being overweight) by including the quality of child care and home quality in the production functions and controlling for the endogeneity of

⁶Gordon et al. (2007) use child-mother fixed effect models which do not deal with the potential endogeneity that may arise from the correlation between the explanatory choice variables and time-varying unobservables.

those variables.⁷

2.2 Maternal Employment, Child Care and Child Cognitive Outcomes

While there is extensive literature that focuses on the effect of maternal employment and/or child care use on children's cognitive development, only a few studies deal with the endogeneity of those decisions. Therefore, the results of these studies may not be causal effects.⁸ Bernal (2008), Bernal and Keane (2010) and Bernal and Keane (2011) find that child care decreases cognitive achievement of children, controlling for the endogeneity of child care, while Bernal and Keane (2011) show that informal child care negatively affects the cognitive development of children of single mothers but formal care (i.e., center-based) does not.⁹ On the other hand, Herbst (2013) shows that children from advantaged families have lower cognitive achievement if they receive non-parental care (especially center-based) than peers in parental care and that there is no benefit for disadvantaged children. This is shown by using the seasonality in the timing of the survey for the first two waves of ECLS-B as a source of exogenous variation in the attendance to non-parental child care. However, he does not control

⁷Even if Gordon et al. (2007) and Ruhm (2008) include home quality measures and Fertig et al. (2009) analyze the impact of variables which are likely to be included in a home quality variable, they do not control for the endogeneity of those variables as well as the endogeneity of child care use and maternal employment.

⁸Bernal and Keane (2011) provide a comprehensive literature on maternal employment and/or child care use on child cognitive development. Many studies use OLS by controlling for a large number of variables, some of which are potentially endogenous (NICHD, 2000; Ruhm, 2004; NICHD and Duncan, 2003), or use mother fixed effects which do not control for the omitted time-varying unobservable heterogeneity/inputs correlated with both the child's cognitive development and child care arrangements (Blau, 1999).

⁹Bernal and Keane (2011) use 78 instruments constructed from 1996 welfare reform and earlier policy changes. The instrument list is constructed from policies such as federal waivers received from 1993 to 1996, and changes after the 1996 federal Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA). The estimation methods that they use include OLS, two-stage least squares (2SLS), generalized method of moments (GMM), Fuller, and limited information maximum likelihood (LIML). Factor analysis is also used in order to reduce the number of instruments. Then results are compared using the 78 instruments and estimated factor scores from factor analysis on the list of instruments. However, the author generates child care time by looking at a mother's employment status since they do not have actual data on non-parental child care time. Therefore, even if their instruments are highly correlated with the constructed child care variable, it is difficult to separate the impact of child care use from that of maternal time.

for the cognitive score from the previous period or include quality variables in the cognitive achievement regression although he argues that the instrument is not related to quality based on a separate regression.¹⁰ Even if non-parental child care results in worse outcomes during earlier years (based on his results from the first two waves), since I include all waves of the study using the longitudinal structure of the survey, the finding of positive impact of non-parental child care in my paper may reflect that children benefit from non-parental child care as they get older.

Besides the findings mentioned above, it has been shown that there are benefits from attending high-quality child care settings (Abner, Gordon, Kaestner and Korenman, 2013; Peisner-Feinberg, Burchinal, Clifford, Culkin, Howes, Kagan and Yazejian, 2001; Hill, Waldfogel and Brooks-Gunn, 2002; NICHD and Duncan, 2003).¹¹ While the OLS and mother fixed effects results from Blau (1999) exhibit wrong signs, especially for the child-staff ratio and training variables, he finds small but significant effects of small group size on the cognitive development of children.¹² Duncan and NICHD (2003) demonstrate positive effects of high quality child care on children's cognitive development by estimating value-added models. However, this does not solve the endogeneity problem arising from the potential correlation

¹⁰However, quality measures are available only at Wave 2, so there may still be unobserved quality effects. Even if the coefficient of the instrument is not significant in quality equations (except for five cases), Herbst (2013) finds consistently negative effects i.e., most measures of quality of child care seem to be lower during summer. Moreover, there is no clear explanation about the possible reasons for the negative impact on advantaged children. His argument that child care subsidies lead to worse outcomes for children is due to the center-based setting, where most subsidized children are placed, may not be complete since it is also argued that families using a subsidy may choose lower quality care. Thus, there might be a quality effect of child care on child outcomes. It would be useful to check for the robustness of his results by including child care quality in the regressions for cognitive achievement while controlling for endogeneity.

¹¹Peisner-Feinberg et al. (2001) and Hill et al. (2002) investigate the impact of quality in center-based settings. Peisner-Feinberg et al. (2001) uses set of controls with OLS whereas Hill et al. (2002) uses a randomized study. Abner et al. (2013) estimate weighted least squares with a set of controls for children having data on quality. That is, their analysis include only children receiving child care.

¹²However, as he points out irregular measurement of child care variables in the National Longitudinal Survey of Youth 1979 (NLSY79) makes analysis difficult. In addition, he states that the nature of the data and diversity of methods used for the analysis of child care inputs strongly affect the results.

between unobservables and inputs. Contrary to previous research, Griffen (2011) estimates a value-added specification of a cognitive achievement production including home and child care quality from ECLS-B in a dynamic discrete choice framework in order to examine the effects of child care policies: Head Start and child care subsidies. Differences between my work and Griffen's are that he does not include any health outcomes in his model nor does he estimate the impact of health on cognitive achievement. In addition, his model is solely identified by functional form whereas I include health-related measures of child care environment for the child care quality index as well as the nutrition data for the home quality index.

2.3 Maternal Employment, Child Care and Child Behavior Problems

The importance of non-cognitive skill development (or called behavior problems) has recently received attention in human capital literature. To my knowledge, there are only few papers on the effects of maternal employment and/or child care use on behavior problems in children. Therefore, my research provides contributions to this literature. Mukherjee (2011) analyzes the impact of maternal work on behavior problems in children aged four and over using NLSY79 data. FE results show that maternal employment at the extensive margin increases emotional problems (measured by Behavior Problems Index (BPI)) for children while at both intensive and extensive margins, it decreases the Aizer Behavior Index which is another measure of non-cognitive skill in children. Thus, results show that the effect of maternal employment might differ according to the outcome measure. Thus, in addition to the comprehensive measure of behavior problems, I also include three subgroups. Home quality is included in Mukherjee's study and found to be a significant predictor. However, FE results may not capture causal effects if there are time-varying unobservables correlated with the outcome variable, maternal hours of work and home quality. Felfe and Zierow (2013) study the effects of after-school center-based

child care on children's development skills using a value-added approach. Although the results do not show a significant effect of child care on average, results from the subgroup analysis indicate that after school center-based child care improves non-cognitive skills.¹³ However, a value-added approach might still suffer from unobserved heterogeneity bias due to permanent heterogeneity such as child's skill endowment. Peter (2013) also examines the effects of child care and structural quality of child care on child's non-cognitive skill development. However, the quality measure is regional not assessed at the individual level. In addition, since the sample size is so small (less than 1000), she is unable to estimate a dynamic model although she notes the importance of dynamics as a future research topic.

The effects of universal child care have also been analyzed in the literature on child development. Gupta and Simonsen (2010) examine the impact of publicly provided universal center-based child care and family day care in Denmark during preschool years on the Strength and Difficulties Questionnaire (SDQ) index measured at age seven. The authors find no significant differences between the effects of attending preschool and receiving parental care, however, family day care reduces the index for boys with mothers having low levels of education. The results also show that more hours of non-parental care reduces the index. The parent's choice of quality of child care is not included in Gupta and Simonsen's model, however, they control for the municipality level quality variable, which is the average number of teachers per child enrolled in preschool, which is also a structural quality measure.¹⁴ In addition to the health outcomes mentioned 2.1, Kottelenberg and Lehrer (2013) also investigates the impact of

¹³Subgroup results show that disadvantaged children (i.e., children with less educated mothers and from single-parent households) benefit from attending child care.

¹⁴ Structural quality refers to measures that are mostly regulated by the government. Examples are the number of children in a child care in a group, child-caregiver ratio and education level of the caregiver. On the other hand, process quality measures the interaction between child and caregiver and activities in a child care setting, so the variable captures what actually occurs in a child care setting.

universal child care introduced in Quebec on behavioral scores for children aged two to three. The results indicate an adverse impact of universal child care on the scores. Felfe and Lalive (2012, 2013) analyze the effects of center-based child care on child development including non-cognitive outcomes by taking advantage of the institutional changes in child care availability in Germany to identify the causal effect of child care. Both studies indicate beneficial heterogeneous effects of center-based care using a Marginal Treatment Effects (MTE) framework. Although the authors control for center-based child care quality measures (i.e., structural quality measures and not process quality), those measures are both state-level (in West German states) in Felfe and Lalive (2012) and county-level in Felfe and Lalive (2013). Another paper by Felfe and Lalive (2011) also indicates positive effects of center-based child care on child development outcomes (cognitive and non-cognitive) based on universal child care provided in Germany. However, my research includes the individual level of quality chosen (controlling for the endogeneity) and differentiates between two quality measures: a) process quality (significantly matters for non-cognitive skill development) and b) structural quality. Moreover, I consider other types of child care in addition to center-based care.

2.4 Child Health Conditions and Cognitive Development

Besides the monetary costs of common childhood illnesses such as ear infections, respiratory illnesses and obesity, there might also be negative effects on the development of children, despite the fact that not all of them may have a long-lasting effect on a child's health. More than ten percent of children under four years old experienced at least three ear infections for the period 2009 and 2011, which decreased from (13.7 %) from 1997-1999.¹⁵ Past studies have examined the relationship between the history of an otitis media with effusion (and also a

¹⁵National Center for Health Statistics. Health, United States, 2012: With Special Feature on Emergency Care. Hyattsville, MD. 2013.

potential hearing loss associated with an ear infection) and language and reading problems at later ages or during early childhood. However, these studies have yielded mixed results.¹⁶ In 2010, respiratory system diseases accounted for 38.4 % of hospital discharges among children aged 1–4.¹⁷ In addition to those illnesses, obesity is one of the major health problems for both adults and children. According to the National Health and Nutrition Examination Survey (NHANES), the prevalence of obesity for children aged 2-5 years increased from 5% to 12% between 1976-1980 and 2009-2010.¹⁸ Obese children may develop other chronic health conditions such as Type 2 diabetes, high blood pressure and high cholesterol and suffer from social and psychological problems such as discrimination.¹⁹ Children who are obese in childhood are also more likely to be obese in adulthood.²⁰ The majority of studies have looked at the impact of obesity on cognitive outcomes for school age children. Some of them have shown that obesity in children is associated with lower test scores and GPA (Datar and Sturm, 2006; Datar, Sturm and Magnabosco, 2004; Ding, Lehrer, Rosenquist and Audrain-McGovern, 2009) and some others find no significant effect of obesity on test scores and GPA (Kaestner and Grossman, 2009; Fletcher and Lehrer, 2011). Both Fletcher and Lehrer (2011) and Ding et al. (2009) use genetic markers as instruments for health conditions. However, genes affecting body weight may also have an effect on the cognitive outcomes through a chemical process in the brain that may

¹⁶For language and cognitive outcomes: Paradise, Dollaghan, Campbell, Feldman, Bernard, Colborn, Rockette, Janosky, Pitcairn, Sabo, Kurs-Lasky and Smith (2000), NICHD (2001), Roberts, Burchinal, Jackson and Zeisel (2002). However, these studies do not include maternal employment and control for endogeneity of child care.

¹⁷<http://mchb.hrsa.gov/chusa12/hs/hsc/pages/h.html>.

¹⁸http://www.cdc.gov/nchs/data/hestat/obesity_child_09_10/obesity_child_09_10.htm.

¹⁹See <http://www.cdc.gov/obesity/childhood/basics.html> and related references there for further information on the obesity related health risks for children.

²⁰See Biro and Wien (2010); Whitaker et al. (1997) and Serdula et al. (1993).

render those instruments invalid. Unlike the aforementioned studies, Cawley and Spiess (2008) analyze the relationship between obesity and skill attainment such as verbal skills, social skills, motor skills and activities of living in early childhood. Their OLS results show a negative effect of obesity on these outcomes. However, self-reported weight and height data may generate measurement error and if the unobservable characteristics of the child are correlated with both the child's obesity status and cognitive development, OLS will not give causal estimates. This paper contributes to the small body of literature by estimating the impact of health conditions such as obesity, ear infection and respiratory illness on cognitive development and behavior problems of children in early childhood when controlling for the endogeneity of health-related variables.

CHAPTER 3: THEORETICAL MODEL

In this section, I describe a dynamic model in which a mother chooses the number of hours of works, child care use and quality variables by considering the health, cognitive achievement and behavior of her child. The model does not include the father's employment choice and the time devoted to his child. In the theoretical model, I assume that the mother has only one child and do not model her fertility decision although the number of siblings of the focal child is treated as endogenous in the empirical work. A mother's marital status and the decision to pursue a university degree are not part of the current model, but they are treated as endogenous variables in the empirical model.

Throughout the paper, 'i' denotes a child-level observation (it also represents a mother-level observation as I only observe one child for each mother).²¹ Each child is observed from birth through kindergarten entry; the variable t is the time index and there are in total T time periods. At the beginning of period t, the mother observes the health status, cognitive achievement and behavior problems of her child entering period t $\{H_{it}, Q_{it}$ and B_{it} respectively} and exogenous family characteristics X_{it} .²² She also observes a vector of prices and state/county-level conditions which are assumed to be exogenous. The price variables are a vector of child care prices P_t^C and prices for goods and services purchased for the child P_t^G such as toys, books,

²¹Although twins are oversampled in my data, I select one child from each twin pair.

²²Among them, marital status, number of siblings and university degree of the mother are treated as endogenous in the empirical model.

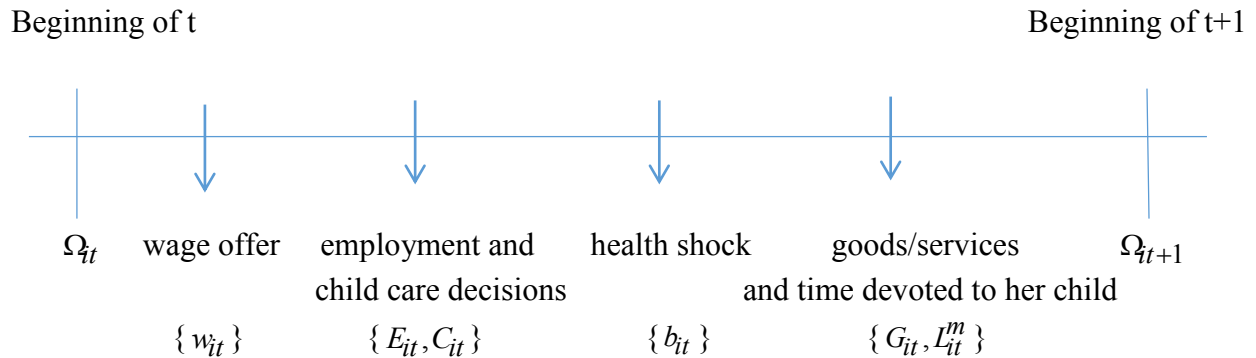
and medical care which are all included in a vector $P_t = \{P_t^C, P_t^G\}$.

The state/county-level variables are represented by Z_t^O and include the unemployment rate, poverty rate, per capita employment in the service sector, per capita employment in the goods sector, per capita number of child care establishments, child care workers' wage rates, and per capita Temporary Assistance for Needy Families (TANF) state expenditures. Other state/county-level variables are establishments for services (except for child care) such as the number of different types of hospitals, physicians, grocery stores, fruit and vegetable markets, fitness centers, museums, full-time restaurants, toys and book stores, which are all denoted by Z_t^G . The distribution of prices for goods and services purchased for the child then depend on state/county-level variables included in Z_t^G . The state level measures of weather conditions are shown by the vector Z_t^b . Hence, all of the information available to a mother at the beginning of period t is represented by a vector $\Omega_{it} = \{H_{it}, Q_{it}, B_{it}, X_{it}, P_t, Z_t\}$ where $Z_t = \{Z_t^O, Z_t^b, Z_t^G\}$.

Upon entering the period, the mother obtains a wage offer drawn from the population distribution of wages w_{it} , which depend on the state/county-level variables except for the ones related to child care included in Z_t^O , and her preferences are revealed. She then makes her decisions about period t hours of work E_{it} , child care use and its quality C_{it} . After making these decisions, a shock to her child's health is observed b_{it} . The health shock is an acute illness such as an ear infection or a respiratory illness. These are not serious health conditions which may affect a mother's employment and child care decisions, however, as discussed in Chapter 2, child care and its quality might have an effect on the probability of observing those illnesses. Therefore, in order to analyze the impact of child care and its quality on the probability of

observing a health shock, I assume that a health shock is observed following a mother's employment and child care decisions. This assumption does not affect the estimation of the production functions.

The mother then allocates her leisure time between her own leisure activities L_{it}^o and time with her child L_{it}^m and her remaining income between purchases related to goods and services for the child G_{it} and a composite consumption good D_{it} . At the end of the period, the child's health, cognitive achievement and behavior problems are updated in accordance with Grossman type production functions.²³ The determinants of the production functions are the state variables entering period t , the mother's time devoted to the child, her child care choices, the health shock and the goods/services purchased for the child. Hence, the next period begins with updated variables represented by $\Omega_{it+1} = \{H_{it+1}, Q_{it+1}, B_{it+1}, X_{it+1}, P_{t+1}, Z_{t+1}\}$ and the process is depicted on the timeline below.



Since not all goods/services and time inputs from the mother to her child are observed in the data, I assume that a mother's time with her child is composed of two parts:

²³In the Grossman (1972) model, individuals are both consumers and producers of health. Health is treated as a capital stock depreciating over time and produced by health-related choices of individuals (e.g., consumption of medical care and other goods).

a) $L_{it}^m = \{L_{it}^{mA}, \bar{L}_{it}^{mA}\}$ where L_{it}^{mA} includes the time inputs observed in the data; and b) \bar{L}_{it}^{mA} includes the time inputs not observed in the data. Observed time inputs are the types and frequency of activities such as reading books to the child and, in later years, taking the child to the library. Similarly, I define goods and services for the child in two parts: a) $G_{it} = \{G_{it}^A, \bar{G}_{it}^A\}$ where G_{it}^A represents observed goods/services such as the number of books and dance lessons; and b) \bar{G}_{it}^A represents goods/services that are not observed. The observed goods and time inputs are referred to as measures of home quality denoted by the vector $A_{it} = \{L_{it}^{mA}, G_{it}^A\}$. In addition, child care varies by quality and the mother selects the number of hours of child care C_{it}^h and its quality K_{it} with $C_{it} = \{C_{it}^h, K_{it}\}$. In the empirical work, the quality of child care is measured by the size of the group (i.e., the number of children in a child care arrangement) and a subset of the same variables used in defining home quality.

The probability that a child experiences a health shock such as an ear infection or respiratory illness depends on the child's health status entering period t , the mother's per period choices of hours of works, child care and its quality, exogenous family characteristics, and exogenous state/county-level weather conditions as shown in equation (1) below:²⁴

$$b_{it} = \{H_{it}, E_{it}, C_{it}, X_{it}, Z_t^b\} \quad (1)$$

The updated health status of the child at the end of period t depends on his/her own health status entering period t , unobserved goods/services purchased for the child, unobserved time inputs, observed home quality, child care variables, health shocks and exogenous family

²⁴I do not include the child's cognitive achievement and behavior problems entering period t in the health shock equation since there is no clear meaning of those variables on the probability of having a health shock. There are no significant changes if those variables are also added for the estimation of health shocks. Results including state variables are available upon request.

characteristics. The updated cognitive achievement of the child at the end of period t is a function of the same variables included in the health production function as well as the child's own cognitive achievement entering period t . The updated behavior problems of the child at the end of period t are functions of the same variables included in the health production function, the child's own cognitive achievement and behavior problems entering period t . Formally, productions functions are formulated in equations (2), (3) and (4) below:

$$H_{it+1} = H(H_{it}, \bar{G}_{it}^A, \bar{L}_{it}^{mA}, A_{it}, C_{it}, b_{it}, X_{it}) \quad (2)$$

$$Q_{it+1} = Q(H_{it}, Q_{it}, \bar{G}_{it}^A, \bar{L}_{it}^{mA}, A_{it}, C_{it}, b_{it}, X_{it}) \quad (3)$$

$$B_{it+1} = B(H_{it}, Q_{it}, B_{it}, \bar{G}_{it}^A, \bar{L}_{it}^{mA}, A_{it}, C_{it}, b_{it}, X_{it}) \quad (4)$$

The mother derives utility from a composite consumption good, her own leisure time, time devoted to her child, the child's health status, cognitive achievement, behavior problems and health shocks. Utility also depends on exogenous family characteristics and preference shifters ξ_{it} .

$$U_{it} = U(D_{it}, L_{it}^o, L_{it}^m, H_{it}, Q_{it}, B_{it}, b_{it} : X_{it}, \xi_{it}) \quad (5)$$

The mother allocates her total time Π (total hours in one week) to hours of work, her own leisure time and time with the child, as shown in her time constraint (6). The child's total time Π is composed of the time with child care providers, his mother, time in school if he is at least 5 years old and time with the mother's partner if the mother lives with a partner as shown in (7).

L_{it}^s is the summation of the child's time in school if he is at least 5 years old and with the mother's partner, if a partner is present.

I assume that L_{it}^S is exogenously given.²⁵

$$\Pi = E_{it} + L_{it}^O + L_{it}^m \quad (6)$$

$$\Pi = C_{it}^h + L_{it}^m + L_{it}^S \quad (7)$$

The total earnings of a mother include her wage earnings $w_{it}E_{it}$ and unearned income V_{it} , which is the mother's partner's income, if she lives with a partner, and assumed to be exogenous.²⁶ Then, her total income is spent on a numeraire composite consumption good, child care use (for which I assume that the price of child care is a function of its quality $P_t^C = P(K_{it})$) and on goods/services purchased for the child such as nutrition, medical care, toys, and learning materials. Formally, the mother's budget constraint is shown below:

$$w_{it}E_{it} + V_{it} = D_{it} + P(K_{it})C_{it}^h + P_t^G G_{it} \quad (8)$$

After substituting the budget constraint and the mother's own leisure time from her time constraint, the utility function can be written as follows:

$$U_{it} = U(w_{it}E_{it} + V_{it} - P(K_{it})C_{it}^h - P_t^G G_{it}, \Pi - E_{it} - L_{it}^m, L_{it}^m, H_{it}, Q_{it}, B_{it}, b_{it} : X_{it}, \xi_{it}) \quad (9)$$

At time T, conditional on employment, child care choices and the observed health shock, the value of choosing the amount of time devoted to the child and goods/services for the child

$V_{G_i, L_i^m}^2(\cdot)$ is as follows:

²⁵In my data set, some of the children started kindergarten at Wave 4 and children who had not started kindergarten at Wave 4 were interviewed again at Wave 5.

²⁶In my data, I observe a mother's partner's earning if she lives with a partner and reports an income for her partner. The mother may be married to him or not. That person can be the child's biological father, other father type, a friend of the mother or anyone else living in the house and is reported as being a partner of the mother. I do not observe other types of unearned income such as interest income and government transfers.

$$V_{G_i, L_i^m}^{2T}(\Omega_{iT} | E_{iT}, C_{iT}, b_{iT}, \xi_{iT}) = U_{iT} + \beta W(\Omega_{iT} + 1) \quad (10)$$

where $W(\cdot)$ is the expected continuation value and the transition functions are defined by equations (2), (3) and (4). The maximal value of lifetime utility conditional on employment, child care choices and the health shock at time T is

$$V^{2T}(\Omega_{iT} | E_{iT}, C_{iT}, b_{iT}, \xi_{iT}) = \max_{G_i, L_i^m} V_{G_i, L_i^m}^{2T}(\Omega_{iT} | E_{iT}, C_{iT}, b_{iT}, \xi_{iT}) \quad (11)$$

The value of choosing employment and child care options $V_{E_i, C_i}^1(\cdot)$ at time T is given in equation (12) below:

$$V_{E_i, C_i}^{1T}(\Omega_{iT} | \xi_{iT}) = E_{b_T} [V^{2T}(\Omega_{iT} | E_{iT}, C_{iT}, b_{iT}, \xi_{iT})] \quad (12)$$

The maximal value of lifetime utility unconditional on employment, child care choices and the health shock at time T is

$$V^1(\Omega_{iT} | \xi_{iT}) = \max_{E_i, C_i} V_{E_i, C_i}^1(\Omega_{iT} | \xi_{iT}) \quad (13)$$

At any time $t < T$, conditional on the employment and child care choices and the observed health shock, the value of choosing the amount of time devoted to the child and goods/services for the child is given below:

$$V_{G_i, L_i^m}^{2t}(\Omega_{it} | E_{it}, C_{it}, b_{it}, \xi_{it}) = U_{it} + \beta E_{\xi_{it+1}} [V_{E_i, C_i}^{1t+1}(\Omega_{it+1} | \xi_{it+1})] \quad \forall t < T \quad (14)$$

Where $\beta \in (0, 1)$ is the discount factor and $V^{1t+1}(\cdot)$ is the maximal value of lifetime utility, unconditional on employment, child care choices and health shock at $t+1$. As shown in equation (15) below, the mother selects the optimal amount of goods and services purchased for the child and her time with the child in order to maximize her lifetime utility conditional on employment, child care choices and health shock.

$$V^{2t}(\Omega_{it} | E_{it}, C_{it}, b_{it}, \xi_{it}) = \max_{G_i, L_i^m} V_{G_i, L_i^m}^{2t}(\Omega_{it} | E_{it}, C_{it}, b_{it}, \xi_{it}) \quad \forall t < T \quad (15)$$

The expected value of employment and child care choices at the beginning of time t , given the distribution of health shocks is

$$V_{G_i, C_i}^{1t}(\Omega_{it} | \xi_{it}) = E_{b_t} [V^{2t}(\Omega_{it} | E_{it}, C_{it}, b_{it}, \xi_{it})] \quad \forall t < T \quad (16)$$

At the beginning of period t , the mother chooses optimal employment and child care options with the resulting discounted expected lifetime utility.

$$V^{1t}(\Omega_{it} | \xi_{it}) = \max_{E_i, C_i} V_{E_i, C_i}^{1t}(\Omega_{it} | \xi_{it}) \quad \forall t < T \quad (17)$$

The solution to this optimization process will yield demand functions for employment and child care choices as well as conditional demand functions for home quality and unobserved inputs, i.e., goods and services purchased for the child and time with the child. Conditional demand functions given in equation (18) depend upon the child's health status entering period t , the child's cognitive achievement and behavior problems entering period t , the mother's per period choices of hours of works, hours of child care and its quality, health shocks, exogenous family characteristics, prices for good/services inputs, and the income variable I_{it} . Income is the net household income after the child care expenditures for the child are subtracted.

$$J_{it+1} = f(H_{it}, Q_{it}, B_{it}, E_{it}, C_{it}, b_{it}, X_{it}, P_t^G, I_{it}) \quad \text{for all } J = \{A, \bar{G}^A, \bar{L}^{m\bar{A}}\} \quad (18)$$

After we substitute conditional demand functions for the unobserved inputs $\{\bar{G}^A, \bar{L}^{m\bar{A}}\}$ into equations (2), (3) and (4), we get the following hybrid production functions:²⁷

$$H_{it+1} = H(H_{it}, \bar{G}_{it}^A, \bar{L}_{it}^{m\bar{A}}, A_{it}, C_{it}, b_{it}, X_{it}) \quad (19)$$

²⁷The notion of hybrid production functions has been introduced by Rosenzweig and Schultz (1983).

$$Q_{it+1} = Q(H_{it}, Q_{it}, \bar{G}_{it}^A, \bar{L}_{it}^{mA}, A_{it}, C_{it}, b_{it}, X_{it}) \quad (20)$$

$$B_{it+1} = B(H_{it}, Q_{it}, B_{it}, \bar{G}_{it}^A, \bar{L}_{it}^{mA}, A_{it}, C_{it}, b_{it}, X_{it}) \quad (21)$$

where each hybrid production function is a function of the child's health status entering period t , cognitive achievement entering period t , behavior problems entering period t , home quality, the mother's per period choices of hours of work, hours of child care and its quality, health shocks, exogenous family characteristics, prices for good/services inputs and an income variable.²⁸ The timing assumptions about the mother's choices are not imposed in the estimation of the production functions while timing matters for the estimation of the health shock equation.

²⁸In the empirical work, maternal education, marital status and number of siblings of the child at home are treated as endogenous and written separately from the exogenous family characteristics vector X_{it} .

CHAPTER 4: DATA

The primary data used in this research are from a nationally representative restricted-use data set, the ECLS-B. This is a longitudinal study that followed a sample of approximately 14,000 children born in 2001 from birth through kindergarten entry. The ECLS-B contains information about children, their families, early education, and child care providers and teachers across the United States. Five rounds of data were collected that occurred when the children were approximately 9 months old (2001-02), 2 years (2003-04), 4 years /preschool age (2005-06) and in the fall of 2006. In 2006, approximately 75% of children were in kindergarten or higher. Thus, in the fall of 2007, the remaining 25% of the children who had not entered kindergarten or higher previously, as well as children who were repeating kindergarten were interviewed again. I utilize data from all five waves.

In every data collection round, the parent respondent (usually the mother) was asked about the parents' employment, earnings, family background, child care arrangements and the child's health. Starting when the children were 2 years old, their child care and early education providers were interviewed and asked about their child care activities with the children. ECLS-B data contains the Bayley Short Form- Research Edition (BSF-R) at Waves 1 and 2. In this paper, scale mental scores are used as cognitive achievement measures for the children at Waves 1 and 2. For other waves, both scale and T-scores for math and reading tests are available. I include the average of the scaled version of the math and reading scores measured at Waves 3, 4 and 5.

The previously mentioned tests were adapted from widely known early reading and math assessments such as the Peabody Picture Vocabulary Test- Third Edition (PPVT-III), the Test of

Early Mathematics Ability-3 (TEMA-3), the Preschool Comprehensive Test of Phonological and Print Processing (Pre-CTOPPP), the PreLAS 2000 and questions from the Early Childhood Longitudinal Study-Kindergarten (ECLS-K). I then standardize all scale measures in order to construct a longitudinal measure of cognitive achievement. The behavior problems cover a large range of skills such as internalizing behaviors (i.e., negative behaviors towards himself/herself such as being unhappy) and externalizing behaviors (i.e., behaviors towards other people such as aggressiveness), communication skills, attention and memory. In the first two waves, interviewers observed child behaviors during their visits and reported them. In the remaining waves, parents reported their observations about their children's behavior covering the type of skills mentioned above. A list of variables used to create behavior problems for all waves is available in Appendix D, Table D1 along with their summary statistics (Table D2). In order to construct an index for behavior problems, factor analysis is used. The index is the estimated first principal component with higher values indicating more behavior problems.

Additionally, I disaggregate the behavior problems into three subgroups: a) emotions; b) social interaction; and c) attention. Each subgroup is created as the estimated first principle component from three separate factor analyses. The emotions index is constructed from the variables representing emotional development of the child such as whether the child is aggressive and unhappy. The second index represents social interaction skills of the child such as whether the child is invited to play by other children and stands up for others. The final index captures a child's attention skills such as whether the child is able to finish a task and pays attention to a given task.

The child health measures that are used in this paper are the general health status of the child reported by the parent, the obesity status of the child, and prevalence of ear infections and

respiratory illnesses as reported by the parent. The general health status of the child has a value of 1 if the child's health is reported as being excellent or very good and is 0 if it is reported as being good, fair or poor. The weight and height of each child were measured at each wave and BMI is available for children who are at least two years old. To construct a measure of obesity prevalence, I first create age-sex specific z-scores for BMI using the Stata command 'zanthro'. Z-scores are then converted into percentiles assuming a normal distribution. A child is then assumed to be obese if his/her age-sex specific BMI percentile exceeds the 95th percentile. However, this measure cannot be constructed for children under two years old since there is no consensus on how to interpret BMI for children in this age group. In order to make use of the weight and height information for children under two years of age, I construct weight for length z-scores using macros provided by the World Health Organization (WHO).²⁹ According to WHO (2008), a child under two years old is assumed to be obese if his/her weight for length z-score exceeds 3.³⁰ The obesity measure has a value of 1 if the age-sex specific BMI percentile exceeds the 95th percentile for children at or above two years old and weight for length z-score exceeds 3 for children under two years old. The obesity measure is zero otherwise. In addition, I include another measure called 'overweight'. This measure covers children who are either overweight or obese. Its value is 1 if the age-sex specific BMI percentile exceeds the 85th percentile for children at or above two years old and the age-sex specific z-score for weight for length percentile exceeds 2 for children under two years of age. A mother's choice variables are hours worked last week, home quality, hours of child care for each type (home-based child care and center-based

²⁹See <http://www.who.int/childgrowth/software/en/>.

³⁰It is recommended to use WHO growth charts for children under 24 months old. See <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5909a1.htm>.

child care), quality of primary child care, mother's current marital status, number of siblings of the focal child, and the mother's education level, defined as whether the mother has a university degree or not.³¹ Exogenous family/child characteristics are the child's age, child's gender, child's race and ethnicity, mother's age, whether the family lives in an urban or rural area, region of residence and the income of the partner.

Two main non-parental child care quality measures are created for this paper. Group size is a structural child care quality measure reported by the parent and is the number of children in a child care setting. The variable is available for all three types of non-parental child care and all waves. If a family uses more than one type of child care, average group size is used.³² Process quality is the second non-parental child care quality variable that measures the interaction between the child and his/her primary child care provider. Process quality includes the frequency with which the primary child care provider reads, does math, and plays music with the child. It also includes items representing the child care environment such as the number of books and toys available and whether the child care arrangement has a reading area or not.³³ Since a primary child care arrangement can take place in a child's own home, I define two child care

³¹Home-based child care includes both relative care and nonrelative care.

³²The percentage of families who use multiple child care arrangements in my sample are 1.9%, 2.7%, 20% and 20% for Waves 1, 2, 3 and 4 respectively.

³³The definition of primary childcare from the ECLS-B user's manual: "The *primary* child care provider is the person who provides the most care to the child in the regular non-parental caregiving arrangement where the child spends the most number of hours per week in care. If the child spends the exact same number of hours with different care providers in the 2nd wave, one provider was selected at random to be the primary child care provider. If the number of hours was the same for two or more types of care in the 3rd wave, then selection of an arrangement for the ECEP (Early Care Education Provider) was made with the following order of preference: Head Start, relative care, nonrelative care, and non-Head Start centers. For cases in which a child spent the exact same number of hours per week with different care providers in the 4th wave, one provider was selected to be the subject of the ECEP, based on the type of care arrangement, in the following order of preference: Head Start program, other center-based care, home-based care (relative), and home-based care (nonrelative). For cases in which a child spent the exact same number of hours per week with different care providers in the 4th wave, the provider was selected to be the subject of the WECEP (Wrap-around Education and Early Care Provider) interview, based on type of care, in the following order of preference: center-based care, home-based care (relative), and home-based care (nonrelative)."

quality measures, which are in-home primary child care quality and out-of-home primary child care quality. All primary center-based child care arrangements are defined as out-of-home child care. The variables that are used to construct the quality index for the primary child care arrangement are shown in Tables C2 and C3 in Appendix C³⁴ and are available for all waves except the first. Since it is not feasible to include every variable separately in the production functions, I create a quality index, which is the estimated first principal component from factor analysis. This method allows me to combine multiple variables into a single index.³⁵

I also create a home quality index using factor analysis that combines information about the materials available in a child's home, nutrition of the child and the mother's interaction with the child into a single index. For example, the number of books and toys, type of beverage that the child drinks with meals, how often the mother tells stories to child, and takes the child to a library are some examples of the variables that are used in the factor analysis to create a home quality index. However, some of the variables used to construct a quality measure for non-parental child care at home are equivalent to the variables related to home quality. Thus, if there are questions asked of both the respondent parent and primary caregiver at home, I use the information given by the parent. The variables used in the factor analysis for home quality can be found in Table C1 in Appendix C.

4.1 Descriptive Statistics

Since ECLS-B oversamples twins, I randomly select one child from each twin pair and exclude the other from estimation. Column 1 in Table 1 shows the number of observations at

³⁴ If a child receives a child care service before or after school (e.g., before or after kindergarten) then the service is represented in the table as before and after.

³⁵As mentioned in Griffen (2011), although ECERS is a widely used quality measure for child care quality, it is available for a small subset of children in ECLS-B. In addition, the HOME scale in ECLS-B, which is a measure for home quality, includes only a subset of questions from the original version of this scale. Therefore, I also used factor analysis to create my own quality variables.

each wave and the second column shows the sample size after I select one child from each twin pair. According to my theoretical model, all of the variables in the production functions, with the exception of the dependent variables, come from the previous period. Therefore, summary statistics of the variables shown in Appendix B, Table B1 are for the first four waves. Since I estimate each model for each dependent variable separately, I do not restrict the sample size to be the same for each dependent variable. Therefore, the number of observations for each dependent variable for the estimation (cognitive achievement, behavior problems general health status, obesity, ear infection and respiratory illness) are different, as shown in Appendix B, Table B2.³⁶

Table 1: Sample size

	Sample size	Sample size after twin restriction
Wave1	10700	9900
Wave2	9850	9050
Wave3	8950	8250
Wave4	7000	6450
Wave5	1900	1700

Notes: Sample sizes (N) are rounded to the nearest 50 as required by NCES.

Table 2 shows the average value of t-1 variables (listed on the left hand side of Table 2) by outcomes at time t, which are obesity, overweight and general health status. Asterisks next to the numbers indicate that means of the corresponding variable by the levels of a particular outcome (e.g., obese vs non-obese) are statistically different than each other at some level of significance. For example, the average hours of work at t-1 for obese children at time t is

³⁶However, there were not any significant differences between summary statistics for demographic variables such as child's age, mother's age, marital status of the mother, her education level, and health variables among different sample sizes.

statistically different than ($p < 0.05$) the average hours of work at t-1 for non-obese children at time t. This holds true for the risk of being overweight and general health status (general health status has a value of zero for poor health and 1 for good health). Similarly, average hours of center-based care are statistically different from each other by the level of each outcome. Average hours of home-based care at time t-1 are significantly different from each other according to the level of outcomes with the exception of general health status. In general, hours of work and child care variables are higher for unhealthy children. Average home and out-of-home child care quality variables are statistically different from each other by the level of each outcome variable. However, average in-home child care quality differs by the level of general health status only. Except for out-of-home primary child care quality other quality variables are higher for healthy children.

Table 3 provides the proportions of outcomes at time t according to the variables on the left hand side of the table. If children had ear infections, the proportions of obese and overweight children are not statistically different than the proportion of children that did not have ear infections. Similarly, although the average cognitive achievement of a child if the child did have an ear infection is slightly larger than the average cognitive achievement if he did not suffer from an ear infection, there is no statistically significant difference. On the other hand, the proportion of children with good health status and the average behavior problems index for children who got ear infections (respiratory illness) are statistically different than the proportions for children who did not have ear infections (respiratory illness).

Table 2: Descriptive Statistics of Health Outcomes by Hours of Work, Hours of Child Care and Quality Variables

	Obese	Not Obese	Overweight	Not Overweight	Poor Health	Good Health
Hours of work	20.991** (20.062)	19.286** (19.650)	20.857** (19.983)	18.971** (19.579)	17.612** (19.542)	19.540** (19.706)
Center-based care hours	8.756 ** (15.086)	7.938** (14.256)	8.711** (14.937)	7.778* (14.131)	7.360* (13.776)	7.802* (14.231)
Home-based care hours	11.153* (17.535)	10.488* (17.454)	11.125** (17.572)	10.355** (17.418)	10.682 (18.211)	10.591 (17.412)
Home quality index	-0.084** (0.979)	0.032** (0.988)	-0.048** (0.978)	0.042** (0.990)	-0.278** (0.993)	0.045** (0.984)
In-home child care quality index	-0.003 (0.229)	-0.0005 (0.207)	-0.002 (0.234)	-0.0003 (0.200)	-0.011** (0.211)	0.0007** (0.206)
Out-of-home child care quality index	0.028** (0.531)	-0.007** (0.520)	0.012** (0.535)	-0.007** (0.516)	0.022** (0.503)	-0.005** (0.515)
N	20400		20400		23650	

Notes: Sample sizes are rounded to the nearest 50 as required by NCES. Standard deviations in parentheses. *p<0.10 **p<0.05

Table 3: Descriptive Statistics of Outcomes by Health Shocks and Obesity

		Obese	Overweight	Good Health	Cognitive Achievement	Behavior Problems
Ear infection	Yes	0.144 (0.351)	0.298 (0.457)	0.823** (0.381)	0.059 (0.978)	-0.021** (0.972)
	No	0.144 (0.351)	0.297 (0.457)	0.874** (0.332)	0.042 (1.002)	-0.068** (0.976)
Respiratory illness	Yes	0.154 (0.361)	0.315** (0.465)	0.745** (0.435)	-0.030** (0.992)	0.018** (1.002)
	No	0.143 (0.350)	0.295** (0.456)	0.871** (0.335)	0.058** (0.993)	-0.061** (0.971)
Obese	Yes				-0.073** (0.970)	0.011** (1.007)
	No				0.061** (0.995)	-0.059** (0.971)
N		20400	20400	23650	20850	21050

Notes: Sample sizes are rounded to the nearest 50 as required by NCES. Standard deviations in parentheses. ** p<0.05

Moreover, average cognitive achievement is lower for children who are obese and statistically different than the average cognitive achievement of non-obese children. Similarly, obese children have more behavior problems and the average behavior problems index for obese children is statistically different than that for non-obese children. Table 4 shows the proportions of obese and overweight children as well as children with good health status, and the averages of cognitive achievement and behavior problems index by the level of the left hand side variables. The proportion of obese (overweight) children whose mothers worked full-time is higher than children of mothers who worked part-time. This holds true for center-based child care while the proportion of obese (overweight) children is higher if part-time home-based child care was used. On the other hand, the proportion of children with good health status is higher for mothers who worked part-time and used full-time center-based care while it is lower if part-time home-based care was used. Average cognitive achievement is higher for children whose mothers worked part-time, and used either full-time center-based care or part-time home-based care. Behavior problems are higher for children of part-time workers who used part-time center-based care or full-time home-based child care.

As shown in table 5, proportion of obese children are higher whose mothers worked full-time and used any type of child care. This holds true for children who are overweight as well. On the other hand, the proportion of children with a good health status, an average cognitive achievement and an average behavior problems index are higher whose mothers worked part-time and used any type of child care. However, it should be noted that all of these results represent correlations, not causality.

Table 4: Descriptive Statistics of Outcomes by Employment and Child Care Variables (Specification 2)

	Obese	Overweight	Good Health	Cognitive Achievement	Behavior Problems
Full-time work	0.155 (0.362)	0.324 (0.468)	0.867 (0.340)	0.119 (0.987)	-0.079 (0.938)
Part-time work	0.141 (0.348)	0.281 (0.450)	0.875 (0.331)	0.142 (0.982)	-0.107 (0.959)
Full-time center-based child care	0.156 (0.363)	0.328 (0.470)	0.873 (0.333)	0.234 (0.969)	-0.072 (0.946)
Part-time center-based child care	0.143 (0.350)	0.301 (0.459)	0.861 (0.346)	0.202 (0.983)	-0.114 (0.950)
Full-time home-based child care	0.150 (0.357)	0.310 (0.462)	0.849 (0.359)	0.037 (1.006)	-0.071 (0.951)
Part-time home-based child care	0.153 (0.360)	0.319 (0.466)	0.871 (0.335)	0.077 (0.987)	-0.062 (0.968)
N	20400	20400	23650	20850	21050

Notes: Sample sizes are rounded to the nearest 50 as required by NCES. Standard deviations in parentheses.
Full-time: >35 hours, Part-time: > 0 & ≤ 35 hours.

Table 5: Descriptive Statistics of Outcomes by Employment and Child Care Variables (Specification 3)

	Obese	Overweight	Good Health	Cognitive Achievement	Behavior Problems
Full-time work with child care	0.156 (0.363)	0.326 (0.469)	0.868 (0.338)	0.140 (0.992)	-0.082 (0.934)
Full-time work without child care	0.148 (0.355)	0.315 (0.465)	0.857 (0.350)	-0.021 (0.942)	-0.060 (0.964)
Part-time work with child care	0.146 (0.354)	0.291 (0.454)	0.877 (0.328)	0.169 (0.981)	-0.118 (0.952)
Part-time work without child care	0.124 (0.330)	0.251 (0.434)	0.868 (0.339)	0.064 (0.980)	-0.075 (0.978)
No work with child care	0.136 (0.342)	0.294 (0.456)	0.843 (0.364)	0.053 (0.998)	-0.033 (1.008)
No work without child care	0.138 (0.344)	0.279 (0.449)	0.869 (0.368)	-0.107 (0.989)	0.009 (1.006)
N	20400	20400	23650	20850	21050

Notes: Sample sizes are rounded to the nearest 50 as required by NCES. Standard deviations in parentheses.

4.2 Instruments

The inclusion of exclusion restrictions in addition to GMM-type instruments constructed from the lags of endogenous variables improves efficiency and are needed since GMM-type instruments are not used for all lagged variables.³⁷ Those instruments affect the final outcome variable only through their effects on endogenous explanatory variables. All of the variables mentioned below potentially affect all endogenous variables in the model. Since ECLS-B data do not include any state/county-level variables that can be used as instruments, I merge the original ECLS-B data with state/county variables using the state and zip code information in the data set. A complete list of summary statistics for the state/county-level variables is given in Table B3, Appendix B.

I include the county-level unemployment rate, poverty rate, service sector employment per capita, goods sector employment per capita, and average state-level wage rate per hour because these are factors that are likely to affect working decisions. For example, while higher unemployment rates or poverty levels might decrease a mother's chance of working in a full-time job, a higher mean wage rate might increase her chance of working full-time. The TANF state expenditures per capita, county-level median household income per capita and the county-level male-female ratio for individuals over 18 years old are likely to impact marital status and the number of siblings of the focal child. I obtain average state level child care prices i.e., state-level average annual cost of infant care for center-based settings and state-level annual average cost of preschool care for center-based settings from reports published by NACCRRRA, the National Association of Child Care Resource & Referral Agencies. However, since NACCRRRA

³⁷Exclusion restrictions are called external instruments in the system GMM framework. The decision to use GMM-type instruments for all or some of the variables depends on how autocorrelation and Sargan test results change with the inclusion of GMM-type instruments.

does not publish prices for years prior to 2005, I impute missing values by extrapolating. Appendix K presents the state-level child care prices over time in detail and examines the determinants of the prices between 2006 and 2012.

Other variables that are likely to affect the decision to use child care and its quality are the per capita county-level number of day care establishments and the per capita state-level number of regulated center-based child care places and family-based child care places. I also include the state-level mean wage of preschool teachers and child care workers in order to capture the state-level quality effects of child care. For example, a higher quality child care establishment may pay higher wages to its workers. I obtain state-level two-year public and four-year public and private university costs for tuition, which may affect a mother's education level. If the cost of education increases, a mother may be less likely to get a university degree. In order to identify the impact of acute health conditions such as ear infections and respiratory illnesses, I use the 95th percentile for the state-level precipitation measure and standard deviations for state-level rain and snow fall.³⁸ Heavy rain and snow fall might make it more likely that the child will have a cold, infection, or a respiratory illness.

4.3 State/County-Level Variables

As mentioned in Chapter 3, the prices of unobserved variables enter the production functions via the conditional demand functions. However, I do not have price data for unobserved inputs such as food, medical services and books. Therefore, the state/county-level variables described below are included, which affect the distribution of prices for the unobserved variables and generate exogenous changes in the consumption of unobserved inputs. Moreover, lags of the variables explained in this section will also be used as additional instruments in GMM

³⁸I also collected county-level air quality data and measurements of other air pollutants. However, they have unexpected signs even in the simple (Random effects) RE models for the health shocks.

estimations. Some of those variables include the county-level number of supermarkets and grocery stores, the number of fruit and vegetable markets, convenience stores, museums, parks, fitness centers, zoos, and full-service and limited-service restaurants. These variables are likely to impact outcomes of children by affecting their food consumption and physical activities such as exercise, walking, and going to a zoo or a museum. For example, families might be more likely to provide healthy foods if alternative places to buy these foods such as fruit and vegetable markets are present. However, an increase in the number of restaurants may also increase the likelihood of eating outside of the home which might increase a child's total caloric intake. Furthermore, the number of visits to a museum or a natural park will likely be higher if there are more options available.

The county-level total number of hospitals, number of short-term general hospitals with child wellness, short-term general hospitals with nutrition programs, short-term and long-term children's psychiatric hospitals, short-term general hospitals with psychiatric services for children and adults and dentist offices are also included. These variables are likely to impact the health and cognitive progress of children by affecting medical care and preventive care use by families. I also use county-level establishments for office supplies and stationery stores, which might affect the number of materials available to the child at home and/or in a non-parental child care setting.

Average state-level values were used to impute the missing values for any of the county-level variables, if the state value was available. Missing values for the number of licensed child care facilities, child care prices and state-level tuition rates were imputed using the `ipolate` command in Stata. The reason for the missing county-level variables is that in the original data, zip codes do not always match what the state reported or are missing, so counties could not be

determined for those cases.³⁹ Summary statistics along with definitions for all of the variables mentioned in this section can be found in Tables A2 and A3 in Appendix A and Table B3 in Appendix B.

³⁹The percentage of cases where the counties are not determined are 1.4%, 1.5%, 1.3% and 0.8% for Waves 1, 2, 3 and 4 respectively.

CHAPTER 5: EMPIRICAL MODEL

A mother's fertility decision as well as her marital status and education decisions are not included in the theoretical model in order to provide a simple and clear understanding of the economic theory behind the production functions. However, a mother's unobserved ability and/or characteristics may not only affect a mother's fertility, marital status, and education decisions but also affect the health, cognitive achievement and behavior problems of her child. Therefore, even though those decisions (i.e., marital status, educational attainment and fertility) are not explicitly modeled in the theory in Chapter 3, marital status and the education level of the mother, together with the number of siblings of the focal child will be treated as endogenous in the empirical work. In addition, household net income of child care expenditures is treated as endogenous.⁴⁰

As shown in the theoretical model, an outcome variable (i.e., health, cognitive achievement or behavior problems) at the beginning of the period depends upon the outcome from the previous period, other outcomes from the previous period, the mother's choices from the previous period, health shocks, exogenous demographic variables, state/county-level variables for goods and services inputs, and an income variable from the previous period. Equation (22) presents the empirical model for the production functions for H (health), Q (cognitive achievement) and B (behavior problems).

⁴⁰See the discussion in Mityakov and Mroz (2013) about the importance of controlling for unobserved inputs and an adjusted income variable in the production functions.

$$\begin{aligned}
F_{it} = & \alpha_0 + \alpha_1 H_{it-1} + \alpha_2 Q_{it-1} + \alpha_3 B_{it-1} + \alpha_4 A_{it-1} + \alpha_5 E_{it-1} + \alpha_6 C_{it-1} + \alpha_7 d_{it-1} \\
& + \alpha_8 (d_{it-1} K_{it-1}) + \alpha_9 M_{it-1} + \alpha_{10} S_{it-1} + \alpha_{11} N_{it-1} + \alpha_{12} b_{it-1} + \alpha_{13} X_{it-1} + \alpha_{14} Z_{it-1}^G \\
& + \alpha_{15} I_{it-1} + \mu_i^F + \varepsilon_{it}^F \quad \text{for } F=H, Q, B
\end{aligned} \tag{22}$$

where μ_i^F is unobserved time-invariant heterogeneity, ε_{it}^F is the idiosyncratic error term and d_{it} is a dummy variable that has a value of 1 if child care is used and 0 otherwise. Both time-invariant $\{\mu_i^H, \mu_i^Q, \mu_i^B\}$ and time-varying $\{\varepsilon_{it}^H, \varepsilon_{it}^Q, \varepsilon_{it}^B\}$ components of the composite error terms are allowed to be correlated across equations. Estimation of equation (22) for every outcome variable by OLS will not provide consistent estimates of the parameters since by construction the previous output is correlated with time-invariant heterogeneity μ_i^F . Taking first difference of equation (22) will remove μ_i^F for every $F=H, Q, B$.

$$\begin{aligned}
F_{it} = & \Delta\alpha_1 H_{it-1} + \Delta\alpha_2 Q_{it-1} + \Delta\alpha_3 B_{it-1} + \Delta\alpha_4 A_{it-1} + \Delta\alpha_5 E_{it-1} + \Delta\alpha_6 C_{it-1} + \Delta\alpha_7 d_{it-1} \\
& + \Delta\alpha_8 (d_{it-1} K_{it-1}) + \Delta\alpha_9 M_{it-1} + \Delta\alpha_{10} S_{it-1} + \Delta\alpha_{11} N_{it-1} + \Delta\alpha_{12} b_{it-1} + \Delta\alpha_{13} X_{it-1} \\
& + \Delta\alpha_{14} Z_{it-1}^G + \Delta\alpha_{15} I_{it-1} + \Delta\varepsilon_{it}^F \quad \text{for } F=H, Q, B
\end{aligned} \tag{23}$$

However, the first difference of the health outcome ΔH_{it-1} is correlated with $\Delta\varepsilon_{it}^H$ by construction as are the first differences of the other outcome variables. Therefore, based on the work by Arellano and Bover (1995), Blundell and Bond (1998) proposed a system GMM estimation method in which equations (22) and (23) are jointly estimated using moment conditions of lagged differences as instruments for the level equation in addition to moment conditions of lagged levels as instruments for the first difference equation. This system estimator is more efficient than estimating only one of those equations (Blundell and Bond, 1998).

In addition to lagged health status, cognitive achievement and behavior problems of the child, the other lagged variables in the production functions, which are represented by the vector,

$R_{it-1} = [A_{it-1}, E_{it-1}, C_{it-1}, d_{it-1}, (d_{it-1}K_{it-1}), M_{it-1}, S_{it-1}, N_{it-1}, b_{it-1}, I_{it-1}]$, might be endogenous since both a mother and her child's unobserved time-invariant characteristics may be correlated with these lagged variables. For example, a child's unobserved (to the researcher) time-invariant health condition, such as a chronic physical or mental health condition that is likely to be correlated with the child's observed health, cognitive achievement and behavior problems, might also be correlated with the mother's hours of work, child care and quality choices. The mother's other decisions, i.e., marital status, her education level and number of siblings of the child, might also be affected by this condition. The child might also be more vulnerable to acute illnesses if she/he has a chronic condition. Therefore, we need instruments for these variables in the level equations. Moreover, these variables are also likely to be correlated with the time-varying error term in equation (23). For instance, unobserved time-varying changes in a mother's stress or emotional level affected by the changes in the mother's work environment or her relationships might also affect her child's health, cognitive achievement and her decisions mentioned above. Thus, we also need instruments for these variables in the first difference equation (23).

As it is seen from (23), for example, $\Delta H_{it-1} = H_{it-1} - H_{it-2}$ is correlated with $\Delta \varepsilon_{it}^H = \varepsilon_{it}^H - \varepsilon_{it-1}^H$ since H_{it-1} is correlated with ε_{it-1}^H . Note that H_{it-2} is correlated with ΔH_{it-1} but orthogonal to $\Delta \varepsilon_{it}^H$ if the errors are serially uncorrelated. Because of this H_{it-2} can be used as an instrument for ΔH_{it-1} equation (23). Additional moment conditions rely on the assumption that idiosyncratic error terms are serially uncorrelated. Thus, equation (23) implies that starting from time $t=3$, the idiosyncratic error terms are uncorrelated with the outcome variables and the variables in R_{it} at least two previous periods.

$$[H'_{it-k} \Delta \varepsilon_{it}^H] = 0 \quad \text{for } t \geq 3 \text{ and all } 2 \leq k \leq t-1$$

$$[Q'_{it-k} \Delta \varepsilon_{it}^Q] = 0 \quad \text{for } t \geq 3 \text{ and all } 2 \leq k \leq t-1$$

$$[B'_{it-k} \Delta \varepsilon_{it}^B] = 0 \quad \text{for } t \geq 3 \text{ and all } 2 \leq k \leq t-1$$

$$[R'_{it-k} \Delta \varepsilon_{it}^j] = 0 \quad \text{for } t \geq 3 \text{ and all } 2 \leq k \leq t-1 \text{ and } j=H, Q, B, b$$

Therefore, valid instruments for example are H_{i1} for $t=3$, $\{H_{i1}, H_{i2}\}$ for $t=4$ and $\{H_{i1}, H_{i2}, H_{i3}\}$ for $t=5$ and so on in a health production equation. Moreover, the total error terms in the production functions are assumed to be uncorrelated with the lagged difference of outcome variables and the variables in R_{it} starting from time $t=3$. This generates GMM-type instruments for the level equations for each outcome variable:

$$[\Delta H'_{it-1} (\mu_i^H + \varepsilon_{it}^H)] = 0 \quad \text{for } t \geq 3$$

$$[\Delta Q'_{it-1} (\mu_i^Q + \varepsilon_{it}^Q)] = 0 \quad \text{for } t \geq 3$$

$$[\Delta B'_{it-1} (\mu_i^B + \varepsilon_{it}^B)] = 0 \quad \text{for } t \geq 3$$

$$[\Delta R'_{it-1} (\mu_i^j + \varepsilon_{it}^j)] = 0 \quad \text{for } t \geq 3 \text{ and } j=H, Q, B, b$$

In order to obtain consistent GMM estimates, we first need to check the presence of second order autocorrelation in the first difference equation (this is equivalent to checking whether the error terms in the level equation are serially uncorrelated or not) and second we need to check if overidentifying restrictions are valid using a Sargan test, which asymptotically follows a chi-squared distribution. As a result, coefficient estimates from a hybrid production function for each outcome are obtained by estimating equations (22) and (23) jointly using a two-step system GMM estimator with the Windmeijer (2005) correction for standard errors.

