

Childcare Arrangements and Family Engagement with Children in the United States

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1. Introduction

Over the last several decades, the share of preschool-aged children enrolled in non-parental childcare arrangements in the United States has increased. In 2011, 61.3 percent of children under 5 were enrolled in some type of regular childcare arrangement (Laughlin 2013). This development has contributed to the growth of literature assessing the relationship between the utilization of childcare arrangements, children's development (Hebrst 2011) and parental choices in workplace and at home.

In this paper, we are interested in assessing the impact of utilizing non-parental childcare arrangements on the family engagement with children. Previous literature finds that sending a child to day care may be associated with a decrease in the amount of time spent with children but not in the quality of engagement with children. Bittman, Craig and Folbre (2004) examine the relationship between non-parental care and the amount and quality of parental engagement with children using Australian time use data from 1997. They find that increased utilization of non-parental care led to only small reductions of parental time in activities with children but that the amount of time in developmental activities did not change regardless of the type of non-parental care used. Booth, Clarke-Stewart, Vandell, McCartney, and Owen (2002) use the data from the 1991 Study of Early Child Care conducted by the National Institute of Child Health and Human Development (NICHD). They find that having an infant in a childcare for 30 or more hours per week was associated with less than one-to-one reduction in mother-infant interaction time and was not associated with a change in the quality of mother-infant interaction. These analyses suggest that although substitution between parental and non-parental time use exists, parents are able to maintain high-quality interaction with children even once they start utilizing non-parental care arrangements.

One potential problem in these studies concerns the role that unobserved factors may play in influencing the estimates of the relationship between non-parental care and engagement with children even in richly-specified estimations. In particular, families that choose non-parental childcare arrangements may have characteristics that also influence the amount and quality of their engagement with children. Children's characteristics, too, may determine non-parental childcare decisions and parental engagement with them. As a result, the estimated coefficient on the non-parental childcare may be confounded by the unobserved heterogeneity and hence represent a biased relationship

between non-parental childcare utilization and engagement with children. To our knowledge, this is the first study to account for the potential endogeneity of non-parental childcare and to assess the causal impact on family engagement with children.

Our identification strategy in establishing the relationship between non-parental care and family engagement with children relies on using panel data techniques to control for time-invariant heterogeneity and instrumental variables estimation to address, in addition, the time-variant heterogeneity. In the analysis, we use the panel data from the 2001 Birth Cohort of the Early Childhood Longitudinal Study (ECLS-B).

This analysis is related to the literature that assesses the impact of parental employment on parental engagement with children (Hsin and Felfe 2014; Cawley and Liu 2007; Kobayashi and Usui 2016; and Heiland, Price and Wilson 2014)¹. However, the impact of non-parental childcare on family

¹ This literature largely finds that maternal employment is associated with a smaller amount of parental time with children (see Hsin and Felfe 2014 for a survey). However, mothers have also modified their time use in different ways in response to their employment. They have done this by reallocating some of the time between weekend and weekdays and throughout the day (Hoffman 1989; Stewart 2010) and modifying their sleep, leisure and personal time (Hsin and Felfe 2014; Huston and Aronson 2005). Craig (2007) finds that “employed mothers reduce their parental childcare time by less than hour for every hour they spend in market work” (for Australia). Hallberg and Klevmarken (2003) find that mothers’ work hours have less of an effect on parents’ time with children than fathers’, highlighting that mothers are more likely to make other adjustments to their time. Drago (2011) also finds that “mothers translate working time reductions into childcare at higher rates.” Importantly, the literature finds that, although the amount of time mothers spend with children somewhat decreases, the quality of the interaction does not necessarily diminish (Nock and Kingston 1988).

Similar to the endogeneity of non-parental childcare utilization, the endogeneity of parental employment is a common problem in this literature. Addressing it, Hsin and Felfe (2014) estimate the impact of maternal work hours on mothers and fathers time with children using the fixed effects and instrumental variables frameworks, instrumenting for work hours by using different indicators of labor market conditions, such as county-level female unemployment rate and income distribution in the county. They find that the amount of time is indeed reduced, but only in less educational tasks (unstructured activities). There is no significant effect of maternal employment on the time use on educational and structured activities. Cawley and Liu (2007) use American Time Use Survey data and state unemployment rates as instruments and find that working mothers spend less total and educational time with their children than nonworking mothers. Kobayashi and Usui (2016) assess the impact of mother’s employment on quality-time activities with children in Japan using panel data. They find that the total amount of time helping with homework (that includes mother’s and father’s time) in families in which mothers work is lower than it is in families with stay-at-home mothers. Heiland, Price and Wilson (2014) find that longer maternal work hours are associated with the reduction in mother-child quality time interaction and time reading together. They use ATUS and PSID-CDS and fixed effects estimation (which shows a smaller negative impact) to address unobserved heterogeneity. For Canada, Rapoport and Le Bourdais (2008) use switching regression and selection models to identify the causal impact of work hours on parental time use and find the evidence of a negative relationship. Gutierrez-Domenech (2010) finds that employed parents spend more time on educational activities than their non-working counterparts using dummies for regions and health status to instrument for the employment status.

engagement with children is distinct from the impact of parental employment on the engagement with children. First of all, families commonly utilize non-parental care even when mother is not employed. Conversely, not all families in which both parents engage in paid employment purchase non-parental care. Bittman et al. (2004) find that in the Australian case hours of paid work and hours of non-parental care have the correlation coefficient of only 0.47 for partnered women and 0.35 for single mothers. In the United States, 17 percent of full-time employed parents use no non-parental childcare. These findings indicate that, although overlapping, non-parental childcare utilization and parental employment are two distinct choices and the mechanisms whereby they influence parental engagement with children likely differ, as well.

For example, whereas employment hours limit the time available for non-work activities, the time spent by a child in non-parental care in principle limits only parental engagement with the child as other non-work related activities can be tended to while the child is in non-parental care. Certain aspects of employment, such as work-related stress, appear to have an additional impact on parental engagement with children (e.g. Hsin and Felfe 2014). Characteristics of non-parental care too may play a role at influencing family members' engagement with children. For example, parent-teacher interactions have been found to influence the way in which parents communicate with school-age children (Walters 2015). For our purposes, an important advantage of the ECLS-B dataset is that, unlike the Child Development Supplement of the Panel Study of Income Dynamics (PSID-CDS), for example, it includes rich information on the types and quality of childcare arrangements, such as childcare-parent interactions