A health shock is a function of the child's health status entering period t , his/her mother's decisions about employment, child care variables, a dummy variable for child care use, its interaction with the child care quality, marital status and the mother's education level, total number of siblings of the focal child, exogenous family characteristics, an income variable and exogenous state/county-level weather conditions. Hence, the set of endogenous variables are $\{H_{it}, Q_{it}, B_{it}, E_{it}, C_{it}, d_{it}, (d_{it}K_{it}), M_{it}, S_{it}, N_{it}, I_{it}\}$. Equations for ear infection and respiratory illness are estimated separately using the system GMM described above.

$$\begin{aligned}
 b_{it} = & \gamma_0 + \gamma_1 H_{it} + \gamma_2 E_{it} + \gamma_3 C_{it} + \gamma_4 d_{it} + \gamma_5 (d_{it}K_{it}) + \gamma_6 M_{it} + \gamma_7 S_{it} + \gamma_8 N_{it} + \gamma_9 X_{it} \\
 & + \gamma_{10} I_{it} + \gamma_{11} Z_t^b + \mu_i^b + \varepsilon_{it}^b
 \end{aligned} \tag{24}$$

CHAPTER 6: RESULTS

In this section, Fixed Effects (FE), Random Effects (RE) and two-step system GMM estimation results of production functions for every outcome variable are compared. RE models do not control for unobservables while the FE models control only for permanent unobserved heterogeneity. Two-step system GMM models handle the endogeneity problem resulting from both time-invariant and time-varying unobservables. The first three columns of every table in this section show the RE models, the next three columns represents results from the FE Models and final columns show results from two-step system GMM. For the RE and FE models, Model 1 does not include the quality variables and exogenous child and mother characteristics and exogenous state/county-level variables. Model 2 adds quality variables into the model and Model 3 includes both quality variables as well as exogenous child and mother characteristics and state/county-level variables. For GMM models, Model 2 adds quality variables into the model in addition to the variables in Model 1 and both models include exogenous variables.

Three different specifications of hours of work and child care are defined. The first specification for which the estimation results are shown in 6.1 assumes that a mother can choose any continuous hours of work and hours of child care types i.e., center-based and home-based. Thus, this specification will show us the impact of a 1 hour increase in maternal employment and child care use on the development of children. Anderson (2003) examines the effect of maternal employment on child's obesity risk using continuous choice of hours of work. Mukherjee (2011) also uses this specification in order to test the impact of maternal employment on child outcomes (cognitive and behavior). 6.2 presents results from the second specification where I assume that a

mother may face restrictions on the choices of hours of work – which may be more plausible assumption than continuous choices, and child care types. The most common discrete choices of hours of work in the labor supply literature are full-time work, part-time work and no work. Similarly, center-based (home-based) child care hours are defined as full-time center (home-based), part-time center (home-based) and no use of center-based (home-based) child care. Hence, this specification will show us whether there are any nonlinearities in the effects of hours of work and hours of childcare. Since there are no interaction effects (between hours of work and child care), the effect of hours of works as defined above, for instance full-time work, is constant regardless of the type of child care and the intensity of child care used. Ruhm (2004), Gennetian et al (2010) and Gupta and Simonson (2010) are among examples of studies that use this specification in the area of maternal employment, child care and child outcomes.

Finally, in the last specification, a mother is still assumed to choose among full-time work, part-time work or no work options while she chooses to use any child care or not (at the extensive margin). Thus, in this specification interaction effects of full-time work, part-time work and no work alternatives with use of child care at the extensive margin will be estimated. Hubbard (2009) and Bernal (2008) use this specification to test the effects of child care and maternal employment on obesity (Hubbard (2009) and cognitive achievement (Bernal (2008))). Thus, the third specification allows differences in the effects of full-time work, part-time work and no work options to vary with the decision to use child care at the extensive margin. The results for this specification are shown in 6.3. In addition to the results in this chapter, Appendix I presents the results with some interaction effects.

6.1 Estimations for Specification 1

6.1.1 Cognitive Achievement Equation

As shown by RE models in Table 6, adding quality variables increases the effects hours of work and hours of child care variables while inclusion of exogenous variables leads to small decreases in the magnitude of home quality variable. All the FE models have smaller effects for hours of work, hours of child care and quality variables. However, the sign of the out-of-home quality variable is negative with the FE model, which is not theoretically true. Thus, these results suggest that unobserved time-invariant variables that are correlated with the maternal employment and child care choices cause upward bias in the estimates if they are ignored. For instance, if the child's cognitive skill endowment is high (positively correlated with the child's cognitive achievement), the mother might be comfortable working more hours and, thus, use more child care. Moreover, if a mother's productivity both at home and work are positively correlated so that child's cognitive development will improve and she will be working more hours (and using more child care), then the estimated coefficients will be biased upward.

The two-step system GMM estimates for the coefficients of hours of work, hours of center-based care and home-based care and quality variables are all greater than the RE and the FE models which implies that not controlling for time-varying unobservables lead to downward biased estimates. For example, if the child experiences a developmental delay worsening over time, a mother might be motivated to find high-quality child care that generates downward bias in the estimated child care and quality variables. Another example might be that she may lose her interest or skills in child rearing over time while intending to work more hours. In addition, if she develops maternal stress over time (e.g., due to working more hours), which worsens a child's

cognitive achievement, she might increase the use of child care. All of this might lead to a downward bias in estimated coefficients.

Inclusion of quality variables as shown in the last column of Table 6 increases the impact of hours of work while reducing the effect of center-based care. A 10-hour weekly increase in the use of center-based care today leads to 0.30 SD (standard deviation) increase in child's cognitive achievement next period ($p < 0.01$). This is equivalent to almost a \$2525 increase in weekly income. That is, this is the change in weekly household income that would keep a child's cognitive achievement level constant if the mother uses 10 hours less of center-based care per week. Moreover, a 1 SD increase in the home quality index increases the cognitive achievement of the child by 0.10 SD at 1% significance level. If home quality decreases by 1 SD, then net household income should increase by almost \$865 per week. A 1 SD increase in out-of-home child care increases the cognitive achievement of the child by almost 0.35 SD ($p < 0.01$). Thus, if out-of-home child care quality decreases by 1 SD, the increase in the amount of weekly income that is needed to compensate for this change is \$2882. Additionally, obesity significantly reduces the cognitive achievement of the child. Being an obese child today decreases the child's cognitive achievement in the next period by 0.13 SD ($p < 0.01$) as shown in the last column of Table 6. The monetary equivalent for being obese is a \$1093 increase in weekly income.

Table 6: Marginal Effects from the Estimation of Production Function for Cognitive Achievement (Specification 1)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1) [1]	(2) [2]
Hours of work ^a	0.006 (0.000)	0.009** (0.000)	0.008** (0.000)	0.002 (0.001)	0.003 (0.001)	0.004 (0.001)	0.047 (0.007)	0.071 (0.008)
Center-based child care hours ^a	0.030** (0.000)	0.034** (0.001)	0.034** (0.001)	0.028** (0.001)	0.027** (0.001)	0.023** (0.001)	0.282*** (0.009)	0.303*** (0.009)
Home-based child care hours ^a	0.002 (0.000)	0.005 (0.000)	0.007 (0.000)	-0.008 (0.001)	-0.010* (0.001)	-0.010* (0.001)	0.102 (0.010)	0.075 (0.007)
Home quality index		0.082** (0.007)	0.074** (0.007)		0.056** (0.009)	0.057** (0.009)		0.104*** (0.022)
In-home child care quality index		0.024 (0.025)	0.017 (0.025)		0.009 (0.026)	0.006 (0.026)		0.040 (0.041)
Out-of-home child care quality index		0.009 (0.010)	0.011 (0.010)		-0.001 (0.010)	-0.003 (0.010)		0.346*** (0.128)
Obese	-0.065*** (0.019)	-0.064*** (0.019)	-0.062*** (0.019)	-0.084*** (0.022)	-0.083*** (0.022)	-0.083*** (0.022)	-0.055 (0.169)	-0.131*** (0.045)
Exogenous Variables	No	No	Yes	No	No	Yes	Yes	Yes
N	20850							

Notes: Sample size is rounded to the nearest 50 as required by NCES. Standard errors in parentheses. *p<0.10 **p<0.05 ***p<0.01

^a Coefficients are reported for 10 hours. Numbers in square brackets [.] show GMM model number.

6.1.2 Obesity Equation

As shown in the RE Models in Table 7, when quality variables are added (even as exogenous variables), the effects of hours of child care and hours of works are almost the same. However, the child care quality variables have theoretically unexpected signs (they are all positive). There is an upward bias due to ignoring time-invariant heterogeneity if we compare RE Models to FE Models since most of the coefficients becomes smaller in the FE model. For instance, a mother who is more work intensive i.e., puts a higher priority on work relative to raising her child is more likely to work and have an unhealthy child. However, the child care quality variables still have positive signs.

Estimation with GMM increases the magnitudes of the coefficients (i.e., downward bias due to time-varying unobservables). For example, if a child develops a health problem that worsens over time and is positively correlated with obesity, the mother might be less likely to work and use child care. As shown in column 7, a 10-hour increase in maternal hours of work increases the risk of obesity by 2.7 percentage points ($p < 0.10$). Child care variables are not statistically significant when quality variables are not included in the model while inclusion of quality variables increases the impact of hours of work. A 10-hour weekly increase in maternal employment increases the child's risk of being obese in the next period by 3.5 percentage points ($p < 0.05$) while hours of center-based care and home-based care do not have significant effects on obesity although they have positive signs. Among quality variables, a 1 SD increase in home quality index today reduces the obesity risk for the child in the next period by 6.4 percentage points ($p < 0.01$).

Table 7: Marginal Effects from the Estimation of Production Function for Obesity (Specification 1)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1) [3]	(2) [4]
Hours of work ^a	0.004*** (0.000)	0.001*** (0.000)	0.001** (0.000)	0.002 (0.000)	0.002 (0.000)	0.002 (0.000)	0.027* (0.002)	0.035** (0.001)
Center-based child care hours ^a	0.001 (0.000)	0.001 (0.000)	0.001 (0.001)	0.001 (0.000)	0.001 (0.000)	0.001 (0.000)	0.004 (0.001)	0.001 (0.001)
Home-based child care hours ^a	-0.001 (0.000)	-0.002 (0.000)	-0.001 (0.000)	-0.003 (0.000)	-0.003 (0.000)	-0.003 (0.000)	0.018 (0.002)	0.020 (0.002)
Home quality index		-0.004 (0.003)	-0.003 (0.007)		-0.007** (0.004)	-0.007** (0.003)		-0.064*** (0.018)
In-home child care quality index		0.008 (0.011)	0.008 (0.011)		0.008 (0.011)	0.007 (0.012)		-0.126 (0.110)
Out-of-home child care quality index		0.007* (0.004)	0.007* (0.004)		0.003 (0.004)	0.003 (0.004)		-0.005 (0.034)
Exogenous Variables	No	No	Yes	No	No	Yes	Yes	Yes
N	20400							

Notes: Sample size is rounded to the nearest 50 as required by NCES. Standard errors in parentheses. *p<0.10 **p<0.05 ***p<0.01

^a Coefficients are reported for 10 hours. Numbers in square brackets [.] show GMM model number.

6.1.3 Overweight Equation

Table 8 compares the RE, FE and two-step system GMM models for the estimation of overweight risk for the child. Inclusion of quality variables increases the magnitude of hours of work variables in the RE model. When exogenous variables are also added, the effect of home quality slightly decreases and child care quality variables have unexpected signs. Results from the FE model show that the magnitude of hours of work is lowered and the signs of both the hours of center-based and home-based child care become negative. That is, time-invariant unobserved variables cause upward bias in those estimates when not controlled.

On the other hand, when the quality variables are not included in the model, estimation with two-step system GMM makes the coefficients of hours of work and home-based care negative, but the effects are not statistically significant. The impact of center-based care is still negative as in the FE model and insignificant. As seen in column 8, with the inclusion of quality variables, the impact of home-based child care becomes significant ($p < 0.05$). A 10-hour weekly increase in home-based care today increases the child's risk of being overweight by 3 percentage points in the next period. A 1 SD increase in the quality of home index reduces the overweight risk by 7 percentage points ($p < 0.01$). Similarly, a 1 SD increase in the in-home child care quality index decreases the risk of being overweight by almost 29 percentage points ($p < 0.01$).

Table 8: Marginal Effects from the Estimation of Production Function for Being Overweight (Specification 1)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1) [5]	(2) [6]
Hours of work ^a	0.001*** (0.000)	0.006*** (0.000)	0.006*** (0.000)	0.003 (0.000)	0.002 (0.000)	0.003 (0.000)	-0.002 (0.001)	-0.011 (0.001)
Center-based child care hours ^a	0.001 (0.000)	-0.000 (0.000)	0.001 (0.000)	-0.003 (0.000)	-0.005 (0.000)	-0.001 (0.000)	-0.005 (0.001)	-0.001 (0.001)
Home-based child care hours ^a	0.002 (0.000)	0.001 (0.000)	0.002 (0.000)	-0.000 (0.000)	-0.001 (0.000)	-0.001 (0.000)	0.021 (0.001)	0.030** (0.001)
Home quality index		-0.006** (0.003)	-0.005* (0.003)		-0.009** (0.004)	-0.009** (0.004)		-0.071*** (0.024)
In-home child care quality index		0.014 (0.014)	0.015 (0.014)		-0.002 (0.014)	-0.002 (0.014)		-0.288*** (0.112)
Out-of-home child care quality index		0.004 (0.005)	0.004 (0.005)		-0.000 (0.005)	0.000 (0.005)		-0.001 (0.028)
Exogenous Variables	No	No	Yes	No	No	Yes	Yes	Yes
N	20400							

Notes: Sample size is rounded to the nearest 50 as required by NCES. Standard errors in parentheses. *p<0.10 **p<0.05 ***p<0.01

^a Coefficients are reported for 10 hours. Numbers in square brackets [.] show GMM model number.

6.1.4 General Health Status Equation

Table 9 shows comparisons between the RE Models, FE Models and two-step system GMM for general health status outcomes.⁴¹ Effects of hours of work and child care variables are almost the same with the inclusion of both quality variables and exogenous child and mother characteristics as well as state/county variables, as seen in the RE models 1-3. The estimated effects are smaller with the FE models than the RE Models and almost the same across the FE Models 1 to 3. Thus, ignoring time-invariant unobservables causes upward bias in the estimates of hours of work, hours of center-based child care, home quality and in-home child care quality variables while there is a downward bias in the estimate of home-based child care and out-of-home child care quality.

The GMM model estimates larger effects of hours of work and hours of child care variables when quality variables are added. A 10-hour weekly increase in maternal employment increases the likelihood of being in good health by 2.9 percentage points ($p < 0.10$) while a 10-hour increase in center-based care hours reduces the likelihood of having good health for the child by 2.1 percentage points ($p < 0.05$). A 10-hour increase in home-based care reduces the probability of having a good health by 3.7 percentage points ($p < 0.05$). Quality variables have expected signs. A 1 SD increase in home quality index increases the probability of good health status for the child by almost 6 percentage points ($p < 0.01$).

⁴¹Production functions for general health status do not include cognitive achievement because AC tests are not satisfied.

Table 9: Marginal Effects from the Estimation of Production Function for General Health Status (Specification 1)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1) [7]	(2) [8]
Hours of work ^a	0.004*** (0.000)	0.004*** (0.000)	0.004*** (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.028* (0.001)	0.029* (0.002)
Center-based child care hours ^a	0.003 (0.000)	0.003 (0.000)	0.003 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.012* (0.001)	-0.021** (0.001)
Home-based child care hours ^a	-0.002 (0.000)	-0.002 (0.000)	-0.002 (0.000)	-0.000 (0.000)	-0.001 (0.000)	-0.001 (0.000)	-0.031** (0.002)	-0.037** (0.002)
Home quality index		0.021*** (0.002)	0.018*** (0.002)		0.002 (0.003)	0.003 (0.003)		0.055*** (0.015)
In-home child care quality index		0.013 (0.011)	0.011 (0.011)		0.007 (0.012)	0.008 (0.012)		0.068 (0.091)
Out-of-home child care quality index		-0.006 (0.004)	-0.006 (0.004)		-0.005 (0.004)	-0.005 (0.004)		0.009 (0.010)
Exogenous Variables	No	No	Yes	No	No	Yes	Yes	Yes
N	23650							

Notes: Sample size is rounded to the nearest 50 as required by NCES. Standard errors in parentheses. *p<0.10 **p<0.05 ***p<0.01

^a Coefficients are reported for 10 hours. Numbers in square brackets [.] show GMM model number.

6.1.5 Behavior Problems Equation

Table 10 shows estimation results for production functions for behavior problems comparing the RE, FE and two-step system GMM Models. Inclusion of quality variables makes both effects of hours of work and home-based care more negative (and changes the center-based child care sign) while inclusion of exogenous variables increases the impact of hours of work. FE Models 1-3 show that ignoring time-invariant unobservables causes a downward bias in hours of work and the home quality index but an upward bias in hours of child care variables (RE Model 3 vs FE Model 3). Estimation with the two-step system GMM model makes the sign of the coefficient for hours of home-based care positive. Without quality variables, there is no significant impact of hours of work and child care variables.

However, with quality variables a 10-hour weekly increase in maternal employment today reduces behavior problems next period by 0.096 SD ($p < 0.05$). If a mother works 10 hours less, in order to keep the child behavior index constant, weekly income must increase by almost \$876. A 10-hour weekly increase in center-based care also decreases the behavior problem index whereas use of more home-based care increases behavior problems, but they are not statistically significant. Moreover, a 1 SD increase in the home quality index reduces behavior problems by almost 0.20 SD ($p < 0.01$). The income equivalent is \$1790. A 1 SD increase in out-of-home quality index decreases behavior problems by almost 0.23 SD ($p < 0.05$) which is equivalent to a \$2074 household net income. Results with subgroups of behavior problems are shown in Appendix J.

Table 10: Marginal Effects from the Estimation of Production Function for Behavior Problems (Specification 1)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1) [9]	(2) [10]
Hours of work ^a	-0.003 (0.000)	-0.007* (0.000)	-0.008** (0.000)	0.001 (0.000)	0.001 (0.001)	0.001 (0.001)	-0.002 (0.004)	-0.096** (0.005)
Center-based child care hours ^a	0.007 (0.001)	-0.000 (0.001)	0.001 (0.001)	-0.006 (0.001)	-0.006 (0.001)	-0.007 (0.001)	-0.021 (0.004)	-0.064 (0.007)
Home-based child care hours ^a	-0.005 (0.000)	-0.009** (0.000)	-0.008* (0.000)	-0.012* (0.001)	-0.011* (0.001)	-0.011* (0.001)	0.043 (0.005)	0.035 (0.006)
Home quality index		-0.112*** (0.007)	-0.112*** (0.007)		-0.012 (0.010)	-0.012 (0.010)		-0.199*** (0.074)
In-home child care quality index		-0.036 (0.028)	0.030 (0.028)		-0.059** (0.030)	-0.060** (0.030)		-0.326 (0.411)
Out-of-home child care quality index		-0.015 (0.011)	-0.013 (0.011)		-0.005 (0.012)	-0.006 (0.012)		-0.228** (0.097)
Exogenous Variables	No	No	Yes	No	No	Yes	Yes	Yes
N	21050							

Notes: Sample size is rounded to the nearest 50 as required by NCES. Standard errors in parentheses. *p<0.10 **p<0.05 ***p<0.01

^aCoefficients are reported for 10 hours. Numbers in square brackets [.] show GMM model number.

6.1.6 Ear Infection Equation

Table 11 compares the RE Models, FE Models and two-step system GMM for the ear infection equation. Inclusion of quality variables, exogenous child and mother characteristics as well as state/county variables slightly increases the effect of hours of center-based while the effect of hours of work remains constant. Both child care hours are statistically significant. When time-invariant heterogeneity is controlled using FE models as shown in the FE models 1-3, the sign of hours of work becomes negative i.e, time-invariant unobservables cause upward bias. This holds true for the effects of child care hours. An increase in hours of both center-based care and home-based care still significantly increase the risk of ear infections. When the endogeneity of variables is controlled using two-step system GMM, the impact of hours of work is positive while the sign of home-based child care is negative. Thus, ignoring time-varying unobservables lead to downward bias in the hours of work effect, but they cause an upward bias in the hours of home-based child care. For instance, if the child's health is getting worse over time (may be correlated with the risk of having an ear infection), then the mother might choose to work less hours and use less center-based child care while increasing the use of home-based child care.

The last two columns show two-step GMM results with two different quality variables, i.e., process quality variables as used in other production functions and group size, a structural quality variable. As shown in column 8, a 10-hour weekly increase in maternal employment increases the likelihood of having an ear infection by 1.9 percentage points ($p < 0.10$). A 10-hour increase in the use of center-based child care increases the ear infection risk by 3.2 percentage points ($p < 0.01$). On the other hand, a 10-hour increase in the use of home-based child care decreases the risk of ear infections by 4.1 percentage points ($p < 0.05$). Although the quality variables have expected signs, none of them are statistically significant. The last column shows

that when a structural child care quality measure is included in the model, a 10 hour increase in the use of home-based child care decreases the risk of having an ear infection by 4.6 percentage points ($p < 0.10$). Moreover, an increase in group size (i.e., one more child in a home-based child care setting) increases the risk of ear infections by almost 10 percentage points ($p < 0.01$).

6.1.7 Respiratory Illness Equation

Table 12 presents the RE Models, FE Models and two-step system GMM estimations for respiratory illness equation. Inclusion of quality variables, exogenous child and mother characteristics and as state/county variables do not change the estimated coefficients in the RE and FE models. The significant impact of center-based care disappears and the in-home child care quality variable has a theoretically unexpected sign. Estimation with the GMM model increases the magnitude of the variables but they are still not statistically significant. As shown in the last columns, lower structural quality (i.e., increase in the group size variable) increases the risk of a respiratory illness. That is, one more child in a center-based care increases the risk of having a respiratory illness by 1.9 percentage points ($p < 0.01$). Thus, the results suggest that structural quality is more important than process quality for health shocks (ear infection and respiratory illness) for children in early childhood. This makes sense since these health shocks are acute illnesses such that their prevalence might be triggered by changes in the child's environment (e.g., number of children and hygiene).

Table 11: Marginal Effects from the Estimation of Ear Infection Equation (Specification 1)

	RE Model			FE Model			GMM Model		
	(1)	(2)	(3)	(1)	(2)	(3)	(1) [19]	(2) [20]	(3) [21]
Hours of work ^a	0.001 (0.000)	0.001 (0.000)	0.000 (0.000)	-0.004 (0.000)	-0.004 (0.000)	-0.004 (0.000)	0.025 (0.003)	0.019* (0.001)	0.024 (0.002)
Center-based child care hours ^a	0.011*** (0.000)	0.012*** (0.000)	0.013*** (0.000)	0.004 (0.000)	0.008** (0.000)	0.008** (0.001)	0.013 (0.002)	0.032*** (0.001)	0.002 (0.002)
Home-based child care hours ^a	0.006*** (0.000)	0.007*** (0.000)	0.008*** (0.000)	0.004 (0.000)	0.005* (0.000)	0.005* (0.000)	-0.070** (0.003)	-0.041** (0.002)	-0.046* (0.003)
In-home child care quality index		-0.008 (0.014)	-0.010 (0.014)		-0.000 (0.016)	0.001 (0.016)		-0.111 (0.130)	
Out-of-home child care quality index		0.014*** (0.005)	0.014*** (0.005)		0.018*** (0.006)	0.018*** (0.006)		-0.011 (0.030)	
Group size center-based									0.004 (0.006)
Group size home-based care									0.096*** (0.031)
Exogenous Variables	No	No	Yes	No	No	Yes	Yes	Yes	Yes
N	24550								

Notes: Sample size is rounded to the nearest 50 as required by NCES. Standard errors in parentheses. *p<0.10 **p<0.05 ***p<0.01

^a Coefficients are reported for 10 hours. Numbers in square brackets [.] show GMM model number.

Table 12: Marginal Effects from the Estimation of Respiratory Illness Equation (Specification 1)

	RE Model			FE Model			GMM Model		
	(1)	(2)	(3)	(1)	(2)	(3)	(1) [22]	(2) [23]	(3) [24]
Hours of work ^a	0.001 (0.000)	0.001 (0.000)	0.001 (0.000)	-0.003 (0.000)	-0.003 (0.000)	-0.003 (0.000)	-0.001 (0.001)	-0.026 (0.009)	-0.017 (0.002)
Center-based child care hours ^a	0.006*** (0.000)	0.007*** (0.000)	0.005** (0.000)	0.001 (0.000)	0.003 (0.000)	0.003 (0.001)	0.003 (0.002)	0.031 (0.002)	0.001 (0.002)
Home-based child care hours ^a	0.001 (0.000)	0.002 (0.000)	0.001 (0.000)	-0.001 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.001 (0.002)	-0.005 (0.006)	-0.047 (0.003)
In-home child care quality index		0.004 (0.009)	0.004 (0.009)		0.002 (0.011)	0.003 (0.011)		-0.097 (0.153)	
Out-of-home child care quality index		-0.002 (0.004)	-0.002 (0.004)		-0.010 (0.005)	-0.001 (0.005)		-0.057 (0.038)	
Group size center-based									0.019*** (0.007)
Group size home-based care									0.008 (0.024)
Exogenous Variables	No	No	Yes	No	No	Yes	Yes	Yes	Yes
N	22950								

Notes: Sample size is rounded to the nearest 50 as required by NCES. Standard errors in parentheses. *p<0.10 **p<0.05 ***p<0.01

^aCoefficients are reported for 10 hours. Numbers in square brackets [.] show GMM model number.

6.2 Estimations for Specification 2

6.2.1 Cognitive Achievement Equation

Table 13 presents the FE Models, RE Models and two-step system GMM Models for the cognitive achievement production function. As shown by RE Models 1-3, maternal work and center-based care variables are significant and their effects are slightly larger when quality and exogenous variables are included. Home quality and out-of-home child care quality variables are also significant. FE Models 1-3 estimate smaller effects for all variables and a negative effect for home-based child care. Magnitude of the coefficient estimates with GMM models are all greater than that of RE Model 3 and FE Model 3 which implies that ignoring time-varying unobservables leads to downward bias in estimates. Neither full-time work nor part-time work is significant while both full- and part-time center-based child care have significant effects on cognitive achievement of the child.

Inclusion of quality variables in the GMM model increases the effect of full-time center-based care while it reduces the impact of part-time center-based care. Consistent with the findings from 6.1.1, center-based care has significant positive effects on cognitive achievement. Full-time center-based child care compared to no center-based care increases the cognitive achievement of the child by 1.73 SD ($p < 0.01$). Additionally, part-time center-based child care when compared to no child care improves cognitive achievement of the child by 0.74 SD ($p < 0.01$). On the other hand, home-based child care variables are not significant. Moreover, a 1 SD increase in the home quality index increases cognitive achievement of the child by almost 0.12 SD at 1% significance level and a 1 SD increase in out-of-home child care increases cognitive achievement of the child by 0.37 SD ($p < 0.01$).

6.2.2 Obesity Equation

Table 14 shows the RE, FE and two-step system GMM results for the estimation of a production function for obesity. As shown in RE and FE models, when quality variables and exogenous variables are added, the effects of maternal work and child care variables are almost the same. However, when FE models are estimated, the effect of full-time work and part-time home-based care become negative. The only significant variable is full-time home-based care. Full-time home-based care compared to no home-based care reduces the risk of obesity by 1.8 percentage points ($p < 0.10$) controlling for quality and exogenous variables. Child care quality variables, however, have theoretically unexpected signs (positive signs).

When quality variables are not included in the GMM model, full-time maternal work compared to no work increases the risk of obesity by almost 15 percentage points ($p < 0.01$) while its effect increases to 18 percentage points when quality variables are added. Child care variables do not exhibit significant effects on the obesity risk for children. From 6.1.2, we have seen that an average increase in maternal hours of works increases the risk of obesity for children and this section shows that there is nonlinearity in the impact of full-time work. All quality variables have expected signs. A 1 SD increase in home quality decreases the risk of obesity by 6 percentage points ($p < 0.05$).

Table 13: Marginal Effects from the Estimation of Production Function for Cognitive Achievement (Specification 2)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1) [25]	(2) [26]
Full-time work	0.032* (0.017)	0.047*** (0.017)	0.043** (0.017)	0.014 (0.022)	0.021 (0.022)	0.020 (0.022)	-0.373 (0.389)	0.150 (0.394)
Part-time work	0.058*** (0.017)	0.058*** (0.017)	0.050*** (0.017)	0.029 (0.022)	0.031 (0.022)	0.027 (0.022)	-0.695* (0.355)	0.112 (0.317)
Full-time center-based care	0.124*** (0.023)	0.154*** (0.025)	0.155*** (0.024)	0.110*** (0.027)	0.115*** (0.029)	0.103*** (0.029)	1.584*** (0.553)	1.727*** (0.534)
Part-time center-based care	0.115*** (0.017)	0.134*** (0.020)	0.128*** (0.020)	0.127*** (0.019)	0.130*** (0.022)	0.112*** (0.022)	1.007*** (0.276)	0.742*** (0.227)
Full-time home-based care	0.001 (0.021)	0.018 (0.022)	0.027 (0.022)	-0.054** (0.025)	-0.060** (0.026)	-0.057** (0.026)	0.801* (0.475)	0.696 (0.442)
Part-time home-based care	0.004 (0.016)	0.012 (0.017)	0.017 (0.016)	-0.001 (0.019)	-0.006 (0.020)	-0.008 (0.019)	0.389 (0.335)	0.257 (0.356)
Home quality index		0.080*** (0.007)	0.072*** (0.007)		0.054*** (0.009)	0.056*** (0.009)		0.115*** (0.024)
In-home child care quality index		0.024 (0.025)	0.017 (0.025)		0.009 (0.026)	0.005 (0.026)		0.044 (0.042)
Out-of-home child care quality index		0.014 (0.010)	0.016* (0.010)		0.003 (0.010)	0.001 (0.010)		0.372*** (0.127)
Exogenous Variables	No	No	Yes	No	No	Yes	Yes	Yes
N	20850							

Notes: Sample size is rounded to the nearest 50 as required by NCES. Standard errors in parentheses. *p<0.10 **p<0.05 *** p<0.01. Numbers in square brackets [.] show GMM model number.

Table 14: Marginal Effects from the Estimation of Production Function for Obesity (Specification 2)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1) [27]	(2) [28]
Full-time work	0.013** (0.007)	0.013** (0.007)	0.011* (0.007)	-0.000 (0.009)	-0.001 (0.009)	-0.001 (0.009)	0.145*** (0.066)	0.184*** (0.067)
Part-time work	0.007 (0.006)	0.007 (0.006)	0.006 (0.007)	0.008 (0.009)	0.008 (0.009)	0.008 (0.009)	0.040 (0.058)	0.069 (0.061)
Full-time center based care	0.003 (0.009)	-0.001 (0.010)	0.001 (0.010)	0.001 (0.012)	0.002 (0.013)	0.001 (0.013)	0.014 (0.035)	-0.001 (0.041)
Part-time center based care	-0.003 (0.007)	-0.004 (0.008)	-0.003 (0.008)	0.003 (0.008)	0.004 (0.009)	0.004 (0.009)	0.017 (0.016)	0.018 (0.025)
Full-time home based care	-0.006 (0.008)	-0.008 (0.008)	-0.007 (0.008)	-0.017* (0.010)	-0.018* (0.011)	-0.018* (0.011)	0.088 (0.076)	0.080 (0.076)
Part-time home based care	0.007 (0.006)	0.006 (0.006)	0.006 (0.006)	-0.005 (0.007)	-0.006 (0.008)	-0.006 (0.008)	0.038 (0.059)	0.067 (0.066)
Home quality index		-0.004 (0.003)	-0.003 (0.003)		-0.007** (0.004)	-0.007** (0.003)		-0.061** (0.019)
In-home child care quality index		0.008 (0.011)	0.017 (0.025)		0.008 (0.012)	0.007 (0.012)		-0.133 (0.115)
Out-of-home child care quality index		0.007* (0.004)	0.007* (0.004)		0.003 (0.004)	0.004 (0.004)		-0.016 (0.031)
Exogenous Variables	No	No	Yes	No	No	Yes	Yes	Yes
N	20400							

Notes: Sample size is rounded to the nearest 50 as required by NCES. Standard errors in parentheses. *p<0.10 **p<0.05 *** p<0.01. Numbers in square brackets [.] show GMM model number.

6.2.3 Overweight Equation

Table 15 compares RE, FE and two-step system GMM models for the estimation of overweight risk for the child. Inclusion of quality variables decreases the magnitude of full-time work, full-time center-based care and full-time home-based care while they increase the effect of part-time center-based child care. When exogenous variables are also included in the model, magnitude of the coefficients remains almost the same. However, child care quality variables have unexpected signs. FE models show no significant impact of full-time work while use of part-time home-based child care compared to no home-based child care increases the risk of being overweight by almost 2.4 percentage points ($p < 0.01$) controlling for quality and exogenous variables. A 1 SD increase in home quality reduces the risk of being overweight by 0.9 percentage points ($p < 0.05$).

Two-step system GMM results indicate that when quality variables are not included, home-based child care significantly increases the risk of being overweight for children (16 percentage points of full-time effect and 20 percentage points for part-time effect). When quality variables are also included, only part-time home-based child care, when compared to no home-based child care, increases the risk of overweight by 16 percentage points ($p < 0.05$). Thus, we can conclude that home-based child care has nonlinear effects on the risk of being overweight. A 1 SD increase in home quality reduces the risk of being overweight by 7 percentage points ($p < 0.01$) and a 1 SD increase in in-home child care quality also decreases the risk of being overweight by 27 percentage points ($p < 0.05$).

Table 15: Marginal Effects from the Estimation of Production Function for Being Overweight (Specification 2)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1) [29]	(1) [30]
Full-time work	0.020** (0.008)	0.018** (0.008)	0.017** (0.008)	0.003 (0.011)	0.001 (0.011)	0.002 (0.011)	0.008 (0.068)	-0.047 (0.070)
Part-time work	-0.008 (0.008)	-0.008 (0.008)	-0.008 (0.008)	-0.007 (0.011)	-0.008 (0.011)	-0.008 (0.011)	0.036 (0.076)	-0.019 (0.069)
Full-time center based care	0.006 (0.012)	-0.001 (0.013)	0.003 (0.013)	-0.008 (0.014)	-0.017 (0.015)	-0.018 (0.015)	0.035 (0.033)	0.020 (0.039)
Part-time center based care	-0.009 (0.008)	-0.014 (0.010)	-0.013 (0.010)	-0.007 (0.010)	-0.014 (0.011)	-0.015 (0.011)	-0.013 (0.020)	-0.013 (0.028)
Full-time home based care	0.008 (0.010)	0.005 (0.010)	0.008 (0.010)	-0.000 (0.012)	-0.003 (0.013)	-0.002 (0.013)	0.161* (0.091)	0.131 (0.082)
Part-time home based care	0.031*** (0.008)	0.029*** (0.008)	0.029*** (0.008)	0.025*** (0.009)	0.024*** (0.009)	0.024*** (0.009)	0.202*** (0.070)	0.158** (0.078)
Home quality index		-0.006* (0.003)	-0.005 (0.003)		-0.009** (0.004)	-0.009** (0.004)		-0.070*** (0.025)
In-home child care quality index		0.015 (0.014)	0.016 (0.014)		-0.002 (0.014)	-0.001 (0.014)		-0.266** (0.112)
Out-of-home child care quality index		0.004 (0.005)	0.004 (0.005)		-0.001 (0.020)	-0.001 (0.005)		-0.004 (0.025)
Exogenous Variables	No	No	Yes	No	No	Yes	Yes	Yes
N	20400							

Notes: Sample size is rounded to the nearest 50 as required by NCES. Standard errors in parentheses. *p<0.10 **p<0.05 *** p<0.01. Numbers in square brackets [.] show GMM model number.

6.2.4 General Health Status Equation

As seen in Table 16, inclusion of quality variables, exogenous child and mother characteristics as well as state/county variables reduces the impact of part-time work while increasing the effect of full-time work in the RE models and primary out-of-home child care quality has theoretically the wrong sign. None of the variables in the FE Models are significant and except for full-time work, all other variables have negative signs. Moreover, out-of-home child care quality still has a negative sign in the FE Model.

When the endogeneity of variables are controlled using the two-step system GMM, the impact of maternal work variables and child care variables become significant. When quality variables are added, coefficient estimates of all variables increase and become more significant. Results are consistent with the results from 6.1.4. Full-time work compared to no work increases the likelihood of being in good health for the child by 16 percentage points. Also, part-time work relative to no work raises the probability of good health status by 18 percentage points ($p < 0.01$). On the other hand, the child care variables have negative signs. Use of full-time center-based child care and also part-time center-based care (relative to no center-based child care) reduce the likelihood of being in good health by 10 percentage points and 7 percentage points respectively ($p < 0.01$). In addition, full-time home-based child care (compared to no home-based child care) reduces the probability of being in good health by 26 percentage points ($p < 0.01$). Quality variables have expected signs. A 1 SD increase in home quality index increases the probability of being in good health for the child by 5.3 percentage points ($p < 0.01$).

Table 16: Marginal Effects from the Estimation of Production Function for General Health Status (Specification 2)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(1) [28]	(1)	(2)	(3)	(1) [31]	(1) [32]
Full-time work	0.013** (0.006)	0.016** (0.006)	0.015** (0.006)	0.005 (0.009)	0.005 (0.009)	0.006 (0.009)	0.113** (0.046)	0.159*** (0.049)
Part-time work	0.017*** (0.006)	0.016** (0.006)	0.014** (0.006)	-0.005 (0.009)	-0.005 (0.009)	-0.005 (0.009)	0.146** (0.060)	0.180*** (0.057)
Full-time center based care	0.020** (0.009)	0.018* (0.009)	0.018* (0.009)	-0.002 (0.011)	-0.004 (0.012)	-0.003 (0.012)	-0.051** (0.026)	-0.099*** (0.033)
Part-time center based care	0.008 (0.007)	0.002 (0.008)	0.001 (0.008)	-0.006 (0.008)	-0.008 (0.008)	-0.007 (0.009)	-0.034*** (0.013)	-0.071*** (0.020)
Full-time home based care	-0.009 (0.008)	-0.009 (0.008)	-0.008 (0.008)	-0.009 (0.010)	-0.011 (0.010)	-0.011 (0.010)	-0.176** (0.067)	-0.257*** (0.067)
Part-time home based care	0.010* (0.006)	0.008 (0.006)	0.009 (0.006)	-0.004 (0.007)	-0.006 (0.008)	-0.006 (0.008)	0.036 (0.054)	-0.025 (0.058)
Home quality index		0.020*** (0.002)	0.018*** (0.002)		0.002 (0.003)	0.003 (0.003)		0.053*** (0.016)
In-home child care quality index		0.014 (0.011)	0.012 (0.011)		0.007 (0.012)	0.008 (0.012)		0.107 (0.095)
Out-of-home child care quality index		-0.006 (0.004)	-0.006 (0.004)		-0.005 (0.004)	-0.005 (0.004)		0.034 (0.029)
Exogenous Variables	No	No	Yes	No	No	Yes	Yes	Yes
N	23650							

Notes: Sample size is rounded to the nearest 50 as required by NCES. Standard errors in parentheses. *p<0.10 **p<0.05 ***p<0.01. Numbers in square brackets [.] show GMM model number.

6.2.5 Behavior Problems Equation

Table 17 presents estimation results from RE, FE and two-step system GMM for the estimation of production function for behavior problems. When quality variables are included (RE Model 2), the effects of full-time work and full-time home-based care become more negative while part-time center-based care changes the sign (compared to RE Model 1). Inclusion of exogenous variables decreases the impact of full-time home-based care and increases the effects of full-time work and part-time work. FE Models 1-3 show that when time-invariant unobserved heterogeneity is not controlled, downward bias is observed in full- and part-time work but upward bias in hours of child care variables (RE Model 3 vs FE Model 3). FE model results indicate that full-time home-based child care relative to no home-based care reduces the behavior problem index by 0.07 SD ($p < 0.05$) while there is no significant impact of maternal work variables.

However, when time-varying unobservables are also controlled, home-based child care and full-time work change sign as shown in the GMM models. Inclusion of quality variables reduces the effect of part-time work while increasing the effect of full-time work. The results show that full-time work compared to no work reduces the behavior problem index by 0.70 SD ($p < 0.01$). This indicates that the significant impact of hours of work found in 6.1.5 is also present here. All quality variables have expected signs. A 1 SD increase in the home quality index reduces the behavior problem index by 0.23 SD ($p < 0.01$) and similarly, a 1 SD increase in the out-of-home quality index decreases behavior problems by 0.24 SD ($p < 0.01$).

Table 17: Marginal Effects from the Estimation of Production Function for Behavior Problems (Specification 2)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1) [33]	(1) [34]
Full-time work	-0.014 (0.018)	-0.034* (0.018)	-0.037** (0.018)	0.007 (0.027)	0.005 (0.027)	0.006 (0.027)	-0.309 (0.249)	-0.702*** (0.266)
Part-time work	-0.039** (0.018)	-0.038** (0.018)	-0.042** (0.018)	-0.028 (0.024)	-0.029 (0.024)	-0.029 (0.024)	-0.388* (0.234)	-0.313 (0.219)
Full-time center based care	0.037 (0.025)	0.012 (0.027)	0.011 (0.027)	0.004 (0.032)	-0.002 (0.035)	-0.005 (0.035)	0.443 (0.317)	0.185 (0.434)
Part-time center based care	0.005 (0.018)	-0.001 (0.022)	-0.006 (0.021)	-0.031 (0.022)	-0.035 (0.026)	-0.035 (0.026)	0.223 (0.138)	0.238 (0.222)
Full-time home based care	-0.036* (0.022)	-0.055** (0.023)	-0.048** (0.022)	-0.071** (0.029)	-0.069** (0.030)	-0.070** (0.030)	0.325 (0.305)	0.511 (0.363)
Part-time home based care	0.010 (0.017)	0.006 (0.017)	0.005 (0.017)	-0.008 (0.021)	-0.006 (0.022)	-0.006 (0.022)	-0.094 (0.204)	0.172 (0.255)
Home quality index		-0.111*** (0.007)	-0.112*** (0.007)		-0.011 (0.010)	-0.011 (0.010)		-0.234*** (0.076)
In-home child care quality index		-0.036 (0.028)	-0.030 (0.028)		-0.060** (0.030)	-0.061** (0.030)		-0.352 (0.432)
Out-of-home child care quality index		-0.015 (0.011)	-0.013 (0.011)		-0.007 (0.012)	-0.007 (0.012)		-0.237*** (0.087)
Exogenous Variables	No	No	Yes	No	No	Yes	Yes	Yes
N	21050							

Notes: Sample size is rounded to the nearest 50 as required by NCES. Standard errors in parentheses. *p<0.10 **p<0.05 ***p<0.01. Numbers in square brackets [.] show GMM model number.

6.2.6 Ear Infection Equation

Estimation of the ear infection equation is shown only for the models with structural quality measures. Inclusion of quality variables and exogenous variables increases the effects of center-based care variables while reducing the effect of part-time work as seen in Table 18. In addition, the home-based child care variable become negative. Full-time and part-time center-based care increase the likelihood of an ear infection by almost 9 and 8 percentage points ($p < 0.01$), respectively. However, group size, when center-based care is used, has a theoretically incorrect sign although its effect is significant.

When the FE models are estimated with quality and exogenous variables, the effects of full-time work and part-time work become negative i.e., ignoring permanent unobservables leads to upward bias and decreases the impact of center-based care. Part-time home-based child care relative to no home-based child care decreases the risk of ear infections by 3.4 percentage points ($p < 0.05$). Group size, when center-based care is used, has the same effect as in the RE models but still has the wrong sign. However, the GMM model shows that part-time work when compared to no work increases the risk of ear infections by 39 percentage points ($p < 0.01$). This indicates that nonlinearity is present in the impact of maternal work and the significant adverse effect of hours of work found in the previous section is also present. Other variables are not statistically significant. One more child in home-based care (i.e., group size in home-based care) increases the risk of ear infections by 10 percentage points ($p < 0.01$).

Table 18: Marginal Effects from the Estimation of Ear Infection Equation (Specification 2)

	RE Model			FE Model			GMM Model
	(1)	(2)	(3)	(1)	(2)	(3)	(1) [35]
Full-time work	0.007 (0.009)	0.003 (0.009)	0.000 (0.009)	-0.012 (0.012)	-0.015 (0.012)	-0.015 (0.012)	0.052 (0.068)
Part-time work	0.019** (0.009)	0.016* (0.009)	0.013 (0.009)	-0.001 (0.012)	-0.003 (0.012)	-0.003 (0.012)	0.393*** (0.124)
Full-time center-based care	0.044*** (0.012)	0.084*** (0.017)	0.087*** (0.017)	0.003 (0.015)	0.043** (0.021)	0.043** (0.021)	0.026 (0.084)
Part-time center-based care	0.033*** (0.009)	0.077*** (0.015)	0.075*** (0.016)	0.010 (0.010)	0.052*** (0.018)	0.052*** (0.018)	-0.013 (0.087)
Full-time home-based care	0.027*** (0.010)	-0.010 (0.015)	-0.007 (0.015)	0.011 (0.013)	-0.025 (0.018)	-0.025 (0.018)	-0.016 (0.054)
Part-time home-based care	0.014* (0.008)	-0.017 (0.012)	-0.015 (0.012)	-0.003 (0.010)	-0.034** (0.015)	-0.034** (0.015)	-0.027 (0.038)
Group size center-based		-0.003*** (0.001)	-0.003*** (0.001)		-0.003** (0.001)	-0.003** (0.001)	0.000 (0.004)
Group size home-based care		0.016*** (0.003)	0.016*** (0.003)		0.013*** (0.003)	0.013*** (0.003)	0.101*** (0.036)
Exogenous Variables	No	No	Yes	No	No	Yes	Yes
N	24550						

Notes: Sample size is rounded to the nearest 50 as required by NCES. Standard errors in parentheses. *p<0.10 **p<0.05 *** p<0.01. Numbers in square brackets [.] show GMM model number.

6.2.7 Respiratory Illness Equation

Table 19 compares the RE Models, FE Models and two-step system GMM estimations for the respiratory illness equation. The magnitude of the coefficients are almost the same when quality variables, exogenous child and mother characteristics and state/county variables are included in the RE and FE models. When permanent heterogeneity is controlled in the FE model, signs of full-time work, part-time work and part-time center-based care become negative. However, none of the effects are significant. In addition, group size, when home-based care is used, has a theoretically incorrect sign. Estimation with the GMM model increases the magnitude of the variables, but they are still not statistically significant. On the other hand, lower structural quality increases the risk of a respiratory illness. That is, one more child in a center-based care increases the risk of having a respiratory illness by 1.5 percentage points ($p < 0.05$).

6.3 Estimations for Specification 3

6.3.1 Cognitive Achievement Equation

As shown in Table 20, all variables are significant in the RE Models 1-3. When both quality and exogenous variables are added, the effects of all variables are increased with the exception of part-time work without child care. The impact of home quality and in-home child care quality variables decreases while the impact of the out-of-home child care quality variable increases when exogenous variables are added to the model. The quality of home and out-of-home child care are significant when exogenous variables are added. The FE models (FE Models 1-3) reduce the effects of all estimates and render the coefficient of part-time work without child care negative. Omission of quality variables in the GMM model leads to larger coefficients for full-time work and no work with child care.

Table 19: Marginal Effects from the Estimation of Respiratory Illness Equation (Specification 2)

	RE Model			FE Model			GMM Model
	(1)	(2)	(3)	(1)	(2)	(3)	(1) [36]
Full-time work	0.004 (0.006)	0.004 (0.006)	0.003 (0.006)	-0.014 (0.009)	-0.014 (0.009)	-0.014 (0.009)	0.025 (0.070)
Part-time work	0.012* (0.006)	0.011* (0.006)	0.011* (0.006)	-0.000 (0.009)	-0.001 (0.009)	-0.001 (0.009)	-0.001 (0.039)
Full-time center-based care	0.031*** (0.010)	0.039*** (0.013)	0.030** (0.013)	0.005 (0.012)	0.001 (0.016)	0.001 (0.016)	-0.176 (0.119)
Part-time center-based care	0.011 (0.007)	0.020 (0.013)	0.013 (0.013)	0.000 (0.008)	-0.004 (0.015)	-0.005 (0.015)	-0.083 (0.101)
Full-time home-based care	0.012 (0.008)	0.002 (0.012)	0.003 (0.012)	-0.001 (0.010)	0.000 (0.015)	0.000 (0.015)	-0.092 (0.094)
Part-time home-based care	-0.003 (0.006)	-0.012 (0.010)	-0.010 (0.010)	-0.006 (0.007)	-0.005 (0.012)	-0.005 (0.012)	0.022 (0.071)
Group size center-based		-0.001 (0.001)	-0.000 (0.001)		0.000 (0.001)	0.000 (0.001)	0.015** (0.007)
Group size home-based care		-0.000 (0.002)	-0.000 (0.002)		-0.003 (0.002)	-0.003 (0.002)	0.005 (0.005)
Exogenous Variables	No	No	Yes	No	No	Yes	Yes
N	22950						

Notes: Sample size is rounded to the nearest 50 as required by NCES. Standard errors in parentheses. *p<0.10 **p<0.05 ***p<0.01. Numbers in square brackets [.] show GMM model number.

As shown in the last column, part-time work without child care (compared to no work and no child care) increases the cognitive achievement of the child by almost 0.35 SD ($p < 0.05$) and when a mother works full-time without child care the effect increases to 0.56 SD ($p < 0.01$). Finally, if the mother works full-time and uses child care, the effect is 0.98 SD ($p < 0.01$). These results indicate the importance of using child care and maternal work in the cognitive development of children. A 1 SD increase in the home quality index increases the cognitive achievement of the child by 0.12 SD at the 1% significance level and a 1 SD increase in out-of-home child care also increases cognitive achievement of children by 0.38 SD ($p < 0.01$).

6.3.2 Obesity Equation

Table 21 shows the RE, FE and two-step system GMM results for the estimation of the production function for obesity. When quality variables and exogenous variables are added, the effects of maternal work and child care variables remain almost the same. However, child care quality variables have theoretically incorrect signs in both the RE and FE models. The only significant variable in the FE models is home quality. A 1 SD increase in home quality reduces the risk of obesity by 0.7 percentage points ($p < 0.05$). Inclusion of quality variables increases the magnitude of full-time work with child care in the GMM model. As shown in the last column, full-time maternal work with child care compared to no work and no child care increases obesity risk by 24.7 percentage points ($p < 0.01$). Part-time work without child care (relative to no work and no child care) increases the risk of obesity by 7 percentage points ($p < 0.10$). From 6.2.2, it has been shown that full-time work is responsible for the increase in obesity risk for the child but not a specific child care variable.

Table 20: Marginal Effects from the Estimation of Production Function for Cognitive Achievement (Specification 3)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1) [37]	(1) [38]
Full-time work with child care	0.082*** (0.017)	0.110*** (0.019)	0.114*** (0.019)	0.050** (0.025)	0.045* (0.027)	0.045* (0.027)	1.000*** (0.294)	0.982*** (0.276)
Full-time work without child care	0.053* (0.029)	0.062** (0.029)	0.063** (0.029)	0.021 (0.035)	0.026 (0.035)	0.031 (0.035)	0.345 (0.656)	0.564*** (0.169)
Part-time work with child care	0.112*** (0.019)	0.122*** (0.021)	0.122*** (0.021)	0.087*** (0.025)	0.076*** (0.027)	0.072*** (0.027)	0.390 (0.366)	0.300 (0.320)
Part-time work without child care	0.051* (0.028)	0.047* (0.028)	0.043 (0.027)	-0.005 (0.033)	-0.002 (0.033)	-0.005 (0.032)	0.082 (0.491)	0.346** (0.157)
No work with child care	0.078*** (0.020)	0.085*** (0.022)	0.095*** (0.021)	0.069*** (0.022)	0.053** (0.025)	0.056** (0.025)	1.051*** (0.317)	0.724*** (0.201)
Home quality index		0.080*** (0.007)	0.073** (0.007)		0.055*** (0.009)	0.057*** (0.009)		0.121*** (0.021)
In-home child care quality index		0.028 (0.025)	0.021 (0.025)		0.012 (0.026)	0.008 (0.026)		0.049 (0.041)
Out-of-home child care quality index		0.016 (0.010)	0.018* (0.010)		0.005 (0.010)	0.002 (0.010)		0.384*** (0.120)
Exogenous Variables	No	No	Yes	No	No	Yes	Yes	Yes
N	20850							

Notes: Sample size is rounded to the nearest 50 as required by NCES. Standard errors in parentheses. *p<0.10 **p<0.05 ***p<0.01. Omitted category is no work with no child care. Numbers in square brackets [,] show GMM model number.

This section tells us that if the mother uses child care when working full-time (compared to no work and no child care case), the risk of obesity increases. All quality variables have negative signs i.e., higher quality reduces the obesity risk. However, only home quality is statistically significant. A 1 SD increase in home quality today reduces the obesity risk for the child in the next period by 6.3 percentage points ($p < 0.01$).

6.3.3 Overweight Equation

Table 22 compares the RE, FE and two-step system GMM models for the estimation of overweight risk for the child. If the mother works full-time and uses child care, the risk of being overweight risk for the child increases by 3 percentage points ($p < 0.01$), even after controlling for quality and exogenous variables in the RE models. The FE models show that the coefficient of full-time work with child care has a negative sign and is not significant even if both quality and exogenous variables are added. Except for home quality none of the variables are significant. A 1 SD increase in home quality reduces the child's risk of obesity by 0.9 percentage points ($p < 0.05$) in the FE Model.

When quality variables are not included, part-time work with child care significantly increases the risk of being overweight for the child while its effect disappears when quality variables are included. None of the variables, however, are significant, as seen in the last column. On the other hand, home quality and in-home child care quality variables are all significant. A 1 SD increase in home quality decreases a child's risk of being overweight by 6.4 percentage points ($p < 0.05$) and a 1 SD increase in in-home child care quality reduces the risk of being overweight by 30 percentage points ($p < 0.05$).

Table 21: Marginal Effects from the Estimation of Production Function for Obesity (Specification 3)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1) [39]	(1) [40]
Full-time work with child care	0.013** (0.007)	0.012 (0.007)	0.011 (0.007)	-0.010 (0.010)	-0.011 (0.011)	-0.012 (0.011)	0.216*** (0.078)	0.247*** (0.083)
Full-time work without child care	0.001 (0.012)	0.001 (0.012)	0.001 (0.012)	-0.005 (0.015)	-0.005 (0.015)	-0.004 (0.015)	-0.127 (0.139)	-0.067 (0.137)
Part-time work with child care	0.011 (0.007)	0.010 (0.008)	0.010 (0.008)	0.001 (0.010)	0.001 (0.011)	0.000 (0.011)	0.046 (0.066)	0.086 (0.072)
Part-time work without child care	-0.003 (0.010)	-0.003 (0.010)	-0.002 (0.010)	0.004 (0.011)	0.004 (0.011)	0.005 (0.011)	0.038 (0.039)	0.067* (0.039)
No work with child care	-0.004 (0.007)	-0.005 (0.008)	-0.003 (0.008)	-0.009 (0.009)	-0.010 (0.010)	-0.010 (0.010)	0.110 (0.071)	0.101 (0.065)
Home quality index		-0.004 (0.003)	-0.003 (0.003)		-0.007** (0.004)	-0.007** (0.004)		-0.063** (0.020)
In-home child care quality index		0.007 (0.011)	0.008 (0.011)		0.008 (0.011)	0.007 (0.012)		-0.159 (0.109)
Out-of-home child care quality index		0.007* (0.004)	0.007* (0.004)		0.003 (0.004)	0.004 (0.004)		-0.002 (0.036)
Exogenous Variables	No	No	Yes	No	No	Yes	Yes	Yes
N	20400							

Notes: Sample size is rounded to the nearest 50 as required by NCES. Standard errors in parentheses. *p<0.10 **p<0.05 ***p<0.01. Omitted category is no work with no child care. Numbers in square brackets [.] show GMM model number.

Table 22: Marginal Effects from the Estimation of Production Function for Being Overweight (Specification 3)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1) [41]	(1) [42]
Full-time work with child care	0.033*** (0.008)	0.029*** (0.009)	0.030*** (0.009)	0.004 (0.012)	-0.001 (0.013)	-0.000 (0.013)	0.100 (0.089)	-0.025 (0.064)
Full-time work without child care	0.017 (0.015)	0.016 (0.015)	0.018 (0.015)	0.024 (0.018)	0.024 (0.018)	0.024 (0.018)	-0.042 (0.128)	-0.092 (0.130)
Part-time work with child care	0.011 (0.009)	0.009 (0.010)	0.011 (0.010)	0.007 (0.012)	0.003 (0.013)	0.003 (0.013)	0.196** (0.087)	-0.016 (0.060)
Part-time work without child care	-0.017 (0.013)	-0.017 (0.013)	-0.016 (0.013)	-0.018 (0.016)	-0.017 (0.016)	-0.018 (0.016)	0.019 (0.124)	0.140 (0.127)
No work with child care	0.006 (0.010)	0.005 (0.011)	0.007 (0.011)	0.005 (0.011)	0.001 (0.012)	0.001 (0.012)	0.125* (0.074)	0.078 (0.067)
Home quality index		-0.006* (0.003)	-0.005* (0.003)		-0.009** (0.004)	-0.009** (0.004)		-0.064** (0.026)
In-home child care quality index		0.014 (0.014)	0.015 (0.014)		-0.002 (0.014)	-0.002 (0.014)		-0.302** (0.132)
Out-of-home child care quality index		0.004 (0.005)	0.004 (0.005)		-0.001 (0.005)	0.001 (0.005)		-0.001 (0.029)
Exogenous Variables	No	No	Yes	No	No	Yes	Yes	Yes
N	20400							

Notes: Sample size is rounded to the nearest 50 as required by NCES. Standard errors in parentheses. *p<0.10 **p<0.05 ***p<0.01. Omitted category is no work with no child care. Numbers in square brackets [,] show GMM model number.

6.3.4 General Health Status Equation

As can be seen in Table 23, inclusion of quality and exogenous variables slightly reduces the impact of part-time work regardless of child care use, while slightly increasing the impact of full-time work, regardless of child care use. Full-time work and part-time work increase the probability of being in good health if child care is used when compared to no work and no child care. However, when the FE method is used, none of the variables are significant and only full-time work with child care has a positive sign while the remaining variables have negative. That is, there is an upward bias if time-invariant variables are not controlled. Quality of out-of-home child care has a theoretically unexpected sign in both the RE and FE models.

When quality variables are not included in the GMM models, the effects of full-time work and part-time work with child care are larger whereas the effect of part-time work without child care is smaller. Both full- and part-time work, regardless of child care, have a positive impact on good health status for the child. Full-time work and part-time work with child care increases the likelihood of good health status by almost 7 percentage points ($p < 0.05$). Full- and part-time work without child care also increases the child's probability of being in good health by 8 and 28 percentage points ($p < 0.05$), respectively, when compared to no work and no child care. A 1 SD increase in quality of home increases the probability of good health by almost 6 percentage points ($p < 0.01$).

Table 23: Marginal Effects from the Estimation of Production Function for General Health Status (Specification 3)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1) [43]	(1) [44]
Full-time work with child care	0.020** (0.006)	0.022** (0.007)	0.022** (0.007)	0.004 (0.010)	0.003 (0.011)	0.003 (0.011)	0.118*** (0.045)	0.067*** (0.025)
Full-time work without child care	0.005 (0.011)	0.008 (0.011)	0.007 (0.011)	-0.000 (0.014)	0.000 (0.014)	-0.000 (0.014)	0.109 (0.078)	0.079** (0.032)
Part-time work with child care	0.027*** (0.007)	0.024*** (0.008)	0.022*** (0.008)	-0.006 (0.010)	-0.008 (0.010)	-0.008 (0.010)	0.186** (0.076)	0.069** (0.028)
Part-time work without child care	0.015 (0.010)	0.014 (0.010)	0.012 (0.010)	-0.007 (0.013)	-0.007 (0.013)	-0.007 (0.013)	0.224** (0.109)	0.284** (0.110)
No work with child care	0.010 (0.008)	0.007 (0.008)	0.008 (0.008)	0.000 (0.009)	-0.001 (0.010)	-0.001 (0.010)	0.130** (0.060)	0.035 (0.023)
Home quality index		0.020*** (0.002)	0.018*** (0.002)		0.002 (0.003)	0.003 (0.003)		0.055*** (0.015)
In-home child care quality index		0.013 (0.011)	0.011 (0.011)		0.007 (0.012)	0.008 (0.012)		0.113 (0.094)
Out-of-home child care quality index		-0.005 (0.004)	-0.005 (0.004)		-0.005 (0.004)	-0.005 (0.004)		0.021 (0.034)
Exogenous Variables	No	No	Yes	No	No	Yes	Yes	Yes
N	23650							

Notes: Sample size is rounded to the nearest 50 as required by NCES. Standard errors in parentheses. *p<0.10 **p<0.05***p<0.01. Omitted category is no work with no child care. Numbers in square brackets [.] show GMM model number.

6.3.5 Behavior Problems Equation

Coefficient estimates for full- and part-time work with child care increase while other coefficient estimates decrease when both quality and exogenous variables are included in the RE models as seen in Table 24. Full-time and part-time work with child care (relative to no work and no child care) significantly reduce behavior problems. However, part-time work with child care is the only significant variable in the FE model and reduces the behavior problems by 0.062 SD ($p < 0.05$).

None of the variables are significant in the GMM model when quality variables are not controlled. This holds true when these variables are also added to the model. However, two-step GMM estimates a positive sign for part-time work with child care when quality variables are included, although it is not statistically significant. Thus, ignoring time-varying unobservables also causes a downward bias in the coefficient estimate for this variable. On the other hand, higher home and out-of-home child care quality reduces behavior problems. A 1 SD increase in home quality reduces the behavior problem index of the child by 0.25 SD ($p < 0.01$) and also a 1 SD increase in out-of-home child care quality reduces the behavior problem index by 0.20 SD ($p < 0.10$).

6.3.6 Ear Infection Equation

The effects of full-time work, part-time work and no work with child care increase with quality and exogenous variables added to them model, as shown in Table 25. Full-time work with child care, part-time work with child care and no work with child care increase the risk of ear infections by almost 8 percentage points ($p < 0.01$). However, these results suffer from unobserved heterogeneity bias.

Table 24: Marginal Effects from the Estimation of Production Function for Behavior Problems (Specification 3)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[45]	(2) [46]
Full-time work with child care	-0.012 (0.018)	-0.050*** (0.020)	-0.052*** (0.019)	-0.025 (0.029)	-0.030 (0.031)	-0.030 (0.031)	0.052 (0.249)	-0.455 (0.336)
Full-time work without child care	-0.035 (0.033)	-0.047 (0.033)	-0.054* (0.032)	-0.008 (0.042)	-0.008 (0.042)	-0.003 (0.042)	-0.258 (0.595)	-0.210 (0.728)
Part-time work with child care	-0.042** (0.020)	-0.053** (0.022)	-0.059*** (0.022)	-0.059** (0.028)	-0.062** (0.031)	-0.062** (0.031)	-0.021 (0.216)	0.040 (0.313)
Part-time work without child care	-0.014 (0.030)	-0.007 (0.029)	-0.011 (0.029)	-0.012 (0.036)	-0.012 (0.036)	-0.012 (0.036)	-0.006 (0.405)	0.339 (0.562)
No work with child care	0.009 (0.021)	-0.002 (0.023)	-0.005 (0.023)	-0.027 (0.026)	-0.030 (0.029)	-0.029 (0.029)	0.141 (0.230)	0.405 (0.308)
Home quality index		-0.111*** (0.007)	-0.111*** (0.007)		-0.011 (0.010)	-0.011 (0.010)		-0.248*** (0.085)
In-home child care quality index		-0.037 (0.028)	-0.031 (0.028)		-0.061** (0.030)	-0.061** (0.030)		-0.552 (0.467)
Out-of-home child care quality index		-0.015 (0.011)	-0.013 (0.011)		-0.007 (0.012)	-0.007 (0.012)		-0.202* (0.110)
Exogenous Variables	No	No	Yes	No	No	Yes	Yes	Yes
N	21050							

Notes: Sample size is rounded to the nearest 50 as required by NCES. Standard errors in parentheses. *p<0.10 **p<0.05 ***p<0.01. Omitted category is no work with no child care. Numbers in square brackets [.] show GMM model number.

When the FE models are estimated with quality and exogenous variables, the effects of all variables increase. Part-time work without child care (relative to no work and no child care) increases the risk of ear infections by 3.6 percentage points ($p < 0.05$). Similarly, no work with child care also increases the risk by 5.8 percentage points ($p < 0.01$). Group size in center care has theoretically incorrect signs in both the RE and FE models. The GMM model estimates a larger effect for part-time work without child care. Compared to no work and no child care, part-time work without child care increases the risk of ear infections by 15 percentage points ($p < 0.05$). Moreover, one more child in home-based care increases the risk of ear infections by 11 percentage points ($p < 0.01$).

6.3.7 Respiratory Illness Equation

Inclusion of quality and exogenous variables in the RE models increases the effects of full- and part-time work with child care variables, as presented in Table 26 and their effects are significant. Part-time work with child care increases the risk of respiratory illness by 2 percentage points ($p < 0.10$). When permanent heterogeneity is controlled in the FE model, the effect of full-time work regardless of child care use and part-time work with child care become negative i.e., ignoring permanent heterogeneity causes upward bias. None of the variables are statistically significant. On the other hand, one of the quality variables has a theoretically incorrect sign (positive sign) in the FE model. The estimation using GMM estimator increases the magnitude of some variables, but the only significant effect is the impact of part-time work without child care. Part-time work without child care increases the likelihood of a respiratory illness for children by 4.8 percentage points ($p < 0.05$) and also one more child in a home-based setting increases this risk by 0.6 percentage points ($p < 0.05$).

Table 25: Marginal Effects from Estimation of Ear Infection Equation (Specification 3)

	RE Model			FE Model			GMM Model
	(1)	(2)	(3)	(1)	(2)	(3)	(1) [47]
Full-time work with child care	0.044*** (0.009)	0.079*** (0.014)	0.079*** (0.014)	0.005 (0.013)	0.023 (0.018)	0.023 (0.018)	0.052 (0.100)
Full-time work without child care	0.000 (0.015)	0.001 (0.015)	0.000 (0.015)	0.002 (0.019)	0.003 (0.019)	0.003 (0.019)	0.079 (0.122)
Part-time work with child care	0.044*** (0.010)	0.081*** (0.015)	0.079*** (0.015)	0.005 (0.013)	0.025 (0.019)	0.025 (0.019)	0.102 (0.118)
Part-time work without child care	0.040*** (0.014)	0.041*** (0.014)	0.040*** (0.014)	0.035** (0.017)	0.036** (0.017)	0.036** (0.017)	0.145** (0.057)
No work with child care	0.042*** (0.010)	0.081*** (0.015)	0.083*** (0.015)	0.036*** (0.011)	0.058*** (0.018)	0.058*** (0.018)	0.051 (0.106)
Group size center-based		-0.002*** (0.001)	-0.002*** (0.001)		-0.002* (0.001)	-0.002* (0.001)	0.003 (0.007)
Group size home-based care		0.016*** (0.003)	0.016*** (0.003)		0.013*** (0.003)	0.013*** (0.003)	0.113*** (0.035)
Exogenous Variables	No	No	Yes	No	No	Yes	Yes
N	24550						

Notes: Sample size is rounded to the nearest 50 as required by NCES. Standard errors in parentheses. *p<0.10 **p<0.05 ***p<0.01. Omitted category is no work with no child care. Numbers in square brackets [.] show GMM model number.

Table 26: Marginal Effects from the Estimation of Respiratory Illness Equation (Specification 3)

	RE Model			FE Model			GMM Model
	(1)	(2)	(3)	(1)	(2)	(3)	(1) [48]
Full-time work with child care	0.017*** (0.006)	0.028** (0.011)	0.020* (0.011)	-0.014 (0.010)	-0.017 (0.014)	-0.014 (0.010)	-0.023 (0.102)
Full-time work without child care	0.005 (0.011)	0.006 (0.011)	0.004 (0.011)	-0.005 (0.014)	-0.005 (0.014)	-0.005 (0.014)	-0.024 (0.026)
Part-time work with child care	0.018** (0.007)	0.029** (0.012)	0.022* (0.012)	-0.003 (0.010)	-0.006 (0.015)	-0.003 (0.010)	0.155 (0.101)
Part-time work without child care	0.014 (0.010)	0.014 (0.010)	0.013 (0.010)	0.009 (0.012)	0.009 (0.012)	0.009 (0.012)	0.048** (0.024)
No work with child care	0.011 (0.007)	0.021* (0.012)	0.013 (0.012)	0.006 (0.009)	0.002 (0.014)	0.006 (0.009)	0.103 (0.127)
Group size center-based		-0.000 (0.001)	0.000 (0.001)		0.000 (0.001)	0.001 (0.001)	0.003 (0.007)
Group size home-based care		0.000 (0.002)	-0.000 (0.002)		-0.003 (0.002)	-0.003 (0.002)	0.006** (0.003)
Exogenous Variables	No	No	Yes	No	No	Yes	Yes
N	22950						

Notes: Sample size is rounded to the nearest 50 as required by NCES. Standard errors in parentheses. *p<0.10 **p<0.05 ***p<0.01. Omitted category is no work with no child care. Numbers in square brackets [.] show GMM model number.

6.4 Specification Tests

Consistency of the system GMM approach requires no second order autocorrelation in the first difference error terms as well as valid overidentifying restrictions. As shown in Table L in Appendix L, p-values for autocorrelation test results imply that there is no second order autocorrelation in the first difference error terms and we cannot reject the null hypothesis, which states that the overidentifying restrictions are valid by looking at the p-values for the Sargan tests. Tables E1-E4 in Appendix E show the relationships between endogenous variables and state/county-level instruments mentioned previously. A complete list of instruments for system GMM for each equation can be found in Tables M1 and M2 in Appendix M.

As shown in Tables E1-E4 in Appendix E, a higher average state-level wage rate decreases the quality of home while increasing the quality of out-of-home primary child care used. An increase in preschool workers wage rate leads to more hours of center-based care used while decreasing the quality received from out-of-home primary child care. An increase in average state-level infant care cost causes the mother to work less hours and use fewer hours of center-based care while raising home quality. On the other hand, the high cost of preschool care leads to greater use of home-based care while decreasing home quality. An increase in the number of group child care settings results in fewer hours of home-based care used while increasing home quality. A higher number of child care establishments in a county leads to work more hours and use of higher quality in-home child care. In addition, greater partner income results in working less hours and use fewer of hours of any type of child care while increasing the quality of home and in-home child care used.

A high poverty rate decreases the likelihood of a mother obtaining a university degree and the likelihood of being married. On the other hand, greater poverty rates increase the number

of children in a family. An increase in the partner's income increases the likelihood of a mother obtaining a university degree and increases the likelihood of being married. An increase in per capita service sector employment increases the likelihood of working full-time (compared to no work) and using full-time center-based care (compared to no center care) while decreasing the use of part-time home-based child care (compared to no home-based care). However, an increase in the cost of infant care decreases the likelihood of full-time work (compared to no work) and the use of full-time center-based care (compared to no center care) while increasing the likelihood of part-time work (compared to no work). Similarly, an increase in the cost of preschool child care decreases the likelihood of full-time work and the use of full-time center-based care. An increase in the preschool worker average wage rate increases the use of part-time center-based child care (compared to no center care). High rates of poverty reduce the likelihood of working either part- or full-time and higher per capita median household income increases the use of part-time center-based care and full-/part-time home-based child care. In addition, likelihood ratio tests at the end of Tables E1-E4 show that the standard instruments are jointly significant in the reduced form equations for endogenous variables, although they are not all individually significant in every equation.

CHAPTER 7: CONCLUSION

This research analyzes the effects of maternal employment and non-parental child care on developmental outcomes of children in early childhood. I estimate hybrid production functions in a dynamic framework, controlling for the endogeneity of observed inputs using a two-step system GMM estimator. The ECLS-B, a nationally representative data set, is used to estimate the model. This data set provides information on child nutrition, parenting style, and home and child care environments. Using this information, I create non-parental child care and home quality indices that are estimated from the first principal components derived from a factor analysis. All models are estimated with those quality indices because child care is a service with heterogeneous quality and the quality of a child's home environment differs by parenting style and nutritional choices of the mother. I also include group size as a structural quality measure in the health shock equations. My model allows for the estimation of causal effects of the health variables (obesity and acute health conditions) on a child's cognitive achievement and behavior problems.

Three different specifications of hours of work and child care are used in this study, as explained in Chapter 6. A comparison of those specifications reveals that the effects of quality variables are robust across specifications. The effects of home quality vary between 0.10 and 0.12 SD on cognitive achievement and between -0.20 and -0.25 SD for behavior problems. The observed effect is 6 to 7 percentage points on the risk of being obese/overweight and 5.5 percentage points on the general health status. The effects of out-of-home child care quality vary between 0.35 and 0.38 SD on the cognitive achievement and between -0.20 and -0.24 SD for

behavior problems. The effects of in-home child care quality on the risk of being overweight vary between 27 and 30 percentage points across specifications.

The comparison of key findings across specifications indicate that significant nonlinearities in the impact of hours of work on cognitive achievement exist when they vary with the use of child care (at the extensive margin), as in specification 3. The effect of full-time work, especially when child care is used, is larger than the effect of part-time work without child care (relative to no work and no child care). In addition, more hours of center-based care significantly improves cognitive achievement and this holds true when full- or part-time center-based care is used (compared to no center-based care), as in specification 2. Estimation results from three specifications for behavior problems imply that more hours of work, specifically full-time work, significantly reduce behavior problems when the effect is held constant across child care types and intensity of child care, as in specification 2.

The adverse impact of maternal hours of work on the risk of obesity for children is shown across all specifications and nonlinearities for the impact of hours of work exist. The results imply that the effect of full-time work when child care is used, as in specification 3, is larger than its effect, regardless of child care used, as in specification 2. On the other hand, no significant impact of maternal hours of work on the risk of being overweight is found for all specifications. However, more hours of home-based child care, particularly part-time care, significantly increases the risk of being overweight or children, as in specification 2.

Maternal hours of work significantly increases the probability of the child being in good health across all specifications. More hours of both center-based and home-based care significantly reduce the probability of good health for children as seen in specifications 1 and 2. However, the third specification demonstrates that when mothers work (full- or part-time), the

probability of good health for their children is increased, even if child care is used. A comparison of the three specifications for health shocks (ear infections and respiratory illness) indicate that when nonlinearity in hours of work is allowed to vary with child care use at the extensive margin, part-time work when no child care is used (compared to no work and no child care) is found to be significant, as seen in specification 3.

We observe that full-/part-time maternal work improves cognitive achievement and full-time work reduces behavior problems while increasing the risk of obesity. These findings may be explained by a number of factors. First, working mothers might be more organized and find the right balance between home and work since they know that they have limited time at home compared to non-workers. This may force them to budget their time more efficiently. Secondly, working outside the home allows mothers to make social connections, increases self-esteem and self-sufficiency, and may help reduce feelings of loneliness and isolation. Finally, working mothers, especially those employed full-time after the child birth, reports better physical and mental health than non-workers.⁴² Hence, these factors can explain the positive impact of working full- or part-time on cognitive development and behavior in children. On the other hand, a child's increased risk of being obese when his/her mother works full-time and using any child care might result from low quality food choices at child care settings, which cannot be controlled due to data limitations regarding dietary habits. In addition, the possibility of unhealthy nutritional choices in home-based child care settings may also explain the adverse effect of part-time home-based child care on the risk of being overweight in children.

In summary, the effects of quality variables are robust across all specifications. Significant maternal employment and hours of child care variables from specification 1 show

⁴²Details can be found in paper by Frech and Damaske (2012).

significant nonlinearities across other specifications. Both second and third specifications reveal significant nonlinearities for the effects of maternal hours of work and child care on cognitive development, obesity risk and general health status. In addition, the signs of the effects are robust across all specifications for each outcome, thus, both specifications can be used in order to see nonlinear effects for these outcomes. However, nonlinearities for the effects of maternal hours of work (and hours of child care) are significant when these effects are assumed to be constant across the intensity of child care used (and intensity of maternal hours of works) for the child's behavior problems and risk of being overweight. Therefore, the second specification is preferred to observe nonlinear effects on these two outcomes. Moreover, across all specifications, omission of quality variables alters the magnitude and significance of maternal work and child care variables, which have theoretically expected signs when unobserved heterogeneity is controlled using the GMM estimator.

APPENDIX A: VARIABLE DEFINITIONS

Table A1: Definitions of the Variables Created from ECLS-B

Variable	Description
Agechild	Age of child in months
Agemom	Age of mother in years
Male	Dummy variable equals to 1 if child is male
Black child	Dummy variable equals to 1 if child is black
Hispanic child	Dummy variable equals to 1 if child is Hispanic
Urban	Dummy variable if urban area
Region1	Dummy variable if region is Northeast
Region2	Dummy variable if region is Midwest
Region3	Dummy variable if region is South
Region4	Dummy variable if region is West
University degree	Dummy variable if the mother has at least B.S. degree
Sibling	Number of siblings of the focal child
Married	Dummy variable equals to 1 if the mother is married
Hours of work	Hours of work for the mother
Full time work	Dummy variable equals to 1 if the mother works more than 35 hours (Full time work)
Part time work	Dummy variable equals to 1 if the mother works less than or equal to 35 hours (Part time work)
Full time work with child care	Dummy variable equals to 1 if the mother works full time and uses any non-parental child care
Full time work without child care	Dummy variable equals to 1 if the mother works full time and doesn't use non-parental child care
Part time work with child care	Dummy variable equals to 1 if the mother works part time and uses any non-parental child care
Part time work without child care	Dummy variable equals to 1 if the mother works part time and doesn't use non-parental child care
No work with child care	Dummy variable equals to 1 if the mother doesn't work and uses any non-parental child care
No work without child care	Dummy variable equals to 1 if the mother doesn't work and doesn't use non-parental child care
Center based child care hours	Hours of center based child care
Home based child care hours	Hours of home based child care (i.e. relative care and nonrelative care)
Use center based care	Dummy variable equals to 1 if center based care is used ¹
Use only home based care	Dummy variable equals to 1 if only home based care is used
Full time center based care	Dummy variable equals to 1 if more than 35 hours of center based care is used (Full time)

Table A1: Continuing from Previous Page

Variable	Description
Part time center based care	Dummy variable equals to 1 if less than or equal to 35 hours of center based care is used (Part time)
Full time home based care	Dummy variable equals to 1 if more than 35 hours of home based care is used (Full time)
Part time home based care	Dummy variable equals to 1 if less than or equal to 35 hours of home based care is used (Part time)
Group size center based	Group size in child care if center based care is used ²
Group size home based care	Group size in child care if only home based care is used (i.e. relative care and nonrelative care)
Home quality index	Home quality
Missing home quality	Dummy variable equals to 1 if home quality is missing
In-home child care quality index	In-home primary non-parental child care quality
Missing in-home care quality	Dummy variable equals to 1 if in-home primary non-parental child care quality is missing
Use in-home care	Dummy variable equals to 1 if in-home primary non-parental child care is used
Out-of-home child care quality index	Out home primary non-parental child care quality
Missing out-of-home care quality	Dummy variable equals to 1 if out-home primary non-parental child care quality is missing
Use out-of-home care	Dummy variable equals to 1 if out-home primary non-parental child care is used
Income others	Income of the partner ³
Missing income others	Dummy variable equals to 1 if income of the partner is missing
Hhincomenet	Household income ³
Missing hhincomenet	Dummy variable equals to 1 if household income is missing
General health	Dummy variable equals to 1 if the child's health is excellent/very good and 0 if it is good/fair/poor
Obesity	Dummy variable equals to 1 if the child is Obese*
Overweight	Dummy variable equals to 1 if the child is overweight*
Cognitive achievement	Standardized values for scale mental scores*
Behavior index	Standardized values for Behavior problems
Ear infection	Dummy variable equals to 1 if the child has an ear infection
Respiratory illness	Dummy variable equals to 1 if the child has a respiratory illness

Notes: ¹If a family uses some home based care in addition to center based i.e. multiple child care use, it is included under this category.

²If multiple child care is used, average of the group sizes are used. ³real income values; household income net of child care expenditures.

*Details are given in the data section of the paper.

Table A2: Definitions of the State/County-Level Variables-Set 1

Variable	Definition	Source
Unemployment rate	County level unemployment rate	http://www.bls.gov/lau/
Poverty	County level poverty	http://www.census.gov/did/www/saipe/data/statecounty/
Median income	Median household income*	http://www.census.gov/did/www/saipe/data/statecounty/
TANF	Temporary Assistance for Needy Families (TANF)--Expenditures by State*	www.census.gov/compendia/statab/2012/tables/12s0567.xls
Goods	State level employment in Goods sector	www.bls.gov/data/#employment
Service	State level employment in Service sector	www.bls.gov/data/#employment
Mean wage preschool	State level mean wage*	http://www.bls.gov/oes/oes_arch.htm
Mean wage child care worker	State level mean wage of preschool teachers*	http://www.bls.gov/oes/oes_arch.htm
Mean wage	State level mean wage of child care workers*	http://www.bls.gov/oes/oes_arch.htm
Price of infant care	Average state level cost of infant care in centers*	NACCRRRA Breaking the Piggy Bank: Parents and High Price of Child Care (2006); Parents and High Price of Child Care (2007a,2008b); Parents and High Cost of Child Care (2009a,2010b,2011a); Child Care in America: 2012 State Fact Sheets
Price of preschool care	Average state level cost of preschool care in centers*	NACCRRRA Breaking the Piggy Bank: Parents and High Price of Child Care (2006); Parents and High Price of Child Care (2007a,2008b); Parents and High Cost of Child Care(2009a,2010b,2011a); Child Care in America: 2012 State Fact Sheets
Public 2year	State level average tuition level for 2-year public universities*	http://trends.collegeboard.org/college-pricing

Table A2: Continuing from Previous Page

Variable	Definition	Source
Public 4year	State level average tuition level for 4-year public universities*	http://trends.collegeboard.org/college-pricing
Private 4year	State level average tuition level for 4-year private universities*	http://trends.collegeboard.org/college-pricing
Center total	State level regulated center based settings per capita	Child Care Center Licensing Study (2001/2002/2003); Child Care Licensing Study (2005/2007)
Family total	State level regulated family based settings per capita	Family Child Care Licensing Study (2001/2002/2003); Child Care Licensing Study (2005/2007)
Male female ratio	County level male to female ratio over 18 years old	http://www.census.gov/popest/data/historical/2000s/ vintage_2008/datasets.html
Total number of hospitals	County level total number of hospitals per capita	Area Resource File 2011-2012 release
Short term general child wellness hospitals	County level short term general hospitals with child wellness per capita	Area Resource File 2011-2012 release
Short term general hospitals with nutrition programs	County level short term general hospitals with nutrition programs per capita	Area Resource File 2011-2012 release
Short term general child psychiatric hospitals	County level Short term children's psychiatric hospitals per capita	Area Resource File 2011-2012 release
Long term general child psychiatric hospitals	County level long term children's psychiatric hospitals per capita	Area Resource File 2011-2012 release
Short term general hospitals with child/adolescence Service	County level short term general hospitals with child/adolescence service per capita	Area Resource File 2011-2012 release
Pct95 precipitation level	State level 95th percentile of precipitation level	GHCN (Global Historical Climatology Network)- Daily
Std of snow fall	State level standard deviation of snow fall	GHCN (Global Historical Climatology Network)- Daily
Std of precipitation level	State level standard deviation of precipitation level	GHCN (Global Historical Climatology Network)- Daily

Notes: *Real values

Table A3: Definitions of the State/County-Level Variables-Set 2

Variable	Definition		Explanation*	Source
Grocery	County level number of supermarkets and grocery stores (except convenience stores) per capita	NAICS Number:445110	This industry comprises establishments generally known as supermarkets and Grocery stores primarily engaged in retailing a general line of food, such as canned and frozen foods; fresh Fruits and vegetables; and fresh and prepared meats, fish, and poultry. Included in this industry are delicatessen-type establishments primarily engaged in retailing a general line of food.	http://www.census.gov/econ/cbp/
Fruit	County level number of fruit and vegetable markets per capita	NAICS Number:445230	This industry comprises establishments primarily engaged in retailing fresh Fruits and vegetables.	http://www.census.gov/econ/cbp/
Convenience	County level number of convenience stores per capita	NAICS Number:445120	This industry comprises establishments known as Convenience stores or food marts (except those with fuel pumps) primarily engaged in retailing a limited line of Goods that generally includes milk, bread, soda, and snacks.	http://www.census.gov/econ/cbp/
Limited service restaurants	County level number of limited-service restaurants per capita	NAICS Number:722211	This U.S. industry comprises establishments primarily engaged in providing food Services (except snack and nonalcoholic beverage bars) where patrons generally order or select items and pay before eating. Food and drink may be consumed on premises, taken out, or delivered to the customers location. Some establishments in this industry may provide these food Services in combination with selling alcoholic beverages.	http://www.census.gov/econ/cbp/

Table A3: Continuing from Previous Page

Variable	Definition		Explanation*	Source
Full service restaurants	County level number of full-service restaurants per capita	NAICS Number:722110	This industry comprises establishments primarily engaged in providing food Services to patrons who order and are served while seated (i.e, waiter/waitress Services) and pay after eating. These establishments may provide this type of food Services to patrons in combination with selling alcoholic beverages, providing carry out Services, or presenting live nontheatrical entertainment.	http://www.census.gov/econ/cbp/
Museum	County level number of museums per capita	NAICS Number:712110	This industry comprises establishments primarily engaged in the preservation and exhibition of objects of historical, cultural, and/or educational value.	http://www.census.gov/econ/cbp/
Park	County level number of nature parks and similar institutions per capita	NAICS Number:712190	This industry comprises establishments primarily engaged in the preservation and exhibition of natural areas or settings.	http://www.census.gov/econ/cbp/
Zoo	County level number of zoos and botanical gardens per capita	NAICS Number:712130	This industry comprises establishments primarily engaged in the preservation and exhibition of live plant and animal life displays.	http://www.census.gov/econ/cbp/
Fitness	County level of number of fitness and recreational sports centers per capita	NAICS Number:713940	This industry comprises establishments primarily engaged in operating Fitness and recreational sports facilities featuring exercise and other active physical Fitness conditioning or recreational sports activities, such as swimming, skating, or racquet sports.	http://www.census.gov/econ/cbp/

Table A3: Continuing from Previous Page

Variable	Definition		Explanation*	Source
Dentist	County level number of offices of dentists per capita	NAICS Number:621210	This industry comprises establishments of health practitioners having the degree of D.M.D. (Doctor of Dental Medicine), D.D.S. (Doctor of Dental Surgery), or D.D.Sc. (Doctor of Dental Science) primarily engaged in the independent practice of general or specialized Dentistry or dental surgery. These practitioners operate Private or group practices in their own Offices (e.g., centers, clinics) or in the facilities of others, such as hospitals or HMO medical centers. They can provide either comprehensive preventive, cosmetic, or emergency care, or specialize in a single field of Dentistry.	http://www.census.gov/econ/cbp/
Daycare total	State level child day care services per capita	NAICS Number:624410	This industry comprises establishments primarily engaged in providing day care of infants or children. These establishments generally care for preschool children, but may care for older children when they are not in school and may also offer pre-kindergarten educational programs.	http://www.census.gov/econ/cbp/
Office	Office supplies and stationery stores	NAICS Number:453210	This industry comprises establishments primarily engaged in one or more of the following: (1) retailing new stationery, school supplies, and Office supplies; (2) selling a combination of new Office equipment, furniture, and supplies; and (3) selling new Office equipment, furniture, and supplies in combination with selling new computers.	http://www.census.gov/econ/cbp/

Notes: *These explanations are taken from <http://www.census.gov/cgi-bin/sssd/naics/naicsrch>.

APPENDIX B: SUMMARY STATISTICS

Table B1: Summary Statistics for Variables Created from ECLS-B

Variable	Wave1		Wave2		Wave3		Wave4	
	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd
Agechild	10.466	1.874	24.460	1.285	52.852	4.150	61.436	2.738
Agemom	28.342	6.365	29.681	6.360	32.219	6.334	32.711	6.345
Male	0.512	0.500	0.508	0.500	0.507	0.500	0.538	0.499
Black child	0.193	0.395	0.188	0.391	0.190	0.392	0.207	0.406
Hispanic child	0.206	0.405	0.201	0.401	0.207	0.405	0.179	0.384
Urban	0.849	0.358	0.842	0.365	0.834	0.372	0.800	0.400
Region1	0.153	0.360	0.149	0.356	0.144	0.351	0.104	0.305
Region2	0.230	0.421	0.233	0.423	0.226	0.418	0.281	0.450
Region3	0.347	0.476	0.354	0.478	0.357	0.479	0.406	0.491
Region4	0.269	0.444	0.265	0.441	0.274	0.446	0.209	0.407
University degree	0.265	0.441	0.279	0.448	0.302	0.459	0.297	0.457
Sibling	1.030	1.127	1.160	1.140	1.422	1.132	1.545	1.183
Married	0.658	0.474	0.688	0.463	0.704	0.457	0.692	0.462
Hours of work	17.708	19.435	19.020	19.518	21.579	20.029	21.063	20.084
Center based child care hours	2.928	10.211	5.032	12.802	16.355	15.963	15.106	14.869
Home based child care hours	13.254	19.350	11.218	17.981	7.396	14.835	6.034	12.678
Group size center based	0.641	2.295	1.444	3.676	9.245	7.506	9.440	7.632
Group size home based care	1.013	1.716	0.967	1.891	0.313	1.179	0.249	1.049
Full time work	0.310	0.463	0.333	0.471	0.394	0.489	0.380	0.486
Part time work	0.201	0.401	0.215	0.411	0.210	0.407	0.214	0.410
Full time work with child care	0.263	0.440	0.276	0.447	0.364	0.481	0.346	0.476
Full time work without child care	0.047	0.212	0.057	0.232	0.031	0.172	0.034	0.180
Part time work with child care	0.137	0.344	0.142	0.349	0.183	0.387	0.184	0.388
Part time work without child care	0.064	0.244	0.073	0.260	0.026	0.159	0.029	0.168
No work with child care	0.101	0.302	0.076	0.264	0.269	0.443	0.270	0.444

Table B1: Continuing from Previous Page

Variable	Wave1		Wave2		Wave3		Wave4	
	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd
No work without child care	0.388	0.487	0.376	0.484	0.128	0.334	0.137	0.343
Use center based care	0.091	0.288	0.164	0.370	0.712	0.453	0.721	0.449
Use only home based care	0.410	0.492	0.330	0.470	0.104	0.306	0.080	0.271
Full time center based care	0.050	0.217	0.079	0.270	0.163	0.370	0.124	0.330
Part time center based care	0.041	0.199	0.085	0.278	0.548	0.498	0.597	0.491
Full time home based care	0.192	0.394	0.167	0.373	0.081	0.273	0.056	0.231
Part time home based care	0.238	0.426	0.191	0.393	0.219	0.414	0.227	0.419
Home quality index	0.008	0.988	0.007	1.003	-0.018	0.989	-0.059	1.007
Missing home quality	0.004	0.066	0.010	0.098	0.016	0.124	0.017	0.131
In-home child care quality index	0.000	0.000	-0.002	0.283	0.000	0.234	-0.003	0.232
Missing in-home care quality	0.000	0.000	0.003	0.057	0.004	0.064	0.007	0.082
Use in-home care	0.000	0.000	0.083	0.276	0.058	0.234	0.058	0.234
Use out-of-home care	0.000	0.000	0.254	0.435	0.624	0.484	0.644	0.479
Out-of-home child care quality index	0.000	0.000	-0.002	0.497	-0.004	0.758	0.015	0.773
Missing out-of-home care quality	0.000	0.000	0.013	0.113	0.048	0.214	0.047	0.211
Income others	335.460	499.098	363.024	535.067	381.222	591.585	419.804	892.706
Missing income others	0.088	0.283	0.086	0.281	0.106	0.308	0.099	0.298
Hhincomenet	486.377	629.398	530.060	661.303	573.759	728.937	600.098	943.638
Missing hhincomenet	0.016	0.127	0.014	0.118	0.026	0.159	0.022	0.146
N=24550	8900		7950		6050		1600	

Notes: N: total person-year observations Sd: standard deviation. Note: Sample sizes are rounded to the nearest 50 as required by NCES. Only twin restriction is applied for summary statistics.

Table B2: Summary Statistics for Outcome Variables Created from ECLS-B

Variable	Wave1		Wave2		Wave3		Wave4		Wave5	
	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd
Health N=23650	0.865	0.342	0.858	0.349	0.855	0.352	0.859	0.348	0.842	0.365
	8700		8700		7500		5900		1600	
Obesity N=20400	0.042	0.199	0.115	0.319	0.166	0.372	0.157	0.364	0.145	0.352
	7300		7300		6400		5250		1450	
Overweight N=20400	0.122	0.327	0.245	0.430	0.333	0.471	0.324	0.469	0.303	0.460
	7300		7300		6400		5250		1450	
Cognitive achievement score N=20850	0.048	0.984	0.030	0.994	0.036	1.004	0.084	0.983	0.064	0.984
	7900		7900		6200		5300		1500	
Behavior index N=21050	-0.073	0.692	-0.026	0.997	-0.042	0.977	-0.089	0.946	-0.097	0.939
	7850		7850		6500		5250		1450	
Ear infection N=24550	0.340	0.490	0.448	0.497	0.376	0.484	0.215	0.411	0.184	0.387
	8900		8900		7950		6050		1600	
Respiratory illness N=22950	0.146	0.354	0.137	0.343	0.143	0.350	0.088	0.284		
	8900		8900		7950		6050			

Notes: N: total person-year observations. Sd: standard deviation. Respiratory illness question was not asked in wave5. Note: Sample sizes are rounded to the nearest 50 as required by NCES. Only twin restriction is applied for summary statistics.

Table B3: Summary Statistics for State/County-Level Variables

	Wave1		Wave2		Wave3		Wave4	
	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd
Goods*	0.787	0.164	0.757	0.155	0.758	0.147	0.761	0.141
Service*	3.736	0.325	3.714	0.323	3.762	0.312	3.791	0.307
Unemployment rate	5.766	1.547	5.961	1.611	5.143	1.452	4.663	1.432
Poverty	12.228	4.517	12.487	4.267	13.292	5.323	13.405	5.150
Median income*	0.220	0.179	0.228	0.461	0.237	0.479	0.246	0.531
TANF*	0.216	0.179	0.220	0.170	0.203	0.179	0.180	0.176
Mean wage	9.455	1.046	9.399	1.068	9.229	1.094	9.247	1.100
Preschool mean wage	5.778	0.700	5.793	0.746	6.075	1.033	6.094	1.001
Childcare worker mean wage	4.594	0.560	4.514	0.573	4.393	0.576	4.404	0.582
Price of infant care	3414.608	1670.637	3538.177	1462.125	3859.782	1207.855	4123.978	1197.903
Price of preschool care	3003.708	1625.053	3010.962	1359.773	3103.158	907.728	3244.624	767.184
Public2year	1027.211	386.463	1061.611	396.426	1112.717	412.649	1115.475	432.759
Public4year	2440.256	691.220	2553.748	720.695	2760.211	785.626	2841.167	829.619
Private4year	9596.923	2203.004	9903.853	2304.057	10403.230	2468.528	10641.400	2507.874
Center total	0.399	0.135	0.407	0.138	0.373	0.189	0.393	0.383
Family total	1.063	0.639	1.040	0.665	0.718	0.608	0.751	0.541
Daycare total	0.430	6.769	0.462	7.363	0.625	14.216	0.683	15.159
Male female ratio	0.946	0.067	0.947	0.068	0.952	0.070	0.954	0.071
short-term child wellness hospitals	0.003	0.008	0.003	0.008	0.003	0.011	0.003	0.011
Total number of hospitals	0.022	0.026	0.022	0.027	0.023	0.028	0.023	0.030
Short-term hospitals with nutrition programs	0.011	0.015	0.011	0.017	0.011	0.017	0.011	0.015
Short-term child psychiatric hospitals	0.004	0.025	0.005	0.034	0.003	0.031	0.004	0.030
Long-term child psychiatric hospitals	0.012	0.074	0.014	0.082	0.010	0.072	0.008	0.062
Short-term hospitals with child/adolescence service	0.003	0.006	0.003	0.006	0.002	0.006	0.002	0.006

Table B3: Continuing from Previous Page

	Wave1		Wave2		Wave3		Wave4	
	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd
Office	0.864	4.556	0.899	4.516	1.055	5.291	1.058	5.589
Zoo	0.101	0.279	0.112	0.297	0.126	0.349	0.128	0.364
Museum	0.448	1.716	0.480	1.835	0.523	1.977	0.521	2.124
Convenience	0.517	6.198	0.559	5.864	0.552	5.831	0.592	6.196
Fitness	0.762	7.265	0.939	8.624	1.156	11.216	1.299	12.529
Full service restaurants	0.699	0.291	0.722	2.244	0.714	0.293	0.722	0.298
Limited service restaurants	0.924	17.969	1.081	21.358	1.544	39.143	1.207	25.564
Fruit	0.437	1.844	0.415	1.659	0.412	1.778	0.416	1.886
Dentist	1.423	26.062	1.601	28.151	1.681	33.113	1.944	38.004
Park	0.107	0.312	0.108	0.318	0.119	0.342	0.138	0.398
Grocery	0.233	1.550	0.247	1.755	0.243	1.800	0.244	2.000
Pct95 precipitation	158.875	102.806	172.691	100.713	158.221	125.621	176.495	102.528
Std of snow fall	6.431	10.040	7.525	13.565	5.017	9.261	7.125	10.936
Std of precipitation level	85.817	118.823	92.746	123.854	91.813	70.211	104.626	174.879
N	10700		9850		8950		7000	

Notes: N: total person-year observations. Sd: standard deviation. No sample size restrictions applied for these summary statistics.

APPENDIX C: VARIABLES USED IN QUALITY INDICES

Table C1: Description of Variables used in the Home Quality Index

Wave1				
Variable	Description	Mean	Sd	N
How often read to child?	2	2.697	1.034	9750
How often tell child stories?	2	2.472	1.111	9750
How often sing song?	2	3.582	0.764	9750
How often take child on errands?	2	3.356	0.877	9750
How often play peekaboo?	1	4.954	1.226	9750
How often tickle child?	1	5.719	0.671	9750
How often outside play or walk?	1	4.182	1.389	9750
Put child bed with bottle?	Yes/No	1.685	0.465	9750
Content of the bottle is juice	Yes/No	0.989	0.104	9750
Wave2				
Variable	Description	Mean	Sd	N
Has library card?	Yes/No	1.626	0.484	8750
Use library to borrow books?	Yes/No	1.241	0.428	8750
Use library to borrow video?	Yes/No	1.195	0.396	8750
Use library to get info?	Yes/No	1.119	0.324	8750
Take child to story hour?	Yes/No	1.121	0.326	8750
Go to Zoo with child?	Yes/No	1.302	0.459	8750
Visit art gallery?	Yes/No	1.137	0.344	8750
Visit library?	Yes/No	1.301	0.459	8750
How often read newspapers?	3	2.672	1.130	8750
Number of soft toys		22.505	26.023	8750
Number of children books		45.957	46.883	8750
Number of records		11.376	17.985	8750
Talk to child while working at home?	4	4.427	0.824	8750
How often read to child?	2	3.115	0.905	8750
How often tell child stories?	2	2.662	1.036	8750
How often take child on errands?	2	3.404	0.797	8750
How often play chasing game?	1	4.668	1.199	8750
Express affection with hugs?	5	4.841	0.425	8750
Easy going?	5	4.151	0.837	8750
How often play games indoor?	1	5.257	0.934	8750
How often outside play or walk?	1	4.384	1.261	8750
Content of the bottle is juice?	Yes/No	0.982	0.131	8750
Add sweetener to bottle?	Yes/No	0.983	0.128	8750
Put child bed with bottle?	Yes/No	1.790	0.407	8750

Table C1: Continuing from Previous Page

Wave2				
Variable	Description	Mean	Sd	N
Beverage child drinks with meals-juice?	Yes/No	1.474	0.499	8750
Beverage child drinks with meals-Fruit drink?	Yes/No	1.863	0.343	8750
Beverage child drinks with meals-soda?	Yes/No	1.937	0.242	8750
Beverage child drinks with meals-coffee/tea?	Yes/No	1.980	0.139	8750
Beverage child drinks with meals-nodrink?	Yes/No	1.004	0.061	8750
Beverage child drinks with snack-Fruit drink?	Yes/No	1.876	0.330	8750
Beverage child drinks with snack-soda?	Yes/No	1.945	0.228	8750
Beverage child drinks with snack-coffee/tea?	Yes/No	1.985	0.122	8750
Beverage child drinks with meals-milk?	Yes/No	1.523	0.499	8750
Beverage child drinks with meals-water?	Yes/No	1.386	0.487	8750
Beverage child drinks with snack-water?	Yes/No	1.468	0.499	8750
Number of days eat breakfast as family		4.665	2.468	8750
Number of days eat dinner as family		5.972	1.791	8750
Number of days eat at regular time		5.449	2.164	8750
Wave3				
Variable	Description	Mean	Sd	N
Milk type is whole milk or 2%	Yes/No	0.189	0.392	7750
How much drank soda in past 7 days?	6	3.313	2.282	7750
How much fast food in past 7 days?	6	2.488	2.236	7750
Has smoke detector?	4	3.767	0.699	7750
Number of days family eat dinner together		5.543	1.867	7750
Number of days eat at regular time		4.915	2.170	7750
Number of children books		69.168	88.366	7750
How often read to child?	2	3.076	0.861	7750
How often tell child stories?	2	2.681	0.922	7750
How often sing song?	2	3.217	0.896	7750
TV hours on weekdays		-2.216	2.330	7750
Participated in athletic activities?	Yes/No	1.304	0.460	7750
Participated in dance lessons?	Yes/No	1.134	0.341	7750
Participated in music lessons?	Yes/No	1.069	0.254	7750
Participated in drama classes?	Yes/No	1.011	0.104	7750
Participated in art classes?	Yes/No	1.085	0.278	7750
Participated in performing arts?	Yes/No	1.134	0.341	7750
Participated in crafts classes?	Yes/No	1.097	0.297	7750
Visit library?	Yes/No	1.408	0.492	7750
Have computer at home?	Yes/No	1.599	0.490	7750
How often play together?	1	3.888	1.311	7750
How often prepare meals?	1	5.319	1.151	7750

Table C1: Continuing from Previous Page

Wave3				
Variable	Description	Mean	Sd	N
How often help to bed?	1	5.005	0.904	7750
How often help child bathe?	1	4.669	0.985	7750
How often go outside to play?	1	4.363	1.055	7750
How often get help dressed?	1	4.465	1.484	7750
How often help brush teeth?	1	4.633	1.555	7750
How often take child to religious Services?	1	2.616	1.125	7750
Express affection with hugs?	5	4.727	0.542	7750
Easy going?	5	3.968	0.804	7750
Wave4				
Variable	Description	Mean	Sd	N
Milk type is whole milk or 2%	Yes/No	0.200	0.400	6000
How much drank soda in past 7 days?	6	3.243	2.311	6000
Number of days eat breakfast as family		5.620	1.811	6000
Number of days eat at regular time		4.976	2.117	6000
Has smoke detector?	4	3.841	0.607	6000
Participated in athletic activities?	Yes/No	1.423	0.494	6000
Participated in dance lessons?	Yes/No	1.161	0.368	6000
Participated in music lessons?	Yes/No	1.091	0.287	6000
Participated in drama classes?	Yes/No	1.019	0.137	6000
Participated in art classes?	Yes/No	1.104	0.305	6000
Participated in performing arts?	Yes/No	1.183	0.387	6000
Participated in crafts classes?	Yes/No	1.107	0.309	6000
TV hours on weekdays		-1.983	2.163	6000
Number of children books		79.250	97.299	6000
How often read to child?	2	3.120	0.836	6000
How often tell child stories?	2	2.600	0.900	6000
How often sing song?	2	2.987	0.950	6000
Talk about books you read to child?	2	2.930	0.884	6000
Have computer at home?	Yes/No	1.670	0.470	6000

Notes: 1= 1: more than once a day 2: about once a day 2: a few Times a week 4: a few Times a month 5: rarely 6: not at all.

2= 1: not at all 2: once or twice 3:3 to 6 Times 4: every day

3= 1: almost every day 2: at least once a week 3: at least once a month 4: hardly ever

4= 1: never 2: rarely 3: sometimes 4: ten 5: always

5= 1: exactly much like 2: very much like 3: somewhat like 4: not much like 5: not at all like

6= 0 1:1 time per day 2:2 Times per day 3:3 Times per day 4:4 or more Times per day

5:1 to 3 Times during the past 7 days 6:4 to 6 Times during the past 7 days

Some of the variables such as TV hours are multiplied by -1 or recoded in order to get positive loadings for all of the variables in factor analysis. That is, increase in these variables will have positive impact on the principal component. Note: Sample sizes (N) are rounded to the nearest 50 as required by NCES.

Sd: standard deviation. Only twin restriction is applied for these summary statistics.

Table C2: Description of Variables used in the In-home child care quality index

Wave2				
Variable	Description	Mean	Sd	N
Health status of the child caregiver	11	3.744	1.076	700
TV hours		-1.979	1.632	700
Times walk, play outside?	1	4.508	1.312	700
Visited art gallery?	Yes/No	1.090	0.286	700
Visited library?	Yes/No	1.207	0.405	700
Visited Zoo?	Yes/No	1.175	0.380	700
Play chasing game?	1	4.222	1.533	700
Member of early education organization?	Yes/No	1.024	0.152	700
How often talk to child?	2	3.717	0.541	700
How often read books to child?	2	3.077	1.031	700
How often tell child stories?	2	2.719	1.132	700
How often sing song?	2	3.266	1.004	700
How often ask questions about stories?	2	2.490	1.225	700
Education level of caregiver	*	12.965	3.994	700
Caregiver smokes?	Yes/No	1.787	0.409	700
Caregiver smokes near child?	Yes/No	1.783	0.412	700
Allows child w/ cough?	Yes/No	1.677	0.468	700
Allows child w/rash?	Yes/No	1.793	0.405	700
Allows feverish children?	Yes/No	1.883	0.322	700
Caregiver administers otc medicines?	Yes/No	1.817	0.387	700
Caregiver administers prescription medicines?	Yes/No	1.951	0.216	700
Wave3				
Variable	Description	Mean	Sd	N
TV hours		-2.109	1.596	450
Health status of the child caregiver	11	3.561	1.107	450
How often emergency number kept by phone?	3	3.421	1.094	450
How often cover all electrical outlets?	3	2.903	1.211	450
Caregiver smokes near child?	Yes/No	1.903	0.297	450
Times walk/play outside?	4	3.247	0.830	450
Times go to public places?	4	1.439	0.720	450
Number of times/per week visit library		0.934	1.866	450
Number of times/per week read books to child		3.921	3.085	450
Number of times/per week tell story to child		3.468	2.991	450
Number of times/per week sing song to child		4.891	5.895	450
Number of times/per week play game		3.633	3.477	450
Number of times/per week build something		2.652	2.720	450
Adult directed individual activities?	5	2.842	1.268	450
Child selected activities?	5	3.425	1.276	450

Table C2: Continuing from Previous Page

Wave3				
Variable	Description	Mean	Std	N
How often learn letter names?	6	3.271	1.605	450
How often practice writing?	6	2.962	1.663	450
How often discuss new words?	6	3.208	1.736	450
How often tell stories?	6	3.195	1.774	450
How often see print while reading?	6	3.147	1.724	450
How often read and see no print?	6	1.690	1.838	450
How often retell stories?	6	2.577	1.765	450
How often learn conventions of prints?	6	2.188	1.951	450
How often write own name?	6	2.821	1.897	450
How often learn about rhyme?	6	1.835	1.775	450
How often count out loud?	6	3.887	1.454	450
How often use geometric manipulative?	6	2.572	1.728	450
How often use counting manipulative?	6	2.038	1.823	450
How often play math games?	6	1.756	1.732	450
How often music w/ math?	6	1.075	1.574	450
How often use creative movement w/ math?	6	1.000	1.574	450
How often use rulers?	6	1.428	1.578	450
How often calendar activities?	6	1.387	1.710	450
How often telling time activity?	6	1.853	1.873	450
How often shapes/patterns activities?	6	2.570	1.745	450
Caregiver education level	*	12.946	4.049	450
Coursework specific to children under 5?	Yes/No	1.262	0.440	450
Caregiver has child development association credential?	Yes/No	1.034	0.181	450
Caregiver has other state credentials?	Yes/No	1.063	0.244	450
How often work on phonics?	6	2.842	1.851	450
Wave4				
Variable	Description	Mean	Sd	N
Creative arts?	7	3.779	1.759	100
Construction w/ blocks?	7	4.052	1.776	100
Science activities?	7	2.532	1.736	100
Board or card games?	7	4.286	1.645	100
Reading independently?	7	4.701	1.850	100
Being read to?	7	5.065	1.507	100
Creative writing?	7	3.961	2.112	100
Computer games?	7	4.117	2.000	100

Table C2: Continuing from Previous Page

Wave4				
Variable	Description	Mean	Sd	N
Dress up play?	7	3.636	1.863	100
Watch TV?	7	5.649	0.984	100
Watch video?	7	5.026	1.478	100
Cooking or food preparation?	7	3.701	2.007	100
Dramatic play?	7	3.688	2.047	100
Role play?	7	3.623	1.777	100
Musical activities?	7	4.753	1.615	100
Movement dance?	7	4.688	1.830	100
Music making?	7	4.429	1.788	100
Unstructured physical play?	7	4.805	1.747	100
Filed trips?	7	3.494	1.553	100
Socializing?	7	4.857	1.760	100
Tutoring?	7	3.805	2.078	100
Free time?	7	5.494	1.334	100
Times/per week read book to child?		3.429	2.593	100
Times/per week tell story to child?		2.922	1.897	100
Times/per week sing to child?		3.766	3.375	100
Times/per week play games?		3.078	2.293	100
Times/per week build something?		2.377	2.177	100
Number of Times visit library		0.740	1.689	100
TV hours		-2.156	1.647	100
How often learn letter names?	8	3.545	1.303	100
How often practice writing?	8	3.364	1.266	100
How often tell child stories?	8	3.390	1.461	100
How often see print while reading?	8	3.558	1.400	100
How often read and see no print?	8	2.377	1.487	100
How often retell stories?	8	2.948	1.503	100
How often write own name?	8	3.519	1.501	100
How often learn about rhyme?	8	2.610	1.540	100
How often discuss new words?	8	3.766	1.317	100
How often work on phonics?	8	2.974	1.614	100
How often learn conventions of prints?	8	2.805	1.598	100
How often count out loud?	8	4.221	1.071	100
How often use geometric manipulative?	8	2.805	1.433	100
How often use counting manipulative?	8	2.753	1.506	100

Table C2: Continuing from Previous Page

Wave4				
Variable	Description	Mean	Sd	N
How often play math games?	8	2.442	1.419	100
How often music w/ math?	8	1.883	1.267	100
How often use creative movement w/ math?	8	1.831	1.292	100
How often use rulers?	8	2.143	1.305	100
How often calendar activities?	8	2.481	1.501	100
How often telling time activity?	8	2.532	1.578	100
How often shapes/patterns activities?	8	3.052	1.547	100
Minutes for lunch?		26.104	15.657	100
Minutes for indoor play?		119.130	96.602	100
Minutes for play outdoor?		78.792	74.124	100
education level of caregiver	*	13.597	3.697	100
Wave4				
Variable (Before and After School)	Description	Mean	Sd	N
TV hours		-2.411	8.716	350
Creative arts?	7	4.330	1.806	350
Construction w/ blocks?	7	3.994	1.927	350
Science activities?	7	2.377	1.717	350
Board or card games?	7	4.679	1.518	350
Reading independently?	7	4.924	1.620	350
Creative writing?	7	3.882	2.051	350
Computer games?	7	3.645	2.132	350
Watch TV?	7	4.479	1.823	350
Cooking or food preparation?	7	3.941	2.000	350
Dress up play?	7	3.301	2.027	350
Role play?	7	3.915	1.954	350
Movement dance?	7	4.563	1.834	350
Music making?	7	4.501	1.863	350
Unstructured physical play?	7	4.411	1.897	350
Filed trips?	7	2.777	1.540	350
Socializing?	7	4.448	1.907	350
Tutoring?	7	3.854	2.142	350
Free time?	7	5.617	1.081	350
Times/per week read book to child?		3.408	2.580	350

Table C2: Continuing from Previous Page

Wave4 (Before and After School)				
Variable	Description	Mean	Sd	N
Times/per week tell story to child?		3.332	3.975	350
Times/per week sing to child?		3.707	3.276	350
Times/per week play games?		3.586	2.514	350
Times/per week build something?		2.149	2.320	350
Number of times visit library		0.623	1.567	350
Education level of caregiver	*	12.718	4.053	350
Recreational activities?	yes/no	1.780	0.415	350
Remedial help?	yes/no	1.501	0.501	350
Substance abuse prevention?	yes/no	1.696	0.461	350
Provide home environment?	yes/no	1.980	0.139	350

Notes: Sample sizes (N) are rounded to the nearest 50 as required by NCES. Some of the variables such as TV hours are multiplied by -1 or recoded in order to get positive loadings for all of the variables in factor analysis. That is, increase in these variables will have positive impact on the principal component. Sd: standard deviation. Only twin restriction is applied for these summary statistics.

Center: Center based care, Homebased: Home based care, Before and After School: child care provided before and/or after school, Inhome: in-home child care, Outhome: out-of-home child care.

1= 1: more than once a day 2: about once a day 2: a few times a week 4: a few times a month 5: rarely 6: not at all

2= 1: not at all 2: once or twice 3: 3 to 6 times 4: every day

3= 1: always 2: most of the time 3: sometimes 4: never

4= 1: once a day or more 2: few times a week 3: few times a month 4: rarely/not at all

5= 1: spend no time 2: half an hour or less 3: bout one hour 4: about two hours 5: three hours or more

6= 1: never 2: about once a month or less 3: two or three times a month 4: once or twice a week 5: three of four times a week 6: everyday

7= 1: daily 2: weekly 3: monthly 4: occasionally 5: as needed 6: never

8= 1: about once a month or less 2: two or three times a month 3: once or twice a week 4: three of four times a week 5: everyday

11= 1: excellent 2: very good 3: good 4: fair 5: poor

*0: no formal schooling 1: 1st grade 2: 2nd grade 3: 3rd grade 4: 4th grade 5: 5th grade 6: 6th grade 7: 7th grade

8: 8th grade 9: 9th grade 10: 10th grade 11: 11th grade 12: 12th grade but no diploma 13: high school diploma

14: Voc/tec program after high school but no diploma 15: Voc/tec diploma after high school

16: Some college but no degree

17: Associate's degree

18: Bachelor's degree 19: graduate or prof. school but no diploma 20: Master's degree

Table C3: Description of Variables used in the Out-of-home Child Care Quality Index

Wave2				
Variable (Center)	Description	Mean	Sd	N
Number of records		21.020	28.420	900
Number of soft toys		18.165	24.879	900
How often talk to child?	9	3.494	0.644	900
Hours of sleep		1.852	0.754	900
How often read books to child?	2	3.854	0.466	900
How often tell child stories?	2	3.543	0.830	900
How often sing song?	2	3.869	0.447	900
How often ask questions about stories?	2	3.055	0.908	900
Play chasing game?	1	4.026	1.406	900
Education level of the caregiver	*	15.145	2.248	900
TV hours		-0.232	0.558	900
Times walk,play outside?	1	5.179	1.126	900
Visited art gallery?	Yes/No	1.028	0.166	900
Visited Zoo?	Yes/No	1.040	0.197	900
Visited library?	Yes/No	1.083	0.276	900
Physical screening provided?	Yes/No	1.156	0.363	900
Dental screening provided?	Yes/No	1.128	0.334	900
Hearing screening provided?	Yes/No	1.338	0.473	900
Vision screening provided?	Yes/No	1.322	0.468	900
Speech screening provided?	Yes/No	1.355	0.479	900
Provides developmental assesment?	Yes/No	1.645	0.479	900
Provides Behavior assesment?	Yes/No	1.671	0.470	900
Has sick area for isolation?	Yes/No	1.901	0.299	900
Caregiver administers prescription medicines?	Yes/No	1.916	0.278	900
Wave2				
Variable (Homebased)	Description	Mean	Sd	N
Number of records		14.747	27.238	1200
Number of soft toys		21.104	24.298	1200
Number of pull toys		9.264	14.662	1200
How often talk to child?	9	3.623	0.561	1200
How often read books to child?	2	3.283	0.969	1200
How often tell child stories?	2	2.833	1.133	1200
How often sing song?	2	3.454	0.880	1200
How often ask questions about stories?	2	2.556	1.181	1200
Play chasing game?	1	4.062	1.511	1200
How often have working smoke detector?	9	3.887	0.555	1200
How often have 1st aid kit available?	9	3.784	0.729	1200

Table C3: Continuing from Previous Page

Wave2				
Variable (Homebased)	Description	Mean	Sd	N
How often emergency number kept by phone?	9	3.596	0.971	1200
How often cover all electrical outlets?	9	3.436	1.070	1200
TV hours		-1.474	1.301	1200
Times walk, play outside?	1	4.726	1.232	1200
Visited art gallery?	Yes/No	1.046	0.209	1200
Visited Zoo?	Yes/No	1.119	0.324	1200
Visited library?	Yes/No	1.150	0.357	1200
Allows child w/rash?	Yes/No	1.584	0.493	1200
Caregiver administers otc medicines?	Yes/No	1.858	0.349	1200
Wave3				
Variable (Center)	Description	Mean	Sd	N
Physical screening provided?	Yes/No	1.360	0.480	3950
Dental screening provided?	Yes/No	1.340	0.474	3950
Hearing screening provided?	Yes/No	1.615	0.487	3950
Vision screening provided?	Yes/No	1.625	0.484	3950
Speech screening provided?	Yes/No	1.683	0.465	3950
Provides developmental assessment?	Yes/No	1.780	0.414	3950
Provides Behavior assessment?	Yes/No	1.795	0.404	3950
Has sick area for isolation?	Yes/No	1.177	0.382	3950
Number of books		112.301	169.863	3950
Reading area?	Yes/No	1.993	0.081	3950
Listening center?	Yes/No	1.705	0.456	3950
Writing center?	Yes/No	1.945	0.228	3950
Pocket chart or flannel board?	Yes/No	1.809	0.393	3950
Math area?	Yes/No	1.955	0.207	3950
Area for puzzles?	Yes/No	1.994	0.076	3950
Water table?	Yes/No	1.828	0.377	3950
Dramatic play area?	Yes/No	1.917	0.276	3950
Art area?	Yes/No	1.971	0.169	3950
Private area?	Yes/No	1.693	0.461	3950
Follow a curriculum?	Yes/No	1.859	0.348	3950
Child selected activities?	5	3.174	0.992	3950
How often learn letter names?	6	4.352	1.126	3950
How often discuss new words?	6	4.178	1.149	3950
How often tell stories?	6	3.685	1.393	3950
How often see print while reading?	6	4.337	1.118	3950

Table C3: Continuing from Previous Page

Wave3				
Variable (Center)	Description	Mean	Sd	N
How often retell stories?	6	3.262	1.405	3950
How often learn conventions of prints?	6	3.827	1.558	3950
How often write own name?	6	4.252	1.252	3950
How often count out loud?	6	4.729	0.679	3950
How often use counting manipul?	6	3.879	1.367	3950
How often play math games?	6	3.569	1.317	3950
How often use creative movement w/ math?	6	2.577	1.703	3950
How often use rulers?	6	2.771	1.624	3950
How often calender acitivities?	6	4.378	1.348	3950
How often telling time activity?	6	2.409	1.962	3950
How often shapes/patterns activities?	6	4.172	1.089	3950
Coursework specific to children under 5?	Yes/No	1.960	0.196	3950
How often work on phonics?	6	4.272	1.137	3950
Wave 3				
Variable (Homebased)	Description	Mean	Sd	N
Health status of the caregiver	11	3.861	1.021	750
How often have 1st aid kit available?	10	3.817	0.677	750
How often emergency number kept by phone?	10	3.568	0.995	750
How often cover all electrical outlets?	10	3.294	1.147	750
Caregiver smokes near child?	Yes/No	1.944	0.229	750
TV hours		-1.598	1.388	750
Number of books		71.740	117.768	750
Times walk,play outside?	1	3.289	0.893	750
Go to Public places?	1	1.382	0.664	750
Number of times visit library		0.622	1.566	750
Number of times/per week read books to child		4.113	3.262	750
Number of times/per week tell stories to child		3.488	3.803	750
Number of times/per week sing songs to child		5.115	6.098	750
Number of times/per week play games		3.662	3.489	750
Number of times/per week build something		3.064	3.303	750
How often learn letter names?	6	3.489	1.544	750
How often practice writing?	6	2.907	1.685	750
How often discuss new words?	6	3.153	1.712	750
How often tell stories?	6	3.312	1.670	750
How often see print while reading?	6	3.411	1.678	750
How often retell stories?	6	2.737	1.706	750

Table C3: Continuing from Previous Page

Wave3				
Variable (Homebased)	Description	Mean	Sd	N
How often learn conventions of prints?	6	2.410	1.985	750
How often write own name?	6	2.910	1.895	750
How often rhyme activities?	6	2.159	1.803	750
How often count out loud?	6	4.037	1.348	750
How often use geometric manipulative?	6	2.866	1.793	750
How often use counting manipulative?	6	2.389	1.920	750
How often play math games?	6	2.049	1.744	750
How often music w/ math?	6	1.249	1.672	750
How often use creative movement w/ math?	6	1.150	1.607	750
How often use rulers?	6	1.495	1.564	750
How often calendar activities?	6	1.926	1.971	750
How often telling time activity?	6	1.889	1.889	750
How often shapes/patterns activities?	6	2.826	1.767	750
Education level of the caregiver	*	13.877	3.575	750
Coursework specific to children under 5?	Yes/No	1.459	0.499	750
Caregiver has child development association credential?	Yes/No	1.074	0.262	750
Caregiver has other state credentials?	Yes/No	1.121	0.326	750
How often work on phonics?	6	3.184	1.780	750
Wave4				
Variable (Center)	Description	Mean	Sd	N
Physical screening provided?	Yes/No	1.347	0.476	900
Dental screening provided?	Yes/No	1.353	0.478	900
Hearing screening provided?	Yes/No	1.674	0.469	900
Vision screening provided?	Yes/No	1.680	0.467	900
Speech screening provided?	Yes/No	1.734	0.442	900
Provides developmental assessment?	Yes/No	1.822	0.382	900
Provides Behavior assessment?	Yes/No	1.835	0.372	900
Have computer?	Yes/No	1.716	0.451	900
Reading area?	Yes/No	1.993	0.082	900
Listening center?	Yes/No	1.781	0.414	900
Writing center?	Yes/No	1.979	0.144	900
Blocks or construction area?	Yes/No	1.984	0.124	900
Math area?	Yes/No	1.955	0.207	900
Area for puzzles?	Yes/No	1.993	0.082	900
Water table?	Yes/No	1.798	0.402	900
Dramatic play area?	Yes/No	1.936	0.244	900
Art area?	Yes/No	1.977	0.151	900

Table C3: Continuing from Previous Page

Wave4				
Variable (Center)	Description	Mean	Sd	N
How often read books to child?	2	6.891	4.674	900
How often tell child stories?	2	4.825	3.778	900
How often sing song?	2	7.237	6.610	900
How often play games?	2	4.636	3.275	900
How often build something?	2	3.829	2.756	900
How often learn letter names?	8	4.627	0.784	900
How often practice writing?	8	4.105	1.123	900
How often tell stories to caregiver?	8	3.804	1.228	900
How often see print while reading?	8	4.472	0.970	900
How often retell stories?	8	3.438	1.228	900
How often write own name?	8	4.590	0.875	900
How often learn about rhyme?	8	3.482	1.249	900
How often discuss new words?	8	4.427	0.898	900
How often work on phonics?	8	4.230	1.151	900
How often learn conventions of prints?	8	4.183	1.193	900
How often count out loud?	8	4.849	0.510	900
How often geometric manipulative?	8	4.217	1.064	900
How often use counting manipulative?	8	4.198	1.038	900
How often play math games?	8	3.779	1.151	900
How often music w/ math?	8	3.070	1.427	900
How often use creative movement w/ math?	8	2.779	1.450	900
How often use rulers?	8	2.899	1.374	900
How often calendar activities?	8	4.582	1.079	900
How often telling time activity?	8	2.959	1.655	900
How often shapes/patterns activities?	8	4.349	0.975	900
Minutes for lunch?		24.372	15.486	900
Minutes for indoor play?		59.672	47.801	900
Minutes for play outdoor?		39.906	25.691	900
Wave4				
Variable (Center, Before and After School)	Description	Mean	Sd	N
Number of books		75.177	116.101	100
Have a computer?	Yes/No	1.452	0.500	100
Construction w/ blocks?	7	4.645	1.664	100
Science activities?	7	2.911	1.628	100
Board or card games?	7	5.065	1.299	100
Reading independently?	7	4.815	1.769	100
Being read to?	7	5.185	1.399	100

Table C3: Continuing from Previous Page

Wave4				
Variable (Center, Before and After School)	Description	Mean	Sd	N
Creative writing?	7	3.766	2.021	100
Computer games?	7	3.202	2.064	100
Watch TV?	7	4.815	1.684	100
Watch video?	7	4.274	1.722	100
Cooking or food preparation?	7	3.806	1.907	100
Dramatic play?	7	3.935	1.954	100
Dress up play?	7	4.210	1.800	100
Role play?	7	4.065	1.743	100
Musical activities?	7	5.048	1.367	100
Movement dance?	7	5.089	1.437	100
Music making?	7	4.556	1.630	100
Unstructured physical play?	7	4.968	1.643	100
Filed trips?	7	3.073	1.466	100
Socializing?	7	5.161	1.505	100
Tutoring?	7	3.444	2.037	100
Free time?	7	5.524	1.213	100
How often read books to child?	2	3.806	2.867	100
How often tell child stories?	2	3.008	2.225	100
How often sing song?	2	3.710	2.819	100
How often play games?	2	3.161	1.956	100
How often build something?	2	2.774	2.518	100
Number of times visit library		0.524	1.193	100
How often learn letter names?	8	3.726	1.309	100
How often practice writing?	8	3.435	1.369	100
How often tell stories to caregiver?	8	3.500	1.382	100
How often see print while reading?	8	3.758	1.364	100
How often read and see no print?	8	2.484	1.580	100
How often retell stories?	8	2.935	1.430	100
How often write own name?	8	3.798	1.379	100
How often learn about rhyme?	8	2.629	1.517	100
How often discuss new words?	8	3.419	1.397	100
How often work on phonics?	8	3.024	1.580	100
How often learn conventions of prints?	8	2.839	1.655	100

Table C3: Continuing from Previous Page

Wave4				
Variable (Center, Before and After School)	Description	Mean	Sd	N
How often count out loud?	8	4.202	1.196	100
How often geometric manipulative?	8	3.056	1.427	100
How often use counting manipulative?	8	2.815	1.439	100
How often play math games?	8	2.500	1.359	100
How often use rulers?	8	2.032	1.161	100
How often calendar activities?	8	2.661	1.701	100
How often telling time activity?	8	2.468	1.580	100
How often shapes/patterns activities?	8	3.194	1.424	100
education level of the caregiver	8	13.855	3.263	100
How often use creative movement w/ math?	8	1.742	1.255	100
How often music w/ math?	*	1.944	1.345	100
Wave4				
Variable (Homebased)	Description	Mean	Sd	N
Physical screening provided?	Yes/No	1.093	0.291	550
Dental screening provided?	Yes/No	1.083	0.277	550
Hearing screening provided?	Yes/No	1.152	0.359	550
Vision screening provided?	Yes/No	1.169	0.375	550
Speech screening provided?	Yes/No	1.186	0.389	550
Provides developmental assessment?	Yes/No	1.277	0.448	550
Provides Behavior assessment?	Yes/No	1.381	0.486	550
Number of books		119.362	185.749	550
Have computer?	Yes/No	1.560	0.497	550
Creative arts?	7	5.239	1.273	550
Construction w/ blocks?	7	5.474	1.257	550
Science activities?	7	3.865	1.731	550
Board or card games?	7	5.670	0.846	550
Reading independently?	7	5.537	1.146	550
Creative writing?	7	4.347	1.894	550
Computer games?	7	3.750	2.174	550
Cooking or food preparation?	7	2.844	1.728	550
Dress up play?	7	4.378	1.954	550
Role play?	7	4.533	1.677	550
Movement dance?	7	5.336	1.195	550
Music making?	7	4.583	1.615	550
Unstructured physical play?	7	5.459	1.273	550
Filed trips?	7	2.398	1.295	550
Socializing?	7	5.926	0.482	550
Tutoring?	7	3.884	2.210	550

Table C3: Continuing from Previous Page

Wave4				
Variable (Homebased)	Description	Mean	Sd	N
Free time?	7	5.852	0.656	550
How often read books to child?	2	4.393	4.257	550
How often tell child stories?	2	3.294	3.447	550
How often sing song?	2	3.298	4.213	550
How often play games?	2	4.750	4.406	550
How often build something?	2	3.753	3.488	550
Number of times visit library		0.843	2.399	550
TV hours		-2.939	15.808	550
Education level of the caregiver	*	16.662	2.222	550
Improve academic skills?	Yes/No	1.869	0.338	550
Provide home environment?	Yes/No	1.850	0.357	550
Wave4				
Variable (Homebased, Before and After School)	Description	Mean	Sd	N
Have a computer?	yes/no	1.495	0.501	400
Creative arts?	7	4.191	1.909	400
Construction w/ blocks?	7	4.134	1.956	400
Science activities?	7	2.580	1.688	400
Board or card games?	7	4.814	1.505	400
Reading independently?	7	4.887	1.748	400
Creative writing?	7	3.923	2.114	400
Computer games?	7	3.402	2.148	400
Watch TV?	7	4.933	1.651	400
Watch video?	7	4.206	1.804	400
Cooking or food preparation?	7	3.642	2.042	400
Dress up play?	7	3.518	2.034	400
Role play?	7	4.082	1.946	400
Movement dance?	7	4.711	1.771	400
Music making?	7	4.418	1.887	400
Unstructured physical play?	7	4.515	1.879	400
Filed trips?	7	2.652	1.598	400
Socializing?	7	4.884	1.756	400
Tutoring?	7	3.649	2.169	400
Free time?	7	5.668	0.951	400
Number of times/per week read books to child		3.137	2.603	400
Number of times/per week sing song		3.629	3.636	400
Number of times/per week tell child stories		2.820	2.353	400

Table C3: Continuing from Previous Page

Wave4				
Variable (Homebased, Before and After School)	Description	Mean	Sd	N
Number of times/per week play games		3.216	2.901	400
Number of times/per week build something		2.147	2.542	400
Number of times visit library		0.495	1.551	400
Education level of the caregiver	*	13.420	3.672	400
Provide safe environment?	yes/no	1.985	0.124	400
Recreational activities?	yes/no	1.807	0.395	400
Improve academic skills?	yes/no	1.747	0.435	400
Cultural opportunities?	yes/no	1.631	0.483	400
Remedial help?	yes/no	1.492	0.501	400
Substance abuse prevention?	yes/no	1.619	0.486	400
Provide home environment?	yes/no	1.982	0.133	400

Notes: Sample sizes (N) are rounded to the nearest 50 as required by NCES. Some of the variables such as TV hours are multiplied by -1 or recoded in order to get positive loadings for all of the variables in factor analysis. That is, increase in these variables will have positive impact on the principal component. Sd: standard deviation. Only twin restriction is applied for these summary statistics.

Center: Center based care, Homebased: Home based care, Before and After School: child care provided before and/or after school, Inhome: in-home child care, Outhome: out-of-home child care.

1= 1: more than once a day 2: about once a day 2: a few times a week 4: a few times a month 5: rarely 6: not at all

2= 1: not at all 2: once or twice 3:3 to 6 times 4: every day

3= 1: always 2: most of the time 3: sometimes 4: never

4= 1: once a day or more 2: few times a week 3: few times a month 4: rarely/not at all

5= 1: spend no time 2: half an hour or less 3: bout one hour 4: about two hours 5: three hours or more

6= 1: never 2: about once a month or less 3: two or three times a month 4: once or twice a week 5: three of four times a week 6:everyday

7= 1: daily 2: weekly 3: monthly 4: occasionally 5: as needed 6: never

8= 1: about once a month or less 2: two or three times a month 3: once or twice a week 4: three of four times a week 5:everyday

11= 1: excellent 2: very good 3: good 4: fair 5: poor

*0: no formal schooling 1:1st grade 2:2nd grade 3:3rd grade 4:4th grade 5:5th grade 6:6th grade 7:7th grade

8:8th grade 9: 9th grade 10:10th grade 11:1th grade 12:12th grade but no diploma 13: high school diploma

14: Voc/tec program after high school but no diploma 15: Voc/tec diploma after high school

16: Some college but no degree

17: Associate's degree

18: Bachelor's degree 19: graduate or prof. school but no diploma 20: Master's degree

APPENDIX D: VARIABLES USED IN BEHAVIOR PROBLEMS INDEX

Table D1: Definitions of the Variables used in the Behavior Problems Index

Variables	Definition
Child displays positive affect	1:no effect 2:1 or 2 brief displays of the effect 3:3 or more brief displays of the effect 4:1 or 2 intense, heightened effect 5:3 or more intense, heightened effect
Child displays negative affect	1:no effect 2:1 or 2 brief displays of the effect 3:3 or more brief displays of the effect 4:1 or 2 intense, heightened effect 5:3 or more intense, heightened effect
Child adapts change in material	1:consistently resists relinquishing materials 2:typically resists relinquishing materials 3:makes poor transitions half the time 4:typically relinquishing materials and accept new 5: consistently relinquishing materials
Child shows interest in material	1:no interest 2:1 or 2 displays of interest 3:moderate interest 4:much interest 5:Constant interest
Child pays attention to tasks	1:Constantly off task 2:typically off task 3:off task half the time 4:typically attends 5:Constantly attends
Child displays social engagement	1:no attempts to interact 2:1 or 2 attempts to interact 3:several attempts to interact 4:many attempts to interact 5:Constant attempts to interact
Child shows control of movements	1:consistently jerky or clumsy 2:typically jerky or clumsy 3:jerky/clumsy half the time-smooth/coordinated 4:typically smooth or coordinated 5:consistently smooth or coordinated

Table D1: Continuing from Previous Page

Variables	Definition
Child persistent in tasks	1:consistently lacks persistence 2:typically not persistent 3:lack persistence half the time 4:typically persistent-lack persistence 5:consistently persistent
Child displays fearfulness	1:Constantly fearful 2:typically fearful 3:fearful half the time 4:typically trusting 5:Constantly trusting
Child display frustration in tasks	1:consistently becomes frustrated 2:typically becomes frustrated 3:occasionally becomes frustrated 4:rarely becomes frustrated 5:never becomes frustrated
Child displays cooperation	1:consistently resists suggestions 2:typically resists 3:resists suggestions/requests 4:typically cooperates 5:consistently cooperates
Child pays attention well	1:never 2:rarely 3:sometimes 4:often 5:very often
Child invited to play by other children	1:never 2:rarely 3:sometimes 4:often 5:very often
Child eagerness to learn	1:never 2:rarely 3:sometimes 4:often 5:very often
Child volunteers to help others	1:never 2:rarely 3:sometimes 4:often 5:very often
Child is liked by others	1:never 2:rarely 3:sometimes 4:often 5:very often
Child shares with others	1:never 2:rarely 3:sometimes 4:often 5:very often
Child is physically aggressive	1:never 2:rarely 3:sometimes 4:often 5:very often
Child seems unhappy	1:never 2:rarely 3:sometimes 4:often 5:very often
Child comforts other children	1:never 2:rarely 3:sometimes 4:often 5:very often
Child uses words to describe feelings	1:never 2:rarely 3:sometimes 4:often 5:very often
Child angry	1:never 2:rarely 3:sometimes 4:often 5:very often
Child works/plays independently	1:never 2:rarely 3:sometimes 4:often 5:very often

Table D1: Continuing from Previous Page

Variables	Definition
Child acts impulsively	1:never 2:rarely 3:sometimes 4:often 5:very often
Child worry about things	1:never 2:rarely 3:sometimes 4:often 5:very often
Child overly active	1:never 2:rarely 3:sometimes 4:often 5:very often
Child invites other children to play	1:never 2:rarely 3:sometimes 4:often 5:very often
Child keeps working until finished	1:never 2:rarely 3:sometimes 4:often 5:very often
Child stands up for others rights	1:never 2:rarely 3:sometimes 4:often 5:very often
Child has temper tantrums	1:never 2:rarely 3:sometimes 4:often 5:very often
Child has difficulty concentrating	1:never 2:rarely 3:sometimes 4:often 5:very often
Child annoys other children	1:never 2:rarely 3:sometimes 4:often 5:very often
Child destroys other things	1:never 2:rarely 3:sometimes 4:often 5:very often
Child tries to understand others	1:never 2:rarely 3:sometimes 4:often 5:very often
Child makes friends easily	1:never 2:rarely 3:sometimes 4:often 5:very often
Child accepts ideas	1:never 2:rarely 3:sometimes 4:often 5:very often
Child adjusts to new situations	1:never 2:rarely 3:sometimes 4:often 5:very often
Child tries new things	1:never 2:rarely 3:sometimes 4:often 5:very often
Child shows imagination	1:never 2:rarely 3:sometimes 4:often 5:very often

Table D2: Summary Statistics of Variables used in the Behavior Problems Index

	Wave1		Wave2		Wave3		Wave4		Wave5	
	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd
Child display positive affect ^a	2.624	1.509	2.578	1.097						
Child display negative affect ^a	2.242	1.552	2.656	1.288						
Child adapt change in material ^c	2.261	1.479	2.446	1.114						
Child shows interest in material ^c	2.474	1.357	2.570	0.950						
Child pays attention to tasks ^c	2.298	1.342	2.622	1.006						
Child displays social engagement ^b	2.796	1.501	2.541	1.123						
Child shows control of movements ^a	2.447	1.431	1.745	0.767						
Child persistent in tasks ^c			2.673	1.074						
Child displays fearfulness ^a			1.940	0.989						
Child display frustration in tasks ^a			2.284	1.003						
Child displays cooperation ^b			2.663	1.074						
Child pays attention well ^c					2.364	0.815	2.290	0.827	2.275	0.838
Child is invited to play by other children ^b					2.131	1.004	2.115	0.974	2.087	0.967
Child eagerness to learn ^c					1.661	0.795	1.631	0.763	1.621	0.747
Child volunteers to help others ^b					2.293	1.003	2.222	1.006	2.160	1.002
Child is liked by others ^b					1.611	0.712	1.583	0.680	1.593	0.700

Table D2: Continuing from Previous Page

	Wave1		Wave2		Wave3		Wave4		Wave5	
	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd
Child shares with others ^b					2.285	0.857				
Child is physically aggressive ^a					2.247	0.946	2.073	0.939	2.026	0.931
Child seems unhappy ^a					1.778	0.752	1.797	0.731	1.822	0.756
Child comforts other children ^b					2.376	0.948	2.379	0.948	2.324	0.954
Child uses words to describe feelings ^b					2.111	0.988	1.950	0.924	1.934	0.933
Child angry ^a					2.873	0.938	2.799	0.946	2.678	0.911
Child works/plays independently ^c					1.947	0.850	1.940	0.835	1.894	0.843
Child acts impulsively ^a					2.253	1.020	2.184	0.973	2.163	0.969
Child worry about things ^a					2.306	0.987	2.454	1.002	2.498	1.001
Child overly active ^c					2.837	1.158	2.764	1.160	2.697	1.131
Child invites other children to play ^b					2	0.921	1.967	0.877	1.986	0.873
Child keeps working until finished ^c					2.638	0.889	2.475	0.889	2.411	0.897
Child stands up for others rights ^b					2.403	0.985	2.312	0.947	2.243	0.940
Child has temper tantrums ^a					2.673	0.977	2.522	0.977	2.458	0.978
Child has difficulty concentrating ^c					2.484	0.897				

Table D2: Continuing from Previous Page

	Wave1		Wave2		Wave3		Wave4		Wave5	
	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd
Child annoys other children ^a					2.212	0.883	2.225	0.890	2.239	0.889
Child destroys other things ^a					1.631	0.824	1.588	0.798	1.581	0.775
Child tries to understand others ^b					2.385	0.927	2.357	0.897	2.329	0.896
Child makes friends easily ^b					1.761	0.808				
Child accepts ideas ^b							2.177	0.836	2.174	0.836
Child adjusts to new situations ^c							2.314	0.848	2.299	0.845
Child tries new things ^c							1.906	0.818	1.898	0.801
Child shows imagination ^c							1.669	0.759	1.655	0.750
N	9550		8450		8050		6250		1650	

Notes: Sample sizes (N) are rounded to the nearest 50 as required by NCES. Only twin restriction is applied for these summary statistics. ^a Those variables are used to create 'emotions' index. ^b Those variable are used to create 'social Behavior' index. ^c Those variables are used to create 'attention' index.

APPENDIX E: REDUCED FORM REGRESSIONS

Table E1: Reduced Form Regressions for Endogenous Variables-Set1

Variable	Hours of work	Hours of center based care	Hours of home based care	Quality of home	Quality of in-home child care	Quality of out-of-home child care
Goods	21492.296 (17830.944)	13938.579 (11216.615)	-14804.144 (15721.996)	300.624 (822.742)	0.077 (166.860)	-989.256** (403.633)
Service	30480.505*** (7933.079)	15688.357*** (5574.275)	2454.668 (7828.477)	-682.522 (420.407)	87.617 (70.657)	-463.443** (204.342)
Unemployment rate	-0.111 (0.131)	-0.185** (0.086)	0.114 (0.125)	-0.023*** (0.006)	-0.003** (0.001)	0.002 (0.003)
Poverty	-0.108** (0.047)	-0.011 (0.031)	0.001 (0.040)	-0.004* (0.002)	0.000 (0.000)	0.002** (0.001)
Median income	0.895 (0.602)	-0.029 (0.373)	1.708*** (0.528)	-0.002 (0.027)	-0.004 (0.004)	0.018 (0.015)
TANF	3616.348 (18297.906)	20892.759* (12173.812)	16176.425 (16883.110)	775.386 (933.725)	46.656 (190.353)	-81.665 (454.175)
Mean wage	0.062 (0.524)	-0.322 (0.352)	0.062 (0.452)	-0.057** (0.024)	-0.007 (0.005)	0.033** (0.014)
Mean wage preschool	0.498 (0.374)	0.753*** (0.290)	-0.265 (0.335)	0.003 (0.018)	0.007 (0.005)	-0.040*** (0.013)
Mean wage child care worker	0.054 (0.852)	-0.641 (0.574)	0.652 (0.744)	0.075* (0.040)	0.007 (0.009)	-0.020 (0.021)
Price of infant care	-0.001*** (0.000)	-0.001*** (0.000)	-0.000 (0.000)	0.000*** (0.000)	-0.000* (0.000)	0.000 (0.000)
Price of preschool care	0.000 (0.000)	-0.000 (0.000)	0.001** (0.000)	-0.000** (0.000)	0.000* (0.000)	0.000 (0.000)
Public 2year	-0.001 (0.001)	-0.001*** (0.000)	-0.000 (0.001)	0.000** (0.000)	0.000 (0.000)	0.000 (0.000)

Table E1: Continuing from Previous Page

Variable	Hours of work	Hours of center based care	Hours of home based care	Quality of home	Quality of in-home child care	Quality of out-of-home child care
Public 4year	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000*** (0.000)
Private 4year	0.000 (0.000)	0.000*** (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000* (0.000)
Center total	0.376 (0.992)	-0.550 (0.497)	1.146 (0.705)	-0.039 (0.037)	0.009 (0.006)	0.028 (0.021)
Family total	0.090 (0.290)	0.042 (0.192)	-0.486* (0.272)	0.070*** (0.014)	-0.004 (0.004)	-0.004 (0.008)
Daycare total	0.034** (0.016)	0.003 (0.006)	0.013 (0.014)	0.001 (0.001)	0.000** (0.000)	0.000 (0.000)
Male female ratio	4.051 (2.703)	1.666 (1.828)	0.345 (2.192)	0.123 (0.115)	-0.044* (0.023)	0.061 (0.065)
Income others	-0.002*** (0.000)	-0.000** (0.000)	-0.001** (0.000)	0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)
Missing income others	-2.113*** (0.399)	-0.554* (0.288)	-1.622*** (0.384)	0.096*** (0.023)	0.003 (0.004)	-0.001 (0.012)
Pct95 precipitation level	0.001 (0.001)	-0.002** (0.001)	0.002* (0.001)	0.000* (0.000)	0.000*** (0.000)	0.000 (0.000)
Std of snow fall	-0.006 (0.010)	0.006 (0.007)	0.014 (0.011)	-0.003*** (0.001)	0.000 (0.000)	0.001*** (0.000)
Std of precipitation level	-0.000 (0.001)	0.001 (0.001)	-0.000 (0.001)	0.000** (0.000)	-0.000* (0.000)	0.000 (0.000)
Age24	1.910 (6.965)	12.672*** (3.870)	-5.572 (5.410)	-0.310 (0.359)	0.004 (0.015)	-0.117* (0.065)
Age48	3.063 (6.954)	13.223*** (3.857)	-4.480 (5.387)	-0.339 (0.358)	0.003 (0.013)	-0.108* (0.064)

Table E1: Continuing from Previous Page

Variable	Hours of work	Hours of center based care	Hours of home based care	Quality of home	Quality of in-home child care	Quality of out-of-home child care
Age60	4.102 (6.916)	17.816*** (3.808)	-5.414 (5.354)	-0.404 (0.356)	0.004 (0.009)	-0.091 (0.058)
Age72	4.984 (6.900)	17.649*** (3.787)	-6.323 (5.340)	-0.453 (0.356)	0.002 (0.008)	-0.060 (0.054)
Agemom	0.328*** (0.030)	0.067*** (0.017)	-0.027 (0.024)	0.015*** (0.001)	0.000 (0.000)	-0.002*** (0.001)
Male	-0.060 (0.354)	0.052 (0.202)	-0.166 (0.288)	-0.057*** (0.016)	-0.006** (0.003)	-0.008 (0.007)
Black child	2.843*** (0.479)	3.609*** (0.317)	3.408*** (0.418)	-0.275*** (0.023)	-0.010** (0.004)	0.057*** (0.010)
Hispanic child	-0.899* (0.480)	-1.652*** (0.255)	0.145 (0.391)	-0.346*** (0.023)	-0.017*** (0.004)	0.008 (0.009)
Urban	-0.769 (0.504)	0.582* (0.312)	-0.235 (0.419)	0.038* (0.023)	0.004 (0.004)	-0.015 (0.012)
Region1	0.628 (1.007)	2.536*** (0.607)	0.081 (0.869)	0.000 (0.047)	-0.013 (0.009)	0.105*** (0.023)
Region2	1.355 (0.853)	0.030 (0.519)	2.305*** (0.731)	-0.080** (0.040)	-0.000 (0.008)	0.093*** (0.020)
Region3	2.084*** (0.704)	3.551*** (0.420)	0.836 (0.579)	-0.057* (0.033)	0.001 (0.006)	0.049*** (0.017)
Time2	-0.451 (0.305)	-1.786*** (0.222)	2.603*** (0.323)	0.005 (0.018)	0.002 (0.006)	0.007 (0.009)
Time3	0.274 (0.628)	6.399*** (0.552)	-3.052*** (0.600)	-0.008 (0.031)	-0.004 (0.010)	0.002 (0.027)
Time4	-0.272 (1.026)	4.826*** (0.845)	-3.427*** (0.867)	-0.057 (0.049)	-0.007 (0.014)	-0.002 (0.042)

Table E1: Continuing from Previous Page

Variable	Hours of work	Hours of center based care	Hours of home based care	Quality of home	Quality of in-home child care	Quality of out-of-home child care
Office	-0.001 (0.064)	0.062* (0.032)	0.035 (0.045)	-0.004 (0.003)	0.001 (0.000)	-0.002 (0.001)
Short term hospitals with Child/adoles. service	-14.285 (23.996)	8.403 (14.303)	-34.674 (23.319)	0.338 (1.081)	0.143 (0.253)	0.317 (0.668)
Short term child wellness hospitals	-12.613 (13.471)	3.667 (8.634)	12.796 (13.666)	-1.308** (0.661)	0.112 (0.103)	-0.341 (0.420)
Total number of hospitals	-2.448 (8.875)	3.097 (5.067)	-6.365 (7.408)	-0.093 (0.391)	-0.027 (0.066)	0.407* (0.239)
Short term hospitals with nutrition programs	6.511 (10.146)	-15.376** (6.291)	9.720 (9.915)	0.241 (0.469)	-0.141 (0.090)	-0.496 (0.305)
Long term child psychiatric hospitals	-1.609 (2.270)	-2.003* (1.193)	0.042 (2.741)	-0.077 (0.093)	0.015 (0.026)	0.012 (0.037)
Short term child psychiatric hospitals	-7.382* (4.461)	-0.045 (3.234)	1.850 (4.386)	0.014 (0.181)	-0.026 (0.042)	0.123 (0.114)
Convenience	-0.007 (0.025)	-0.020** (0.008)	0.029 (0.020)	-0.001 (0.001)	-0.000 (0.000)	-0.000 (0.001)
Fitness	-0.034* (0.019)	-0.006 (0.011)	-0.009 (0.015)	0.001 (0.001)	0.000 (0.000)	-0.000 (0.001)
Full service restaurants	0.095 (0.567)	-0.097 (0.324)	0.166 (0.510)	0.040 (0.027)	0.006 (0.004)	0.013 (0.012)
Limited service restaurants	0.011** (0.005)	0.003 (0.003)	0.004 (0.005)	-0.001** (0.000)	-0.000 (0.000)	-0.000* (0.000)

Table E1: Continuing from Previous Page

Variable	Hours of work	Hours of center based care	Hours of home based care	Quality of home	Quality of in-home child care	Quality of out-of-home child care
Fruit	0.014 (0.148)	-0.080 (0.071)	-0.083 (0.122)	0.008 (0.007)	-0.002 (0.001)	0.003 (0.002)
Dentist	-0.010 (0.009)	-0.005* (0.003)	-0.003 (0.005)	0.001** (0.000)	-0.000 (0.000)	-0.000* (0.000)
Park	-0.454 (0.883)	0.272 (0.511)	-0.979 (0.708)	-0.025 (0.040)	0.009 (0.006)	0.000 (0.023)
Museum	-0.211 (0.149)	-0.083 (0.075)	0.016 (0.110)	-0.002 (0.006)	-0.002* (0.001)	-0.004 (0.004)
Zoo	0.607 (1.042)	-0.245 (0.659)	-0.694 (0.848)	0.022 (0.049)	0.003 (0.009)	0.011 (0.024)
Grocery	0.108*** (0.018)	0.043*** (0.007)	0.024** (0.012)	-0.005*** (0.001)	-0.000 (0.000)	0.002*** (0.000)
Constant	-9.943 (8.692)	-17.710*** (5.262)	12.325* (7.154)	0.226 (0.439)	-0.016 (0.047)	0.261* (0.146)
LR test	110.36***	89.90***	68.76***	211.75***	48.71***	75.94***
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)

Notes: Sample size for all equations is 23650 which is rounded to the nearest 50 as required by NCES. Degrees of freedom for all regressions is 23. * p<0.10 ** p<0.05 *** p<0.01 Results are obtained from RE models.

Table E2: Reduced Form Regressions for Endogenous Variables-Set2

Variables	Full time work with child care	Full time work without child care	Part time work with child care	Part time work without child care	No work with child care
Goods	328.616 (342.174)	-172.006 (151.915)	-40.871 (271.595)	248.739 (172.544)	142.032 (265.869)
Service	686.383*** (163.341)	81.142 (74.333)	-241.142* (135.345)	-27.548 (85.182)	-254.230* (135.573)
Unemployment rate	0.001 (0.003)	-0.001 (0.001)	-0.002 (0.002)	0.002 (0.001)	-0.002 (0.002)
Poverty	-0.002** (0.001)	-0.001 (0.000)	-0.002*** (0.001)	-0.001 (0.001)	0.003*** (0.001)
Median income	0.036*** (0.012)	-0.001 (0.005)	-0.010 (0.010)	0.002 (0.006)	0.001 (0.010)
TANF	854.680** (380.103)	-308.249* (174.984)	95.633 (303.94)1	-247.419 (199.793)	-41.863 (289.717)
Mean wage	0.004 (0.011)	0.003 (0.005)	-0.009 (0.008)	-0.000 (0.006)	0.002 (0.008)
Mean wage preschool	0.029*** (0.009)	0.005 (0.004)	-0.009 (0.007)	-0.003 (0.005)	0.006 (0.007)
Mean wage child care worker	-0.029* (0.017)	0.004 (0.008)	0.017 (0.014)	0.003 (0.009)	0.003 (0.013)
Price of infant care	-0.000*** (0.000)	-0.000* (0.000)	0.000** (0.000)	0.000* (0.000)	0.000 (0.000)
Price of preschool care	0.000*** (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000** (0.000)	-0.000 (0.000)
Public 2year	-0.000*** (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Public 4year	0.000** (0.000)	0.000 (0.000)	0.000*** (0.000)	-0.000 (0.000)	-0.000 (0.000)

Table E2: Continuing from Previous Page

Variables	Full time work with child care	Full time work without child care	Part time work with child care	Part time work without child care	No work with child care
Private 4year	0.000 (0.000)	0.000 (0.000)	-0.000** (0.000)	-0.000* (0.000)	0.000 (0.000)
Center total	0.049*** (0.018)	0.002 (0.008)	-0.023 (0.017)	-0.016 (0.012)	-0.023 (0.016)
Family total	-0.009 (0.006)	0.005** (0.003)	0.009* (0.005)	0.001 (0.003)	0.009* (0.005)
Daycare total	0.001** (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Male female ratio	-0.015 (0.052)	0.012 (0.023)	0.134*** (0.039)	-0.002 (0.029)	0.008 (0.037)
Income others	-0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	0.000 (0.000)	0.000*** (0.000)
Missing income others	-0.087*** (0.011)	-0.030*** (0.005)	-0.003 (0.009)	-0.003 (0.006)	0.037*** (0.008)
Pct95 precipitation level	0.000** (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000** (0.000)
Std of snow fall	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Std of precipitation level	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)
Age24	-0.270 (0.242)	0.482*** (0.061)	-0.312** (0.123)	0.622*** (0.070)	-0.121 (0.137)
Age48	-0.231 (0.242)	0.493*** (0.061)	-0.309** (0.123)	0.611*** (0.070)	-0.116 (0.137)
Age60	-0.163 (0.242)	0.492*** (0.062)	-0.272** (0.122)	0.589*** (0.071)	-0.089 (0.136)

Table E2: Continuing from Previous Page

Variables	Full time work with child care	Full time work without child care	Part time work with child care	Part time work without child care	No work with child care
Age72	-0.184 (0.241)	0.514*** (0.062)	-0.302** (0.122)	0.602*** (0.072)	-0.118 (0.136)
Agemom	0.007*** (0.000)	0.002*** (0.000)	0.000 (0.000)	0.001** (0.000)	-0.005*** (0.000)
Male	-0.000 (0.006)	0.000 (0.003)	0.007 (0.005)	-0.001 (0.003)	0.005 (0.004)
Black child	0.059*** (0.008)	-0.006 (0.004)	0.015** (0.007)	-0.022*** (0.005)	0.043*** (0.006)
Hispanic child	-0.014* (0.008)	-0.002 (0.004)	-0.018*** (0.007)	-0.010** (0.004)	-0.013** (0.006)
Urban	-0.019** (0.010)	-0.000 (0.004)	0.006 (0.008)	-0.004 (0.005)	0.018** (0.007)
Region1	-0.029 (0.019)	-0.014 (0.009)	0.087*** (0.015)	-0.001 (0.010)	0.019 (0.014)
Region2	0.032* (0.017)	0.006 (0.007)	0.043*** (0.013)	-0.010 (0.008)	-0.006 (0.013)
Region3	0.070*** (0.013)	-0.001 (0.006)	0.006 (0.011)	-0.024*** (0.007)	-0.002 (0.010)
Time2	0.011 (0.011)	-0.001 (0.004)	-0.008 (0.008)	-0.014*** (0.004)	0.035*** (0.009)
Time4	0.009 (0.018)	-0.026*** (0.009)	0.027* (0.014)	-0.023** (0.010)	0.161*** (0.012)
Time5	-0.009 (0.025)	-0.038*** (0.013)	0.038** (0.019)	-0.021 (0.016)	0.178*** (0.016)
Office	0.000 (0.001)	-0.001 (0.000)	0.001 (0.001)	0.002*** (0.001)	0.000 (0.001)

Table E2: Continuing from Previous Page

Variables	Full time work with child care	Full time work without child care	Part time work with child care	Part time work without child care	No work with child care
Short term hospitals with child/adoles. service	0.185 (0.500)	0.213 (0.199)	-0.235 (0.397)	-1.239*** (0.331)	-0.170 (0.394)
Short term child wellness hospitals	0.272 (0.332)	-0.160 (0.155)	-0.587* (0.309)	0.140 (0.152)	0.238 (0.240)
Total number of hospitals	-0.126 (0.174)	0.019 (0.076)	-0.183 (0.145)	-0.049 (0.097)	0.158 (0.134)
Short term hospitals with nutrition programs	0.066 (0.237)	-0.074 (0.109)	0.378** (0.186)	0.315*** (0.115)	-0.194 (0.181)
Long term child psychiatric hospitals	0.008 (0.041)	-0.031 (0.024)	-0.057 (0.039)	0.040*** (0.014)	0.012 (0.030)
Short term child psychiatric hospitals	-0.095 (0.105)	-0.103 (0.071)	0.085 (0.072)	0.005 (0.055)	0.076 (0.065)
Convenience	0.000 (0.001)	-0.000 (0.000)	0.001*** (0.000)	-0.000 (0.000)	-0.000 (0.001)
Fitness	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Full service restaurants	-0.018* (0.011)	0.003 (0.005)	0.028*** (0.008)	0.018*** (0.005)	0.001 (0.008)
Limited service restaurants	0.000 (0.001)	0.000 (0.000)	0.000 (0.000)	-0.001 (0.002)	0.000 (0.000)
Fruit	0.002 (0.003)	0.002 (0.001)	-0.003 (0.002)	-0.003* (0.002)	0.002 (0.002)
Dentist	-0.000 (0.000)	0.000** (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Park	-0.019 (0.020)	0.006 (0.008)	0.011 (0.014)	-0.014 (0.011)	-0.018 (0.015)

Table E2: Continuing from Previous Page

Variables	Full time work with child care	Full time work without child care	Part time work with child care	Part time work without child care	No work with child care
Museum	-0.005 (0.003)	-0.001 (0.001)	0.003 (0.002)	-0.003** (0.002)	0.003 (0.002)
Zoo	-0.019 (0.023)	0.007 (0.010)	0.012 (0.017)	-0.004 (0.013)	-0.020 (0.017)
Grocery	0.034 (0.023)	0.006 (0.004)	0.013 (0.017)	-0.015 (0.024)	0.015 (0.010)
Constant	0.297*** (0.003)	0.045*** (0.001)	0.154*** (0.002)	0.055*** (0.002)	0.146*** (0.002)
LR test	233.67***	223.46***	107.55***	60.69***	76.31***
p-value	0.000	0.000	0.000	0.000	0.000

Notes: Sample size for all equations is 23650 which is rounded to the nearest 50 as required by NCES. Degrees of freedom for all regressions is 23. * p<0.10 ** p<0.05 *** p<0.01 Results are obtained from multinomial logit models. Base category is no work and no child care.

Table E3: Reduced Form Regressions for Endogenous Variables-Set3

Variables	Hhincomenet	University degree	Sibling	Married	Use in-home care	Use out-of-home care
Goods	132243.425 (230843.265)	-575.878** (240.083)	-160.865 (932.544)	134.398 (369.199)	-113.239 (166.379)	454.052 (299.210)
Service	47839.084 (111637.397)	-188.232** (92.498)	-329.687 (330.673)	18.868 (147.718)	-99.371 (74.353)	526.632*** (147.996)
Unemployment rate	0.285 (1.485)	-0.000 (0.002)	-0.008 (0.006)	0.002 (0.003)	0.003** (0.001)	0.001 (0.002)
Poverty	-3.296*** (0.749)	-0.004*** (0.001)	0.004** (0.002)	-0.003*** (0.001)	-0.000 (0.000)	-0.001 (0.001)
Median income	4.298 (5.818)	-0.011 (0.008)	0.032 (0.031)	-0.018 (0.014)	0.009 (0.006)	-0.000 (0.011)
TANF	-82186.664 (266211.299)	-617.511*** (227.059)	-717.277 (817.332)	-500.792 (331.495)	-283.662 (194.798)	704.267** (337.612)
Mean wage	8.543 (7.043)	0.005 (0.007)	-0.008 (0.025)	0.006 (0.010)	-0.010** (0.005)	-0.014 (0.010)
Mean wage preschool	-1.845 (5.703)	-0.002 (0.004)	-0.002 (0.014)	0.003 (0.006)	0.008* (0.005)	0.001 (0.009)
Mean wage child care worker	3.776 (11.680)	0.021* (0.011)	-0.012 (0.039)	0.008 (0.016)	0.022** (0.009)	0.001 (0.016)
Price of infant care	0.003 (0.004)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000* (0.000)	-0.000** (0.000)
Price of preschool care	132243.425 (230843.265)	-575.878** (240.083)	-160.865 (932.544)	134.398 (369.199)	-113.239 (166.379)	454.052 (299.210)
Public 2year	47839.084 (111637.397)	-188.232** (92.498)	-329.687 (330.673)	18.868 (147.718)	-99.371 (74.353)	526.632*** (147.996)
Public 4year	0.285 (1.485)	-0.000 (0.002)	-0.008 (0.006)	0.002 (0.003)	0.003** (0.001)	0.001 (0.002)

Table E3: Continuing from Previous Page

Variables	Hhincomenet	University degree	Sibling	Married	Use in-home care	Use out-of-home care
Private 4year	0.002 (0.001)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)
Center total	12.895 (8.370)	-0.001 (0.005)	-0.001 (0.028)	-0.013 (0.012)	-0.002 (0.006)	-0.003 (0.021)
Family total	2.049 (5.428)	-0.008** (0.004)	0.005 (0.014)	-0.007 (0.005)	0.000 (0.003)	0.005 (0.006)
Daycare total	0.286 (0.289)	-0.000 (0.000)	0.001 (0.001)	-0.001 (0.000)	0.000 (0.000)	-0.000 (0.000)
Male female ratio	3.027 (25.803)	-0.040 (0.038)	0.250** (0.118)	0.018 (0.060)	-0.032 (0.022)	0.072 (0.046)
Income others	1.046*** (0.023)	0.000*** (0.000)	0.000* (0.000)	0.000*** (0.000)	-0.000 (0.000)	0.000** (0.000)
Missing income others	-51.579*** (13.143)	0.016*** (0.005)	0.015 (0.014)	0.079*** (0.009)	-0.016*** (0.004)	-0.036*** (0.009)
Pct95 precipitation level	0.024 (0.018)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Std of snow fall	-0.134 (0.168)	0.000 (0.000)	-0.001* (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Std of precipitation level	-0.013 (0.008)	-0.000* (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Age24	58.562 (72.554)	0.043** (0.017)	0.182 (0.366)	0.112*** (0.019)	0.070*** (0.016)	0.221 (0.236)
Age48	64.451 (72.301)	0.047*** (0.017)	0.181 (0.366)	0.111*** (0.019)	0.061*** (0.014)	0.247 (0.235)
Age60	77.110 (71.871)	0.037** (0.015)	0.180 (0.365)	0.098*** (0.015)	0.046*** (0.009)	0.348 (0.234)

Table E3: Continuing from Previous Page

Variables	Hhincomenet	University degree	Sibling	Married	Use in-home care	Use out-of-home care
Age72	81.099 (71.694)	0.026* (0.014)	0.168 (0.364)	0.078*** (0.013)	0.046*** (0.008)	0.248 (0.235)
Agemom	7.360*** (0.604)	0.022*** (0.001)	0.052*** (0.002)	0.022*** (0.001)	-0.000 (0.000)	0.002*** (0.000)
Male	-1.246 (5.117)	0.002 (0.008)	-0.052** (0.022)	0.008 (0.008)	0.002 (0.003)	0.009* (0.005)
Black child	-4.204 (6.697)	-0.168*** (0.009)	0.303*** (0.032)	-0.367*** (0.012)	0.005 (0.004)	0.040*** (0.008)
Hispanic child	-41.575*** (6.266)	-0.196*** (0.009)	0.176*** (0.030)	-0.142*** (0.012)	0.004 (0.004)	-0.037*** (0.007)
Urban	4.439 (6.749)	0.025*** (0.007)	-0.054** (0.023)	0.010 (0.011)	0.003 (0.004)	-0.001 (0.009)
Region1	-2.438 (13.732)	0.010 (0.016)	-0.123** (0.055)	0.000 (0.022)	0.005 (0.009)	0.052*** (0.017)
Region2	6.346 (11.220)	0.034** (0.014)	-0.020 (0.047)	-0.004 (0.018)	0.012 (0.008)	0.031** (0.014)
Region3	27.939*** (8.833)	0.040*** (0.012)	-0.117*** (0.039)	0.040*** (0.015)	-0.004 (0.006)	0.049*** (0.012)
Time2	0.694 (3.451)	0.026*** (0.003)	-0.061*** (0.010)	0.006 (0.004)	-0.090*** (0.005)	-0.244*** (0.008)
Time3	-9.217 (7.553)	-0.033*** (0.007)	0.145*** (0.021)	-0.030*** (0.009)	-0.006 (0.010)	0.269*** (0.019)
Time4	-22.933** (11.651)	-0.044*** (0.011)	0.186*** (0.037)	-0.041** (0.017)	-0.002 (0.014)	0.332*** (0.027)
Office	0.369 (0.672)	0.001 (0.001)	0.002 (0.003)	0.003** (0.001)	-0.001 (0.001)	0.001 (0.001)

Table E3: Continuing from Previous Page

Variables	Hhincomenet	University degree	Sibling	Married	Use in-home care	Use out-of-home care
Short term hospitals with child/adoles. service	-60.888 (197.318)	-0.291 (0.366)	0.647 (1.134)	-0.003 (0.501)	-0.192 (0.202)	0.179 (0.421)
Short term child wellness hospitals	58.442 (121.034)	-0.008 (0.083)	-1.277** (0.556)	0.139 (0.282)	-0.155 (0.126)	-0.089 (0.317)
Total number of hospitals	-5.842 (78.897)	-0.009 (0.095)	0.629 (0.456)	-0.173 (0.189)	-0.120 (0.089)	0.060 (0.152)
Short term hospitals with nutrition programs	-73.182 (82.705)	0.017 (0.073)	0.712* (0.397)	0.062 (0.200)	0.117 (0.112)	0.125 (0.210)
Long term child psychiatric hospitals	1.904 (34.457)	0.088*** (0.031)	0.025 (0.075)	-0.035 (0.035)	0.009 (0.026)	-0.050 (0.035)
Short term child psychiatric hospitals	-35.027 (35.690)	-0.067* (0.041)	0.325** (0.134)	0.046 (0.076)	-0.046 (0.060)	0.112 (0.091)
Convenience	-0.214 (0.175)	0.000 (0.000)	-0.000 (0.001)	-0.001 (0.000)	0.000 (0.000)	0.000 (0.000)
Fitness	-0.140 (0.157)	0.000 (0.000)	-0.001 (0.001)	-0.000 (0.000)	0.001*** (0.000)	-0.001 (0.000)
Full service restaurants	7.416 (8.032)	0.019*** (0.007)	-0.144*** (0.028)	-0.008 (0.011)	0.001 (0.005)	0.012 (0.009)
Limited service restaurants	0.013 (0.078)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000* (0.000)	0.000** (0.000)
Fruit	-0.740 (1.323)	-0.003* (0.002)	-0.003 (0.006)	-0.007** (0.003)	0.000 (0.001)	-0.001 (0.002)
Dentist	-0.065 (0.060)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Park	6.624 (6.988)	-0.009 (0.009)	-0.023 (0.038)	-0.013 (0.020)	0.003 (0.007)	-0.001 (0.019)

Table E3: Continuing from Previous Page

Variables	Hhincomenet	University degree	Sibling	Married	Use in-home care	Use out-of-home care
Museum	-1.319 (1.092)	0.002 (0.002)	-0.003 (0.007)	-0.000 (0.004)	0.000 (0.001)	0.000 (0.002)
Zoo	-8.252 (9.174)	-0.023* (0.012)	0.022 (0.051)	0.036* (0.020)	-0.014 (0.009)	0.008 (0.022)
Grocery	0.731*** (0.179)	-0.000** (0.000)	0.003*** (0.001)	0.002*** (0.000)	-0.000 (0.000)	0.000** (0.000)
Constant	-249.867** (98.719)	-0.404*** (0.075)	-0.369 (0.449)	-0.070 (0.111)	0.060 (0.050)	-0.261 (0.255)
LR test	12414.97***	166.47***	51.40***	120.15***	48.98***	88.28***
p-value	0.000	0.000	0.001	0.000	0.001	0.000

Notes: Sample size for all equations is 23650 which is rounded to the nearest 50 as required by NCES. Degrees of freedom for all regressions is 23. * p<0.10 ** p<0.05 *** p<0.01 Results are obtained from RE models.

Table E4: Reduced Form Regressions for Endogenous Variables-Set4

Variables	Full time work	Part time work	Full time Center based care	Part time Center based care	Full time Home based care	Part time Home based care
Goods	92.355 (353.203)	182.569 (305.247)	372.116* (217.512)	677.611** (265.659)	-158.657 (263.844)	-374.625 (312.230)
Service	738.606*** (170.023)	-270.280* (151.242)	373.233*** (99.192)	-131.526 (125.523)	143.587 (122.861)	-418.652*** (158.514)
Unemployment rate	0.001 (0.003)	-0.000 (0.003)	-0.005*** (0.002)	-0.000 (0.002)	0.001 (0.002)	0.000 (0.003)
Poverty	-0.003*** (0.001)	-0.003*** (0.001)	-0.001* (0.001)	0.001 (0.001)	-0.000 (0.001)	-0.000 (0.001)
Median income	0.037*** (0.013)	-0.008 (0.011)	-0.010 (0.010)	0.027*** (0.009)	0.029*** (0.009)	0.025** (0.011)
TANF	619.852 (391.875)	-198.262 (342.053)	465.479* (244.876)	178.791 (282.522)	434.792 (298.309)	222.615 (352.108)
Mean wage	0.010 (0.011)	-0.010 (0.010)	-0.007 (0.006)	0.005 (0.008)	0.006 (0.009)	-0.009 (0.010)
Mean wage preschool	0.027*** (0.010)	-0.013 (0.008)	0.018*** (0.006)	0.011* (0.006)	0.002 (0.008)	-0.003 (0.008)
Mean wage child care worker	-0.029 (0.018)	0.022 (0.015)	-0.021** (0.011)	-0.008 (0.012)	0.010 (0.014)	0.004 (0.016)
Price of infant care	-0.000*** (0.000)	0.000*** (0.000)	-0.000** (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)
Price of preschool care	0.000** (0.000)	-0.000** (0.000)	-0.000 (0.000)	-0.000* (0.000)	0.000** (0.000)	0.000 (0.000)
Public 2year	-0.000** (0.000)	0.000 (0.000)	-0.000*** (0.000)	-0.000 (0.000)	-0.000** (0.000)	0.000* (0.000)
Public 4year	0.000 (0.000)	-0.000*** (0.000)	0.000*** (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000* (0.000)

Table E4: Continuing from Previous Page

Variables	Full time work	Part time work	Full time Center based care	Part time Center based care	Full time Home based care	Part time Home based care
Private 4year	0.000** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)
Center total	0.052*** (0.019)	-0.038** (0.019)	0.010 (0.011)	0.004 (0.011)	0.025* (0.014)	-0.005 (0.017)
Family total	-0.003 (0.007)	0.009* (0.006)	-0.002 (0.004)	0.010** (0.005)	-0.013** (0.005)	0.008 (0.006)
Daycare total	0.001* (0.000)	0.000 (0.000)	-0.001 (0.002)	0.000 (0.001)	0.000 (0.000)	0.000 (0.000)
Male female ratio	-0.008 (0.053)	0.136*** (0.046)	-0.029 (0.036)	0.033 (0.039)	-0.020 (0.039)	0.125*** (0.044)
Income others	-0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)	0.000** (0.000)
Missing income others	-0.116*** (0.011)	-0.007 (0.010)	-0.032*** (0.007)	0.024*** (0.008)	-0.050*** (0.009)	-0.020** (0.010)
Pct95 precipitation level	0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000* (0.000)
Std of snow fall	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000* (0.000)
Std of precipitation level	0.000 (0.000)	0.000 (0.000)	0.000** (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Age24	0.093 (0.251)	-0.133 (0.153)	0.953 (46.515)	-0.371 (17.433)	-0.571*** (0.139)	2.183*** (0.109)
Age48	0.150 (0.250)	-0.140 (0.152)	0.959 (46.515)	-0.349 (17.433)	-0.539*** (0.139)	2.185*** (0.109)
Age60	0.191 (0.250)	-0.132 (0.152)	0.998 (46.515)	-0.294 (17.433)	-0.565*** (0.138)	2.210*** (0.110)

Table E4: Continuing from Previous Page

Variables	Full time work	Part time work	Full time Center based care	Part time Center based care	Full time Home based care	Part time Home based care
Age72	0.211 (0.250)	-0.143 (0.151)	1.000 (46.515)	-0.329 (17.433)	-0.567*** (0.138)	2.196*** (0.110)
Agemom	0.009*** (0.001)	0.001** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001** (0.000)	-0.002*** (0.000)
Male	-0.000 (0.006)	0.006 (0.005)	0.000 (0.004)	0.008* (0.004)	-0.008* (0.005)	0.012** (0.005)
Black child	0.050*** (0.008)	-0.008 (0.008)	0.053*** (0.005)	-0.008 (0.006)	0.043*** (0.006)	0.029*** (0.007)
Hispanic child	-0.016* (0.009)	-0.029*** (0.008)	-0.030*** (0.006)	-0.041*** (0.006)	0.008 (0.006)	-0.010 (0.008)
Urban	-0.020** (0.010)	0.003 (0.009)	0.012* (0.006)	0.017** (0.007)	0.002 (0.008)	-0.021** (0.009)
Region1	-0.038** (0.019)	0.086*** (0.017)	0.013 (0.012)	0.063*** (0.014)	-0.011 (0.015)	0.052*** (0.017)
Region2	0.040** (0.017)	0.030** (0.015)	-0.016 (0.011)	0.025** (0.013)	0.043*** (0.013)	0.046*** (0.015)
Region3	0.067*** (0.014)	-0.020* (0.012)	0.038*** (0.009)	0.029*** (0.010)	0.037*** (0.011)	-0.028** (0.012)
Time2	0.021** (0.011)	-0.020** (0.009)	-0.015** (0.007)	-0.066*** (0.010)	0.041*** (0.007)	0.052*** (0.009)
Time4	-0.020 (0.018)	0.001 (0.016)	0.006 (0.010)	0.229*** (0.011)	-0.088*** (0.016)	0.026 (0.017)
Time5	-0.056** (0.026)	0.010 (0.023)	-0.027** (0.014)	0.262*** (0.014)	-0.132*** (0.025)	0.046** (0.023)
Office	0.000 (0.001)	0.002** (0.001)	0.001 (0.001)	0.000 (0.001)	0.000 (0.001)	-0.001 (0.001)

Table E4: Continuing from Previous Page

Variables	Full time work	Part time work	Full time Center based care	Part time Center based care	Full time Home based care	Part time Home based care
Short term hospitals with child/adoles. service	0.387 (0.509)	-1.342*** (0.466)	0.025 (0.379)	0.549 (0.368)	0.317 (0.365)	-0.792* (0.448)
Short term child wellness hospitals	0.101 (0.340)	-0.389 (0.317)	-0.301 (0.280)	0.408* (0.244)	0.100 (0.257)	0.081 (0.286)
Total number of hospitals	-0.098 (0.181)	-0.235 (0.164)	-0.016 (0.129)	0.107 (0.129)	-0.096 (0.133)	-0.246 (0.155)
Short term hospitals with nutrition programs	-0.016 (0.246)	0.683*** (0.209)	-0.068 (0.173)	-0.247 (0.173)	0.274 (0.179)	0.325 (0.204)
Long term child psychiatric hospitals	-0.033 (0.042)	0.005 (0.036)	-0.017 (0.025)	-0.023 (0.030)	-0.015 (0.033)	0.049 (0.035)
Short term child psychiatric hospitals	-0.187* (0.110)	0.089 (0.084)	-0.004 (0.054)	-0.038 (0.070)	-0.092 (0.088)	0.134 (0.083)
Convenience	-0.000 (0.001)	0.001* (0.000)	-0.001 (0.001)	0.000 (0.000)	0.000 (0.000)	0.001** (0.000)
Fitness	-0.001 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.001 (0.000)	-0.000 (0.000)	0.000 (0.000)
Full service restaurants	-0.011 (0.011)	0.046*** (0.009)	-0.009 (0.007)	0.016* (0.008)	-0.006 (0.008)	0.018* (0.010)
Limited service restaurants	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.001)
Fruit	0.003 (0.003)	-0.006** (0.002)	-0.003 (0.002)	0.002 (0.002)	-0.002 (0.002)	0.001 (0.002)
Dentist	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Park	-0.012 (0.020)	-0.003 (0.017)	0.008 (0.014)	-0.017 (0.014)	-0.023 (0.016)	-0.011 (0.017)

Table E4: Continuing from Previous Page

Variables	Full time work	Part time work	Full time Center based care	Part time Center based care	Full time Home based care	Part time Home based care
Museum	-0.006** (0.003)	0.001 (0.002)	-0.004* (0.002)	0.005** (0.002)	0.001 (0.002)	0.001 (0.003)
Zoo	-0.008 (0.023)	0.014 (0.020)	0.008 (0.016)	-0.019 (0.016)	-0.013 (0.019)	-0.007 (0.019)
Grocery	0.004 (0.007)	-0.005 (0.015)	0.034*** (0.009)	-0.127*** (0.033)	0.001 (0.002)	-0.004 (0.008)
Constant	0.342*** 0.003	0.209*** 0.002	0.092*** (0.002)	0.219*** (0.002)	0.146** (0.002)	0.219*** (0.003)
LR test	366.52***	136.88***	115.02***	92.85***	134.11***	68.74**
p-value	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Sample size for all equations is 23650 which is rounded to the nearest 50 as required by NCES. Degrees of freedom for all regressions is 23.
 * p<0.10 ** p<0.05 *** p<0.01 Results are obtained from multinomial logit models. Base categories are no work (for columns 1 and 2), no center based care (for columns 3 and 4) and no home based care (for columns 5 and 6).

APPENDIX F: ESTIMATION RESULTS FOR SPECIFICATION 1

Table F1: Estimation Results of Production Functions for Cognitive Achievement (Specification 1)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[25]	(2)[26]
Cognitive achievement	0.267*** (0.007)	0.259*** (0.007)	0.239*** (0.007)	-0.039*** (0.008)	-0.045*** (0.008)	-0.055*** (0.008)	0.135 (0.108)	0.278*** (0.083)
Behavior	-0.065*** (0.019)	-0.064*** (0.019)	-0.061*** (0.019)	-0.084*** (0.022)	-0.081*** (0.022)	-0.083*** (0.022)	-0.055 (0.169)	-0.131*** (0.045)
Ear infection	-0.035*** (0.007)	-0.025*** (0.007)	-0.021*** (0.007)	0.030*** (0.008)	0.034*** (0.008)	0.035*** (0.008)	-0.107 (0.150)	0.058 (0.088)
Respiratory illness	0.017 (0.013)	0.013 (0.013)	0.008 (0.013)	0.029* (0.016)	0.029* (0.016)	0.027* (0.016)	0.105 (0.253)	-0.122 (0.242)
University degree	-0.015 (0.019)	-0.019 (0.019)	-0.008 (0.019)	0.030 (0.024)	0.031 (0.024)	0.035 (0.024)	0.497 (0.585)	-0.292* (0.174)
Sibling	0.413*** (0.018)	0.380*** (0.018)	0.314*** (0.019)	0.043 (0.051)	0.041 (0.051)	0.046 (0.050)	-0.362 (0.305)	0.147 (0.292)
Married	-0.071*** (0.006)	-0.068*** (0.006)	-0.080*** (0.006)	-0.048*** (0.016)	-0.046*** (0.016)	-0.048*** (0.016)	-0.520*** (0.145)	-0.202*** (0.078)
Hhincomenet	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000*** (0.000)	0.000** (0.000)
Missing hincomenet	0.136*** (0.029)	0.132*** (0.029)	0.116*** (0.029)	0.066* (0.034)	0.069** (0.034)	0.068** (0.034)	0.510** (0.206)	0.582*** (0.224)
Time2	0.045*** (0.015)	0.043*** (0.016)	0.087*** (0.020)	0.072*** (0.014)	0.086*** (0.015)	0.109*** (0.030)	0.086** (0.040)	0.084 (0.094)
Time4	0.042*** (0.013)	0.047*** (0.014)	-0.395*** (0.026)	0.030** (0.014)	0.025* (0.014)	-0.374*** (0.049)	-0.349*** (0.095)	-0.345*** (0.105)

Table F1: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[25]	(2)[26]
Time5	0.374*** (0.020)	0.377*** (0.021)	-0.205*** (0.041)	0.485*** (0.022)	0.481*** (0.023)	-0.086 (0.072)	0.117 (0.151)	0.129 (0.163)
Missing home quality		-0.013 (0.063)	-0.034 (0.063)		0.055 (0.067)	0.039 (0.067)		-1.890 (1.157)
Missing in-home quality		0.104 (0.105)	0.084 (0.102)		0.083 (0.119)	0.093 (0.115)		5.386** (2.710)
Use in-home care		0.007 (0.030)	0.009 (0.030)		0.072** (0.031)	0.067** (0.031)		0.309 (0.485)
Use out-of-home care		-0.015 (0.017)	-0.020 (0.017)		0.030* (0.018)	0.023 (0.018)		-0.229 (0.223)
Missing out-of-home quality		-0.058 (0.035)	-0.068* (0.035)		-0.093** (0.040)	-0.100** (0.039)		-1.746*** (0.617)
Age24			-0.466 (0.600)			-1.260** (0.595)	-0.225 (0.627)	0.137 (0.840)
Age48			-0.402 (0.599)			-1.297** (0.594)	-0.256 (0.624)	0.133 (0.837)
Age60			0.063 (0.599)			-0.930 (0.593)	-0.050 (0.624)	0.368 (0.836)
Age72			0.137 (0.598)			-0.882 (0.592)	-0.061 (0.618)	0.271 (0.831)
Agemom			0.008*** (0.001)			0.043** (0.019)	0.041*** (0.011)	0.012* (0.007)
Male			-0.157*** (0.014)				-0.192*** (0.035)	-0.157*** (0.029)
Black child			-0.159*** (0.019)				-0.264** (0.114)	-0.278*** (0.102)

Table F1: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[25]	(2)[26]
Hispanic child			-0.235*** (0.018)				-0.270*** (0.054)	-0.209*** (0.048)
Urban			0.017 (0.020)			-0.033 (0.041)	0.017 (0.036)	0.012 (0.038)
Region1			-0.016 (0.023)			-0.097 (0.120)	-0.079 (0.049)	-0.063 (0.046)
Region2			-0.084*** (0.020)			-0.131 (0.085)	-0.094** (0.041)	-0.087** (0.041)
Region3			-0.064*** (0.018)			-0.087 (0.076)	-0.187*** (0.060)	-0.120*** (0.045)
Office			0.002 (0.002)			-0.001 (0.005)	0.005 (0.004)	-0.001 (0.004)
Short term hospitals with child/adoles. service			-1.855* (1.033)			0.937 (1.788)	-1.608 (1.639)	-0.654 (1.489)
Short term child wellness hospitals			-0.128 (0.559)			-0.017 (0.901)	-1.302 (0.901)	0.703 (0.933)
Total number of hospitals			-0.796** (0.311)			0.110 (0.631)	-0.511 (0.617)	-0.922* (0.504)
Short term hospitals with nutrition programs			0.503 (0.421)			0.695 (0.576)	1.385** (0.619)	0.912 (0.652)
Long term child psychiatric hospitals			-0.127 (0.092)			-0.310** (0.148)	-0.054 (0.149)	-0.034 (0.143)
Short term child psychiatric hospitals			-0.227 (0.182)			0.271 (0.209)	-0.280 (0.277)	-0.043 (0.254)

Table F1: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[25]	(2)[26]
Convenience			-0.001 (0.001)			-0.010*** (0.002)	-0.001 (0.001)	-0.000 (0.001)
Fitness			0.001* (0.001)			0.002 (0.002)	0.001 (0.002)	0.002 (0.001)
Full service restaurants			0.027 (0.023)			-0.026 (0.054)	-0.019 (0.038)	-0.011 (0.035)
Limited service restaurants			0.000* (0.000)			0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Fruit			0.000 (0.006)			0.006 (0.017)	-0.010 (0.010)	-0.004 (0.009)
Dentist			-0.001* (0.000)			-0.000 (0.001)	-0.001 (0.000)	-0.001 (0.000)
Park			0.035 (0.036)			0.200*** (0.059)	0.085 (0.066)	0.028 (0.050)
Museum			-0.007 (0.005)			-0.014 (0.010)	-0.003 (0.009)	-0.000 (0.008)
Zoo			-0.103** (0.044)			-0.153* (0.090)	-0.135* (0.080)	-0.051 (0.063)
Grocery			0.003*** (0.001)			0.095 (0.062)	0.003 (0.002)	0.000 (0.001)
Constant	-0.277*** (0.018)	-0.266*** (0.019)	0.209 (0.600)	0.012 (0.035)	-0.009 (0.035)	0.101 (0.852)	-0.731 (0.628)	-0.495 (0.839)

Notes: Sample size is 20850 and rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates.
 * p<0.10 ** p<0.05 *** p<0.01 Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old;
 age 48 is 1 if the child age is (24≥ & <48); Age60 is 1 if the child's age is (≥48 & <60); Age72 is 1 if the child's age is (≥60 & <72) and the
 reference category: child's age is ≥72. Numbers in square brackets [.] show GMM model number.

Table F2: Estimation Results of Production Functions for Obesity (Specification 1)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[27]	(2)[28]
Obese	0.372*** (0.012)	0.372*** (0.012)	0.371*** (0.012)	-0.154*** (0.012)	-0.155*** (0.012)	-0.153*** (0.012)	0.041* (0.024)	0.037 (0.025)
Cognitive achievement	-0.002 (0.003)	-0.002 (0.003)	-0.000 (0.003)	-0.010*** (0.003)	-0.010*** (0.003)	-0.011*** (0.003)	0.002 (0.005)	0.006 (0.005)
Behavior	-0.002 (0.003)	-0.002 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.005 (0.003)	-0.004 (0.005)	-0.014** (0.006)
Ear infection	0.005 (0.005)	0.005 (0.005)	0.005 (0.005)	-0.003 (0.007)	-0.003 (0.007)	-0.003 (0.007)	-0.017 (0.046)	-0.030 (0.045)
Respiratory illness	0.001 (0.007)	0.002 (0.007)	0.002 (0.007)	-0.012 (0.010)	-0.012 (0.010)	-0.011 (0.010)	-0.043 (0.077)	-0.003 (0.072)
University degree	-0.035*** (0.006)	-0.034*** (0.006)	-0.033*** (0.006)	-0.022 (0.018)	-0.022 (0.018)	-0.020 (0.018)	-0.264*** (0.064)	-0.065** (0.031)
Sibling	-0.007*** (0.002)	-0.007*** (0.002)	-0.009*** (0.002)	-0.019*** (0.007)	-0.020*** (0.007)	-0.019*** (0.007)	0.003 (0.013)	0.013 (0.012)
Married	-0.027*** (0.006)	-0.026*** (0.006)	-0.028*** (0.007)	0.010 (0.014)	0.009 (0.014)	0.009 (0.014)	-0.042 (0.070)	-0.133* (0.068)
Hhincomenet	0.372*** (0.012)	0.372*** (0.012)	0.371*** (0.012)	-0.154*** (0.012)	-0.155*** (0.012)	-0.153*** (0.012)	0.041* (0.024)	0.037 (0.025)
Missing hincomenet	-0.002 (0.003)	-0.002 (0.003)	-0.000 (0.003)	-0.010*** (0.003)	-0.010*** (0.003)	-0.011*** (0.003)	0.002 (0.005)	0.006 (0.005)
Time2	-0.002 (0.003)	-0.002 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.005 (0.003)	-0.004 (0.005)	-0.014** (0.006)
Time4	-0.026*** (0.006)	-0.025*** (0.006)	-0.009 (0.012)	-0.000 (0.006)	0.001 (0.006)	-0.020 (0.020)	-0.016 (0.016)	-0.011 (0.018)

Table F2: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[27]	(2)[28]
Time5	-0.029*** (0.008)	-0.028*** (0.008)	-0.023 (0.019)	-0.009 (0.009)	-0.008 (0.010)	-0.037 (0.031)	-0.037 (0.026)	-0.031 (0.028)
Missing home quality		-0.036* (0.021)	-0.035 (0.021)		-0.040 (0.027)	-0.038 (0.027)		0.052 (0.188)
Missing in-home quality		-0.015 (0.051)	-0.015 (0.051)		-0.008 (0.050)	-0.002 (0.051)		0.324 (0.317)
Use in-home care		0.007 (0.013)	0.005 (0.013)		0.006 (0.013)	0.005 (0.013)		0.070 (0.127)
Use out-of-home care		-0.000 (0.007)	-0.000 (0.007)		-0.004 (0.008)	-0.003 (0.008)		-0.012 (0.033)
Missing out-of-home quality		0.007 (0.014)	0.009 (0.014)		0.011 (0.014)	0.010 (0.014)		0.242* (0.127)
Age24			0.127*** (0.023)			0.082** (0.032)	0.147* (0.075)	0.217*** (0.057)
Age48			0.094*** (0.020)			0.048 (0.030)	0.113 (0.074)	0.181*** (0.055)
Age60			0.085*** (0.016)			0.039* (0.024)	0.109 (0.072)	0.168*** (0.052)
Age72			0.105*** (0.014)			0.032 (0.021)	0.121* (0.070)	0.183*** (0.048)
Agemom			0.001*** (0.000)			0.017** (0.008)	0.004*** (0.002)	0.003** (0.002)
Male			0.023*** (0.005)				0.031*** (0.007)	0.030*** (0.007)
Black child			0.010 (0.008)				-0.033 (0.026)	-0.074*** (0.026)

Table F2: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[27]	(2)[28]
Hispanic child			0.033*** (0.007)				0.008 (0.013)	-0.001 (0.014)
Urban			-0.019** (0.008)			-0.012 (0.015)	-0.003 (0.011)	-0.008 (0.010)
Region1			0.009 (0.008)			-0.009 (0.043)	0.026** (0.012)	0.020* (0.012)
Region2			-0.001 (0.007)			-0.041 (0.032)	0.007 (0.011)	-0.003 (0.011)
Region3			-0.003 (0.007)			-0.018 (0.031)	0.008 (0.010)	0.005 (0.010)
Office			0.000 (0.001)			0.000 (0.002)	0.002 (0.001)	0.001 (0.001)
Short term hospitals with child/adoles. service			-0.101 (0.432)			0.213 (0.827)	-0.233 (0.543)	0.004 (0.554)
Short term child wellness hospitals			-0.056 (0.249)			0.607 (0.560)	0.173 (0.282)	0.113 (0.301)
Total number of hospitals			0.142 (0.147)			-0.304 (0.276)	0.125 (0.181)	0.006 (0.176)
Short term hospitals with nutrition programs			-0.166 (0.181)			-0.011 (0.267)	-0.323 (0.258)	-0.290 (0.244)
Long term child psychiatric hospitals			-0.074*** (0.020)			-0.127** (0.059)	-0.052* (0.028)	-0.065** (0.026)
Short term child psychiatric hospitals			-0.127** (0.057)			-0.108* (0.066)	-0.053 (0.065)	-0.062 (0.064)

Table F2: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[27]	(2)[28]
Convenience			0.000 (0.001)			-0.000 (0.003)	0.000 (0.001)	-0.000 (0.001)
Fitness			0.000 (0.000)			-0.000 (0.001)	0.000 (0.001)	0.000 (0.001)
Full service restaurants			0.002 (0.009)			-0.000 (0.022)	0.014 (0.012)	0.008 (0.012)
Limited service restaurants			-0.000 (0.000)			0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Fruit			-0.006*** (0.002)			-0.004 (0.006)	-0.009*** (0.003)	-0.009*** (0.003)
Dentist			-0.000 (0.000)			-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Park			0.025 (0.016)			0.056* (0.032)	0.006 (0.018)	0.001 (0.021)
Museum			0.000 (0.002)			-0.002 (0.005)	0.002 (0.004)	0.002 (0.004)
Zoo			0.007 (0.017)			0.025 (0.035)	0.005 (0.020)	0.026 (0.021)
Grocery			0.001*** (0.000)			-0.011 (0.013)	0.001 (0.000)	0.001 (0.001)
Constant	0.153*** (0.007)	0.152*** (0.007)	-0.002 (0.027)	0.209*** (0.015)	0.211*** (0.015)	-0.339 (0.247)	-0.118 (0.073)	-0.145*** (0.054)

Notes: Sample size is 20400 and rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates.
 * p<0.10 ** p<0.05 *** p<0.01 Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old; age 48 is 1 if the child age is (24≥ & <48); Age60 is 1 if the child's age is (≥48 & <60); Age72 is 1 if the child's age is (≥60 & <72) and the reference category: child's age is ≥72. Numbers in square brackets [.] show GMM model number.

Table F3: Estimation Results of Production functions for Being Overweight (Specification 1)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[29]	(2)[30]
Oweight	0.385*** (0.009)	0.385*** (0.009)	0.384*** (0.009)	-0.174*** (0.010)	-0.174*** (0.010)	-0.171*** (0.010)	0.013 (0.055)	0.108 (0.108)
Cognitive achievement	0.003 (0.003)	0.003 (0.003)	0.006* (0.003)	-0.007* (0.004)	-0.007* (0.004)	-0.005 (0.004)	-0.012 (0.012)	0.012 (0.013)
Behavior	-0.009*** (0.003)	-0.010*** (0.004)	-0.012*** (0.004)	-0.012*** (0.004)	-0.012*** (0.004)	-0.013*** (0.004)	-0.011 (0.017)	-0.034* (0.020)
Ear infection	0.007 (0.006)	0.007 (0.006)	0.008 (0.006)	-0.005 (0.008)	-0.004 (0.008)	-0.003 (0.008)	-0.015 (0.034)	-0.014 (0.042)
Respiratory illness	0.012 (0.009)	0.012 (0.009)	0.013 (0.009)	-0.010 (0.012)	-0.010 (0.012)	-0.011 (0.012)	0.087** (0.044)	0.031 (0.069)
University degree	-0.043*** (0.008)	-0.040*** (0.008)	-0.036*** (0.008)	-0.011 (0.023)	-0.010 (0.023)	-0.010 (0.023)	-0.049 (0.034)	-0.015 (0.034)
Sibling	-0.003 (0.003)	-0.003 (0.003)	-0.004 (0.003)	-0.008 (0.008)	-0.008 (0.008)	-0.007 (0.008)	0.004 (0.013)	0.015 (0.013)
Married	-0.036*** (0.008)	-0.035*** (0.008)	-0.036*** (0.008)	0.010 (0.017)	0.009 (0.017)	0.009 (0.017)	-0.247*** (0.071)	-0.302*** (0.080)
Hhincomenet	-0.000** (0.000)	-0.000* (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Missing hincomenet	-0.000 (0.015)	0.000 (0.015)	0.003 (0.015)	0.013 (0.017)	0.012 (0.017)	0.013 (0.017)	0.131 (0.108)	0.092 (0.117)
Time2	-0.043*** (0.008)	-0.040*** (0.008)	-0.075*** (0.011)	-0.113*** (0.006)	-0.109*** (0.007)	-0.137*** (0.014)	-0.115*** (0.011)	-0.092*** (0.024)
Time4	-0.036*** (0.007)	-0.038*** (0.008)	0.008 (0.015)	0.011 (0.007)	0.008 (0.007)	0.048* (0.025)	0.015 (0.018)	0.020 (0.022)

Table F3: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[29]	(2)[30]
Time5	-0.046*** (0.010)	-0.048*** (0.011)	0.011 (0.022)	0.006 (0.012)	0.001 (0.012)	0.071* (0.036)	0.013 (0.028)	0.033 (0.034)
Missing home quality		0.040 (0.031)	0.041 (0.031)		0.012 (0.034)	0.015 (0.034)		0.052 (0.238)
Missing in-home quality		0.009 (0.050)	0.012 (0.051)		0.009 (0.055)	0.008 (0.054)		0.602 (0.375)
Use in-home care		0.008 (0.016)	0.005 (0.016)		0.003 (0.015)	0.001 (0.015)		0.073 (0.126)
Use out-of-home care		0.009 (0.009)	0.009 (0.009)		0.015* (0.009)	0.016* (0.009)		0.049 (0.036)
Missing out-of-home quality		-0.012 (0.019)	-0.010 (0.018)		-0.014 (0.020)	-0.014 (0.020)		-0.087 (0.123)
Age24			0.319*** (0.038)			0.608*** (0.203)	0.443*** (0.086)	0.475*** (0.101)
Age48			0.261*** (0.035)			0.561*** (0.203)	0.406*** (0.086)	0.422*** (0.103)
Age60			0.232*** (0.032)			0.538*** (0.201)	0.398*** (0.084)	0.386*** (0.103)
Age72			0.221*** (0.031)			0.509** (0.201)	0.392*** (0.084)	0.368*** (0.102)
Agemom			0.001 (0.001)			-0.001 (0.010)	0.004*** (0.002)	0.005*** (0.002)
Male			0.022*** (0.006)				0.026*** (0.010)	0.027*** (0.010)

Table F3: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[29]	(2)[30]
Black child			0.001 (0.009)				-0.068** (0.029)	-0.106*** (0.029)
Hispanic child			0.043*** (0.009)				0.037** (0.017)	0.006 (0.017)
Urban			-0.017* (0.009)			0.020 (0.021)	-0.019 (0.013)	-0.017 (0.013)
Office			0.001 (0.001)			0.005* (0.003)	0.002 (0.002)	0.002 (0.001)
Short term hospitals with child/adoles. service			0.348 (0.514)			0.111 (0.957)	0.484 (0.646)	0.578 (0.689)
Short term child wellness hospitals			0.199 (0.330)			0.371 (0.490)	0.444 (0.378)	0.509 (0.394)
Total number of hospitals			0.447*** (0.161)			0.249 (0.406)	0.505** (0.218)	0.370* (0.212)
Short term hospitals with nutrition programs			-0.491** (0.222)			-0.328 (0.313)	-0.553* (0.289)	-0.578** (0.285)
Long term child psychiatric hospitals			-0.038 (0.035)			0.003 (0.077)	-0.056 (0.059)	-0.049 (0.054)
Short term child psychiatric hospitals			-0.231** (0.100)			-0.210 (0.135)	-0.279 (0.190)	-0.280* (0.146)
Convenience			0.001 (0.001)			-0.001 (0.002)	0.001 (0.001)	0.000 (0.001)

Table F3: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[29]	(2)[30]
Fitness			0.001** (0.000)			-0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Full service restaurants			-0.006 (0.011)			-0.016 (0.023)	-0.003 (0.014)	0.003 (0.014)
Limited service restaurants			-0.000 (0.000)			0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Fruit			-0.005* (0.003)			-0.016*** (0.006)	-0.006 (0.004)	-0.008** (0.003)
Dentist			-0.000** (0.000)			-0.000 (0.000)	-0.000* (0.000)	-0.000 (0.000)
Park			0.006 (0.018)			0.012 (0.033)	-0.006 (0.023)	-0.012 (0.023)
Museum			-0.005** (0.003)			0.004 (0.006)	-0.005 (0.004)	-0.006* (0.003)
Zoo			0.021 (0.020)			0.020 (0.038)	0.020 (0.027)	0.045* (0.027)
Grocery			0.001*** (0.000)			0.049*** (0.015)	0.003*** (0.000)	0.002*** (0.000)
Constant	0.265*** (0.009)	0.262*** (0.010)	-0.051 (0.041)	0.379*** (0.018)	0.378*** (0.018)	-0.207 (0.362)	-0.092 (0.081)	-0.148 (0.092)

Notes: Sample size is 20400 and rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates.

* p<0.10 ** p<0.05 *** p<0.01 Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old; age 48 is 1 if the child age is (24≥ & <48); Age60 is 1 if the child's age is (≥48 & <60); Age72 is 1 if the child's age is (≥60 & <72) and the reference category: child's age is ≥72. Numbers in square brackets [.] show GMM model number.

Table F4: Estimation Results of Production Functions for General Health Status (Specification 1)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[31]	(2)[32]
General health	0.227*** (0.010)	0.223*** (0.010)	0.219*** (0.010)	-0.248*** (0.010)	-0.248*** (0.010)	-0.249*** (0.010)	0.093*** (0.018)	0.098*** (0.017)
Behavior	-0.019*** (0.003)	-0.016*** (0.003)	-0.016*** (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.058*** (0.016)	-0.005 (0.005)
Ear infection	-0.036*** (0.005)	-0.037*** (0.005)	-0.039*** (0.005)	-0.028*** (0.006)	-0.028*** (0.006)	-0.028*** (0.006)	0.013 (0.055)	0.012 (0.040)
Respiratory illness	-0.085*** (0.008)	-0.087*** (0.008)	-0.089*** (0.008)	-0.055*** (0.010)	-0.055*** (0.010)	-0.056*** (0.010)	-0.015 (0.057)	-0.024 (0.050)
University degree	0.030*** (0.005)	0.020*** (0.005)	0.013** (0.006)	0.011 (0.018)	0.010 (0.018)	0.011 (0.018)	0.169*** (0.054)	0.055* (0.029)
Sibling	-0.003 (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.005 (0.006)	-0.005 (0.006)	-0.005 (0.006)	0.083*** (0.021)	0.060*** (0.019)
Married	0.021*** (0.006)	0.018*** (0.006)	0.010* (0.006)	-0.003 (0.014)	-0.002 (0.014)	-0.003 (0.014)	0.034 (0.063)	0.097* (0.051)
Hhincomenet	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Missing hincomenet	0.011 (0.011)	0.008 (0.011)	0.006 (0.011)	0.011 (0.014)	0.010 (0.014)	0.010 (0.014)	-0.059 (0.044)	-0.053 (0.047)
Time2	0.008 (0.005)	0.012** (0.006)	0.015** (0.007)	0.011** (0.005)	0.012** (0.005)	0.008 (0.011)	0.010 (0.009)	0.034** (0.016)
Time4	-0.009 (0.006)	-0.012* (0.006)	0.006 (0.011)	-0.002 (0.006)	-0.002 (0.006)	0.024 (0.019)	0.021 (0.016)	0.005 (0.016)
Time5	-0.034*** (0.009)	-0.036*** (0.009)	-0.003 (0.017)	-0.017* (0.010)	-0.017* (0.010)	0.024 (0.028)	0.033 (0.024)	0.004 (0.024)

Table F4: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[31]	(2)[32]
Missing home quality		-0.006 (0.023)	-0.006 (0.024)		-0.027 (0.028)	-0.022 (0.028)		-0.174 (0.269)
		0.006 (0.039)	0.007 (0.039)		-0.027 (0.040)	-0.030 (0.040)		0.695 (0.458)
Missing in-home quality		0.019* (0.011)	0.019* (0.011)		0.012 (0.012)	0.013 (0.012)		0.069 (0.095)
Use in-home care		0.010 (0.011)	0.007 (0.011)		0.000 (0.012)	0.000 (0.012)		0.050* (0.100)
Use out-of-home care		-0.007 (0.015)	-0.006 (0.015)		0.010 (0.017)	0.010 (0.017)		0.100 (0.148)
Missing out-of-home quality			0.059 (0.116)			0.002 (0.128)	0.075 (0.046)	0.022 (0.044)
Age24			0.064 (0.116)			0.012 (0.128)	0.071 (0.045)	0.026 (0.043)
Age48			0.043 (0.115)			0.000 (0.127)	0.051 (0.041)	0.012 (0.041)
Age60			0.024 (0.114)			-0.006 (0.126)	0.020 (0.039)	-0.004 (0.039)
Age72			0.000 (0.000)			-0.009 (0.008)	-0.008*** (0.002)	-0.007*** (0.002)
Agemom			-0.015*** (0.005)				-0.009 (0.007)	-0.019*** (0.006)
Male			-0.024*** (0.007)				-0.011 (0.021)	0.016 (0.020)
Black child			-0.052*** (0.007)				-0.044*** (0.011)	-0.035*** (0.011)
Hispanic child								

Table F4: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[31]	(2)[32]
Urban			-0.006 (0.007)			-0.006 (0.015)	-0.005 (0.009)	-0.003 (0.009)
Region1			0.008 (0.008)			0.005 (0.038)	0.015 (0.011)	0.008 (0.010)
Region2			0.006 (0.007)			-0.004 (0.031)	-0.009 (0.010)	-0.010 (0.009)
Region3			0.007 (0.006)			0.000 (0.029)	0.002 (0.009)	0.000 (0.009)
Office			0.001 (0.001)			0.003 (0.002)	0.002* (0.001)	0.002* (0.001)
Short term hospitals with child/adoles. service			0.607* (0.346)			0.362 (0.689)	0.872** (0.396)	0.615 (0.398)
Short term child wellness hospitals			-0.272 (0.277)			-0.207 (0.365)	0.200 (0.314)	0.204 (0.323)
Total number of hospitals			-0.024 (0.124)			0.386 (0.262)	-0.169 (0.143)	-0.117 (0.145)
Short term hospitals with nutrition programs			0.117 (0.180)			0.075 (0.259)	-0.039 (0.203)	-0.059 (0.204)
Long term child psychiatric hospitals			0.023 (0.029)			-0.020 (0.054)	0.062** (0.029)	0.076*** (0.026)
Short term child psychiatric hospitals			0.062 (0.065)			0.027 (0.083)	0.058 (0.045)	0.110*** (0.042)

Table F4: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[31]	(2)[32]
Convenience			0.000 (0.000)			-0.000 (0.001)	0.000 (0.000)	0.001 (0.000)
Fitness			-0.001** (0.000)			-0.002*** (0.001)	-0.000 (0.000)	-0.000 (0.000)
Full service restaurants			-0.005 (0.008)			0.001 (0.022)	0.012 (0.010)	0.010 (0.010)
Limited service restaurants			0.000 (0.000)			0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)
Fruit			-0.004* (0.002)			-0.008* (0.005)	-0.003 (0.003)	-0.003 (0.003)
Dentist			0.000 (0.000)			0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Park			-0.020 (0.015)			-0.025 (0.025)	-0.008 (0.017)	-0.003 (0.017)
Museum			-0.000 (0.002)			-0.003 (0.004)	0.000 (0.002)	-0.000 (0.002)
Zoo			0.030* (0.017)			0.067** (0.030)	0.022 (0.022)	0.012 (0.022)
Grocery			0.000*** (0.000)			-0.004 (0.011)	0.000 (0.000)	0.000 (0.000)
Constant	0.648*** (0.011)	0.652*** (0.011)	0.623*** (0.117)	1.089*** (0.016)	1.088*** (0.016)	1.337*** (0.264)	0.778*** (0.060)	0.783*** (0.054)

Notes: Sample size is 23650 and rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates.
 * p<0.10 ** p<0.05 *** p<0.01 Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old; age 48 is 1 if the child age is (24≥ & <48); Age60 is 1 if the child's age is (≥48 & <60); Age72 is 1 if the child's age is (≥60 & <72) and the reference category: child's age is ≥72. Numbers in square brackets [.] show GMM model number.

Table F5: Estimation Results of Production functions for Behavior Problems (Specification 1)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[33]	(2)[34]
Behavior	0.276*** (0.012)	0.268*** (0.012)	0.259*** (0.012)	-0.131*** (0.010)	-0.132*** (0.010)	-0.132*** (0.010)	0.311*** (0.086)	0.655*** (0.054)
Cognitive achievement	-0.055*** (0.008)	-0.042*** (0.008)	-0.036*** (0.008)	0.035*** (0.009)	0.036*** (0.009)	0.036*** (0.010)	0.014 (0.053)	0.125*** (0.048)
Overweight	-0.009 (0.016)	-0.012 (0.016)	-0.015 (0.016)	0.019 (0.020)	0.017 (0.020)	0.018 (0.020)	0.043 (0.106)	0.128 (0.108)
Ear infection	0.034** (0.014)	0.041*** (0.014)	0.035** (0.014)	0.025 (0.018)	0.025 (0.018)	0.026 (0.018)	0.233 (0.159)	0.413** (0.184)
Respiratory illness	0.022 (0.021)	0.029 (0.020)	0.020 (0.020)	-0.032 (0.027)	-0.031 (0.027)	-0.030 (0.027)	-0.972*** (0.299)	-1.256*** (0.285)
University degree	-0.118*** (0.016)	-0.073*** (0.016)	-0.078*** (0.017)	0.016 (0.051)	0.016 (0.051)	0.015 (0.051)	0.158 (0.247)	0.312 (0.233)
Sibling	0.034*** (0.006)	0.031*** (0.006)	0.035*** (0.007)	0.057*** (0.020)	0.056*** (0.020)	0.054*** (0.020)	0.077 (0.073)	0.143* (0.077)
Married	-0.092*** (0.016)	-0.077*** (0.016)	-0.085*** (0.017)	-0.046 (0.038)	-0.048 (0.038)	-0.046 (0.038)	-0.027 (0.129)	-0.025 (0.123)
Hhincomenet	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000** (0.000)	-0.000*** (0.000)
Missing hincomenet	-0.104*** (0.033)	-0.096*** (0.033)	-0.092*** (0.033)	-0.116*** (0.041)	-0.118*** (0.041)	-0.115*** (0.041)	-0.211 (0.152)	-0.113 (0.182)
Time2	0.012 (0.017)	0.017 (0.018)	-0.000 (0.023)	-0.005 (0.015)	-0.008 (0.016)	-0.002 (0.034)	-0.023 (0.032)	0.193** (0.092)
Time4	-0.037** (0.015)	-0.042*** (0.015)	-0.041 (0.032)	-0.026* (0.015)	-0.026* (0.016)	-0.038 (0.056)	-0.025 (0.059)	-0.149 (0.094)

Table F5: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[33]	(2)[34]
Time5	-0.132*** (0.022)	-0.134*** (0.023)	-0.138*** (0.048)	-0.156*** (0.025)	-0.157*** (0.025)	-0.153* (0.083)	-0.238** (0.095)	-0.398*** (0.142)
Missing home quality		0.038 (0.061)	0.048 (0.061)		-0.047 (0.077)	-0.054 (0.078)		-0.072 (0.922)
Missing in-home quality		0.060 (0.131)	0.060 (0.133)		0.020 (0.174)	0.013 (0.174)		0.137 (1.566)
Use in-home care		-0.028 (0.032)	-0.034 (0.032)		-0.036 (0.034)	-0.034 (0.034)		0.557 (0.387)
Use out-of-home care		0.031 (0.019)	0.024 (0.019)		0.006 (0.020)	0.007 (0.020)		0.646*** (0.244)
Missing out-of-home quality		-0.020 (0.043)	-0.016 (0.043)		-0.026 (0.044)	-0.028 (0.044)		0.420 (0.480)
Age24			-0.473*** (0.120)			0.326** (0.157)	-0.575** (0.225)	-0.699* (0.358)
Age48			-0.501*** (0.117)			0.312** (0.154)	-0.575*** (0.222)	-0.690* (0.353)
Age60			-0.489*** (0.112)			0.305** (0.146)	-0.523** (0.217)	-0.705** (0.351)
Age72			-0.492*** (0.110)			0.276* (0.144)	-0.457** (0.212)	-0.582* (0.348)
Agemom			0.000 (0.001)			0.010 (0.023)	-0.010 (0.008)	-0.012* (0.007)
Male			0.265*** (0.013)				0.286*** (0.025)	0.211*** (0.022)
Black child			-0.018 (0.021)				0.090 (0.061)	0.081 (0.062)

Table F5: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[33]	(2)[34]
Hispanic child			-0.017 (0.018)				0.054 (0.039)	0.007 (0.037)
Urban			0.022 (0.020)			-0.058 (0.046)	-0.015 (0.032)	-0.027 (0.033)
Region1			-0.002 (0.022)			-0.080 (0.130)	-0.013 (0.033)	-0.040 (0.036)
Region2			0.023 (0.019)			-0.032 (0.091)	0.027 (0.031)	0.016 (0.033)
Region3			0.027 (0.018)			0.081 (0.082)	0.064** (0.030)	0.048 (0.035)
Office			0.001 (0.002)			0.009 (0.008)	0.004 (0.003)	0.003 (0.003)
Short term hospitals with child/adoles. service			0.777 (1.039)			-4.370** (2.033)	0.393 (1.364)	-0.327 (1.443)
Short term child wellness hospitals			0.489 (0.633)			-1.062 (1.245)	0.905 (0.749)	0.577 (0.852)
Total number of hospitals			0.102 (0.325)			-0.285 (0.664)	0.239 (0.441)	-0.011 (0.436)
Short term hospitals with nutrition programs			0.300 (0.480)			1.056 (0.717)	0.284 (0.587)	0.141 (0.719)
Long term child psychiatric hospitals			-0.026 (0.085)			0.200 (0.157)	-0.126 (0.113)	-0.095 (0.128)
Short term child psychiatric hospitals			0.171 (0.254)			-0.035 (0.343)	0.510 (0.357)	0.574 (0.391)

Table F5: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[33]	(2)[34]
Convenience			0.001 (0.001)			0.003 (0.003)	0.001 (0.001)	0.001 (0.002)
Fitness			-0.001 (0.001)			0.002 (0.002)	-0.001 (0.001)	-0.000 (0.001)
Full service restaurants			0.031 (0.023)			0.019 (0.062)	0.008 (0.030)	0.027 (0.032)
Limited service restaurants			-0.000 (0.000)			-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Fruit			-0.004 (0.006)			-0.003 (0.014)	-0.001 (0.008)	0.001 (0.008)
Dentist			0.000 (0.000)			0.000 (0.001)	0.000 (0.000)	0.000 (0.000)
Park			-0.052 (0.035)			-0.052 (0.070)	-0.059 (0.047)	-0.070 (0.056)
Museum			0.000			-0.014	-0.007	-0.007
Zoo			0.087** (0.042)			-0.053 (0.095)	0.062 (0.057)	0.063 (0.063)
Grocery			0.004*** (0.000)			0.002 (0.067)	0.003*** (0.001)	0.001 (0.001)
Constant	0.057*** (0.020)	0.039* (0.020)	0.328*** (0.124)	-0.065 (0.040)	-0.060 (0.040)	-0.638 (0.716)	0.584** (0.267)	0.664* (0.383)

Notes: Sample size is 21050 and rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates.
 * p<0.10 ** p<0.05 *** p<0.01 Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old;
 age 48 is 1 if the child age is (24≥ & <48); Age60 is 1 if the child's age is (≥48 & <60); Age72 is 1 if the child's age is (≥60 & <72) and the
 reference category: child's age is ≥72. Numbers in square brackets [.] show GMM model number.

Table F6: Estimation Results of the Ear Infection Equation (Specification 1)

	RE Model			FE Model			GMM Model		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[19]	(2)[20]	(3)[21]
General health	-0.057*** (0.009)	-0.057*** (0.009)	-0.060*** (0.009)	-0.011 (0.011)	-0.011 (0.011)	-0.011 (0.011)	-0.009 (0.020)	-0.021 (0.015)	-0.022 (0.015)
University degree	0.005 (0.009)	0.005 (0.009)	-0.003 (0.009)	-0.038 (0.024)	-0.037 (0.024)	-0.037 (0.024)	-0.117 (0.086)	-0.096*** (0.031)	-0.177* (0.094)
Sibling	-0.009*** (0.003)	-0.010*** (0.003)	-0.008** (0.003)	-0.001 (0.008)	-0.002 (0.008)	-0.001 (0.008)	0.057** (0.025)	0.031** (0.016)	0.037 (0.032)
Married	0.018** (0.008)	0.018** (0.008)	-0.005 (0.009)	0.009 (0.018)	0.010 (0.018)	0.009 (0.018)	-0.030 (0.036)	-0.031 (0.028)	-0.041 (0.029)
Hhincomenet	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000** (0.000)	0.000** (0.000)
Missing hincomenet	0.014 (0.015)	0.015 (0.015)	0.016 (0.015)	0.033* (0.018)	0.035** (0.018)	0.035** (0.018)	-0.026 (0.069)	-0.026 (0.051)	0.022 (0.061)
Time3	-0.074*** (0.006)	-0.071*** (0.007)	-0.090*** (0.009)	-0.075*** (0.007)	-0.065*** (0.007)	-0.057*** (0.015)	-0.121*** (0.012)	-0.112*** (0.020)	-0.130*** (0.014)
Time4	-0.243*** (0.008)	-0.237*** (0.009)	-0.293*** (0.018)	-0.235*** (0.009)	-0.215*** (0.010)	-0.197*** (0.037)	-0.362*** (0.026)	-0.320*** (0.032)	-0.364*** (0.033)
Time5	-0.276*** (0.011)	-0.270*** (0.012)	-0.351*** (0.024)	-0.277*** (0.013)	-0.256*** (0.014)	-0.247*** (0.047)	-0.427*** (0.031)	-0.371*** (0.038)	-0.425*** (0.043)
Missing in-home quality		0.001 (0.051)	-0.000 (0.051)		0.006 (0.055)	0.003 (0.056)		0.460 (0.554)	
Use in-home care		-0.001 (0.015)	-0.002 (0.015)		-0.008 (0.018)	-0.007 (0.018)		0.258** (0.124)	
Use out-of-home care		-0.009 (0.009)	-0.011 (0.009)		-0.039*** (0.010)	-0.040*** (0.010)		-0.103*** (0.037)	
Missing out-of-home quality		-0.025 (0.018)	-0.023 (0.018)		-0.016 (0.021)	-0.015 (0.021)		-0.224 (0.175)	
Age24			-0.201 (0.179)			-0.133 (0.198)	-0.329 (0.246)	-0.257 (0.255)	-0.155 (0.183)

Table F6: Continuing from Previous Page

	RE Model			FE Model			GMM Model		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[19]	(2)[20]	(3)[21]
Age48			-0.171 (0.179)			-0.108 (0.197)	-0.297 (0.246)	-0.224 (0.254)	-0.125 (0.182)
Age60			-0.142 (0.179)			-0.075 (0.196)	-0.282 (0.245)	-0.193 (0.253)	-0.108 (0.181)
Age72			-0.124 (0.178)			-0.054 (0.195)	-0.281 (0.245)	-0.199 (0.253)	-0.104 (0.181)
Agemom			0.001 (0.001)			-0.020** (0.010)	-0.001 (0.003)	0.000 (0.001)	0.001 (0.003)
Male			0.017** (0.007)				0.024*** (0.008)	0.021*** (0.008)	0.024*** (0.008)
Black child			-0.103*** (0.010)				-0.126*** (0.024)	-0.130*** (0.017)	-0.144*** (0.020)
Hispanic child			-0.016* (0.010)				-0.040** (0.017)	-0.042*** (0.012)	-0.046** (0.019)
Urban			-0.007 (0.010)			0.048** (0.021)	0.021 (0.014)	0.012 (0.012)	0.025* (0.014)
Region1			0.039*** (0.013)			0.029 (0.059)	0.049*** (0.015)	0.048*** (0.014)	0.059*** (0.015)
Region2			0.084*** (0.011)			0.038 (0.048)	0.080*** (0.013)	0.080*** (0.012)	0.071*** (0.013)
Region3			0.090*** (0.010)			0.042 (0.041)	0.082*** (0.012)	0.087*** (0.011)	0.094*** (0.012)
Pct95 precipitation			0.000 (0.000)			-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Std of snow fall			0.000 (0.000)			0.001** (0.000)	0.001* (0.000)	0.001** (0.000)	0.001 (0.000)

Table F6: Continuing from Previous Page

	RE Model			FE Model			GMM Model		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[19]	(2)[20]	(3)[21]
Std of precipitation level			0.000* (0.000)			0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000* (0.000)
Use center based care									-0.037 (0.097)
use Home based care									-0.284 (0.176)
Constant	0.477*** (0.011)	0.476*** (0.011)	0.633*** (0.181)	0.460*** (0.020)	0.456*** (0.020)	1.082*** (0.359)	0.773*** (0.257)	0.680*** (0.258)	0.582*** (0.192)

Notes: Sample size is 24550 and rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates. * p<0.10
 ** p<0.05 *** p<0.01 Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old; age 48 is 1 if the child age is (24≥ & <48); Age60 is 1 if the child's age is (≥48 & <60); Age72 is 1 if the child's age is (≥60 & <72) and the reference category: child's age is ≥72. Numbers in square brackets [.] show GMM model number.

Table F7: Estimation Results of the Respiratory Illness Equation (Specification 1)

	RE Model			FE Model			GMM Model		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[22]	(2)[23]	(3)[24]
General health	-0.071*** (0.007)	-0.071*** (0.007)	-0.072*** (0.007)	-0.011 (0.009)	-0.011 (0.009)	-0.011 (0.009)	-0.035*** (0.012)	-0.035** (0.017)	-0.038*** (0.013)
University degree	-0.007 (0.006)	-0.007 (0.006)	-0.006 (0.007)	0.010 (0.016)	0.010 (0.016)	0.010 (0.016)	-0.016 (0.020)	-0.012 (0.105)	-0.002 (0.022)
Sibling	0.001 (0.002)	0.001 (0.002)	0.002 (0.002)	-0.002 (0.006)	-0.002 (0.006)	-0.002 (0.006)	0.047** (0.019)	0.042 (0.067)	0.066*** (0.022)
Married	-0.018*** (0.006)	-0.018*** (0.006)	-0.015** (0.007)	-0.024* (0.014)	-0.024* (0.014)	-0.024* (0.014)	-0.051** (0.021)	-0.076* (0.043)	-0.072*** (0.021)
Hhincomenet	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Missing hincomenet	0.020* (0.011)	0.019* (0.011)	0.020* (0.011)	0.040*** (0.013)	0.040*** (0.013)	0.039*** (0.013)	0.016 (0.038)	-0.231 (0.167)	-0.016 (0.038)
Time3	0.005 (0.005)	0.006 (0.005)	0.000 (0.007)	0.006 (0.005)	0.011** (0.005)	0.016 (0.011)	-0.002 (0.007)	-0.022 (0.057)	-0.008 (0.010)
Time4	-0.054*** (0.005)	-0.051*** (0.006)	-0.052*** (0.013)	-0.042*** (0.006)	-0.033*** (0.007)	-0.010 (0.026)	-0.064*** (0.018)	-0.095 (0.104)	-0.106*** (0.027)
Missing in-home quality		-0.089** (0.037)	-0.086** (0.037)		-0.100* (0.054)	-0.100* (0.054)		0.242 (0.924)	
Use in-home care		-0.000 (0.011)	0.000 (0.011)		-0.004 (0.012)	-0.004 (0.012)		0.147 (0.481)	
Use out-of-home care		-0.003 (0.007)	-0.004 (0.007)		-0.017** (0.007)	-0.017** (0.007)		0.006 (0.080)	
Missing out-of-home quality		-0.021 (0.014)	-0.021 (0.014)		-0.014 (0.016)	-0.014 (0.016)		-0.509 (0.787)	
Age24			0.006 (0.018)			0.007 (0.024)	-0.005 (0.008)	-0.014 (0.022)	-0.008 (0.008)

Table F7: Continuing from Previous Page

	RE Model			FE Model			GMM Model		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[22]	(2)[23]	(3)[24]
Age48			0.018 (0.016)			0.009 (0.021)			
Age60			0.011 (0.014)			0.006 (0.017)	0.000 (0.011)	0.007 (0.015)	-0.017 (0.013)
Age72							-0.011 (0.018)	0.003 (0.025)	-0.030 (0.021)
Agemom			-0.001 (0.000)			-0.006 (0.007)	-0.002 (0.001)	-0.001 (0.004)	-0.002 (0.001)
Male			0.019*** (0.005)				0.022*** (0.006)	0.019*** (0.007)	0.024*** (0.006)
Black child			0.006 (0.008)				-0.019 (0.015)	-0.010 (0.032)	-0.022 (0.016)
Hispanic child			-0.024*** (0.007)				-0.037*** (0.008)	-0.036*** (0.013)	-0.041*** (0.009)
Urban			-0.019** (0.008)			0.000 (0.015)	-0.007 (0.009)	-0.009 (0.040)	-0.007 (0.009)
Region1			0.025*** (0.009)			-0.016 (0.039)	0.030*** (0.009)	0.032*** (0.010)	0.037*** (0.011)
Region2			0.026*** (0.007)			-0.001 (0.030)	0.022*** (0.008)	0.024 (0.023)	0.029*** (0.009)
Region3			0.048*** (0.007)			-0.021 (0.028)	0.048*** (0.008)	0.047*** (0.015)	0.055*** (0.009)
Pct95 precipitation			0.000 (0.000)			0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Std of snow fall			0.000 (0.000)			0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)

Table F7: Continuing from Previous Page

	RE Model			FE Model			GMM Model		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[22]	(2)[23]	(3)[24]
Std of precipitation level			0.000 (0.000)			0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Use center based care									-0.177 (0.112)
use Home based care									-0.013 (0.162)
Constant	0.206*** (0.009)	0.205*** (0.009)	0.195*** (0.025)	0.164*** (0.015)	0.162*** (0.015)	0.347 (0.213)	0.188*** (0.033)	0.236 (0.260)	0.223*** (0.047)

Notes: Sample size is 22950 and rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates. *p<0.10 **p<0.05 ***p<0.01 Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old; age 48 is 1 if the child age is (24≥ & <48); Age60 is 1 if the child's age is (≥48 & <60); Age72 is 1 if the child's age is (≥60 & <72) and the reference category: child's age is ≥72. Numbers in square brackets [.] show GMM model number.

APPENDIX G: ESTIMATION RESULTS FOR SPECIFICATION 2

Table G1: Estimation Results of Production Functions for Cognitive Achievement (Specification 2)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[25]	(2)[26]
Cognitive achievement	0.265*** (0.007)	0.258*** (0.007)	0.237*** (0.007)	-0.042*** (0.008)	-0.047*** (0.008)	-0.057*** (0.008)	0.027 (0.100)	0.206** (0.094)
Obese	-0.062*** (0.019)	-0.062*** (0.019)	-0.059*** (0.019)	-0.081*** (0.022)	-0.080*** (0.022)	-0.081*** (0.022)	-0.087** (0.042)	-0.111** (0.045)
Behavior	-0.035*** (0.007)	-0.026*** (0.007)	-0.021*** (0.007)	0.030*** (0.008)	0.034*** (0.008)	0.034*** (0.008)	-0.165 (0.103)	0.094 (0.084)
Ear infection	0.016 (0.013)	0.011 (0.013)	0.007 (0.013)	0.029* (0.016)	0.028* (0.016)	0.025 (0.016)	0.314 (0.323)	-0.245 (0.260)
Respiratory illness	-0.014 (0.019)	-0.019 (0.019)	-0.008 (0.019)	0.031 (0.024)	0.031 (0.024)	0.035 (0.024)	1.109* (0.590)	-0.265 (0.175)
University degree	0.409*** (0.018)	0.377*** (0.018)	0.313*** (0.019)	0.048 (0.051)	0.046 (0.051)	0.051 (0.050)	0.297 (0.374)	0.088 (0.288)
Sibling	-0.070*** (0.006)	-0.068*** (0.006)	-0.080*** (0.006)	-0.050*** (0.016)	-0.048*** (0.016)	-0.050*** (0.016)	-0.408*** (0.118)	-0.178** (0.081)
Married	0.197*** (0.016)	0.186*** (0.016)	0.119*** (0.016)	-0.017 (0.033)	-0.014 (0.033)	-0.016 (0.033)	0.434 (0.288)	0.219 (0.267)
Hhincomenet	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000** (0.000)
Missing hincomenet	0.127*** (0.030)	0.122*** (0.030)	0.106*** (0.029)	0.053 (0.035)	0.057* (0.035)	0.056 (0.035)	0.081 (0.217)	0.572** (0.242)
Time2	0.049*** (0.015)	0.039** (0.016)	0.083*** (0.020)	0.075*** (0.014)	0.081*** (0.015)	0.104*** (0.030)	0.052 (0.052)	0.053 (0.093)
Time4	0.011 (0.015)	0.019 (0.015)	-0.420*** (0.027)	-0.008 (0.016)	-0.006 (0.016)	-0.400*** (0.049)	-0.558*** (0.153)	-0.513*** (0.142)

Table G1: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[25]	(2)[26]
Time5	0.336*** (0.022)	0.343*** (0.022)	-0.239*** (0.042)	0.440*** (0.024)	0.444*** (0.024)	-0.119* (0.072)	-0.184 (0.212)	-0.139 (0.211)
Missing home quality		-0.004 (0.063)	-0.026 (0.064)		0.063 (0.067)	0.046 (0.067)		-2.055* (1.171)
Missing in-home quality		0.107 (0.105)	0.087 (0.102)		0.089 (0.118)	0.099 (0.115)		5.863** (2.765)
Use in-home care		-0.012 (0.031)	-0.009 (0.030)		0.054* (0.031)	0.050 (0.031)		0.022 (0.505)
Use out-of-home care		-0.042** (0.018)	-0.045** (0.018)		0.003 (0.019)	-0.002 (0.019)		-0.334 (0.231)
Missing out-of-home quality		-0.060* (0.035)	-0.070** (0.035)		-0.097** (0.040)	-0.104*** (0.039)		-1.772*** (0.657)
Age24			-0.425 (0.622)			-1.234** (0.612)	-0.240 (0.669)	0.376 (0.824)
Age48			-0.362 (0.621)			-1.272** (0.612)	-0.272 (0.666)	0.382 (0.821)
Age60			0.102 (0.621)			-0.908 (0.611)	-0.020 (0.664)	0.672 (0.821)
Age72			0.181 (0.621)			-0.855 (0.610)	0.075 (0.663)	0.644 (0.820)
Agemom			0.008*** (0.001)			0.043** (0.019)	0.025** (0.010)	0.012* (0.007)
Male			-0.159*** (0.014)				-0.207*** (0.030)	-0.176*** (0.029)
Black child			-0.156*** (0.019)				-0.119 (0.121)	-0.309*** (0.116)

Table G1: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[25]	(2)[26]
Hispanic child			-0.233*** (0.018)				-0.169*** (0.058)	-0.226*** (0.048)
Urban			0.016 (0.020)			-0.032 (0.041)	-0.035 (0.040)	0.008 (0.037)
Region1			-0.017 (0.023)			-0.095 (0.120)	-0.115** (0.045)	-0.051 (0.047)
Region2			-0.086*** (0.020)			-0.135 (0.086)	-0.143*** (0.043)	-0.086** (0.040)
Region3			-0.062*** (0.018)			-0.084 (0.077)	-0.238*** (0.055)	-0.093** (0.043)
Office			0.002 (0.002)			-0.001 (0.005)	0.003 (0.004)	-0.001 (0.004)
Short term hospitals with child/adoles. service			-1.888* (1.031)			0.786 (1.777)	-2.188 (1.631)	-1.285 (1.545)
Short term child wellness hospitals			-0.139 (0.556)			-0.043 (0.907)	-1.733* (0.911)	0.562 (0.917)
Total number of hospitals			-0.156*** (0.019)				-0.119 (0.121)	-0.309*** (0.116)
Short term hospitals with nutrition programs			-0.233*** (0.018)				-0.169*** (0.058)	-0.226*** (0.048)
Long term child psychiatric hospitals			-0.786** (0.310)			0.111 (0.638)	-0.403 (0.564)	-0.956* (0.522)
Short term child psychiatric hospitals			0.474 (0.421)			0.700 (0.575)	1.110* (0.673)	0.745 (0.682)

Table G1: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[25]	(2)[26]
Convenience			-0.130 (0.092)			-0.308** (0.149)	-0.132 (0.137)	-0.011 (0.130)
Fitness			-0.223 (0.181)			0.270 (0.209)	-0.162 (0.281)	-0.065 (0.236)
Full service restaurants			-0.001 (0.001)			-0.010*** (0.002)	-0.002 (0.001)	-0.001 (0.001)
Limited service restaurants			0.001* (0.001)			0.002 (0.002)	0.002 (0.002)	0.002 (0.001)
Fruit			0.027 (0.023)			-0.023 (0.054)	0.042 (0.040)	0.014 (0.037)
Dentist			0.000* (0.000)			0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)
Park			-0.000 (0.006)			0.005 (0.017)	-0.011 (0.011)	-0.003 (0.009)
Museum			-0.001* (0.000)			-0.000 (0.001)	-0.001 (0.000)	-0.001 (0.000)
Zoo			-0.103** (0.044)			-0.148 (0.091)	-0.100 (0.086)	-0.066 (0.063)
Grocery			0.003*** (0.001)			0.095 (0.063)	0.004** (0.002)	-0.001 (0.001)
Constant	-0.289*** (0.018)	-0.271*** (0.019)	0.165 (0.622)	0.001 (0.035)	-0.012 (0.035)	0.078 (0.864)	-0.531 (0.691)	-0.756 (0.830)

Notes: Sample size is 20850 and rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates.
 * p<0.10 ** p<0.05 *** p<0.01 Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old; age 48 is 1 if the child age is (24≥ & <48); Age60 is 1 if the child's age is (≥48 & <60); Age72 is 1 if the child's age is (≥60 & <72) and the reference category: child's age is ≥72. Numbers in square brackets [.] show GMM model number.

Table G2: Estimation Results of Production Functions for Obesity (Specification 2)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[27]	(2)[28]
Obese	0.372*** (0.012)	0.372*** (0.012)	0.371*** (0.012)	-0.154*** (0.012)	-0.154*** (0.012)	-0.153*** (0.012)	0.044* (0.024)	0.035 (0.025)
Cognitive achievement	-0.002 (0.003)	-0.001 (0.003)	-0.000 (0.003)	-0.010*** (0.003)	-0.010*** (0.003)	-0.011*** (0.003)	0.004 (0.005)	0.006 (0.005)
Behavior	-0.002 (0.003)	-0.002 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.005 (0.003)	-0.003 (0.005)	-0.013** (0.006)
Ear infection	0.005 (0.005)	0.005 (0.005)	0.005 (0.005)	-0.003 (0.007)	-0.004 (0.007)	-0.003 (0.007)	-0.011 (0.045)	-0.037 (0.046)
Respiratory illness	0.002 (0.007)	0.002 (0.007)	0.003 (0.007)	-0.012 (0.010)	-0.012 (0.010)	-0.011 (0.010)	-0.028 (0.066)	-0.003 (0.068)
University degree	-0.035*** (0.006)	-0.033*** (0.006)	-0.033*** (0.006)	-0.021 (0.018)	-0.021 (0.018)	-0.019 (0.018)	-0.276*** (0.064)	-0.070** (0.031)
Sibling	-0.007*** (0.002)	-0.007*** (0.002)	-0.009*** (0.002)	-0.020*** (0.007)	-0.020*** (0.007)	-0.020*** (0.007)	0.007 (0.012)	0.012 (0.012)
Married	-0.027*** (0.006)	-0.026*** (0.006)	-0.028*** (0.007)	0.010 (0.014)	0.009 (0.014)	0.009 (0.014)	-0.042 (0.067)	-0.135** (0.066)
Hhincomenet	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000* (0.000)	0.000 (0.000)
Missing hincomenet	-0.014 (0.011)	-0.013 (0.011)	-0.013 (0.011)	0.004 (0.014)	0.004 (0.014)	0.005 (0.013)	0.139 (0.106)	0.049 (0.121)
Time2	-0.026*** (0.006)	-0.025*** (0.006)	-0.044*** (0.008)	-0.066*** (0.005)	-0.066*** (0.006)	-0.065*** (0.011)	-0.065*** (0.010)	-0.066*** (0.019)
Time4	-0.023*** (0.007)	-0.023*** (0.007)	-0.008 (0.013)	-0.001 (0.007)	-0.000 (0.007)	-0.021 (0.021)	-0.018 (0.016)	-0.016 (0.017)

Table G2: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[27]	(2)[28]
Time5	-0.026*** (0.009)	-0.026*** (0.009)	-0.022 (0.019)	-0.010 (0.010)	-0.009 (0.010)	-0.039 (0.031)	-0.041 (0.025)	-0.039 (0.026)
Missing home quality		-0.036* (0.021)	-0.034 (0.021)		-0.040 (0.026)	-0.037 (0.027)		0.110 (0.193)
Missing in-home quality		-0.013 (0.051)	-0.013 (0.051)		-0.008 (0.050)	-0.002 (0.051)		0.365 (0.346)
Use in-home care		0.005 (0.013)	0.003 (0.013)		0.006 (0.013)	0.005 (0.013)		0.036 (0.125)
Use out-of-home care		0.003 (0.008)	0.002 (0.008)		-0.004 (0.008)	-0.003 (0.008)		-0.026 (0.033)
Missing out-of-home quality		0.007 (0.014)	0.009 (0.014)		0.010 (0.014)	0.010 (0.014)		0.271** (0.133)
Age24			0.124*** (0.023)			0.081** (0.032)	0.116* (0.064)	0.182*** (0.064)
Age48			0.091*** (0.021)			0.047 (0.030)	0.078 (0.062)	0.144** (0.063)
Age60			0.082*** (0.016)			0.037 (0.024)	0.073 (0.060)	0.130** (0.061)
Age72			0.103*** (0.014)			0.031 (0.021)	0.088 (0.059)	0.148** (0.058)
Agemom			0.002*** (0.000)			0.018** (0.008)	0.004** (0.002)	0.003** (0.002)
Male			0.023*** (0.005)				0.031*** (0.007)	0.030*** (0.007)
Black child			0.011 (0.008)				-0.033 (0.025)	-0.070*** (0.026)

Table G2: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[27]	(2)[28]
Hispanic child			0.033*** (0.007)				0.007 (0.013)	0.002 (0.014)
Urban			0.009 (0.008)			-0.009 (0.043)	0.028** (0.013)	0.022* (0.012)
Region1			-0.001 (0.007)			-0.041 (0.032)	0.006 (0.011)	-0.004 (0.011)
Region2			-0.002 (0.007)			-0.018 (0.031)	0.007 (0.010)	0.006 (0.010)
Region3			-0.019** (0.008)			-0.012 (0.016)	0.001 (0.011)	-0.006 (0.010)
Office			0.000 (0.001)			0.000 (0.002)	0.002 (0.001)	0.001 (0.001)
Short term hospitals with child/adoles. service			-0.087 (0.432)			0.213 (0.827)	-0.450 (0.561)	-0.104 (0.571)
Short term child wellness hospitals			-0.061 (0.249)			0.606 (0.562)	0.111 (0.277)	0.015 (0.304)
Total number of hospitals			0.145 (0.147)			-0.306 (0.276)	0.147 (0.181)	0.025 (0.179)
Short term hospitals with nutrition programs			-0.172 (0.181)			-0.016 (0.266)	-0.354 (0.258)	-0.295 (0.247)
Long term child psychiatric hospitals			-0.074*** (0.021)			-0.128** (0.059)	-0.046 (0.028)	-0.064** (0.026)
Short term child psychiatric hospitals			-0.128** (0.057)			-0.111* (0.066)	-0.052 (0.061)	-0.067 (0.063)

Table G2: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[27]	(2)[28]
Convenience			0.000 (0.001)			-0.000 (0.003)	0.000 (0.001)	-0.000 (0.001)
Fitness			0.000 (0.000)			-0.000 (0.001)	0.000 (0.001)	0.000 (0.001)
Full service restaurants			0.002 (0.009)			-0.001 (0.022)	0.016 (0.012)	0.007 (0.012)
Limited service restaurants			-0.000 (0.000)			0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Fruit			-0.006*** (0.002)			-0.004 (0.006)	-0.010*** (0.003)	-0.009*** (0.003)
Dentist			-0.000 (0.000)			-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Park			0.025 (0.016)			0.056* (0.032)	0.003 (0.019)	0.004 (0.022)
Museum			0.000			-0.002	0.002	0.002
Zoo			0.007 (0.017)			0.026 (0.035)	0.009 (0.021)	0.027 (0.021)
Grocery			0.001*** (0.000)			-0.011 (0.013)	0.001 (0.001)	0.001 (0.001)
Constant	0.154*** (0.007)	0.153*** (0.008)	0.001 (0.028)	0.210*** (0.015)	0.213*** (0.016)	-0.344 (0.247)	-0.099 (0.065)	-0.111* (0.061)

Notes: Sample size is 20400 and rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates. * p<0.10 ** p<0.05 *** p<0.01 Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old; age 48 is 1 if the child age is (24≥ & <48); Age60 is 1 if the child's age is (≥48 & <60); Age72 is 1 if the child's age is (≥60 & <72) and the reference category: child's age is ≥72. Numbers in square brackets [.] show GMM model number.

Table G3: Estimation Results of Production Functions for Being Overweight (Specification 2)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[29]	(2)[30]
Oweight	0.384*** (0.009)	0.384*** (0.009)	0.384*** (0.009)	-0.174*** (0.010)	-0.174*** (0.010)	-0.171*** (0.010)	0.055 (0.105)	0.107 (0.107)
Cognitive achievement	0.003 (0.003)	0.004 (0.003)	0.006** (0.003)	-0.007* (0.004)	-0.006* (0.004)	-0.005 (0.004)	-0.003 (0.014)	0.009 (0.013)
Behavior	-0.010*** (0.003)	-0.010*** (0.004)	-0.012*** (0.004)	-0.012*** (0.004)	-0.012*** (0.004)	-0.013*** (0.004)	-0.015 (0.020)	-0.030 (0.021)
Ear infection	0.007 (0.006)	0.007 (0.006)	0.008 (0.006)	-0.004 (0.008)	-0.004 (0.008)	-0.003 (0.008)	-0.083** (0.042)	-0.018 (0.042)
Respiratory illness	0.013 (0.009)	0.013 (0.009)	0.014 (0.009)	-0.009 (0.012)	-0.009 (0.012)	-0.011 (0.012)	0.221** (0.104)	0.056 (0.064)
University degree	-0.042*** (0.008)	-0.040*** (0.008)	-0.036*** (0.008)	-0.010 (0.023)	-0.010 (0.023)	-0.009 (0.023)	-0.191* (0.097)	-0.027 (0.034)
Sibling	-0.003 (0.003)	-0.003 (0.003)	-0.004 (0.003)	-0.008 (0.008)	-0.008 (0.008)	-0.007 (0.008)	-0.010 (0.033)	0.016 (0.014)
Married	-0.035*** (0.008)	-0.035*** (0.008)	-0.036*** (0.008)	0.011 (0.017)	0.009 (0.017)	0.009 (0.017)	-0.186** (0.090)	-0.259*** (0.081)
Hhincomenet	-0.000* (0.000)	-0.000* (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Missing hincomenet	-0.002 (0.015)	-0.001 (0.015)	0.002 (0.015)	0.011 (0.017)	0.010 (0.017)	0.012 (0.017)	0.124 (0.150)	0.057 (0.132)
Time2	-0.045*** (0.008)	-0.042*** (0.008)	-0.076*** (0.011)	-0.115*** (0.006)	-0.112*** (0.007)	-0.138*** (0.014)	-0.111*** (0.013)	-0.109*** (0.025)
Time4	-0.031*** (0.008)	-0.033*** (0.008)	0.012 (0.016)	0.012 (0.008)	0.010 (0.008)	0.050** (0.025)	0.015 (0.020)	0.025 (0.021)

Table G3: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[29]	(2)[30]
Time5	-0.041*** (0.011)	-0.043*** (0.011)	0.016 (0.022)	0.006 (0.013)	0.004 (0.013)	0.073** (0.037)	0.028 (0.034)	0.034 (0.033)
Missing home quality		0.038 (0.031)	0.040 (0.031)		0.011 (0.034)	0.014 (0.034)		0.115 (0.255)
Missing in-home quality		0.013 (0.050)	0.016 (0.051)		0.013 (0.055)	0.012 (0.054)		0.377 (0.428)
Use in-home care		0.003 (0.016)	-0.000 (0.016)		-0.003 (0.016)	-0.005 (0.016)		-0.006 (0.127)
Use out-of-home care		0.012 (0.010)	0.012 (0.010)		0.016 (0.010)	0.016 (0.010)		0.021 (0.036)
Missing out-of-home quality		-0.011 (0.018)	-0.009 (0.018)		-0.014 (0.020)	-0.014 (0.020)		-0.070 (0.125)
Age24			0.305*** (0.043)			0.601*** (0.206)	0.345*** (0.112)	0.437*** (0.105)
Age48			0.247*** (0.041)			0.555*** (0.206)	0.306*** (0.114)	0.388*** (0.106)
Age60			0.219*** (0.038)			0.532*** (0.204)	0.285** (0.114)	0.353*** (0.107)
Age72			0.208*** (0.037)			0.502** (0.204)	0.283** (0.113)	0.340*** (0.106)
Agemom			0.001 (0.001)			-0.000 (0.010)	0.007** (0.003)	0.005** (0.002)
Male			0.022*** (0.006)				0.022** (0.010)	0.024** (0.010)
Black child			0.002 (0.009)				-0.081** (0.033)	-0.095*** (0.031)

Table G3: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[29]	(2)[30]
Hispanic child			0.043*** (0.009)				0.025 (0.019)	0.008 (0.018)
Urban			-0.016* (0.009)			0.019 (0.021)	-0.005 (0.014)	-0.013 (0.013)
Office			0.001 (0.001)			0.005* (0.003)	0.002 (0.002)	0.002 (0.001)
Short term hospitals with child/adoles. service			0.346 (0.513)			0.117 (0.952)	0.391 (0.723)	0.554 (0.712)
Short term child wellness hospitals			0.190 (0.331)			0.371 (0.491)	0.403 (0.407)	0.590 (0.427)
Total number of hospitals			0.449*** (0.161)			0.248 (0.408)	0.506** (0.229)	0.337 (0.217)
Short term hospitals with nutrition programs			-0.494** (0.222)			-0.333 (0.314)	-0.625** (0.316)	-0.579** (0.287)
Long term child psychiatric hospitals			-0.038 (0.035)			-0.002 (0.077)	-0.039 (0.059)	-0.059 (0.052)
Short term child psychiatric hospitals			-0.230** (0.101)			-0.210 (0.135)	-0.339** (0.163)	-0.300* (0.159)
Convenience			0.001 (0.001)			-0.001 (0.002)	0.001 (0.001)	0.000 (0.001)
Fitness			0.001** (0.000)			-0.001 (0.001)	0.001* (0.001)	0.001 (0.001)

Table G3: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[29]	(2)[30]
Full service restaurants			-0.006 (0.011)			-0.015 (0.023)	-0.003 (0.015)	0.004 (0.014)
Limited service restaurants			-0.000 (0.000)			0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Fruit			-0.005* (0.003)			-0.016*** (0.006)	-0.007** (0.004)	-0.008** (0.003)
Dentist			-0.000** (0.000)			-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Park			0.006 (0.018)			0.011 (0.033)	-0.012 (0.024)	-0.013 (0.023)
Museum			-0.005* (0.003)			0.004 (0.006)	-0.005 (0.004)	-0.005 (0.004)
Zoo			0.022 (0.020)			0.018 (0.038)	0.017 (0.027)	0.038 (0.027)
Grocery			0.001*** (0.000)			0.050*** (0.015)	0.003*** (0.001)	0.002*** (0.001)
Constant	0.267*** (0.009)	0.264*** (0.010)	-0.039 (0.046)	0.379*** (0.018)	0.378*** (0.018)	-0.212 (0.364)	-0.120 (0.098)	-0.136 (0.097)

Notes: Sample size is 20400 and rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates. * p<0.10 ** p<0.05 *** p<0.01. Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old; age 48 is 1 if the child age is (24≥ & <48); Age60 is 1 if the child's age is (≥48 & <60); Age72 is 1 if the child's age is (≥60 & <72) and the reference category: child's age is ≥72. Numbers in square brackets [.] show GMM model number.

Table G4: Estimation Results of Production Functions for General Health Status (Specification 2)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[31]	(2)[32]
General health	0.227*** (0.010)	0.223*** (0.010)	0.219*** (0.010)	-0.248*** (0.010)	-0.249*** (0.010)	-0.249*** (0.010)	0.103*** (0.017)	0.094*** (0.017)
Behavior	-0.019*** (0.003)	-0.016*** (0.003)	-0.016*** (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.007 (0.005)	-0.004 (0.005)
Ear infection	-0.036*** (0.005)	-0.037*** (0.005)	-0.039*** (0.005)	-0.028*** (0.006)	-0.028*** (0.006)	-0.028*** (0.006)	0.033 (0.038)	0.017 (0.039)
Respiratory illness	-0.085*** (0.008)	-0.087*** (0.008)	-0.089*** (0.008)	-0.055*** (0.010)	-0.055*** (0.010)	-0.056*** (0.010)	-0.073 (0.061)	-0.044 (0.050)
University degree	0.029*** (0.005)	0.020*** (0.005)	0.013** (0.006)	0.010 (0.018)	0.009 (0.018)	0.010 (0.018)	0.084*** (0.027)	0.047* (0.029)
Sibling	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.005 (0.006)	-0.005 (0.006)	-0.005 (0.006)	0.044*** (0.017)	0.047** (0.018)
Married	0.022*** (0.006)	0.018*** (0.006)	0.010* (0.006)	-0.003 (0.014)	-0.002 (0.014)	-0.003 (0.014)	0.089** (0.044)	0.093** (0.046)
Hhincomenet	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Missing hincomenet	0.009 (0.011)	0.008 (0.011)	0.006 (0.011)	0.012 (0.014)	0.012 (0.014)	0.012 (0.014)	-0.053 (0.043)	-0.030 (0.047)
Time2	0.008 (0.005)	0.011* (0.006)	0.014* (0.007)	0.011** (0.005)	0.013** (0.005)	0.009 (0.011)	0.008 (0.009)	0.029 (0.020)
Time4	-0.012* (0.007)	-0.011* (0.007)	0.007 (0.011)	-0.000 (0.006)	-0.000 (0.006)	0.026 (0.019)	0.022 (0.016)	0.021 (0.016)
Time5	-0.036*** (0.010)	-0.035*** (0.010)	-0.003 (0.017)	-0.015 (0.011)	-0.015 (0.011)	0.026 (0.028)	0.026 (0.023)	0.023 (0.024)

Table G4: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[31]	(2)[32]
Missing home quality		-0.005 (0.024)	-0.004 (0.024)		-0.028 (0.028)	-0.023 (0.028)		-0.232 (0.269)
Missing in-home quality		0.008 (0.039)	0.009 (0.039)		-0.026 (0.040)	-0.029 (0.040)		0.573 (0.420)
Use in-home care		0.014 (0.012)	0.014 (0.012)		0.015 (0.013)	0.016 (0.013)		0.045 (0.123)
Use out-of-home care		0.008 (0.007)	0.007 (0.007)		0.004 (0.008)	0.004 (0.008)		0.029 (0.027)
Missing out-of-home quality		-0.007 (0.015)	-0.006 (0.015)		0.010 (0.017)	0.011 (0.017)		0.127 (0.141)
Age24			0.058 (0.117)			-0.000 (0.127)	-0.011 (0.058)	-0.005 (0.050)
Age48			0.063 (0.117)			0.010 (0.126)	-0.006 (0.057)	0.003 (0.048)
Age60			0.042 (0.116)			-0.002 (0.125)	-0.021 (0.054)	-0.010 (0.047)
Age72			0.023 (0.115)			-0.009 (0.125)	-0.047 (0.054)	-0.031 (0.045)
Agemom			0.000 (0.000)			-0.009 (0.008)	-0.005*** (0.001)	-0.006*** (0.001)
Male			-0.015*** (0.005)				-0.023*** (0.006)	-0.021*** (0.006)
Black child			-0.025*** (0.007)				0.006 (0.018)	0.018 (0.019)
Hispanic child			-0.051*** (0.007)				-0.045*** (0.010)	-0.030*** (0.011)

Table G4: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[31]	(2)[32]
Urban			-0.006 (0.007)			-0.007 (0.015)	-0.004 (0.009)	-0.004 (0.009)
Region1			0.007 (0.008)			0.005 (0.038)	0.002 (0.010)	0.002 (0.010)
Region2			0.006 (0.007)			-0.004 (0.031)	-0.011 (0.009)	-0.011 (0.009)
Region3			0.007 (0.006)			0.000 (0.029)	-0.000 (0.009)	0.002 (0.009)
Office			0.001 (0.001)			0.003 (0.002)	0.001 (0.001)	0.001 (0.001)
Short term hospitals with child/adoles. service			0.623* (0.347)			0.366 (0.690)	0.938** (0.402)	0.863** (0.410)
Short term child wellness hospitals			-0.273 (0.277)			-0.198 (0.366)	0.056 (0.306)	0.144 (0.319)
Total number of hospitals			-0.019 (0.123)			0.392 (0.262)	-0.031 (0.140)	-0.055 (0.147)
Short term hospitals with nutrition programs			0.105 (0.180)			0.071 (0.259)	-0.072 (0.212)	-0.066 (0.219)
Long term child psychiatric hospitals			0.060 (0.066)			0.029 (0.083)	0.082 (0.052)	0.098* (0.054)
Short term child psychiatric hospitals			0.000 (0.000)			-0.000 (0.001)	0.000 (0.000)	0.000 (0.000)
Convenience			-0.001** (0.000)			-0.002*** (0.000)	-0.000 (0.000)	-0.000 (0.000)

Table G4: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[31]	(2)[32]
Fitness			(0.000) -0.005			(0.001) 0.000	(0.000) 0.006	(0.000) 0.001
Full service restaurants			(0.008) 0.000			(0.022) 0.000	(0.010) 0.000	(0.011) 0.000*
Limited service restaurants			(0.000) -0.004*			(0.000) -0.008*	(0.000) -0.002	(0.000) -0.002
Fruit			(0.002) 0.000			(0.005) 0.000	(0.003) -0.000	(0.003) -0.000
Dentist			(0.000) -0.020			(0.000) -0.025	(0.000) -0.007	(0.000) -0.006
Park			(0.015) -0.000			(0.025) -0.003	(0.017) 0.000	(0.017) 0.000
Museum			(0.002) (0.029)			(0.004) (0.054)	(0.002) (0.026)	(0.002) (0.025)
Zoo			0.030* (0.017)			0.066** (0.030)	0.011 (0.021)	0.008 (0.022)
Grocery			0.000*** (0.000)			-0.005 (0.011)	0.000 (0.000)	0.001* (0.000)
Constant	0.643*** (0.011)	0.649*** (0.011)	0.621*** (0.118)	1.091*** (0.016)	1.090*** (0.017)	1.345*** (0.263)	0.778*** (0.068)	0.793*** (0.060)

Notes: Sample size is 20400 and rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates. * p<0.10 ** p<0.05 *** p<0.01 Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old; age 48 is 1 if the child age is (24≥ & <48); Age60 is 1 if the child's age is (≥48 & <60); Age72 is 1 if the child's age is (≥60 & <72) and the reference category: child's age is ≥72. Numbers in square brackets [.] show GMM model number.

Table G5: Estimation Results of Production Functions for Behavior Problems (Specification 2)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[33]	(2)[34]
Behavior	0.276*** (0.012)	0.268*** (0.012)	0.259*** (0.012)	-0.131*** (0.010)	-0.132*** (0.010)	-0.132*** (0.010)	0.330*** (0.083)	0.643*** (0.058)
Cognitive achievement	-0.054*** (0.008)	-0.042*** (0.008)	-0.036*** (0.008)	0.035*** (0.009)	0.036*** (0.009)	0.036*** (0.010)	0.031 (0.049)	0.094* (0.053)
Overweight	-0.010 (0.016)	-0.012 (0.016)	-0.015 (0.016)	0.019 (0.020)	0.018 (0.020)	0.019 (0.020)	-0.038 (0.114)	0.133 (0.120)
Ear infection	0.034** (0.014)	0.041*** (0.014)	0.035** (0.014)	0.025 (0.018)	0.025 (0.018)	0.026 (0.018)	0.299* (0.159)	0.500*** (0.191)
Respiratory illness	0.022 (0.021)	0.030 (0.020)	0.020 (0.020)	-0.032 (0.027)	-0.031 (0.027)	-0.029 (0.027)	-0.583** (0.248)	-1.048*** (0.320)
University degree	-0.118*** (0.017)	-0.073*** (0.016)	-0.078*** (0.017)	0.012 (0.051)	0.012 (0.051)	0.011 (0.051)	0.128 (0.245)	0.448* (0.235)
Sibling	0.034*** (0.006)	0.031*** (0.006)	0.035*** (0.007)	0.057*** (0.020)	0.057*** (0.020)	0.055*** (0.020)	0.077 (0.078)	0.143* (0.078)
Married	-0.091*** (0.016)	-0.075*** (0.016)	-0.085*** (0.017)	-0.045 (0.038)	-0.047 (0.038)	-0.045 (0.038)	-0.135 (0.116)	-0.010 (0.133)
Hhincomenet	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000** (0.000)	-0.000*** (0.000)
Missing hincomenet	-0.106*** (0.033)	-0.099*** (0.033)	-0.093*** (0.033)	-0.115*** (0.041)	-0.117*** (0.041)	-0.114*** (0.041)	-0.196 (0.148)	-0.193 (0.195)
Time2	0.011 (0.017)	0.015 (0.018)	-0.001 (0.023)	-0.005 (0.015)	-0.006 (0.017)	-0.001 (0.034)	-0.008 (0.033)	0.104 (0.093)
Time4	-0.037** (0.016)	-0.043*** (0.017)	-0.040 (0.032)	-0.020 (0.017)	-0.021 (0.017)	-0.032 (0.057)	-0.083 (0.083)	-0.168* (0.101)

Table G5: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[33]	(2)[34]
Time5	-0.131*** (0.024)	-0.135*** (0.024)	-0.136*** (0.048)	-0.148*** (0.027)	-0.149*** (0.027)	-0.144* (0.084)	-0.247** (0.119)	-0.409*** (0.148)
Missing home quality		0.036 (0.061)	0.045 (0.061)		-0.051 (0.077)	-0.058 (0.078)		-0.121 (0.964)
Missing in-home quality		0.063 (0.131)	0.063 (0.133)		0.028 (0.174)	0.021 (0.174)		-0.720 (1.938)
Use in-home care		-0.032 (0.033)	-0.037 (0.033)		-0.032 (0.035)	-0.031 (0.035)		0.407 (0.424)
Use out-of-home care		0.029 (0.021)	0.025 (0.021)		0.011 (0.022)	0.011 (0.022)		0.349 (0.259)
Missing out-of-home quality		-0.021 (0.043)	-0.017 (0.043)		-0.026 (0.044)	-0.028 (0.044)		0.517 (0.434)
Age24			-0.485*** (0.118)			0.293* (0.156)	-0.514*** (0.200)	-0.623 (0.384)
Age48			-0.512*** (0.114)			0.280* (0.153)	-0.513*** (0.196)	-0.611 (0.380)
Age60			-0.500*** (0.110)			0.272* (0.145)	-0.518*** (0.193)	-0.641* (0.377)
Age72			-0.505*** (0.108)			0.241* (0.143)	-0.448** (0.193)	-0.509 (0.375)
Agemom			0.000 (0.001)			0.010 (0.023)	-0.006 (0.008)	-0.012* (0.007)
Male			0.265*** (0.013)				0.280*** (0.025)	0.205*** (0.023)
Black child			-0.019 (0.021)				0.025 (0.063)	0.065 (0.073)

Table G5: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[33]	(2)[34]
Hispanic child			-0.017 (0.018)				0.048 (0.038)	0.016 (0.040)
Urban			0.023 (0.020)			-0.059 (0.046)	-0.034 (0.031)	-0.045 (0.034)
Region1			-0.002 (0.022)			-0.080 (0.130)	-0.029 (0.034)	-0.067* (0.038)
Region2			0.024 (0.019)			-0.027 (0.091)	0.035 (0.031)	0.015 (0.034)
Region3			0.027 (0.018)			0.080 (0.082)	0.016 (0.034)	0.017 (0.039)
Office			0.001 (0.002)			0.009 (0.008)	0.003 (0.003)	0.003 (0.004)
Short term hospitals with child/adoles. service			0.772 (1.037)			-4.307** (2.035)	-0.581 (1.298)	-0.483 (1.500)
Short term child wellness hospitals			0.497 (0.633)			-1.017 (1.246)	0.806 (0.740)	0.388 (0.935)
Total number of hospitals			0.098 (0.325)			-0.258 (0.664)	-0.011 (0.415)	-0.180 (0.451)
Short term hospitals with nutrition programs			0.309 (0.481)			1.033 (0.718)	0.642 (0.538)	0.534 (0.736)
Long term child psychiatric hospitals			-0.028 (0.085)			0.194 (0.157)	-0.109 (0.107)	-0.124 (0.133)
Short term child psychiatric hospitals			0.171 (0.253)			-0.023 (0.346)	0.419 (0.354)	0.511 (0.390)

Table G5: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[33]	(2)[34]
Convenience			0.001 (0.001)			0.003 (0.003)	0.001 (0.001)	0.001 (0.002)
Fitness			-0.001 (0.001)			0.002 (0.002)	-0.000 (0.001)	0.000 (0.001)
Full service restaurants			0.032 (0.023)			0.019 (0.062)	0.025 (0.032)	0.031 (0.033)
Limited service restaurants			-0.000 (0.000)			-0.000 (0.000)	-0.000 (0.000)	-0.001* (0.000)
Fruit			-0.004 (0.006)			-0.002 (0.014)	-0.002 (0.008)	0.004 (0.009)
Dentist			0.000 (0.000)			0.000 (0.001)	0.000 (0.000)	0.000 (0.000)
Park			-0.053 (0.036)			-0.055 (0.070)	-0.047 (0.050)	-0.049 (0.057)
Museum			0.000 (0.005)			-0.013 (0.014)	-0.010 (0.007)	-0.012 (0.008)
Zoo			0.087** (0.042)			-0.056 (0.094)	0.073 (0.060)	0.054 (0.063)
Grocery			0.004*** (0.000)			-0.000 (0.068)	0.003*** (0.001)	0.001 (0.001)
Constant	0.063*** (0.021)	0.041** (0.021)	0.341*** (0.122)	-0.060 (0.041)	-0.056 (0.041)	-0.600 (0.716)	0.582** (0.266)	0.594 (0.424)

Notes: Sample size is 21050 and rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates.
 * p<0.10 ** p<0.05 *** p<0.01 Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old; age 48 is 1 if the child age is (24≥ & <48); Age60 is 1 if the child's age is (≥48 & <60); Age72 is 1 if the child's age is (≥60 & <72) and the reference category: child's age is ≥72. Numbers in square brackets [.] show GMM model number.

Table G6: Estimation Results of the Ear Infection Equation (Specification 2)

	RE Model			FE Model			GMM Model
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[35]
General health	-0.057*** (0.009)	-0.056*** (0.009)	-0.059*** (0.009)	-0.011 (0.011)	-0.010 (0.011)	-0.011 (0.011)	-0.025 (0.016)
University degree	0.004 (0.009)	0.004 (0.009)	-0.004 (0.009)	-0.038 (0.024)	-0.038 (0.024)	-0.038 (0.024)	-0.047 (0.035)
Sibling	-0.009*** (0.003)	-0.010*** (0.003)	-0.009*** (0.003)	-0.001 (0.008)	-0.002 (0.008)	-0.001 (0.008)	0.055* (0.029)
Married	0.017** (0.008)	0.016** (0.008)	-0.007 (0.009)	0.009 (0.018)	0.008 (0.018)	0.007 (0.018)	-0.038 (0.028)
Hhincomenet	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Missing hincomenet	0.011 (0.015)	0.008 (0.015)	0.009 (0.015)	0.033* (0.018)	0.028 (0.018)	0.028 (0.018)	-0.004 (0.056)
Time3	-0.075*** (0.007)	-0.077*** (0.007)	-0.096*** (0.009)	-0.076*** (0.007)	-0.078*** (0.007)	-0.071*** (0.015)	-0.133*** (0.012)
Time4	-0.251*** (0.009)	-0.246*** (0.009)	-0.303*** (0.018)	-0.237*** (0.010)	-0.234*** (0.010)	-0.218*** (0.037)	-0.351*** (0.024)
Time5	-0.286*** (0.012)	-0.280*** (0.012)	-0.365*** (0.024)	-0.280*** (0.014)	-0.275*** (0.014)	-0.271*** (0.047)	-0.411*** (0.032)
Age24			-0.187 (0.185)			-0.128 (0.207)	-0.091 (0.197)
Age48			-0.158 (0.185)			-0.104 (0.207)	-0.059 (0.197)
Age60			-0.128 (0.184)			-0.071 (0.206)	-0.038 (0.197)
Age72			-0.106 (0.183)			-0.046 (0.205)	-0.023 (0.196)
Agemom			0.000 (0.001)			-0.019* (0.010)	-0.002 (0.002)

Table G6: Continuing from Previous Page

	RE Model			FE Model			GMM Model
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[35]
Male			0.016** (0.007)				0.022*** (0.008)
Black child			-0.103*** (0.010)				-0.126*** (0.019)
Hispanic child			-0.014 (0.010)				-0.011 (0.014)
Urban			-0.006 (0.010)			0.046** (0.021)	0.015 (0.013)
Region1			0.039*** (0.013)			0.024 (0.059)	0.048*** (0.015)
Region2			0.080*** (0.011)			0.033 (0.048)	0.057*** (0.013)
Region3			0.092*** (0.010)			0.039 (0.041)	0.099*** (0.012)
Pct95 precipitation			0.000 (0.000)			-0.000 (0.000)	0.000 (0.000)
Std of snow fall			0.000 (0.000)			0.001** (0.000)	0.000 (0.000)
Std of precipitation level			0.000* (0.000)			0.000 (0.000)	0.000 (0.000)
Use home based care		-0.000 (0.016)	0.003 (0.016)		0.007 (0.019)	0.007 (0.019)	-0.387*** (0.121)
Constant	0.473*** (0.011)	0.473*** (0.012)	0.617*** (0.186)	0.461*** (0.020)	0.459*** (0.020)	1.068*** (0.365)	0.511** (0.200)

Notes: Sample size is 24550 and rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates.

*p<0.10 **p<0.05 ***p<0.01 Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old; age 48 is 1 if the child age is (24≥ & <48); Age60 is 1 if the child's age is (≥48 & <60); Age72 is 1 if the child's age is (≥60 & <72) and the reference category: child's age is ≥72. Numbers in [.] show GMM model number.

Table G7: Estimation Results of the Respiratory Illness Equation (Specification 2)

	RE Model			FE Model			GMM Model
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[36]
General health	-0.071*** (0.007)	-0.071*** (0.007)	-0.073*** (0.007)	-0.011 (0.009)	-0.011 (0.009)	-0.011 (0.009)	-0.034*** (0.013)
University degree	-0.008 (0.006)	-0.008 (0.006)	-0.006 (0.007)	0.010 (0.016)	0.010 (0.016)	0.010 (0.016)	-0.003 (0.025)
Sibling	0.001 (0.002)	0.001 (0.002)	0.002 (0.002)	-0.002 (0.006)	-0.002 (0.006)	-0.002 (0.006)	0.054** (0.023)
Married	-0.018*** (0.006)	-0.018*** (0.006)	-0.015** (0.007)	-0.024* (0.014)	-0.024* (0.014)	-0.024* (0.014)	-0.062*** (0.023)
Hhincomenet	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Missing hincomenet	0.020* (0.011)	0.019* (0.011)	0.020* (0.011)	0.041*** (0.013)	0.041*** (0.013)	0.041*** (0.013)	-0.066 (0.116)
Time3	0.005 (0.005)	0.005 (0.005)	-0.002 (0.006)	0.006 (0.005)	0.006 (0.005)	0.011 (0.010)	-0.009 (0.007)
Time4	-0.054*** (0.006)	-0.052*** (0.006)	-0.054*** (0.013)	-0.042*** (0.007)	-0.042*** (0.007)	-0.020 (0.026)	-0.118*** (0.022)
Age24			0.005 (0.018)			0.006 (0.024)	-0.006 (0.008)
Age48			0.016 (0.016)			0.008 (0.021)	
Age60			0.009 (0.014)			0.004 (0.017)	-0.024* (0.013)
Age72							-0.032 (0.020)
Agemom			-0.001 (0.001)			-0.006 (0.007)	-0.003 (0.002)

Table G7: Continuing from Previous Page

	RE Model			FE Model			GMM Model
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[36]
Male			(0.001) 0.019***			(0.007)	(0.002) 0.023***
Black child			(0.005) 0.006				(0.006) -0.012
Hispanic child			(0.008) -0.024***				(0.014) -0.031***
Urban			(0.007) -0.020***			-0.000	(0.010) -0.004
Region1			(0.008) 0.025***			(0.015) -0.016	(0.009) 0.033***
Region2			(0.009) 0.026***			(0.038) -0.003	(0.010) 0.025***
Region3			(0.007) 0.048***			(0.030) -0.021	(0.009) 0.054***
Pct95 precipitation			(0.007) 0.000			(0.028) 0.000	(0.009) 0.000
Std of snow fall			(0.000) 0.000			(0.000) 0.000	(0.000) 0.000
Std of precipitation level			(0.000) 0.000			(0.000) 0.000	(0.000) 0.000
Use home based care		0.012 (0.012)	0.010 (0.012)		0.007 (0.014)	0.007 (0.014)	-0.009 (0.069)
Constant	0.206*** (0.009)	0.205*** (0.009)	0.195*** (0.025)	0.164*** (0.015)	0.162*** (0.015)	0.347 (0.213)	0.188*** (0.033)

Notes: Sample size is 22950 and rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates.
* p<0.10 ** p<0.05 *** p<0.01 Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old; age 48 is 1 if the child age is (24≥ & <48); Age60 is 1 if the child's age is (≥48 & <60); Age72 is 1 if the child's age is (≥60 & <72) and the reference category: child's age is ≥72. Numbers in [.] show GMM model number.

APPENDIX H: ESTIMATION RESULTS FOR SPECIFICATION 3

Table H1: Estimation Results of Production Functions for Cognitive Achievement (Specification 3)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[37]	(2)[38]
Cognitive achievement	0.269*** (0.007)	0.261*** (0.007)	0.240*** (0.007)	-0.037*** (0.008)	-0.043*** (0.008)	-0.053*** (0.008)	0.147 (0.098)	0.318*** (0.084)
Obese	-0.065*** (0.019)	-0.064*** (0.019)	-0.061*** (0.019)	-0.085*** (0.022)	-0.082*** (0.022)	-0.083*** (0.022)	-0.104** (0.045)	-0.105** (0.043)
Behavior	-0.035*** (0.007)	-0.025*** (0.007)	-0.021*** (0.007)	0.029*** (0.008)	0.034*** (0.008)	0.034*** (0.008)	-0.133 (0.107)	0.187** (0.073)
Ear infection	0.017 (0.013)	0.012 (0.013)	0.008 (0.013)	0.029* (0.016)	0.029* (0.016)	0.026 (0.016)	0.296 (0.254)	-0.083 (0.233)
Respiratory illness	-0.013 (0.019)	-0.017 (0.019)	-0.007 (0.019)	0.031 (0.024)	0.032 (0.024)	0.036 (0.024)	-0.343** (0.163)	-0.233 (0.172)
University degree	0.414*** (0.018)	0.382*** (0.018)	0.316*** (0.019)	0.049 (0.051)	0.047 (0.051)	0.051 (0.050)	0.028 (0.323)	0.283 (0.285)
Sibling	-0.070*** (0.006)	-0.068*** (0.006)	-0.080*** (0.006)	-0.050*** (0.016)	-0.047*** (0.016)	-0.050*** (0.016)	-0.400*** (0.100)	-0.196*** (0.070)
Married	0.196*** (0.016)	0.183*** (0.016)	0.116*** (0.016)	-0.017 (0.033)	-0.015 (0.033)	-0.017 (0.033)	0.193 (0.269)	0.001 (0.262)
Hhincomenet	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000* (0.000)	0.000** (0.000)
Missing hincomenet	0.127*** (0.030)	0.124*** (0.030)	0.104*** (0.029)	0.053 (0.035)	0.060* (0.035)	0.056 (0.035)	0.344 (0.211)	0.625*** (0.206)
Time2	0.039*** (0.015)	0.034** (0.016)	0.077*** (0.020)	0.064*** (0.014)	0.075*** (0.015)	0.099*** (0.030)	0.009 (0.038)	0.194*** (0.059)
Time4	0.054*** (0.013)	0.058*** (0.014)	-0.391*** (0.026)	0.046*** (0.013)	0.043*** (0.014)	-0.368*** (0.049)	-0.381*** (0.100)	-0.439*** (0.084)

Table H1: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[37]	(2)[38]
Time5	0.383*** (0.020)	0.384*** (0.021)	-0.208*** (0.041)	0.500*** (0.021)	0.498*** (0.022)	-0.086 (0.072)	-0.047 (0.163)	-0.041 (0.141)
Missing home quality		-0.014 (0.063)	-0.035 (0.064)		0.056 (0.067)	0.039 (0.067)		-1.477 (0.944)
Missing in-home quality		0.113 (0.105)	0.094 (0.101)		0.087 (0.120)	0.096 (0.117)		5.005* (2.652)
Use in-home care		-0.031 (0.030)	-0.029 (0.030)		0.031 (0.031)	0.027 (0.031)		0.334 (0.337)
Use out-of-home care		-0.013 (0.019)	-0.022 (0.019)		0.033 (0.020)	0.023 (0.020)		0.414*** (0.146)
Missing out-of-home quality		-0.054 (0.035)	-0.065* (0.035)		-0.086** (0.040)	-0.095** (0.039)		-1.714*** (0.542)
Age24			-0.407 (0.601)			-1.177** (0.588)	0.372 (0.658)	0.563 (0.759)
Age48			-0.344 (0.601)			-1.216** (0.588)	0.339 (0.657)	0.539 (0.758)
Age60			0.126 (0.600)			-0.843 (0.586)	0.570 (0.652)	0.771 (0.754)
Age72			0.204 (0.600)			-0.791 (0.586)	0.596 (0.651)	0.762 (0.753)
Agemom			0.008*** (0.001)			0.045** (0.019)	0.030*** (0.009)	0.012* (0.007)
Male			-0.158*** (0.014)				-0.172*** (0.029)	-0.189*** (0.026)
Black child			-0.155*** (0.019)				-0.191* (0.100)	-0.271*** (0.099)

Table H1: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[37]	(2)[38]
Hispanic child			-0.236*** (0.018)				-0.250*** (0.052)	-0.197*** (0.047)
Urban			0.019 (0.020)			-0.030 (0.041)	0.007 (0.036)	0.022 (0.036)
Region1			-0.015 (0.023)			-0.098 (0.119)	-0.041 (0.042)	-0.057 (0.041)
Region2			-0.086*** (0.020)			-0.133 (0.086)	-0.116*** (0.042)	-0.123*** (0.039)
Region3			-0.056*** (0.018)			-0.082 (0.077)	-0.102** (0.040)	-0.074** (0.037)
Office			0.002 (0.002)			-0.001 (0.005)	0.003 (0.004)	-0.000 (0.004)
Short term hospitals with child/adoles. service			-1.807* (1.031)			0.967 (1.790)	-0.426 (1.719)	-0.959 (1.519)
Short term child wellness hospitals			-0.129 (0.557)			-0.112 (0.900)	-1.321 (0.966)	0.128 (0.975)
Total number of hospitals			-0.781** (0.310)			0.072 (0.626)	-0.208 (0.541)	-1.071** (0.516)
Short term hospitals with nutrition programs			0.449 (0.420)			0.701 (0.578)	0.626 (0.678)	0.725 (0.666)
Long term child psychiatric hospitals			-0.128 (0.093)			-0.295** (0.149)	-0.081 (0.141)	-0.027 (0.142)
Short term child psychiatric hospitals			-0.228 (0.182)			0.262 (0.215)	-0.279 (0.348)	0.024 (0.312)

Table H1: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[37]	(2)[38]
Convenience			-0.001 (0.001)			-0.010*** (0.002)	-0.002 (0.002)	-0.000 (0.002)
Fitness			0.001* (0.001)			0.002 (0.002)	0.001 (0.001)	0.002 (0.001)
Full service restaurants			0.025 (0.023)			-0.026 (0.054)	-0.015 (0.040)	-0.027 (0.038)
Limited service restaurants			0.000* (0.000)			0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Fruit			-0.000 (0.006)			0.005 (0.016)	-0.011 (0.011)	-0.003 (0.009)
Dentist			-0.001* (0.000)			-0.000 (0.001)	-0.000 (0.000)	-0.000 (0.000)
Park			0.038 (0.037)			0.203*** (0.059)	0.085 (0.067)	0.046 (0.059)
Museum			-0.007 (0.005)			-0.014 (0.010)	-0.002 (0.008)	-0.001 (0.008)
Zoo			-0.106** (0.044)			-0.157* (0.089)	-0.093 (0.086)	-0.087 (0.072)
Grocery			0.003*** (0.001)			0.103* (0.062)	0.002 (0.002)	-0.000 (0.001)
Constant	-0.297*** (0.019)	-0.282*** (0.019)	0.126 (0.602)	-0.010 (0.036)	-0.024 (0.036)	-0.043 (0.848)	-1.242* (0.678)	-1.077 (0.763)

Notes: Sample size is 20850 and rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates.

* p<0.10 ** p<0.05 *** p<0.01 Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old; age 48 is 1 if the child age is (24≥ & <48); Age60 is 1 if the child's age is (≥48 & <60); Age72 is 1 if the child's age is (≥60 & <72) and the reference category: child's age is ≥72. Numbers in [.] show GMM model number.

Table H2: Estimation Results of Production Functions for Obesity (Specification 3)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[39]	(2)[40]
Obese	0.372*** (0.012)	0.372*** (0.012)	0.371*** (0.012)	-0.154*** (0.012)	-0.155*** (0.012)	-0.153*** (0.012)	0.050** (0.024)	0.049** (0.025)
Cognitive achievement	-0.002 (0.003)	-0.001 (0.003)	-0.000 (0.003)	-0.010*** (0.003)	-0.009*** (0.003)	-0.011*** (0.003)	0.003 (0.005)	0.005 (0.005)
Behavior	-0.002 (0.003)	-0.002 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.005 (0.003)	-0.003 (0.005)	-0.014** (0.006)
Ear infection	0.005 (0.005)	0.005 (0.005)	0.005 (0.005)	-0.003 (0.007)	-0.003 (0.007)	-0.003 (0.007)	-0.030 (0.061)	-0.050 (0.053)
Respiratory illness	0.002 (0.007)	0.002 (0.007)	0.003 (0.007)	-0.012 (0.010)	-0.012 (0.010)	-0.011 (0.010)	0.014 (0.077)	0.031 (0.075)
University degree	-0.035*** (0.006)	-0.034*** (0.006)	-0.033*** (0.006)	-0.021 (0.018)	-0.021 (0.018)	-0.019 (0.018)	-0.373*** (0.078)	-0.083** (0.033)
Sibling	-0.007*** (0.002)	-0.007*** (0.002)	-0.009*** (0.002)	-0.020*** (0.007)	-0.020*** (0.007)	-0.019*** (0.007)	0.011 (0.012)	0.016 (0.012)
Married	-0.027*** (0.006)	-0.026*** (0.006)	-0.028*** (0.007)	0.010 (0.014)	0.009 (0.014)	0.009 (0.014)	0.008 (0.071)	-0.133* (0.069)
Hhincomenet	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000** (0.000)	0.000 (0.000)
Missing hincomenet	-0.013 (0.011)	-0.012 (0.011)	-0.012 (0.011)	0.006 (0.014)	0.006 (0.014)	0.007 (0.014)	0.198* (0.113)	0.096 (0.114)
Time2	-0.026*** (0.006)	-0.026*** (0.007)	-0.044*** (0.008)	-0.066*** (0.005)	-0.066*** (0.006)	-0.065*** (0.012)	-0.060*** (0.010)	-0.059*** (0.019)
Time4	-0.023*** (0.006)	-0.023*** (0.006)	-0.008 (0.012)	0.005 (0.006)	0.004 (0.006)	-0.018 (0.020)	-0.049** (0.024)	-0.041* (0.022)

Table H2: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[39]	(2)[40]
Time5	-0.026*** (0.008)	-0.026*** (0.008)	-0.022 (0.019)	-0.003 (0.009)	-0.004 (0.010)	-0.035 (0.031)	-0.072** (0.032)	-0.065** (0.032)
Missing home quality		-0.035 (0.021)	-0.033 (0.021)		-0.039 (0.027)	-0.037 (0.027)		0.042 (0.201)
Missing in-home quality		-0.015 (0.051)	-0.015 (0.051)		-0.010 (0.050)	-0.004 (0.050)		0.610 (0.442)
Use in-home care		0.003 (0.013)	0.002 (0.013)		0.005 (0.013)	0.004 (0.013)		0.075 (0.114)
Use out-of-home care		0.000 (0.008)	0.000 (0.008)		0.001 (0.008)	0.001 (0.008)		-0.033 (0.040)
Missing out-of-home quality		0.008 (0.014)	0.010 (0.014)		0.012 (0.014)	0.011 (0.014)		0.271** (0.135)
Age24			0.128*** (0.023)			0.085*** (0.032)	0.068 (0.071)	0.176** (0.076)
Age48			0.095*** (0.021)			0.052* (0.030)	0.035 (0.070)	0.140* (0.075)
Age60			0.087*** (0.016)			0.043* (0.023)	0.020 (0.068)	0.118 (0.072)
Age72			0.107*** (0.014)			0.037* (0.021)	0.036 (0.065)	0.138** (0.068)
Agemom			0.001*** (0.000)			0.018** (0.008)	0.004*** (0.002)	0.004** (0.002)
Male			0.023*** (0.005)				0.029*** (0.007)	0.029*** (0.007)
Black child			0.011 (0.008)				-0.031 (0.027)	-0.080*** (0.027)

Table H2: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[39]	(2)[40]
Hispanic child			0.033*** (0.007)				0.002 (0.014)	-0.001 (0.014)
Urban			0.009 (0.008)			-0.009 (0.043)	0.030** (0.013)	0.020 (0.013)
Region1			-0.001 (0.007)			-0.041 (0.032)	0.012 (0.012)	-0.001 (0.011)
Region2			-0.003 (0.007)			-0.017 (0.031)	0.003 (0.011)	0.001 (0.011)
Region3			-0.019** (0.008)			-0.012 (0.016)	0.004 (0.011)	-0.007 (0.010)
Office			0.000 (0.001)			0.000 (0.002)	0.001 (0.001)	0.001 (0.001)
Short term hospitals with child/adoles. service			-0.097 (0.433)			0.241 (0.827)	-0.476 (0.555)	-0.095 (0.563)
Short term child wellness hospitals			-0.061 (0.248)			0.600 (0.561)	0.007 (0.307)	-0.061 (0.312)
Total number of hospitals			0.146 (0.147)			-0.310 (0.277)	0.187 (0.183)	0.040 (0.179)
Short term hospitals with nutrition programs			-0.170 (0.181)			-0.015 (0.267)	-0.337 (0.239)	-0.258 (0.243)
Long term child psychiatric hospitals			-0.073*** (0.020)			-0.126** (0.059)	-0.037 (0.031)	-0.062** (0.026)
Short term child psychiatric hospitals			-0.129** (0.057)			-0.114* (0.066)	-0.073 (0.067)	-0.067 (0.064)

Table H2: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[39]	(2)[40]
Convenience			0.000 (0.001)			-0.000 (0.003)	0.000 (0.001)	-0.000 (0.001)
Fitness			0.000 (0.000)			-0.000 (0.001)	0.000 (0.001)	0.000 (0.001)
Full service restaurants			0.002 (0.009)			-0.001 (0.022)	0.026** (0.012)	0.013 (0.012)
Limited service restaurants			-0.000 (0.000)			0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Fruit			-0.006*** (0.002)			-0.004 (0.006)	-0.010*** (0.003)	-0.009*** (0.003)
Dentist			-0.000 (0.000)			-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Park			0.025 (0.016)			0.056* (0.032)	0.011 (0.020)	0.010 (0.021)
Museum			-0.000 (0.002)			-0.002 (0.005)	0.002 (0.004)	0.002 (0.004)
Zoo			0.007 (0.017)			0.026 (0.035)	0.000 (0.021)	0.024 (0.020)
Grocery			0.001*** (0.000)			-0.010 (0.013)	0.001 (0.001)	0.001 (0.001)
Constant	0.155*** (0.008)	0.155*** (0.008)	-0.002 (0.028)	0.211*** (0.015)	0.213*** (0.016)	-0.350 (0.247)	-0.094 (0.072)	-0.112 (0.075)

Notes: Sample size is 20400 and rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates.
* p<0.10 ** p<0.05 *** p<0.01 Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old;
age 48 is 1 if the child age is (24≥ & <48); Age60 is 1 if the child's age is (≥48 & <60); Age72 is 1 if the child's age is (≥60 & <72) and the
reference category: child's age is ≥72. Numbers in [.] show GMM model number.

Table H3: Estimation Results of Production Functions for Being Overweight (Specification 3)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[41]	(2)[42]
Oweight	0.385*** (0.009)	0.385*** (0.009)	0.384*** (0.009)	-0.174*** (0.010)	-0.174*** (0.010)	-0.171*** (0.010)	0.029 (0.103)	0.150* (0.090)
Cognitive achievement	0.003 (0.003)	0.003 (0.003)	0.006* (0.003)	-0.008** (0.004)	-0.007* (0.004)	-0.006 (0.004)	-0.013 (0.015)	0.004 (0.014)
Behavior	-0.010*** (0.003)	-0.010*** (0.004)	-0.012*** (0.004)	-0.012*** (0.004)	-0.012*** (0.004)	-0.013*** (0.004)	-0.021 (0.026)	-0.028 (0.026)
Ear infection	0.007 (0.006)	0.007 (0.006)	0.008 (0.006)	-0.005 (0.008)	-0.004 (0.008)	-0.003 (0.008)	-0.084** (0.043)	-0.019 (0.041)
Respiratory illness	0.012 (0.009)	0.013 (0.009)	0.014 (0.009)	-0.009 (0.012)	-0.009 (0.012)	-0.011 (0.012)	0.079 (0.053)	0.059 (0.057)
University degree	-0.043*** (0.008)	-0.041*** (0.008)	-0.037*** (0.008)	-0.010 (0.023)	-0.010 (0.023)	-0.010 (0.023)	-0.193* (0.101)	-0.022 (0.035)
Sibling	-0.003 (0.003)	-0.003 (0.003)	-0.004 (0.003)	-0.008 (0.008)	-0.008 (0.008)	-0.008 (0.008)	-0.013 (0.035)	0.001 (0.013)
Married	-0.035*** (0.008)	-0.034*** (0.008)	-0.036*** (0.008)	0.010 (0.017)	0.009 (0.017)	0.009 (0.017)	-0.257*** (0.093)	-0.273*** (0.083)
Hhincomenet	-0.000* (0.000)	-0.000* (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Missing hincomenet	-0.002 (0.015)	-0.001 (0.015)	0.001 (0.015)	0.010 (0.017)	0.010 (0.017)	0.011 (0.017)	0.062 (0.121)	0.154 (0.122)
Time2	-0.043*** (0.008)	-0.042*** (0.008)	-0.076*** (0.011)	-0.113*** (0.006)	-0.110*** (0.007)	-0.138*** (0.014)	-0.103*** (0.013)	-0.089*** (0.026)
Time4	-0.039*** (0.007)	-0.039*** (0.008)	0.007 (0.015)	0.007 (0.007)	0.004 (0.007)	0.046* (0.025)	-0.039 (0.026)	-0.005 (0.024)

Table H3: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[41]	(2)[42]
Time5	-0.049*** (0.010)	-0.049*** (0.011)	0.010 (0.022)	0.001 (0.012)	-0.002 (0.012)	0.069* (0.036)	-0.052 (0.037)	-0.003 (0.034)
Missing home quality		0.040 (0.031)	0.041 (0.031)		0.012 (0.034)	0.015 (0.034)		-0.167 (0.294)
Missing in-home quality		0.011 (0.050)	0.014 (0.051)		0.007 (0.055)	0.006 (0.054)		-0.072 (0.455)
Use in-home care		0.007 (0.016)	0.003 (0.016)		0.003 (0.016)	0.002 (0.016)		0.083 (0.124)
Use out-of-home care		0.004 (0.010)	0.004 (0.010)		0.011 (0.010)	0.011 (0.010)		0.018 (0.056)
Missing out-of-home quality		-0.012 (0.019)	-0.010 (0.018)		-0.015 (0.020)	-0.015 (0.020)		0.082 (0.145)
Age24			0.317*** (0.039)			0.597*** (0.208)	0.493*** (0.121)	0.442*** (0.110)
Age48			0.259*** (0.037)			0.550*** (0.208)	0.453*** (0.122)	0.393*** (0.110)
Age60			0.230*** (0.034)			0.527** (0.207)	0.427*** (0.122)	0.362*** (0.110)
Age72			0.219*** (0.033)			0.497** (0.206)	0.426*** (0.121)	0.348*** (0.109)
Agemom			0.001 (0.001)			-0.001 (0.010)	0.008** (0.003)	0.006*** (0.002)
Male			0.022*** (0.006)				0.025** (0.011)	0.023** (0.010)
Black child			0.001 (0.009)				-0.104*** (0.034)	-0.094*** (0.031)

Table H3: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[41]	(2)[42]
Hispanic child			0.043*** (0.009)				0.014 (0.020)	0.008 (0.018)
Urban			-0.017* (0.009)			0.020 (0.021)	-0.008 (0.014)	-0.018 (0.013)
Office			0.001 (0.001)			0.005* (0.003)	0.003* (0.002)	0.002 (0.001)
Short term hospitals with child/adoles. service			0.329 (0.513)			0.059 (0.960)	0.275 (0.714)	0.719 (0.691)
Short term child wellness hospitals			0.196 (0.329)			0.375 (0.490)	0.360 (0.403)	0.231 (0.399)
Total number of hospitals			0.448*** (0.161)			0.239 (0.405)	0.445** (0.223)	0.319 (0.206)
Short term hospitals with nutrition programs			-0.477** (0.222)			-0.309 (0.314)	-0.578** (0.288)	-0.558** (0.275)
Long term child psychiatric hospitals			-0.037 (0.035)			0.004 (0.077)	-0.030 (0.063)	-0.066 (0.050)
Short term child psychiatric hospitals			-0.229** (0.100)			-0.207 (0.135)	-0.419** (0.183)	-0.334** (0.159)
Convenience			0.001 (0.001)			-0.001 (0.002)	0.000 (0.001)	0.001 (0.001)
Fitness			0.001** (0.000)			-0.001 (0.001)	0.001 (0.001)	0.001 (0.001)

Table H3: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[41]	(2)[42]
Full service restaurants			-0.006 (0.011)			-0.016 (0.023)	-0.008 (0.016)	-0.000 (0.014)
Limited service restaurants			-0.000 (0.000)			0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Fruit			-0.005* (0.003)			-0.016*** (0.006)	-0.009** (0.004)	-0.009*** (0.003)
Dentist			-0.000** (0.000)			-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Park			0.006 (0.018)			0.011 (0.034)	-0.008 (0.025)	0.001 (0.023)
Museum			-0.005** (0.003)			0.004 (0.006)	-0.005 (0.004)	-0.006* (0.003)
Zoo			0.022 (0.020)			0.021 (0.038)	0.019 (0.028)	0.041 (0.026)
Grocery			0.001*** (0.000)			0.048*** (0.015)	0.003*** (0.001)	0.002*** (0.001)
Constant	0.269*** (0.010)	0.266*** (0.010)	-0.047 (0.043)	0.380*** (0.018)	0.380*** (0.018)	-0.185 (0.365)	-0.205* (0.118)	-0.127 (0.104)

Notes: Sample size is 20400 and rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates. * p<0.10 ** p<0.05 *** p<0.01 Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old; age 48 is 1 if the child age is (24≥ & <48); Age60 is 1 if the child's age is (≥48 & <60); Age72 is 1 if the child's age is (≥60 & <72) and the reference category: child's age is ≥72. Numbers in [.] show GMM model number.

Table H4: Estimation Results of Production Functions for General Health Status (Specification 3)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[43]	(2)[44]
General health	0.227*** (0.010)	0.223*** (0.010)	0.219*** (0.010)	-0.248*** (0.010)	-0.248*** (0.010)	-0.249*** (0.010)	0.069*** (0.019)	0.095*** (0.018)
Behavior	-0.019*** (0.003)	-0.016*** (0.003)	-0.016*** (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.003 (0.005)	-0.005 (0.005)
Ear infection	-0.036*** (0.005)	-0.037*** (0.005)	-0.039*** (0.005)	-0.028*** (0.006)	-0.028*** (0.006)	-0.028*** (0.006)	0.043 (0.052)	-0.070 (0.054)
Respiratory illness	-0.085*** (0.008)	-0.087*** (0.008)	-0.089*** (0.008)	-0.055*** (0.010)	-0.055*** (0.010)	-0.056*** (0.010)	-0.012 (0.060)	0.084 (0.061)
University degree	0.030*** (0.005)	0.020*** (0.005)	0.013** (0.006)	0.010 (0.018)	0.010 (0.018)	0.010 (0.018)	0.068** (0.027)	0.044 (0.028)
Sibling	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.005 (0.006)	-0.005 (0.006)	-0.005 (0.006)	0.058*** (0.020)	0.052*** (0.019)
Married	0.022*** (0.006)	0.018*** (0.006)	0.010* (0.006)	-0.002 (0.014)	-0.002 (0.014)	-0.003 (0.014)	0.107** (0.047)	0.090** (0.044)
Hhincomenet	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Missing hincomenet	0.008 (0.011)	0.007 (0.011)	0.005 (0.011)	0.010 (0.014)	0.010 (0.014)	0.010 (0.014)	-0.029 (0.043)	-0.033 (0.048)
Time2	0.007 (0.005)	0.009 (0.006)	0.013* (0.007)	0.011** (0.005)	0.012** (0.005)	0.008 (0.011)	0.005 (0.009)	0.023** (0.011)
Time4	-0.009 (0.006)	-0.010 (0.006)	0.007 (0.011)	-0.002 (0.006)	-0.002 (0.006)	0.025 (0.019)	0.001 (0.021)	0.005 (0.017)

Table H4: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[43]	(2)[44]
Time5	-0.033*** (0.009)	-0.034*** (0.009)	-0.003 (0.017)	-0.018* (0.010)	-0.017 (0.010)	0.024 (0.028)	0.004 (0.029)	0.012 (0.025)
Missing home quality		-0.004 (0.024)	-0.004 (0.024)		-0.028 (0.028)	-0.023 (0.028)		-0.145 (0.279)
Missing in-home quality		0.006 (0.039)	0.007 (0.039)		-0.027 (0.040)	-0.030 (0.040)		0.419 (0.418)
Use in-home care		0.009 (0.012)	0.010 (0.012)		0.011 (0.013)	0.012 (0.013)		0.003 (0.071)
Use out-of-home care		0.008 (0.007)	0.005 (0.007)		0.000 (0.008)	0.001 (0.008)		0.029 (0.025)
Missing out-of-home quality		-0.006 (0.015)	-0.005 (0.015)		0.010 (0.017)	0.011 (0.017)		-0.221 (0.149)
Age24			0.065 (0.117)			0.001 (0.127)	0.002 (0.053)	-0.019 (0.041)
Age48			0.069 (0.117)			0.011 (0.127)	-0.001 (0.053)	-0.015 (0.040)
Age60			0.049 (0.116)			-0.001 (0.125)	-0.020 (0.050)	-0.020 (0.037)
Age72			0.031 (0.115)			-0.007 (0.125)	-0.036 (0.049)	-0.037 (0.035)
Agemom			0.000 (0.000)			-0.009 (0.008)	-0.006*** (0.002)	-0.005*** (0.001)
Male			-0.015*** (0.005)				-0.026*** (0.006)	-0.018*** (0.006)
Black child			-0.024*** (0.007)				-0.013 (0.019)	-0.008 (0.018)

Table H4: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[43]	(2)[44]
Hispanic child			-0.052*** (0.007)				-0.045*** (0.010)	-0.031*** (0.011)
Urban			-0.006 (0.007)			-0.007 (0.015)	-0.003 (0.009)	-0.000 (0.009)
Region1			0.008 (0.008)			0.005 (0.038)	0.002 (0.011)	0.011 (0.010)
Region2			0.006 (0.007)			-0.004 (0.031)	-0.010 (0.009)	-0.001 (0.009)
Region3			0.008 (0.006)			0.000 (0.029)	-0.002 (0.009)	0.010 (0.010)
Office			0.001 (0.001)			0.003 (0.002)	0.001 (0.001)	0.002 (0.001)
Short term hospitals with child/adoles. service			0.623* (0.346)			0.366 (0.691)	1.046*** (0.380)	0.949** (0.390)
Short term child wellness hospitals			-0.277 (0.277)			-0.209 (0.365)	-0.023 (0.304)	0.142 (0.331)
Total number of hospitals			-0.021 (0.124)			0.391 (0.262)	-0.127 (0.138)	-0.134 (0.142)
Short term hospitals with nutrition programs			0.106 (0.180)			0.075 (0.260)	-0.154 (0.200)	-0.198 (0.208)
Long term child psychiatric hospitals			0.023 (0.029)			-0.020 (0.054)	0.059** (0.027)	0.059** (0.027)
Short term child psychiatric hospitals			0.061 (0.066)			0.027 (0.083)	0.080* (0.043)	0.074 (0.047)

Table H4: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[43]	(2)[44]
Convenience			0.000 (0.000)			-0.000 (0.001)	0.000 (0.000)	0.000 (0.000)
Fitness			-0.001** (0.000)			-0.002*** (0.001)	-0.000 (0.000)	-0.000 (0.000)
Full service restaurants			-0.005 (0.008)			0.001 (0.022)	0.007 (0.011)	0.004 (0.011)
Limited service restaurants			0.000 (0.000)			0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Fruit			-0.004* (0.002)			-0.008* (0.005)	-0.002 (0.003)	-0.002 (0.003)
Dentist			0.000 (0.000)			0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Park			-0.019 (0.015)			-0.025 (0.025)	-0.001 (0.016)	-0.009 (0.016)
Museum			-0.000 (0.002)			-0.003 (0.004)	-0.001 (0.002)	-0.000 (0.002)
Zoo			0.030* (0.017)			0.067** (0.030)	0.020 (0.021)	0.020 (0.019)
Grocery			0.001*** (0.000)			-0.004 (0.011)	-0.000 (0.000)	0.000 (0.000)
Constant	0.642*** (0.011)	0.649*** (0.011)	0.614*** (0.118)	1.089*** (0.017)	1.089*** (0.017)	1.344*** (0.263)	0.722*** (0.061)	0.785*** (0.050)

Notes: Sample size is 23650 and rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates.
 * p<0.10 ** p<0.05 *** p<0.01 Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old; age 48 is 1 if the child age is (24≥ & <48); Age60 is 1 if the child's age is (≥48 & <60); Age72 is 1 if the child's age is (≥60 & <72) and the reference category: child's age is ≥72. Numbers in [.] show GMM model number.

Table H5: Estimation Results of Production Functions for Behavior Problems (Specification 3)

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[45]	(2)[46]
Behavior	0.276*** (0.012)	0.268*** (0.012)	0.259*** (0.012)	-0.132*** (0.010)	-0.132*** (0.010)	-0.132*** (0.010)	0.412*** (0.088)	0.662*** (0.063)
Cognitive achievement	-0.054*** (0.008)	-0.042*** (0.008)	-0.036*** (0.008)	0.035*** (0.009)	0.036*** (0.009)	0.036*** (0.010)	0.056 (0.050)	0.083 (0.054)
Overweight	-0.010 (0.016)	-0.012 (0.016)	-0.015 (0.016)	0.018 (0.020)	0.017 (0.020)	0.018 (0.020)	0.024 (0.113)	0.208 (0.135)
Ear infection	0.034** (0.014)	0.041*** (0.014)	0.035** (0.014)	0.024 (0.018)	0.025 (0.018)	0.026 (0.018)	0.378** (0.189)	0.473** (0.232)
Respiratory illness	0.022 (0.021)	0.029 (0.020)	0.020 (0.020)	-0.032 (0.027)	-0.031 (0.027)	-0.029 (0.027)	-0.937*** (0.329)	-1.389*** (0.386)
University degree	-0.116*** (0.016)	-0.072*** (0.016)	-0.077*** (0.017)	0.013 (0.051)	0.013 (0.051)	0.012 (0.051)	-0.093 (0.260)	0.641** (0.270)
Sibling	0.034*** (0.006)	0.031*** (0.006)	0.035*** (0.007)	0.056*** (0.020)	0.056*** (0.020)	0.054*** (0.020)	0.041 (0.083)	0.164* (0.088)
Married	-0.092*** (0.016)	-0.075*** (0.016)	-0.085*** (0.017)	-0.045 (0.038)	-0.047 (0.038)	-0.045 (0.038)	0.196 (0.233)	-0.080 (0.261)
Hhincomenet	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000** (0.000)	-0.000*** (0.000)
Missing hincomenet	-0.107*** (0.034)	-0.100*** (0.033)	-0.094*** (0.033)	-0.115*** (0.042)	-0.116*** (0.042)	-0.114*** (0.042)	-0.268 (0.170)	-0.245 (0.233)
Time2	0.009 (0.017)	0.016 (0.019)	-0.001 (0.023)	-0.006 (0.015)	-0.006 (0.017)	-0.002 (0.034)	-0.024 (0.034)	0.184 (0.119)
Time4	-0.029** (0.014)	-0.038** (0.015)	-0.037 (0.032)	-0.017 (0.015)	-0.021 (0.015)	-0.032 (0.056)	-0.029 (0.072)	-0.248** (0.108)

Table H5: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[45]	(2)[46]
Time5	-0.123*** (0.022)	-0.129*** (0.023)	-0.134*** (0.048)	-0.146*** (0.025)	-0.150*** (0.025)	-0.145* (0.083)	-0.214** (0.108)	-0.555*** (0.162)
Missing home quality		0.038 (0.061)	0.047 (0.061)		-0.046 (0.078)	-0.053 (0.078)		0.019 (1.139)
Missing in-home quality		0.054 (0.131)	0.055 (0.133)		0.014 (0.174)	0.007 (0.174)		-0.373 (2.143)
Use in-home care		-0.035 (0.033)	-0.039 (0.033)		-0.035 (0.035)	-0.034 (0.035)		0.507 (0.449)
Use out-of-home care		0.038* (0.021)	0.031 (0.021)		0.014 (0.023)	0.015 (0.023)		0.511* (0.306)
Missing out-of-home quality		-0.019 (0.043)	-0.015 (0.043)		-0.025 (0.044)	-0.027 (0.044)		1.435** (0.623)
Age24			-0.478*** (0.120)			0.310** (0.153)	-0.649*** (0.196)	-0.670 (0.420)
Age48			-0.506*** (0.116)			0.296** (0.150)	-0.648*** (0.193)	-0.662 (0.416)
Age60			-0.492*** (0.111)			0.289** (0.142)	-0.637*** (0.183)	-0.713* (0.407)
Age72			-0.496*** (0.109)			0.261* (0.139)	-0.572*** (0.177)	-0.571 (0.398)
Agemom			0.000 (0.001)			0.009 (0.023)	-0.007 (0.008)	-0.016** (0.008)
Male			0.265*** (0.013)				0.265*** (0.025)	0.201*** (0.026)
Black child			-0.018 (0.021)				0.155* (0.083)	0.057 (0.098)

Table H5: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[45]	(2)[46]
Hispanic child			-0.018 (0.018)				0.053 (0.039)	0.036 (0.044)
Urban			0.022 (0.020)			-0.059 (0.046)	-0.011 (0.031)	-0.065* (0.034)
Region1			-0.000 (0.022)			-0.079 (0.130)	-0.025 (0.036)	-0.082** (0.040)
Region2			0.024 (0.019)			-0.029 (0.091)	0.034 (0.032)	-0.003 (0.038)
Region3			0.028 (0.018)			0.081 (0.082)	0.032 (0.034)	0.029 (0.040)
Office			0.001 (0.002)			0.009 (0.008)	0.004 (0.003)	0.002 (0.004)
Short term hospitals with child/adoles. service			0.794 (1.038)			-4.277** (2.024)	-0.284 (1.528)	-0.126 (1.756)
Short term child wellness hospitals			0.473 (0.633)			-1.093 (1.247)	1.135 (0.767)	0.793 (0.969)
Total number of hospitals			0.093 (0.325)			-0.274 (0.664)	0.311 (0.445)	-0.124 (0.474)
Short term hospitals with nutrition programs			0.296 (0.480)			1.061 (0.714)	0.383 (0.600)	0.437 (0.783)
Long term child psychiatric hospitals			-0.028 (0.084)			0.201 (0.157)	-0.099 (0.119)	-0.162 (0.149)
Short term child psychiatric hospitals			0.172 (0.252)			-0.039 (0.343)	0.365 (0.391)	0.381 (0.366)

Table H5: Continuing from Previous Page

	RE Model			FE Model			GMM Model	
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[45]	(2)[46]
Convenience			0.001 (0.001)			0.003 (0.003)	0.001 (0.001)	0.001 (0.002)
Fitness			-0.001 (0.001)			0.002 (0.002)	-0.001 (0.001)	-0.000 (0.001)
Full service restaurants			0.031 (0.023)			0.018 (0.062)	0.023 (0.031)	0.004 (0.035)
Limited service restaurants			-0.000 (0.000)			-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Fruit			-0.004 (0.006)			-0.003 (0.014)	-0.002 (0.007)	0.004 (0.009)
Dentist			0.000 (0.000)			0.000 (0.001)	0.000 (0.000)	0.000 (0.000)
Park			-0.052 (0.036)			-0.051 (0.070)	-0.039 (0.048)	-0.041 (0.057)
Museum			0.000 (0.005)			-0.014 (0.014)	-0.007 (0.007)	-0.008 (0.007)
Zoo			0.088** (0.042)			-0.051 (0.095)	0.040 (0.056)	0.051 (0.063)
Grocery			0.004*** (0.000)			0.002 (0.066)	0.003* (0.001)	0.000 (0.001)
Constant	0.061*** (0.021)	0.037* (0.021)	0.330*** (0.124)	-0.060 (0.041)	-0.055 (0.041)	-0.597 (0.716)	0.506** (0.238)	0.673 (0.434)

Notes: Sample size is 21050 and rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates.
 * p<0.10 ** p<0.05 *** p<0.01 Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old; age 48 is 1 if the child age is (24≥ & <48); Age60 is 1 if the child's age is (≥48 & <60); Age72 is 1 if the child's age is (≥60 & <72) and the reference category: child's age is ≥72. Numbers in [.] show GMM model number.

Table H6: Estimation Results of the Ear Infection Equation (Specification 3)

	RE Model			FE Model			GMM Model
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[47]
General health	-0.058*** (0.009)	-0.056*** (0.009)	-0.059*** (0.009)	-0.011 (0.011)	-0.010 (0.011)	-0.010 (0.011)	-0.022 (0.015)
University degree	0.005 (0.009)	0.004 (0.009)	-0.004 (0.009)	-0.038 (0.024)	-0.038 (0.024)	-0.038 (0.024)	-0.050 (0.032)
Sibling	-0.009*** (0.003)	-0.010*** (0.003)	-0.009*** (0.003)	-0.002 (0.008)	-0.002 (0.008)	-0.002 (0.008)	0.077*** (0.028)
Married	0.016** (0.008)	0.016** (0.008)	-0.008 (0.009)	0.008 (0.018)	0.008 (0.018)	0.007 (0.018)	-0.034 (0.028)
Hhincomenet	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000* (0.000)
Missing hincomenet	0.008 (0.015)	0.005 (0.015)	0.005 (0.015)	0.024 (0.018)	0.022 (0.018)	0.021 (0.018)	-0.001 (0.052)
Time3	-0.073*** (0.006)	-0.076*** (0.007)	-0.096*** (0.009)	-0.075*** (0.007)	-0.077*** (0.007)	-0.070*** (0.015)	-0.119*** (0.013)
Time4	-0.244*** (0.007)	-0.249*** (0.009)	-0.306*** (0.018)	-0.239*** (0.008)	-0.237*** (0.010)	-0.221*** (0.037)	-0.343*** (0.030)
Time5	-0.279*** (0.011)	-0.283*** (0.012)	-0.368*** (0.024)	-0.282*** (0.012)	-0.278*** (0.014)	-0.275*** (0.047)	-0.409*** (0.036)
Age24			-0.190 (0.184)			-0.129 (0.202)	-0.075 (0.156)
Age48			-0.160 (0.183)			-0.105 (0.202)	-0.049 (0.156)
Age60			-0.131 (0.183)			-0.074 (0.201)	-0.030 (0.155)
Age72			-0.108 (0.182)			-0.048 (0.200)	-0.008 (0.154)
Agemom			0.001 (0.001)			-0.019* (0.010)	-0.003 (0.002)

Table H6: Continuing from Previous Page

	RE Model			FE Model			GMM Model
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[47]
Male			0.016** (0.007)				0.025*** (0.008)
Black child			-0.102*** (0.010)				-0.147*** (0.018)
Hispanic child			-0.014 (0.010)				-0.024* (0.014)
Urban			-0.006 (0.010)			0.046** (0.021)	0.022* (0.012)
Region1			0.040*** (0.013)			0.025 (0.059)	0.057*** (0.015)
Region2			0.080*** (0.011)			0.031 (0.048)	0.061*** (0.013)
Region3			0.093*** (0.010)			0.039 (0.041)	0.102*** (0.012)
Pct95 precipitation			0.000 (0.000)			-0.000 (0.000)	0.000 (0.000)
Std of snow fall			0.000 (0.000)			0.001** (0.000)	0.000 (0.000)
Std of precipitation level			0.000* (0.000)			0.000 (0.000)	0.000* (0.000)
Use Home based care		-0.085*** (0.015)	-0.081*** (0.015)		-0.054*** (0.018)	-0.054*** (0.018)	-0.296* (0.161)
Constant	0.468*** (0.012)	0.470*** (0.012)	0.615*** (0.185)	0.453*** (0.020)	0.452*** (0.020)	1.051*** (0.362)	0.471*** (0.164)

Notes: Sample size is 24550 and rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates. *p<0.10 **p<0.05 ***p<0.01 Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old; age 48 is 1 if the child age is (24≥ & <48); Age60 is 1 if the child's age is (≥48 & <60); Age72 is 1 if the child's age is (≥60 & <72) and the reference category: child's age is ≥72. Numbers in [.] show GMM model number.

Table H7: Estimation Results of the Respiratory Illness Equation (Specification 3)

	RE Model			FE Model			GMM Model
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[48]
General health	-0.072*** (0.007)	-0.071*** (0.007)	-0.073*** (0.007)	-0.011 (0.009)	-0.011 (0.009)	-0.011 (0.009)	-0.029** (0.013)
University degree	-0.007 (0.006)	-0.007 (0.006)	-0.006 (0.007)	0.011 (0.016)	0.011 (0.016)	0.011 (0.016)	-0.003 (0.024)
Sibling	0.001 (0.002)	0.001 (0.002)	0.002 (0.002)	-0.002 (0.006)	-0.002 (0.006)	-0.002 (0.006)	0.036** (0.017)
Married	-0.019*** (0.006)	-0.019*** (0.006)	-0.015** (0.007)	-0.024* (0.014)	-0.024* (0.014)	-0.025* (0.014)	-0.062*** (0.023)
Hhincomenet	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Missing hincomenet	0.020* (0.011)	0.019* (0.011)	0.020* (0.011)	0.038*** (0.013)	0.039*** (0.013)	0.039*** (0.013)	-0.170 (0.121)
Time3	0.006 (0.005)	0.005 (0.005)	-0.002 (0.006)	0.006 (0.005)	0.006 (0.005)	0.011 (0.010)	-0.010 (0.007)
Time4	-0.050*** (0.005)	-0.055*** (0.006)	-0.057*** (0.013)	-0.041*** (0.006)	-0.043*** (0.007)	-0.021 (0.026)	-0.108*** (0.019)
Age24			0.005 (0.018)			0.006 (0.024)	-0.007 (0.008)
Age48			0.016 (0.016)			0.008 (0.021)	
Age60			0.008 (0.014)			0.004 (0.017)	-0.017 (0.012)
Age72							-0.021 (0.020)
Agemom			-0.001 (0.000)			-0.006 (0.007)	-0.001 (0.002)

Table H7: Continuing from Previous Page

	RE Model			FE Model			GMM Model
	(1)	(2)	(3)	(1)	(2)	(3)	(1)[48]
Male			0.019*** (0.005)				0.020*** (0.006)
Black child			0.007 (0.008)				-0.019 (0.013)
Hispanic child			-0.024*** (0.007)				-0.028*** (0.010)
Urban			-0.019** (0.008)			-0.000 (0.015)	-0.012 (0.008)
Region1			0.025*** (0.009)			-0.016 (0.038)	0.023** (0.010)
Region2			0.026*** (0.007)			-0.004 (0.030)	0.019** (0.009)
Region3			0.049*** (0.007)			-0.021 (0.028)	0.049*** (0.008)
Pct95 precipitation			0.000 (0.000)			0.000 (0.000)	0.000 (0.000)
Std of snow fall			0.000 (0.000)			0.000 (0.000)	0.000 (0.000)
Std of precipitation level			0.000 (0.000)			0.000 (0.000)	0.000 (0.000)
Use Home based care		-0.015 (0.012)	-0.009 (0.012)		0.009 (0.014)	0.009 (0.014)	-0.066 (0.088)
Constant	0.204*** (0.009)	0.205*** (0.009)	0.196*** (0.025)	0.162*** (0.015)	0.162*** (0.015)	0.333 (0.213)	0.169*** (0.031)

Notes: Sample size is 22950 and rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates.

* p<0.10 ** p<0.05 *** p<0.01 Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old; age 48 is 1 if the child age is (24≥ & <48) Age60 is 1 if the child's age is (≥48 & <60); Age72 is 1 if the child's age is (≥60 & <72) and the reference category: child's age is ≥72. Numbers in [.] show GMM model number.

APPENDIX I: ESTIMATION WITH INTERACTION EFFECTS

In this appendix, production functions for each outcome variable is estimated with interaction effects, as shown in Table I. Since interactions between maternal work hours and quality variables are not significant, those results are not shown here. In order to understand the effects of quality on the cognitive ability gap between an obese and non-obese child, the first column of Table I shows the estimation results with interaction effects for cognitive achievement. According to the results, a 1 SD increase in home quality increases the next period cognitive achievement of children who are not obese by 0.11 SD ($p < 0.01$). However, higher home quality does not reduce the cognitive achievement gap between obese and non-obese children, although the interaction effect is not statistically significant. On the other hand, higher out-of-home child care quality decreases the cognitive achievement gap between obese and non-obese children. The gap is reduced by 0.75 SD ($p < 0.05$) for high quality, out-of-home child care. This means that for low levels of out-of-home child care quality, obese children exhibit lower cognitive achievement but the gap narrows as out-of-home child care quality increases. High levels of household income do not have a significant effect on the cognitive achievement gap between obese and non-obese children.

The second column in Table I shows estimation results with interaction effects for behavior problems using the two-step system GMM estimator. According to the results, a 1 SD increase in in-home primary child care quality decreases behavior problems by 1.04 SD ($p < 0.10$) but widens the gap between overweight and non-overweight children by 1.01 SD ($p < 0.10$). That is, overweight children have more behavior problems at all levels of in-home child care quality. On the other hand, an increase in household income reduces the gap between overweight and non-overweight children ($p < 0.01$). That is, the behavior problem gap between

children who are and are not overweight decreases as household income increases. Although the other interaction variables are not statistically significant, more hours of center-based care, higher levels of home quality and out-of-home child care quality significantly reduce behavior problems in non-overweight children.

The third column in Table I shows the estimation results of the production function for the risk of obesity. A 1 SD increase in home quality decreases the risk of obesity in the next period by 7 percentage points for non-obese children ($p < 0.01$) but this effect is smaller for currently obese children than that of currently non-obese children. On the other hand, ten more hours of work increases the non-obese child's risk of being obese in the next period by 3 percentage points ($p < 0.05$), but increases this risk for currently obese children less than that of currently non-obese children. Thus, higher home quality increases the next period risk of obesity gap by almost 5 percentage points ($p < 0.05$) while more hours of work decreases this risk ($p < 0.05$). These findings imply that healthy children (i.e., non-obese children) benefit from higher home quality more than children who are unhealthy. Higher levels of in-home child care quality reduce the gap while higher out-of-home quality increases the same gap, although the corresponding interaction effects are not significant.

The fourth column in Table I shows GMM results with some interaction effects to test if more hours of home-based care, high quality home and in-home child care variables have effects on the next period overweight risk gap between children who are and are no overweight. A 1 SD increase in home quality decreases the currently non-overweight child's next period risk of being overweight by almost 8 percentage points ($p < 0.01$) and 1 SD increase in in-home child care quality decreases the currently non-overweight child's risk of being overweight in the next period by almost 29 percentage points ($p < 0.05$). However, higher home quality and higher in-

home child care quality increase the next period overweight risk gap between children who are and are not overweight. That is, higher levels of home quality increase the gap by almost 6 percentage points ($p < 0.05$) and an increase in in-home child care quality widens the gap by 28 percentage points ($p < 0.05$). Thus, results indicate that healthier children (i.e., non-overweight) benefit more from higher home quality and in-home child care quality. Other interaction effects are not statistically significant.

The fifth column in Table I shows GMM estimation results with some interaction effects for the estimation of the production function for general health status. Results without interaction effects indicate that more hours of child care of any type are detrimental for child's general health status while maternal work and higher home quality improve health. In addition, a healthy child today is more likely to be healthy in the next period. Thus, in this table, I present whether or not the next period health status gap increases or decreases with more hours of child care, maternal work and higher home quality. The results show that an increase in maternal hours of works improves the next period general health status of unhealthy children more than that of healthy children. Ten more hours of maternal work increases the likelihood of good health by 8 percentage points for unhealthy children ($p < 0.05$). Hence, the gap decreases with more maternal hours of works ($p < 0.10$). In addition, a 1 SD increase in home quality increases the unhealthy child's probability of having good health by 19 percentage points ($p < 0.01$). Thus, higher home quality also reduces the gap by almost 18 percentage points ($p < 0.01$). On the other hand, more hours of both center-based and home-based child care, however, increase the gap. Ten more hours of center-based child care decreases the likelihood of good health status for unhealthy children by 8 percentage points ($p < 0.05$) and ten more hours of home-based child care decreases this likelihood for unhealthy children by almost 13 percentage points ($p < 0.01$).

Hence, as shown by interaction effects, more hours of both center-based and home-based child care decrease the next period good health status of currently unhealthy children more than that of healthy children.

Table I: Marginal Effects from the Estimation of Production Functions with Interactions

	GMM Models				
	(1) [11]	(2) [12]	(3) [13]	(4) [14]	(5) [15]
Hours of work ^a	0.109** (0.005)	-0.063 (0.006)	0.033** (0.001)	-0.010 (0.001)	0.082** (0.004)
Center based child care hours ^a	0.282*** (0.006)	-0.165* (0.009)	0.001 (0.001)	-0.003 (0.001)	-0.083*** (0.003)
Home based child care hours ^a	0.045 (0.005)	0.002 (0.007)	0.016 (0.001)	0.019 (0.002)	-0.127*** (0.005)
Home quality index	0.108*** (0.021)	-0.217** (0.100)	-0.071*** (0.017)	-0.076*** (0.026)	0.188*** (0.056)
In-home child care quality index	0.032 (0.092)	-1.043* (0.585)	-0.040 (0.097)	-0.290** (0.138)	0.137 (0.083)
Out-of-home child care quality index	0.0105 (0.126)	-0.242* (0.135)	-0.006 (0.028)	-0.002 (0.027)	0.06 (0.010)
Obese*hoursofwork ^a			-0.028** (0.001)		
Overweight*hoursofwork ^a		-0.024 (0.010)			
Goodhealth*hoursofwork ^a					-0.073* (0.004)
Overweight*hoursofcentercare ^a		0.070 (0.007)			
Goodhealth*hoursofcentercare ^a					0.071** (0.003)
Overweight*hoursofhomecare ^a				-0.017 (0.003)	
Goodhealth*hoursofhomecare ^a					0.104** (0.005)
Obese*homequality	-0.027 (0.041)		0.049** (0.024)		
Overweight*homequality		0.132 (0.091)		0.055** (0.025)	
Goodhealth*homequality					-0.176*** (0.052)
Obese*in-homecare-quality	0.072 (0.580)		-0.034 (0.147)		
Overweight*in-homecare-quality		1.010* (0.587)		0.284** (0.140)	

Table I: Continuing from Previous Page

	GMM Models				
	(1) [11]	(2) [12]	(3) [13]	(4) [14]	(5) [15]
Obese*out-of-homecare-quality	0.745** (0.304)		0.005 (0.034)		
Obese*income	-0.000 (0.000)		0.000 (0.000)		
Overweight*income		-0.000*** (0.000)		-0.000 (0.000)	
Goodhealth*income					
Obese	-0.094 (0.061)		0.059* (0.034)		
Overweight		0.082 (0.168)		0.071 (0.076)	
Good health					0.008 (0.064)
Income	0.000*** (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000** (0.000)	-0.000 (0.000)
Cognitive achievement	0.273*** (0.077)	0.131** (0.055)	0.005 (0.005)	0.008 (0.013)	
Behavior	0.018 (0.067)	0.663*** (0.058)	-0.012** (0.005)	-0.011 (0.018)	-0.007 (0.005)
Ear infection	-0.192 (0.211)	0.392** (0.186)	-0.040 (0.038)	-0.016 (0.037)	0.040 (0.040)
Respiratory illness	-0.206 (0.162)	-1.268*** (0.308)	-0.027 (0.064)	0.024 (0.052)	-0.047 (0.051)
University degree	0.077 (0.249)	0.271 (0.236)	-0.074** (0.030)	-0.028 (0.034)	0.036 (0.028)
Sibling	-0.199*** (0.068)	0.136* (0.075)	0.005 (0.011)	0.007 (0.013)	0.032** (0.016)
Married	0.278 (0.229)	-0.074 (0.126)	-0.104 (0.065)	-0.319*** (0.076)	0.069 (0.045)
Missing home quality	-2.298** (1.141)	-1.003 (1.008)	0.076 (0.173)	-0.061 (0.179)	-0.265 (0.266)

Table I: Continuing from Previous Page

	GMM Models				
	(1) [11]	(2) [12]	(3) [13]	(4) [14]	(5) [15]
Missing in-home quality	3.023*	1.350	0.331	0.253	0.596*
	(1.768)	(1.439)	(0.255)	(0.404)	(0.357)
Use in-home care	0.416	0.313	-0.021	0.130	0.113
	(0.365)	(0.412)	(0.107)	(0.115)	(0.086)
Use out-of-home care	-0.400**	0.836***	-0.010	0.0377	0.0640**
	(0.175)	(0.246)	(0.029)	(0.034)	(0.027)
Missing out-of-home quality	-1.098**	0.300	0.216*	0.006	0.037
	(0.488)	(0.509)	(0.120)	(0.102)	(0.146)
Age24	0.051	-0.398	0.207***	0.491***	0.063
	(0.930)	(0.395)	(0.053)	(0.108)	(0.042)
Age48	0.059	-0.375	0.173***	0.451***	0.065
	(0.928)	(0.387)	(0.051)	(0.107)	(0.040)
Age60	0.300	-0.371	0.163***	0.419***	0.048
	(0.926)	(0.379)	(0.048)	(0.106)	(0.037)
Age72	0.207	-0.226	0.180***	0.412***	0.029
	(0.923)	(0.380)	(0.044)	(0.107)	(0.035)
Agemom	0.010	-0.011	0.004***	0.006***	-0.004***
	(0.007)	(0.007)	(0.001)	(0.002)	(0.001)
Male	-0.155***	0.213***	0.029***	0.024**	-0.023***
	(0.026)	(0.022)	(0.007)	(0.010)	(0.006)
Black child	-0.239***	0.087	-0.060**	-0.102***	0.016
	(0.093)	(0.065)	(0.025)	(0.030)	(0.017)
Hispanic child	-0.205***	0.004	-0.002	0.011	-0.041***
	(0.044)	(0.038)	(0.014)	(0.018)	(0.010)
Region1	-0.044	-0.024	0.022*		0.007
	(0.040)	(0.035)	(0.012)		(0.010)
Region2	-0.075**	0.007	0.003		-0.008
	(0.038)	(0.033)	(0.010)		(0.009)
Region3	-0.110***	0.063*	0.007	-0.017	0.002
	(0.039)	(0.035)	(0.010)	(0.013)	(0.009)
Urban	-0.110***	0.063*	0.007	-0.017	0.002
	(0.039)	(0.035)	(0.010)	(0.013)	(0.009)

Table I: Continuing from Previous Page

	GMM Models				
	(1) [11]	(2) [12]	(3) [13]	(4) [14]	(5) [15]
Hhincomenet	0.000*** (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000* (0.000)	-0.000 (0.000)
Missing hincomenet	0.577*** (0.203)	-0.021 (0.188)	0.024 (0.096)	0.119 (0.104)	-0.033 (0.043)
Time2	0.067 (0.068)	0.193** (0.088)	-0.065*** (0.018)	-0.092*** (0.021)	0.033** (0.016)
Time4	-0.316*** (0.081)	-0.172* (0.095)	-0.015 (0.016)	0.011 (0.020)	0.0147 (0.017)
Time5	0.164 (0.134)	-0.455*** (0.147)	-0.039 (0.026)	0.018 (0.031)	0.019 (0.025)
Office	0.001 (0.004)	0.001 (0.003)	0.001 (0.001)	0.002 (0.002)	0.002 (0.001)
Short term hospitals with child/adoles. service	-0.508 (1.416)	-0.427 (1.443)	0.002 (0.534)	0.543 (0.691)	0.571 (0.399)
Short term child wellness hospitals	0.495 (0.844)	0.587 (0.852)	0.151 (0.301)	0.561 (0.428)	0.052 (0.305)
Total number of hospitals	-0.862* (0.470)	-0.077 (0.448)	0.007 (0.174)	0.380* (0.224)	-0.066 (0.137)
Short term hospitals with nutrition programs	0.860 (0.617)	-0.254 (0.772)	-0.309 (0.227)	-0.526* (0.288)	-0.015 (0.202)
Long term child psychiatric hospitals	-0.055 (0.114)	-0.078 (0.131)	-0.067*** (0.025)	-0.046 (0.056)	0.063** (0.025)
Short term child psychiatric hospitals	-0.063 (0.266)	0.427 (0.426)	-0.068 (0.063)	-0.327* (0.170)	0.089** (0.038)
Convenience	-0.001 (0.001)	0.001 (0.001)	-0.000 (0.001)	0.000 (0.001)	0.000 (0.000)
Fitness	0.002 (0.001)	0.000 (0.001)	0.000 (0.001)	0.001 (0.001)	-0.000 (0.000)
Full service restaurants	-0.006 (0.033)	0.023 (0.032)	0.004 (0.012)	0.001 (0.014)	0.009 (0.010)
Limited service restaurants	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)

Table I: Continuing from Previous Page

	GMM Models				
	(1) [11]	(2) [12]	(3) [13]	(4) [14]	(5) [15]
Fruit	-0.004 (0.008)	-0.000 (0.008)	-0.009*** (0.003)	-0.008** (0.003)	-0.003 (0.003)
Dentist	-0.001* (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Park	0.055 (0.047)	-0.061 (0.057)	0.009 (0.020)	-0.008 (0.024)	-0.003 (0.018)
Museum	-0.004 (0.007)	-0.006 (0.007)	0.001 (0.004)	-0.006 (0.004)	-0.000 (0.002)
Zoo	-0.070 (0.060)	0.0802 (0.064)	0.027 (0.020)	0.041 (0.027)	0.013 (0.021)
Grocery	0.000 (0.001)	0.001 (0.001)	0.001 (0.000)	0.003*** (0.000)	0.000 (0.000)
Constant	-0.434 (0.929)	0.400 (0.422)	-0.126** (0.051)	-0.142 (0.103)	0.804*** (0.079)
N	20850	21050	20400	20400	23650

Notes: Sample size N is rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates. * p<0.10 ** p<0.05 *** p<0.01. Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old; age 48 is 1 if the child age is (24≥ & <48); Age60 is 1 if the child's age is (≥48 & <60); Age72 is 1 if the child's age is (≥60 & <72) and the reference category: child's age is ≥72. Numbers in square brackets [.] show GMM model number.

APPENDIX J: ESTIMATION RESULTS FOR BEHAVIOR PROBLEMS SUBGROUPS

This appendix presents the Estimation results of three subgroups of behavior problems. The first column in Table J shows estimation results for emotions, the first subgroup of behavior problems. This index represents the emotional level of the child and high values indicate lower emotional development. Variables used in creation of this include being aggressive, unhappy, worried, and having a temper. The results show that while hours of work reduce the value of the emotions index, more hours of center- or home-based care increases the value of the emotions index. However, the only significant impact stems from the use of home-based child care. A ten-hour more weekly use of home-based child care increases the value of the index by 0.11 SD ($p < 0.05$). Among the quality variables, primary out-of-home child care has a significant impact. A 1 SD increase in out-of-home quality reduces the index by 0.22 SD ($p < 0.01$). Another point to note is that obesity increases the value of this index significantly. An obese child today has a 0.33 SD higher level of emotions index in the next period than a non-obese child ($p < 0.05$). This indicates that the adverse effect of obesity is also seen in a child's emotional development. The reason might be that an obese child's emotional development might be negatively affected by experiencing discrimination against him/her by others, such as child care providers and other children in a child care setting (or even by his/her family).

The second column in Table J shows estimation results for social interaction, another subgroup of the behavior problems that includes variables such as whether the child is invited to play by other children, understands others and cooperates with other children. This index represents the social interaction level of the child and high values indicate lower social development. According to the results, a greater number of work hours and center-based child care decrease the value of the social interaction index whereas more hours of home-based care

increases the value of the index. Ten more hours of maternal work reduces the value of the index by 0.12 SD ($p < 0.05$). A 1 SD increase in home quality, the only significant quality variable, reduces the index by 0.17 SD ($p < 0.05$).

The third column of Table J shows estimation results for attention, the last subgroup of behavior problems. This index is constructed from variables such as level of attention, adaptation, concentration, eagerness to learn and hyperactivity level. The index represents the overall attention level of the child and high values indicate lower development. The results indicate that hours of work increase the value of this index (although not significantly) while more hours of child care result in a decreased value. A ten-hour increase in the use of home-based child care reduces the value of the attention index by 0.14 SD ($p < 0.05$). Similar to the social interaction index, a 1 SD increase in home quality reduces the value of the attention index by 0.36 SD ($p < 0.01$). Other quality variables are not statistically significant. In summary, all results for behavior problems indicate that maternal employment reduces behavior problems through reducing social interaction problems in children while home-based child care decreases behavior problems by lowering attention problems in children. However, home-based care has detrimental effects on the emotional development of the child. Higher home quality reduces behavior problems in children by reducing social interaction and attention problems whereas high levels of out-of-home child primary care quality decreases behavior problems by decreasing emotional problems.

Table J: Marginal Effects from Estimation of Production Functions for the Behavior Problems Subgroups

	GMM Models		
	(1) [16]	(2) [17]	(3) [18]
Hours of work ^a	-0.036 (0.005)	-0.120** (0.005)	0.005 (0.007)
Center based child care hours ^a	0.010 (0.006)	-0.050 (0.008)	-0.096 (0.008)
Home based child care hours ^a	0.108** (0.005)	0.036 (0.007)	-0.135** (0.007)
Home quality index	-0.010 (0.072)	-0.165** (0.080)	-0.361*** (0.074)
In-home child care quality index	-0.374 (0.354)	-0.738 (0.524)	-0.375 (0.360)
Out-of-home child care quality index	-0.220*** (0.083)	-0.080 (0.100)	-0.091 (0.099)
Emotions	0.613*** (0.054)		
Social interaction		0.420*** (0.068)	
Attention			0.254*** (0.070)
Cognitive achievement	0.073 (0.045)	0.115** (0.052)	0.164*** (0.055)
Obese	0.331** (0.135)	0.167 (0.152)	0.219 (0.159)
Ear infection	0.611*** (0.184)	0.507** (0.217)	0.366* (0.205)
Respiratory illness	-0.633** (0.284)	-1.209*** (0.346)	-0.913*** (0.318)
University degree	0.219 (0.221)	0.446* (0.260)	0.366 (0.229)
Sibling	0.128* (0.075)	0.161** (0.078)	0.151* (0.081)
Married	0.121 (0.118)	-0.041 (0.128)	-0.253** (0.122)
Hhincomenet	-0.000** (0.000)	-0.000*** (0.000)	-0.000* (0.000)

Table J: Continuing from Previous Page

	GMM Models		
	(1) [16]	(2) [17]	(3) [18]
Missing hincomenet	-0.167 (0.174)	-0.227 (0.184)	-0.132 (0.177)
Time2	-0.103 (0.076)	0.107 (0.094)	0.062 (0.098)
Time4	0.066 (0.086)	-0.050 (0.092)	0.005 (0.106)
Time5	0.007 (0.132)	-0.230* (0.134)	-0.098 (0.154)
Missing home quality	0.209 (0.955)	-0.637 (1.023)	0.056 (1.107)
Missing in-home quality	-0.088 (2.270)	0.089 (1.738)	3.881* (2.091)
Use in-home care	-0.585 (0.382)	0.553 (0.415)	-0.109 (0.401)
Use out-of-home care	0.157 (0.205)	0.438 (0.275)	0.359 (0.266)
Missing out-of-home quality	0.290 (0.473)	0.164 (0.544)	-0.147 (0.505)
Age24	-0.326 (0.444)	-0.454 (0.423)	-0.315 (0.330)
Age48	-0.354 (0.441)	-0.483 (0.416)	-0.319 (0.322)
Age60	-0.434 (0.440)	-0.463 (0.408)	-0.441 (0.320)
Age72	-0.446 (0.440)	-0.384 (0.406)	-0.428 (0.313)
Agemom	-0.018*** (0.007)	-0.009 (0.007)	-0.016** (0.007)
Male	0.168*** (0.021)	0.199*** (0.024)	0.266*** (0.025)

Table J: Continuing from Previous Page

	GMM Models		
	(1) [16]	(2) [17]	(3) [18]
Black child	0.070 (0.065)	0.078 (0.068)	0.086 (0.066)
Hispanic child	0.019 (0.037)	0.045 (0.042)	-0.021 (0.039)
Region1	-0.068** (0.032)	0.008 (0.039)	0.002 (0.037)
Region2	0.012 (0.032)	0.020 (0.036)	0.018 (0.034)
Region3	-0.001 (0.032)	0.053 (0.038)	0.062* (0.036)
Urban	-0.031 (0.033)	-0.002 (0.034)	-0.025 (0.033)
Office	0.001 (0.004)	0.001 (0.004)	0.001 (0.004)
Short term hospitals with child/adoles. service	-1.307 (1.385)	0.599 (1.481)	-0.277 (1.354)
Short term child wellness hospitals	0.554 (0.879)	0.446 (0.931)	0.688 (0.866)
Total number of hospitals	0.143 (0.481)	0.089 (0.478)	0.281 (0.434)
Short term hospitals with nutrition programs	0.483 (0.776)	-0.552 (0.722)	-0.749 (0.667)
Long term child psychiatric hospitals	-0.001 (0.111)	-0.061 (0.139)	-0.119 (0.128)
Short term child Psychiatric hospitals	0.490 (0.397)	0.338 (0.366)	0.478 (0.392)

Table J: Continuing from Previous Page

	GMM Models		
	(1) [16]	(2) [17]	(3) [18]
Convenience	0.000 (0.001)	0.000 (0.002)	0.000 (0.001)
Fitness	0.003* (0.002)	-0.001 (0.001)	-0.001 (0.001)
Full service restaurants	-0.010 (0.032)	0.055 (0.035)	0.054 (0.033)
Limited service restaurants	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Fruit	0.008 (0.008)	-0.003 (0.008)	0.006 (0.008)
Dentist	-0.000 (0.000)	0.000 (0.000)	0.001 (0.000)
Park	-0.024 (0.052)	-0.064 (0.056)	-0.088* (0.052)
Museum	-0.013* (0.008)	-0.010 (0.008)	0.001 (0.007)
Zoo	-0.009 (0.061)	0.151** (0.062)	0.062 (0.059)
Grocery	0.004*** (0.001)	-0.000 (0.001)	0.001 (0.001)
Constant	0.352 (0.469)	0.318 (0.444)	0.589 (0.360)
N	21400	21150	21450

Notes: Sample size N is rounded to the nearest 50 as required by NCES. Robust standard errors are shown for coefficient estimates. * p<0.10 ** p<0.05 *** p<0.01. Age24, Age48, Age60 and Age72 are age dummies for the child. Age 24 is 1 if the child is <24 months old; age 48 is 1 if the child age is (24 >= & <48); Age60 is 1 if the child's age is (>=48 & <60); Age72 is 1 if the child's age is (>=60 & <72) and the reference category: child's age is >=72. Numbers in square brackets [.] show GMM model number.

APPENDIX K: ANALYSIS OF STATE-LEVEL CHILD CARE PRICES

Child care is essential for families especially for working mothers caring for their children during early childhood. The results of this dissertation show that child care and child care quality are important determinants of child development. However, the high cost of child care might reduce the use of paid child care for families. Families also assign importance to quality of child care, which may affect the cost of care. Appendix K provides an examination of the state average child care (center and family homes) prices for infants and 4-year olds between 2006 and 2012, and an analysis of the state-level demand and supply side determinants of child care prices. A cross-sectional analysis by Davis and Li (2009) examines demand and supply side factors for center-based child care prices across states. However, as the authors state, an analysis on family child care (FCC) homes is also needed since it is an important alternative to center-based child care. My analysis here extends their paper by analyzing child care prices longitudinally, including the cost data for FCC homes, as well as costs for centers, and the regulation and oversight scores for child care centers and small family child care homes.

Center care and FCC home prices are available for every state between 2006 and 2012 in annual reports published by the National Association of Child Care Resource and Referral Agencies (NACCRRA). The prices represent annual, state average cost of full-time child care in centers and family child care homes for infants and 4-year olds. A family child care home provides child care in a home-based setting. NACCRRA also scores child care centers and small family homes in terms of the child care setting standards and oversight system. Those scores are published in two reports entitled “We Can Do Better (2007b, 2009b, 2011b)” and “Leaving Children to Chance (2008a, 2010a, 2012a)”. The first report includes scores for child care centers and the second report includes scores for small family child care homes. Missing child

care price data and missing scores for child care settings are imputed by interpolation. Means for original and imputed data are very close to each other, as can be seen in Table K7. In addition, other state-level data are also gathered for the analysis. They are state-level annual median rent, mean wage of child care workers, population of children under five, employment rate as a percentage of women across the population, child care co-payment as a percentage of family income. Summary statistics for those variables can be found in Table K6 and the complete list of data sources is listed in Table K8. In addition to these variables, regional CPI is also included in the model to control for price differences across regions over time.

Figure 1 represents the yearly average costs of child care in centers and in FCC homes for infants. As can be noted from the figure, the cost of child care in centers is, in general, higher than the cost of care in FCC homes. Particularly, Massachusetts (MA) and the District of Columbia (DC) have higher costs of child care for infants. Figure 2 shows the yearly average cost of care in FCC homes and centers for 4-year olds. Similar to Figure 1, center-based care costs more than family child care homes for 4-year olds and MA and DC charge higher prices for child care. However, the difference between costs of child care in centers and FCC homes are more significant for infants than 4-year olds. Figures 3 and 4 show the cost of child care for DC and Mississippi (MS). DC generally has higher costs while MS is a state with smaller costs over time. The cost of child care (between 2006 and 2012) in DC varies between \$6000 and \$22000 whereas the cost of child care in MS is in between \$3000 and \$5500. In addition, all child care prices show increasing trends over time in DC, however, the cost of child care in centers shows an increasing trend between 2011 and 2012 in MS. Summary statistics for average (over states) annual child care costs for infants and 4-year olds in centers and FCC homes between 2006 and 2012 are available in Table K5.

Figure 1: State Comparison of Child Care Costs for Infants (average of all years)

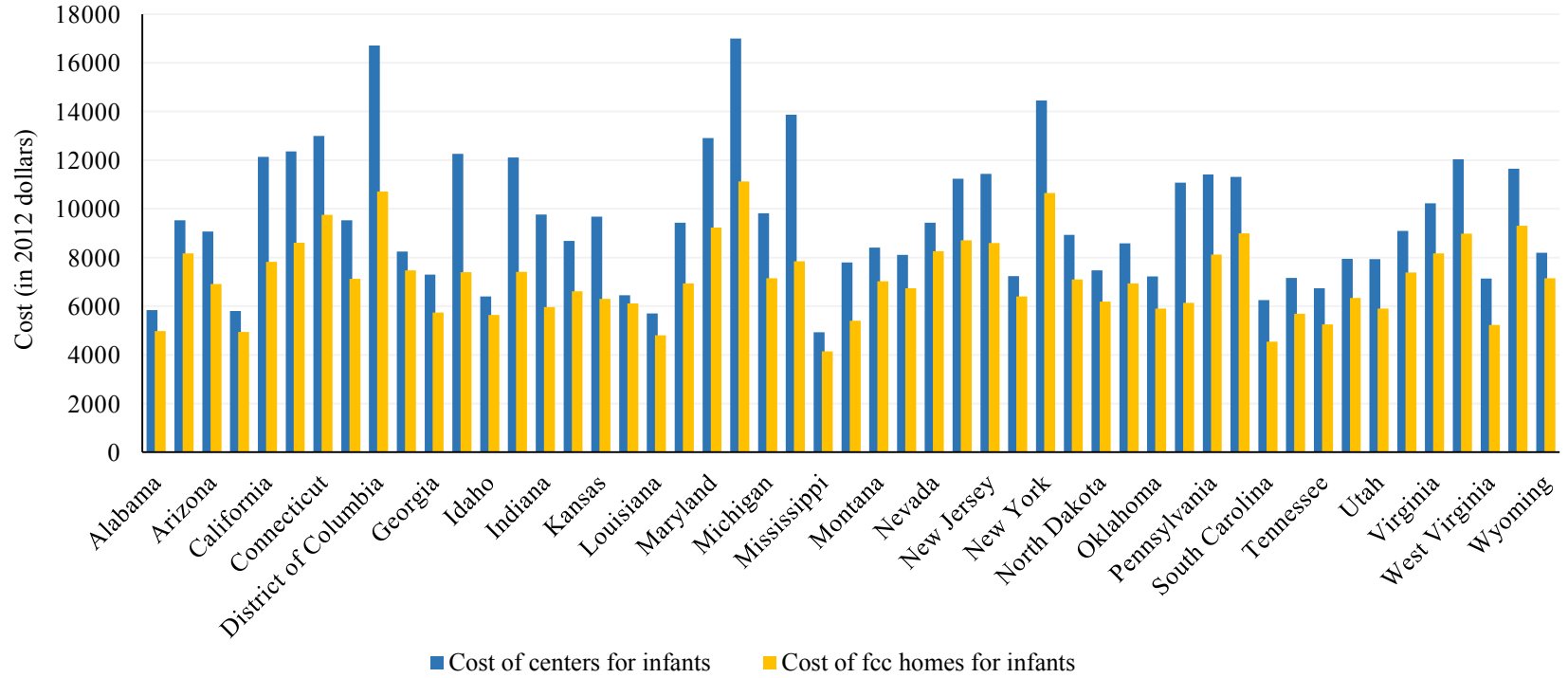


Figure 2: State Comparison of Child Care Costs for Four-year olds (average of all years)

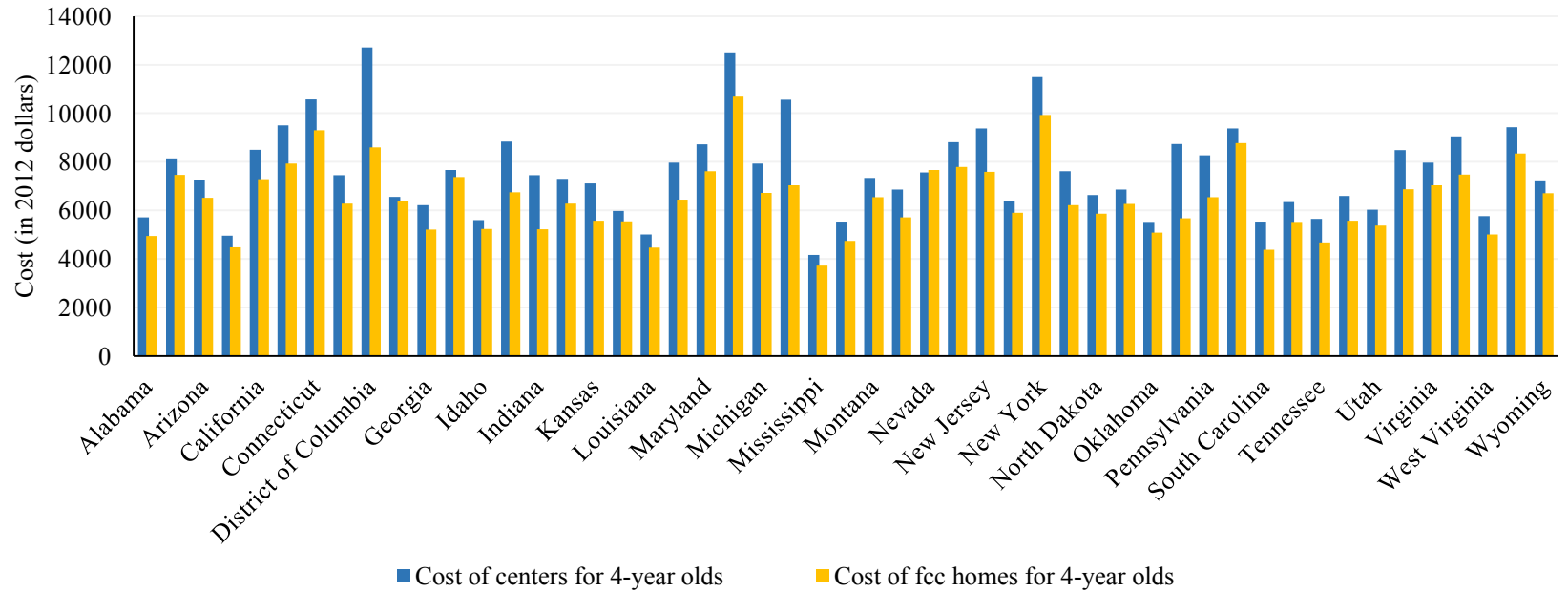


Figure 3: Child Care Costs in District of Columbia from 2006 to 2012

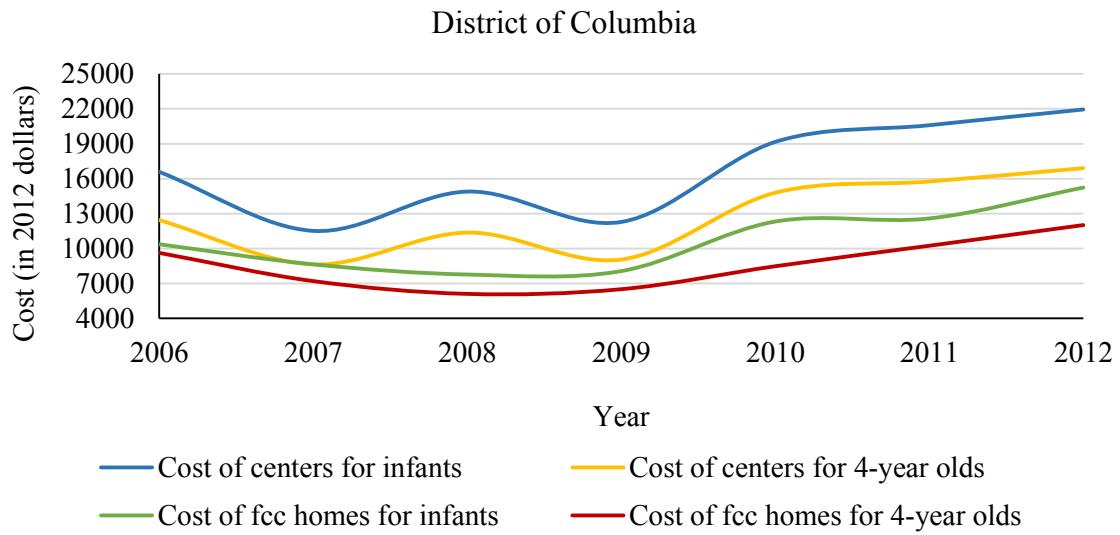


Figure 4: Child Care Costs in Mississippi from 2006 to 2012

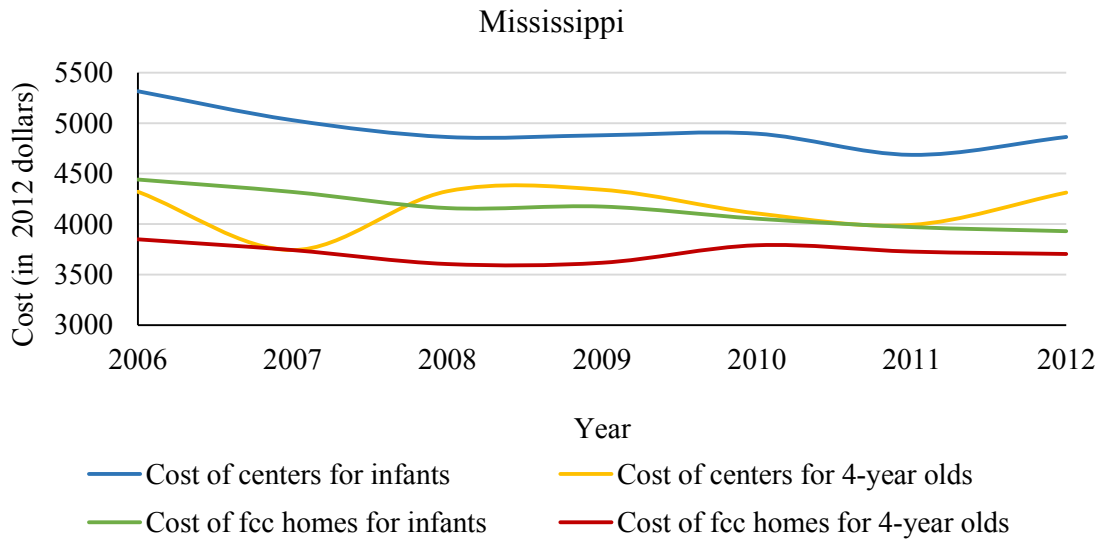


Figure 5 shows average (over states) cost of child care in centers and Figure 6 shows the cost of child care in FCC homes between 2006 and 2012. FCC home costs are more volatile than center costs as seen in the figures. While average center care costs are almost stable between 2007 and 2008, FCC home costs decreased between 2007 and 2008. However, all prices show an increasing trend after 2008, although the cost of care in FCC homes for infants decreased between 2010 and 2011. Between 2008 and 2011, employment rates of women as a percentage of population of mothers with children under age 6 and age 3 decreased while child care prices increased. This may indicate that higher cost of child care might reduce the use of child care while decreasing mother's employment. On the other hand, employment rates and FCC home costs show an increasing trend starting in 2011 whereas center costs show a small decrease or are almost constant. If employed mothers preferred child care in centers to FCC homes during this time period, this might explain the increase in costs of FCC homes while costs in centers decreased.

Child care costs are affected by both supply and demand side factors. For instance, higher income, higher employment rate of mothers and an increase in population of children might increase the demand for child care and its prices.⁴³ On the other hand, higher co-payment rates as a percent of family income might decrease the use of child care and the price of child care. Similarly, an increase in rents and wages of child care workers might increase input costs of child care services and prices. Tables K1-K4 show the RE Estimation results of the determinants of child care costs for infants and 4-year olds.

⁴³Estimation results were repeated with the overall employment rate instead of the employment rate for women. However, the employment rate was insignificant in all models and estimates for all other variables were almost the same. Thus, those results are not shown here.

Figure 5: Child Care Costs for Infants from 2006 to 2012 (average of all states)

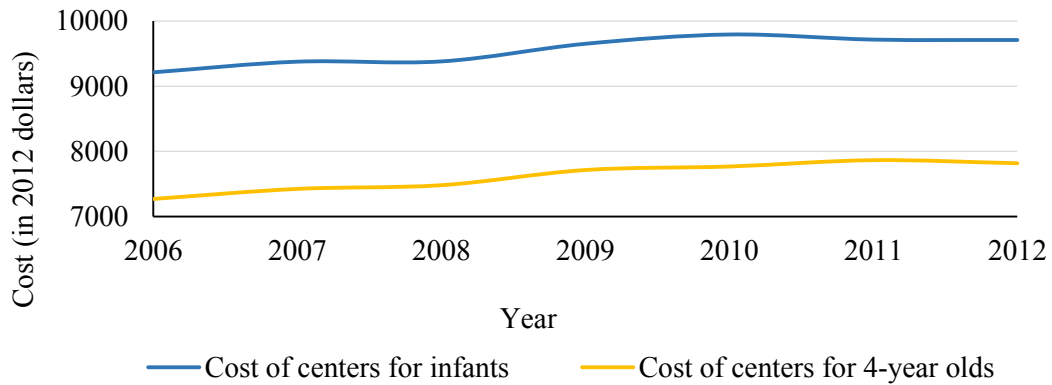


Figure 6: Child Care Costs for Four-year olds from 2006 to 2012 (average of all states)

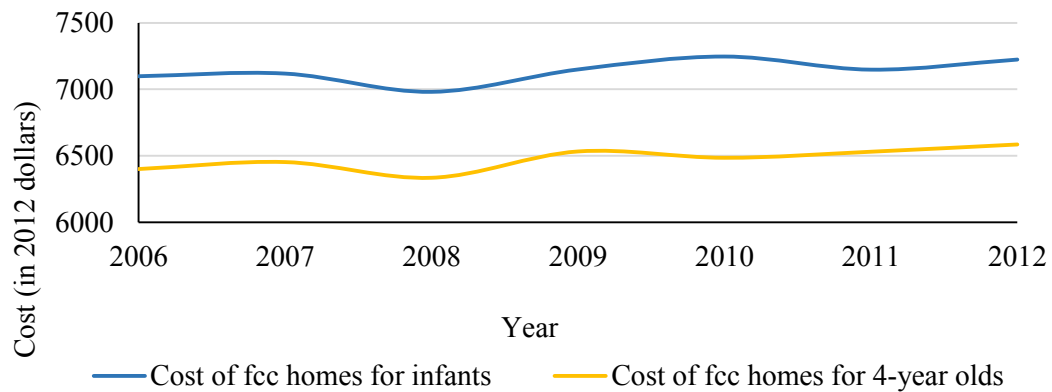
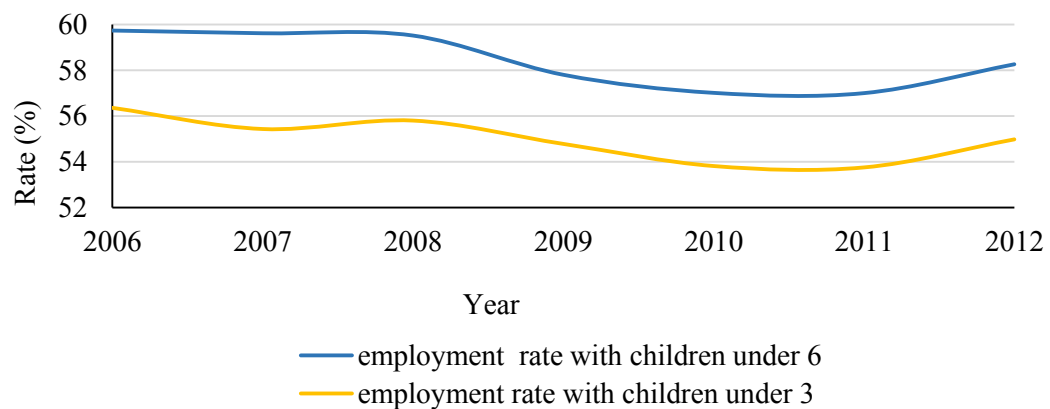


Figure 7: Employment Rate for Women with Children under Ages Three and Six from 2006 to 2012



Except for dummy variables, co-payment and employment rates and FCC home score variables are expressed in natural logs.⁴⁴ FCC home and center scores show whether centers and FCC homes satisfy the requirements defined by the NACCRRA.⁴⁵ Higher scores indicate that child care establishments satisfy most of the required regulation and oversight standards which might imply higher quality provided in those child care establishments. Thus, an increase in the score might increase the cost of child care services to families.

In Tables K1-K4, Model 2 includes the scores and co-payment variables in addition to the variables in Model 1. Model 3 includes CPI and Model 4 incorporates the cost of alternative child care types to the model. As shown in Table K1, median income and wage of child care workers are positively associated with FCC home costs for infants ($p < 0.01$; $p < 0.05$). Moreover, the FCC home score is also positively associated with FCC home costs for infants ($p < 0.01$; $p < 0.05$). This indicates that satisfying the overall quality requirements is positively associated with child care costs to families. As shown in the last column in Table K1, the positive and significant coefficient for the cost of centers for infants might imply that an increase in the cost of centers might reduce the use of center care for infants and increase demand for FCC homes which increases the price.

Table K2 shows Estimation results of the cost of FCC homes for 4-year olds. Similar to Table K1, median income and wages of child care workers are significant and positively associated with the cost of FCC homes for 4-year olds. However, the magnitude of these effects are slightly larger for 4-year olds than the results for infants. The FCC home score is also positively associated with FCC home costs and its coefficient is significant ($p < 0.05$). The

⁴⁴FCC home score is not expressed in natural logarithm since it includes zero.

⁴⁵These are overall scores for both oversight and regulation standards.

increase in cost of centers for 4-year olds is also significantly and positively associated with the cost of FCC homes for 4-year olds. As shown in Table K3, in addition to the median income and wage rate of workers, high annual rents are also significantly and positively associated with the cost of child care in centers for infants. This implies that an increase in rents and wages for child care workers raises the input costs of child care service as well as prices charged to families. An increase in the employment rate for women is also significantly and positively associated with the cost of centers for infants. Similar to the results for FCC homes, a higher center score is also positively associated with the cost of centers for infants. Moreover, a higher cost of FCC homes for infants is positively associated with the cost of centers for infants.

Estimation results of center costs for 4-year olds are shown in Table K4. Median income, child care worker wage and employment rate are significant and positively associated with child care costs in centers for 4-year olds. The center score is also significantly and positively associated with the cost of centers. In summary, the results indicate that among the demand side factors, median income is a significant determinant of child care prices. Child care worker wage is an important supply side factor and, particularly for child care centers, median rent is also an important determinant for child care prices. The results also imply that state-level overall quality for child care establishments is a significant determinant of child care costs to families.

Table K1: Estimation Results for the Cost of Family Child Care (FCC)
Homes for Infants

	RE Model 1	RE Model 2	RE Model 3	RE Model 4
Annual rent	0.273*	0.289**	0.234	0.051
	(0.143)	(0.136)	(0.142)	(0.120)
Median income	0.555***	0.493***	0.474**	0.230**
	(0.199)	(0.188)	(0.187)	(0.112)
Annual wage of child care workers	0.425***	0.445***	0.443***	0.100
	(0.096)	(0.094)	(0.096)	(0.082)
Employment rate	0.004	0.005	0.005	-0.001
	(0.003)	(0.003)	(0.003)	(0.002)
Children population	0.002	0.004	0.012	-0.009
	(0.016)	(0.015)	(0.017)	(0.012)
CPI			0.003	0.002
			(0.002)	(0.002)
FCC home score		0.001***	0.001***	0.001**
		(0.000)	(0.000)	(0.000)
The score is more than average		-0.031**	-0.031**	-0.028*
		(0.015)	(0.016)	(0.015)
Co-payment as a percent of family income		-0.002	-0.002	-0.002
		(0.003)	(0.003)	(0.003)
Co-payment is more than national average		-0.013	-0.011	-0.009
		(0.020)	(0.020)	(0.021)
Cost of centers for infants				0.578***
				(0.053)
Year2007	-0.014	-0.014	-0.030**	-0.025**
	(0.013)	(0.013)	(0.014)	(0.010)
Year2008	-0.032*	-0.027	-0.068**	-0.060***
	(0.017)	(0.017)	(0.030)	(0.018)
Year2009	-0.012	-0.008	-0.044	-0.051***
	(0.017)	(0.017)	(0.027)	(0.018)
Year2010	0.023	0.024	0.023	-0.048**
	(0.017)	(0.017)	(0.038)	(0.024)
Year2011	0.024	0.025	-0.042	-0.063**
	(0.021)	(0.020)	(0.051)	(0.031)
Year2012	0.032	0.031	-0.050	-0.065*
	(0.021)	(0.020)	(0.062)	(0.037)
Constant	-4.180***	-3.903***	-3.915***	-0.597
	(1.510)	(1.392)	(1.392)	(0.887)

Notes: Sample size is 357. Prices are in 2012 dollars. Robust standard errors are in parentheses.

Table K2: Estimation Results for the Cost of Family Child Care (FCC)
Homes for 4-year olds

	RE Model 1	RE Model 2	RE Model 3	RE Model 4
Annual rent	0.170 (0.136)	0.174 (0.129)	0.081 (0.135)	0.042 (0.106)
Median income	0.656*** (0.186)	0.612*** (0.170)	0.574*** (0.169)	0.298** (0.130)
Annual wage of child care workers	0.434*** (0.114)	0.444*** (0.112)	0.440*** (0.123)	0.168* (0.091)
Employment rate	0.003 (0.003)	0.003 (0.003)	0.004 (0.003)	0.001 (0.002)
Children population	-0.007 (0.015)	-0.005 (0.015)	0.008 (0.014)	0.000 (0.010)
CPI			0.005*** (0.002)	0.003*** (0.001)
FCC home score		0.001** (0.000)	0.001** (0.000)	0.000 (0.000)
The score is more than average		-0.025 (0.018)	-0.023 (0.018)	0.004 (0.019)
Co-payment as a percent of family income		-0.001 (0.003)	-0.001 (0.003)	-0.001 (0.002)
Co-payment is more than national average		-0.010 (0.017)	-0.008 (0.017)	-0.008 (0.010)
Cost of centers for 4-year olds				0.520*** (0.065)
Year2007	-0.018 (0.016)	-0.017 (0.016)	-0.042** (0.016)	-0.030* (0.016)
Year2008	-0.045* (0.023)	-0.038* (0.022)	-0.101*** (0.027)	-0.079*** (0.022)
Year2009	-0.012 (0.023)	-0.006** (0.023)	-0.061** (0.027)	-0.059** (0.021)
Year2010	-0.000 (0.020)	0.004 (0.020)	-0.070** (0.029)	-0.071** (0.023)
Year2011	0.014 (0.025)	0.019 (0.024)	-0.086** (0.040)	-0.087** (0.030)
Year2012	0.018 (0.024)	0.021 (0.023)	-0.105** (0.048)	-0.091*** (0.033)
Constant	-4.304*** (1.522)	-4.036*** (1.405)	-4.061*** (1.358)	-1.891** (0.769)

Notes: Sample size is 357. Prices are in 2012 dollars. Robust standard errors are in parentheses.

Table K3: Estimation Results for the Cost of Centers for Infants

	RE Model 1	RE Model 1	RE Model 3	RE Model 4
Annual rent	0.353** (0.162)	0.338** (0.165)	0.319* (0.171)	0.157 (0.149)
Median income	0.542** (0.262)	0.511** (0.247)	0.499** (0.250)	0.059 (0.172)
Annual wage of child care workers	0.557*** (0.119)	0.612*** (0.115)	0.596*** (0.119)	0.182** (0.085)
Employment rate	0.008** (0.004)	0.009** (0.004)	0.009** (0.004)	0.005* (0.003)
Children population	0.026 (0.022)	0.026 (0.021)	0.026 (0.022)	0.020 (0.017)
CPI			0.002 (0.003)	-0.001 (0.002)
Center score		0.116** (0.051)	0.115** (0.052)	0.073 (0.049)
The score is more than average		-0.026 (0.031)	-0.026 (0.032)	-0.014 (0.020)
Co-payment as a percent of family income		-0.001 (0.004)	-0.001 (0.003)	-0.001 (0.002)
Co-payment is more than national average		-0.009 (0.029)	-0.008 (0.029)	0.002 (0.019)
Cost of FCC home for infants				0.816*** (0.082)
Year2007	-0.013 (0.022)	-0.026 (0.024)	-0.033 (0.024)	0.004 (0.017)
Year2008	-0.027 (0.025)	-0.051* (0.030)	-0.068* (0.040)	0.015 (0.028)
Year2009	-0.002 (0.027)	-0.036 (0.037)	-0.050 (0.041)	0.015 (0.032)
Year2010	0.031 (0.027)	-0.006 (0.038)	-0.025 (0.052)	0.026 (0.041)
Year2011	0.022 (0.032)	-0.016 (0.042)	-0.045 (0.066)	0.028 (0.048)
Year2012	0.014 (0.033)	-0.026 (0.044)	-0.060 (0.073)	0.021 (0.053)
Constant	-6.323*** (1.763)	-6.863*** (1.729)	-6.757*** (1.748)	-2.601** (1.023)

Notes: Sample size is 357. Prices are in 2012 dollars. Robust standard errors are in parentheses.

Table K4: Estimation Results for the Cost of Centers for 4-year olds

	RE Model 1	RE Model 1	RE Model 3	RE Model 4
Annual rent	0.109 (0.138)	0.102 (0.140)	0.033 (0.144)	-0.030 (0.114)
Median income	0.594*** (0.208)	0.561*** (0.202)	0.527*** (0.198)	0.123 (0.139)
Annual wage of child care workers	0.601*** (0.092)	0.633*** (0.093)	0.615*** (0.108)	0.260*** (0.081)
Employment rate	0.006* (0.003)	0.006* (0.003)	0.007* (0.004)	0.003 (0.003)
Children population	0.006 (0.019)	0.005 (0.019)	0.015 (0.023)	0.010 (0.017)
CPI			0.004* (0.002)	0.000 (0.002)
Center score		0.129*** (0.048)	0.131*** (0.046)	0.089* (0.046)
The score is more than average		-0.029 (0.023)	-0.028 (0.022)	-0.004 (0.015)
Co-payment as a percent of family income		0.000 (0.003)	-0.000 (0.003)	0.001 (0.002)
Co-payment is more than national average		-0.004 (0.024)	-0.001 (0.024)	0.003 (0.016)
Cost of FCC home for 4-year olds				0.720*** (0.082)
Year2007	-0.007 (0.022)	-0.020 (0.023)	-0.039* (0.022)	-0.003 (0.019)
Year2008	-0.008 (0.022)	-0.033 (0.025)	-0.082*** (0.030)	0.006 (0.027)
Year2009	0.025 (0.027)	-0.010 (0.032)	-0.053 (0.033)	0.010 (0.026)
Year2010	0.048** (0.024)	0.009 (0.030)	-0.047 (0.040)	0.021 (0.031)
Year2011	0.068** (0.028)	0.027 (0.034)	-0.055 (0.051)	0.027 (0.039)
Year2012	0.061** (0.028)	0.018 (0.035)	-0.080 (0.057)	0.014 (0.042)
Constant	-4.962*** (1.528)	-5.335*** (1.539)	-5.245*** (1.532)	-1.834** (0.842)

Notes: Sample size is 357. Prices are in 2012 dollars. Robust standard errors are in parentheses.

Table K5: Summary Statistics for Child Care Costs by Year

Year	2006			2007			2008			2009		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Average cost of FCC homes for infants	7098.42 (1748.40)	4441.55 [MS]	10910.27 [WI]	7118.38 (1559.53)	4318.55 [MS]	10663.49 [MA]	6981.17 (1557.57)	3819.76 [SC]	11009.27 [MA]	7149.54 (1686.84)	3833.40 [SC]	12777.99 [MA]
Average cost of centers for infants	9214.13 (2845.17)	4997.31 [LA]	16680.87 [MA]	9377.85 (2571.41)	5029.45 [MS]	16156.91 [MA]	9381.64 (2656.41)	4862.68 [MS]	16950.05 [MA]	9652.41 (2849.44)	4880.04 [MS]	20090.56 [MA]
Average cost of FCC homes for 4-year olds	6400.12 (1559.69)	3849.34 [MS]	10252.01 [MA]	6452.46 (1439.36)	3742.74 [MS]	10147.48 [MA]	6334.36 (1442.10)	3604.35 [MS]	10455.82 [MA]	6532.44 (1574.31)	3617.22 [MS]	12280.36 [MA]
Average cost of centers for 4-year olds	7269.67 (1887.19)	4320.83 [MS]	12436.34 [DC]	7423.71 (1791.77)	3742.74 [MS]	11944.66 [MA]	7480.69 (1795.49)	4325.22 [MS]	12453.14 [MA]	7713.63 (1909.88)	4340.67 [MS]	14081.48 [MA]

Table K5: Continuing from previous page

Year	2010			2011			2012		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Average cost of FCC homes for infants	7246.75 (1789.31)	4053.72 [MS]	12740.25 [MA]	7147.98 (1681.86)	3970.50 [MS]	12584.14 [DC]	7224 (1947.77)	3930 [MS]	15240 [DC]
Average cost of centers for infants	9795.19 (4896.05)	4896.05 [MS]	19163.02 [DC]	9717.05 (2997.8)	4686.01 [MS]	20595.57 [DC]	9710.63 (3172.12)	4863 [MS]	21948 [DC]
Average cost of FCC homes for four-year olds	6484.75 (1543.53)	3790.49 [MS]	11897.92 [MA]	6530.44 (1520.38)	3727.58 [MS]	10238.59 [DC]	6584.88 (1648.15)	3704 [MS]	12012 [DC]
Average cost of centers for four-year olds	7767.81 (2027.73)	4106.36 [MS]	14793.43 [DC]	7864.89 (2115.62)	3991.94 [MS]	15756.46 [DC]	7817.04 (2254.81)	4312 [MS]	16908 [DC]

Notes: Sample size is 357. There are 51 states and 7 years. Standard deviations are in parentheses. State abbreviations are shown in squared brackets []. MS: Mississippi, MA: Massachusetts, DC: District of Columbia. Min: Minimum Max: Maximum.

Table K6: Summary Statistics for Demand and Supply Sides Variables

	Mean	Min	Max
Annual rent	9720.86 (2044.26)	6546.16	15860.12
Annual wage of child care workers	21127.03 (2467.30)	16615.96	30490
Median income	53727.69 (8803.83)	37179	75285.6
Employment rate	56.56 (4.78)	44.8	68.1
Children population	484908 (567911.8)	37242	3284693
CPI	214.93 (12.57)	193	245.70
Co-payment as a percent of family income	6.53 (2.92)	0	20.7
Co-payment is more than national average	0.51 (0.50)	0	1
FCC home score	43.03 (34.07)	0	120
The score is more than average	0.53 (0.50)	0	1
Center score	78.43 (18.71)	15	118
The score is more than average	0.56 (0.50)	0	1

Notes: Sample size is 357. Standard deviations are in parentheses. Min: Minimum
Max: Maximum.

Table K7: Summary Statistics for Original and Imputed Variables

	N	Mean	Min	Max
Cost of centers for infants	356	8998.059 (2737.451)	4388	21948
	357	8987.188 (2741.31)	4388	21948
Cost of centers for 4-year olds	356	7180.643 (1912.246)	3380	16908
	357	7172.894 (1915.165)	3380	16908
Cost of FCC homes for infants	348	6746.233 (1622.089)	3582	15240
	357	6714.045 (1637.155)	3582	15240
Cost of FCC homes for 4-year olds	345	6101.267 (1442.855)	3380	12012
	357	6090.395 (1466.521)	3380	12012
Small family home score	153	43.052 (34.723)	0	120
	357	43.031 (34.070)	0	120
Center score	153	79.124 (18.058)	15	114
	357	78.426 (18.709)	15	118

Notes: N: Sample size. Standard deviations are in parentheses. Min: Minimum
Max: Maximum.

Table K8: Data Resources

Variable	Definition	Data Resource
Cost of centers for infants	Average state level cost of child care in centers for infants	NACCRRA: Parent and the high price of child care (2007a, 2008b) NACCRRA: Parents and the high cost of child care (2009a, 2010b, 2011a, 2012b, 2013)
Cost of centers for 4-year olds	Average state level cost of child care in centers for 4-year olds	NACCRRA: Parent and the high price of child care (2007a, 2008b) NACCRRA: Parents and the high cost of child care (2009a, 2010b, 2011a, 2012b, 2013)
Cost of FCC homes for infants	Average state level cost of family child care homes for infants	NACCRRA: Parent and the high price of child care (2007a, 2008b) NACCRRA: Parents and the high cost of child care (2009a, 2010b, 2011a, 2012b, 2013)
Cost of FCC homes for 4-year olds	Average state level cost of family child care homes for infants	NACCRRA: Parent and the high price of child care (2007a, 2008b) NACCRRA: Parents and the high cost of child care (2009a, 2010b, 2011a, 2012b, 2013)
Annual rent	State median annual rent	NACCRRA: Parent and the high price of child care (2007a, 2008b) NACCRRA: Parents and the high cost of child care (2009a, 2010b, 2011a, 2012b, 2013)
Annual wage of child care workers	State average annual child care worker wage	www.bls.gov
Median income	State median income	http://www.census.gov/did/www/saipe/data/statecounty/
Employment rate	Employment rate of women as percent of population of mothers with children under age 6 and age 3	www.bls.gov
Children population	Number of children under age 5 (including age 5)	http://www.census.gov/popest/data/historical/2000s/vintage_2009/datasets.html http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml
CPI	Regional CPI	www.bls.gov
Co-payment as percent of family income	Co-payment rate as percent of family income	http://www.acf.hhs.gov/programs/occ/resource/
Small family home score	State level overall regulation and oversight score for small family child care homes	NACCRRA: We can do better (2007b, 2009b, 2011b)
Center score	State level overall regulation and oversight score for child care in centers	NACCRRA: Leaving children to chance (2008a, 2010a, 2012a)

APPENDIX L: AUTOCORRELATION AND SARGAN TESTS

Table L: AR and Sargan Tests

Models										
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
AR(1)	-6.776 (0.000)	-8.125 (0.000)	-12.495 (0.000)	-12.172 (0.000)	-5.214 (0.000)	-3.902 (0.000)	-24.079 (0.000)	-23.661 (0.000)	-6.1367 (0.000)	-13.851 (0.000)
AR(2)	-1.503 (0.133)	-0.997 (0.319)	1.32 (0.187)	1.299 (0.194)	0.396 (0.692)	1.106 (0.267)	1.588 (0.112)	1.384 (0.167)	0.115 (0.908)	1.417 (0.156)
Sargan	$\chi^2(56)$ = 69.147 (0.112)	$\chi^2(79)$ = 90.290 (0.181)	$\chi^2(159)$ = 179.182 (0.131)	$\chi^2(165)$ = 184.027 (0.148)	$\chi^2(240)$ = 268.154 (0.102)	$\chi^2(185)$ = 208.395 (0.115)	$\chi^2(162)$ = 177.740 (0.188)	$\chi^2(193)$ = 216.146 (0.122)	$\chi^2(126)$ = 141.160 (0.168)	$\chi^2(121)$ = 139.353 (0.122)
	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]
AR(1)	-8.854 (0.000)	-13.208 (0.000)	-11.497 (0.000)	-6.685 (0.000)	-21.731 (0.000)	-13.758 (0.000)	-8.953 (0.000)	-8.066 (0.000)	-23.925 (0.000)	-25.109 (0.000)
AR(2)	-1.164 (0.244)	1.634 (0.102)	1.334 (0.182)	0.927 (0.354)	1.269 (0.204)	0.800 (0.424)	1.469 (0.142)	0.995 (0.320)	-1.080 (0.280)	-1.313 (0.189)
Sargan	$\chi^2(111)$ = 111.910 (0.196)	$\chi^2(110)$ = 126.581 (0.133)	$\chi^2(199)$ = 217.090 (0.180)	$\chi^2(232)$ = 258.325 (0.113)	$\chi^2(200)$ = 223.194 (0.125)	$\chi^2(118)$ = 137.533 (0.106)	$\chi^2(103)$ = 104.849 (0.431)	$\chi^2(91)$ = 106.207 (0.132)	$\chi^2(66)$ = 79.723 (0.120)	$\chi^2(140)$ = 157.208 (0.152)
	[21]	[22]	[23]	[24]	[25]	[26]	[27]	[28]	[29]	[30]
AR(1)	-22.960 (0.000)	-19.930 (0.000)	-14.810 (0.000)	-19.717 (0.000)	-7.662 (0.000)	-6.458 (0.000)	-12.712 (0.000)	-12.280 (0.000)	-3.396 (0.000)	-3.875 (0.000)
AR(2)	-1.590 (0.112)	-	-	-	-1.012 (0.312)	-1.493 (0.135)	1.465 (0.143)	1.325 (0.185)	0.396 (0.692)	1.109 (0.267)
Sargan	$\chi^2(114)$ = 124.298 (0.240)	$\chi^2(90)$ = 104.569 (0.140)	$\chi^2(101)$ = 102.239 (0.447)	$\chi^2(107)$ = 125.019 (0.112)	$\chi^2(76)$ = 89.346 (0.140)	$\chi^2(65)$ = 79.658 (0.104)	$\chi^2(170)$ = 192.534 (0.114)	$\chi^2(168)$ = 183.185 (0.200)	$\chi^2(164)$ = 185.662 (0.118)	$\chi^2(184)$ = 206.538 (0.122)

Table L: Continuing from previous page

	Models									
	[31]	[32]	[33]	[34]	[35]	[36]	[37]	[38]	[39]	[40]
AR(1)	-24.014 (0.000)	-23.752 (0.000)	-6.389 (0.000)	-13.440 (0.000)	-21.093 (0.000)	-19.676 (0.000)	-6.760 (0.000)	-8.406 (0.000)	-13.110 (0.000)	-12.343 (0.000)
AR(2)	1.576 (0.115)	1.197 (0.232)	0.771 (0.441)	1.444 (0.149)	-1.622 (0.105)	-	-1.249 (0.212)	-1.103 (0.2701)	1.281 (0.200)	1.275 (0.202)
Sargan	$\chi^2(185)$ = 208.205 (0.116)	$\chi^2(194)$ = 204.221 (0.293)	$\chi^2(116)$ = 134.774 (0.112)	$\chi^2(117)$ = 133.406 (0.143)	$\chi^2(90)$ = 74.563 (0.880)	$\chi^2(109)$ = 127.834 (0.105)	$\chi^2(88)$ = 104.824 (0.107)	$\chi^2(100)$ = 116.434 (0.125)	$\chi^2(155)$ = 176.053 (0.118)	$\chi^2(153)$ = 175.348 (0.104)
	[41]	[42]	[43]	[44]	[45]	[46]	[47]	[48]		
AR(1)	-3.124 (0.000)	-4.973 (0.000)	-21.644 (0.000)	-23.454 (0.000)	-6.599 (0.000)	-12.409 (0.000)	-20.624 (0.000)	-19.718 (0.000)		
AR(2)	0.350 (0.726)	1.358 (0.175)	1.396 (0.163)	0.871 (0.384)	0.576 (0.565)	1.287 (0.198)	-1.417 (0.157)	-		
Sargan	$\chi^2(170)$ = 192.087 (0.118)	$\chi^2(178)$ = 200.879 (0.115)	$\chi^2(146)$ = 159.743 (0.206)	$\chi^2(170)$ = 192.450 (0.114)	$\chi^2(186)$ = 91.984 (0.310)	$\chi^2(87)$ = 97.419 (0.209)	$\chi^2(92)$ = 103.256 (0.199)	$\chi^2(93)$ = 93.984 (0.452)		

Notes: Number in square brackets [.] shows GMM model numbers.

APPENDIX M: INSTRUMENT LIST FOR GMM MODELS

Table M1: Instruments for First Difference Equation in the GMM Models

Variables	First Difference Equation			
	First Difference		Levels	
	lag1	lag2	lag3	lag4
Goods	1-48	23 24	23 24	23 24
Service	1-48			
Unemployment rate	1-48	21 22 23 24 36	21 22 23 24 36	21 23 24
Poverty	1-48			
Median income	1-48	21 22 23 24 36	21 22 23 24 36	21 23 24
TANF	1-48			
Mean wage	1-48	21 22 23 24 35 36 47	21 22 23 24 35 36 47	21 23 24 35 47
Preschool mean wage	1-48	14 41 42	3 4 5 6 13 14 27 28 29 30 39 41 42	5 6 13 14 28 29 30 39 41 42
Child care worker mean wage	1-48	13 14	3 4 5 6 13 14 27 28 29 30 39 41 42	5 6 14 28 29 30 39 41 42
Price of infant care	1-48	5 6 13 14 29 30 41 42	3 4 5 6 13 14 27 28 29 30 39 41 42	5 6 14 28 29 30 39 41 42
Price of preschool care	1-48	3 4 5 6 13 14 27 28 29 30 39 41 42	3 4 5 6 13 14 27 28 29 30 39 41 42	5 6 14 29 30 41 42
Public 2year	1-48	21 23 24 36	21 23 24 36	21 23 24
Public 4year	1-48			
Private 4year	1-48	21 23 24 35 47	21 23 24 35 47	21 23 24 35 47
Center total	1-48			
Family total	1-48			
Daycare total	1-48			
Male female ratio	1-48			
Pct95 precipitation level	1-18, 25-34, 38-46	5 6 14 15 29 30 31 32 42 43 44	5 6 8 14 15 29 30 31 32 42 43 44	5 6 8 14 15 29 30 31 32 42
		3 4 5 6 7 8 9 10 13 14 16 15 17 18 27 28 29 30 31 32 33 34	3 4 5 6 7 8 9 10 13 14 16 15 17 20 21 27 28 29 30 31 32 33 34	5 6 7 8 9 10 14 16 15 20 21 29 30 31 32 33
Std of snow fall	1-18, 25-34, 38-46	39 42 43 44 45 46	39 42 43 44	34 42

Table M1: Continuing from Previous Page

First Difference Equation				
Variables	First Difference		Levels	
	lag1	lag2	lag3	lag4
Std of precipitation level	1-18, 25-34, 38-46	5 6 7 8 13 14 15 29 30 31 32 33 34 42 43 44 45 46	5 6 7 8 13 14 15 20 29 30 31 32 33 34 42 43 44	5 6 7 8 15 20 29 30 31 32 33 34 42
Income others	1 7 8 9 11 12 15 16 17 18 20 22 24 25 26 31 33 34 35 37 38 43 44 45 46 47		20 36 48	20 36 48
Missing income others	1 7 8 9 11 12 15 16 17 18 20 22 24 25 26 31 33 34 35 37 38 43 44 45 46 47		20 36 48	20 36 48
Cognitive achievement score		3 4 13 27 28 39 40	1 2 3 4 6 9 10 11 12 13 14 16 17 18 25 26 27 28 29 30 33 34 37 38 40 41 42 45 46	1 2 3 4 6 9 10 11 12 13 14 16 18 25 26 27 28 29 30 37 38 41 42
Overweight		12	1 5 6 9 10 14 29 30 33 34 41 42 45 46	5 6 9 10 14 29 30 41 42
Obesity		4 11 13 25 26 27 28 37 38 39 40	2 3 11 16 17 18 26	11 16 18
General health		7 8 15 19 20 21 22 23 24 31 32 35 36 43 44 46 48	8 15 19 20 21 22 23 24 31 32 35 36 46 48	19 20 21 23 24 35 46
Behavior		8 15 31 43 44	2 5 7 8 9 10 11 12 15 25 26 31 33 34 37 38 45 46	2 5 8 9 10 11 12 15 25 26 37 38
Social interaction			17	
Attention			18	18
Ear infection		5 6 8 14 15 29 30 31 32 41 42	3 4 5 7 8 9 10 12 13 14 16 15 17 18 27 28 31 32 33 34 41 42 45 46	3 4 5 8 9 10 12 13 16 15 18 27 28 32
Respiratory illness		5 6 7 8 11 14 15 25 30 32 37 38 41 42 43 44	2 4 5 8 10 12 13 14 16 15 17 18 25 27 28 32 33 34 37 38 39 40 41 42 45 46	2 4 5 8 10 12 13 16 15 18 27 28 32 40

Table M1: Continuing from Previous Page

Variables	First Difference Equation			
	First Difference		Levels	
	lag1	lag2	lag3	lag4
Sibling		4 6 13 14 27 28 30 39 40 48	4 6 13 14 19 20 28 30 48	4 6 13 19 20 28 30
University degree		8 15 20 32 35 43 44 47 48	8 15 20 32 35 47 48	8 15 20 32 35 47
Married		19 20 21 24 35 36 47 48	10 12 14 16 17 18 19 20 21 24 33 34 35 36 47 48	10 12 14 16 18 19 20 21 24 35 47
Hours of work			5 6	5 6
Hours of Center based care		3 6 8 14 15 20 23 28	3 8 9 14 15 19 20 22 23 28	3 8 9 14 15 20 22 23 28
Full time center based care		29 30 31 32	31 32 36	36
Part time center based care		27 28 29 30 31 32	31 32	
Obese*in-home quality			11	11
Obese*out-of-home quality			11	11
Obese*Hhincomenet			11	11
Overweight*Hours of Center based care		12		
Overweight*home quality		12 14		
Overweight*in-home child care quality		12 14	14	14
Overweight*Hhincomenet		12 14		
Home quality		2 11 25 38	2 10 11 12 16 17 18 25 34 38 46	10 12 16 18
Missing home quality			14	
In-home child care quality		2 11 25 38	2 6 20 11 14 25 30 38 42	6 14 20 30 42
Missing in-home quality			6 14 20	6 20
Out-of-home child care quality		8 15	8 10 12 16 15 17 18 20 34 46	8 10 12 16 15 18 20
Missing out-of-home quality			20	20
Use in-home child care			20	20

Table M1: Continuing from Previous Page

Variables	First Difference Equation			
	First Difference		Levels	
	lag1	lag2	lag3	lag4
Use out-of-home care			14 20	20
Use only home care		48	48	
Group size home based care		48	21 36 48	21 36
Full time work				
Part time work			38	38
Full time work with child care		38 44		
Full time work without child care		44 48	48	
Part time work with child care		44	45 46	
Part time work without child care		38 39 40 48	48	
No work with child care		44		
Short term general child psychiatric hospitals		5 7 8 9 10 12 16 15 17 18 31 32 33 34 43 44 45 46	5 7 8 9 10 12 16 15 17 31 32 33 34 43 44	5 7 8 9 10 12 16 15 31 32 33 34
Long term general child psychiatric hospitals		2 5 7 8 9 10 11 12 14 16 15 17 18 25 26 29 30 31 32 33 34 37 38 41 42 43 44 45 46	5 7 8 9 10 11 12 14 16 15 17 29 30 31 32 33 34 37 38 41 42 43 44	5 7 8 9 10 12 14 16 15 29 30 31 32 33 34 41 42
Short term general hospitals with child/adolescence Service		3 4 5 13 27 28 39	3 4 5 13 27 28 39	5
Short term general child wellness hospitals		3 4 5 6 9 10 12 13 14 16 17 18 27 28 29 30 33 34 39 41 42 45 46	3 4 5 6 9 10 12 13 14 16 17 27 28 29 30 33 34 39 41 42	5 6 9 10 12 14 16 29 30 33 34 41 42
Short term general hospitals with nutrition programs		3 4 5 6 13 14 27 28 29 30 39 41 42	3 4 5 6 13 14 27 28 29 30 39 41 42	5 6 14 29 30 41 42
Total number of hospitals		5 41 42	5 9 10 12 16 17 18 33 34 41 42 45 46	5 9 10 12 16 17 33 34 41 42

Table M1: Continuing from Previous Page

Variables	First Difference Equation			
	First Difference	Levels		
	lag1	lag2	lag3	lag4
Office		2 5 7 8 9 11 15 25 26 31 32 37 38 43 44	5 7 8 9 11 15 31 32 37 38 43 44	5 7 8 9 15 31 32
Zoo		5 9 20 22 23 24 36 48	5 9 20 22 23 24 36 48	5 9 20 23 24
Museum		1 2 3 4 5 6 7 8 9 10 11 12 14 16 15 17 18 20 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 39 41 42 43 44 45 46 47 48	1 3 4 5 6 7 8 9 10 11 12 14 16 15 17 19 20 22 23 24 27 28 29 30 31 32 33 34 35 36 37 39 41 42 43 44 47 48	1 5 6 7 8 9 10 12 14 16 15 20 23 24 29 30 31 32 33 34 35 41 42 47
Convenience		1 2 3 4 11 13 20 22 23 24 25 26 27 28 35 36 37 38 39 47	1 3 4 11 13 19 20 22 23 24 25 26 27 28 35 36 37 38 39 47	1 11 20 23 24 35 47
Fitness		1 5 9 10 12 13 16 17 18 20 22 23 24 26 33 34 35 36 37 38 45 46 47 48	1 5 9 10 12 13 16 17 19 20 22 23 24 26 33 34 35 36 37 38 47 48	1 5 9 10 12 16 20 23 24 33 34 35 47
Full service restaurants		10 12 16 17 18 33 34	10 12 16 17 33 34	10 12 16 33 34
Limited service restaurants		5 6 9 10 14 16 18 20 22 23 24 29 30 33 34 41 42 45 46 48	5 6 9 10 14 16 20 22 23 24 30 33 34 42 48	5 6 9 10 14 16 20 23 24 33 34 42
Fruit		2 5 6 7 8 11 13 14 15 25 26 29 30 31 32 37 38 41 44 46	2 5 6 7 8 11 13 15 25 26 30 31 32 37 38 44	5 6 7 8 11 15 31 32
Dentist		1	1	
Park		5 7 8 13 14 15 31 32 43 44	5 7 8 13 14 15 31 32 43 44	5 7 8 14 15 31 32
Grocery		3 4 5 7 8 9 10 13 16 15 17 18 27 28 31 32 33 34 39 44 45 46	3 4 5 7 8 9 10 13 16 15 17 27 28 31 32 33 34 39 44	5 7 8 9 10 16 15 31 32 33 34

Notes: Numbers correspond to GMM model numbers in square brackets.

. Table M2: Instruments for Level Equation in the GMM Models

Variables	Level equation			
	First Difference			Levels
	lag1	lag2	lag3	lag1
Goods		19		1-38
Service	22 23 24	19		1-38
Unemployment rate	21 22 23 24	19		1-38
Poverty		19		1-38
Median income	21 22 23 24 31	19		1-38
TANF				1-38
Mean wage	21 22 23 24 30 31 37 38	19		1-38
Preschool mean wage				1-38
Child care worker mean wage		3 4 13 26 33		1-38
Price of infant care				1-38
Price of preschool care		3 4 26 33		1-38
Public 2year	21 24 30 31 37	19		1-38
Public 4year	22 23 24 30 37	19		1-38
Private 4year	21			1-38
Std of precipitation level	2 20	5 6 7 8 9 10 11 12 14 16 15 17 18 25 26 29 30 31 32 33 34 37 38 41 42 43 45 46		1-18, 25-34, 38-46
Income others		14 20 36 42	6 29 30 41	7 8 9 10 11 12 16 17 18 19 20 21 22 24 25 32 33 34 35 38 41 44 45 46 47
Missing income others		14 20 36 42	6 29 30 41	7 8 9 10 11 12 16 17 18 19 20 21 22 24 25 32 33 34 35 38 41 44 45 46 47
Cognitive achievement score	3 4 13 27 28 39 40	5 6 9 10 12 14 16 17 18 29 30 33 34 41 42 45 46		
Overweight		9 10 33 34 45 46		

Table M2: Continuing from Previous Page

Variables	Level equation			
	First Difference			Levels
	lag1	lag2	lag3	lag1
Obesity	2 11 25 26 37 38 7 8 15 20 21 22 23 24 31 32 35	1 16 17 18		
General health	36 44 47 48			
Behavior	3 4 8 13 15 27 28 32 39 40 44	5 6 7 10 12 14 29 30 34 46		
Emotions		16		
Ear infection	5 6 8 14 15 30 31 32 33 42	7 8 10 12 16 17 18 34 37 38 45 46		
Respiratory illness	2 5 6 7 8 11 14 15 25 30 31 32 33 37 38 41 42	4 8 10 12 13 16 17 18 27 28 34 39 40 45 46		
Sibling	3 4 5 6 13 14 27 28 30 39 40 42	20	19	
University degree	4 5 6 8 13 14 15 20 22 24 28 30 31 32 35 36 40 42 43 44 47 48	1 19		
Married	20 21 22 23 24 33 35 36 47 48	9 10 19 12 16 17 18 34		
Hours of work		5 6 14 22		
Hours of Center based care	3 4 6 7 8 13 14 15 20 21 23 28	5 8 22		
Hours of Home based care		8		
Full time center based care	29 30 31 32 35	36		
Part time center based care	27 28 29 30 31 32			
Full time home based care	35			

Table M2: Continuing from Previous Page

Variables	Level equation			
	First Difference			Levels
	lag1	lag2	lag3	lag1
Part time home based care	35			
General health*home quality	15			
General health*Hours of work	15			
General health*Hours of Home based care	15			
General health*Hhincomenet	15			
Obese*home quality	11			
Obese*in-home quality	11			
Obese*out-of-home quality	11			
Obese*Hhincomenet	11			
Overweight*home quality	14			
Overweight*in-home child care quality	14	12		
Overweight*out-of-Home child care quality		12		
Home quality	2 11 25 38	10 12 16 17 18 34 46		
Missing home quality		14		
In-home child care quality	2 11 25 38	6 14 20 30		
Missing in-home quality		6 14 20		
Out-of-home child care quality		10 12 16 17 18 20 34 46		
Missing out-of-home quality		20		

Table M2: Continuing from Previous Page

Variables	Level equation			
	lag1	First Difference		Levels
	lag1	lag2	lag3	lag1
Use in-home child care		20		
Use out-of-home care		20		
Use only home care	36 48			
Group size center based care	35			
Group size home based care	36 48	21 35 47		
Full time work		35 44		
Part time work	36			
Full time work with child care	42 43 44 47			
Full time work without child care	44 48			
Part time work with child care	42 44	45 46		
Part time work without child care	39 40 47 48			
No work with child care	44 47			
Short term general child psychiatric hospitals	2	1 7 8 9 10 11 12 16 15 17 18 25 26 31 32 33 34 37 38 43 44 46	5	
Long term general child psychiatric hospitals	2	7 8 9 10 11 12 16 15 17 18 25 26 31 32 33 34 37 38 43 44 45 46	5 14 29 30 41	
Short term general hospitals with child/adolescence Service		1 45	6 42	
Short term general child wellness hospitals	2	3 4 5 9 10 11 12 13 14 16 17 18 25 26 27 28 29 33 34 38 39 40 45 46		

Table M2: Continuing from Previous Page

Level equation				
Variables	First Difference			Levels
	lag1	lag2	lag3	lag1
Short term general hospitals with nutrition programs	2	1 3 4 5 6 9 10 11 12 13 14 16 17 18 25 26 27 28 29 30 33 34 37 38 39 40 41 42 45 46		
Total number of hospitals		1 5 6 14 29 30 41 42		
Office	2	9 10 11 12 16 17 18 25 26 33 34 37 38 45 46		
Zoo	23 24	9 10 12 16 17 18 20 33 34 36 45 46		
Museum	2 21 23 24 47 48	1 3 4 5 6 7 8 9 10 11 12 13 14 16 15 17 18 19 20 25 26 27 28 29 30 31 32 33 34 36 37 38 39 40 41 42 43 44 45 46		
Convenience	21 23 24 47 48	1 3 4 5 6 13 14 19 20 27 28 29 30 36 37 38 39 40 41 42		
Fitness	2 21 23 24 47	1 3 4 9 10 11 12 13 16 17 19 20 25 26 27 28 33 34 36 37 38 39 40 45 46		
Full service restaurants	2	7 8 10 11 15 25 31 32 37 38 43		
Limited service restaurants	23 24	3 4 5 6 9 10 13 14 16 17 18 20 27 28 29 30 33 34 36 39 40 41 42 45		
Fruit	2	3 4 5 6 7 8 11 13 14 15 25 26 27 28 29 30 31 32 37 38 39 40 41 42 43 44		
Park		7 8 14 15 31 32 43 44		
Grocery		5 7 8 9 10 12 16 15 17 18 31 32 33 34 37 38 43 44 45 46		

Notes: Numbers correspond to GMM model numbers in square brackets.

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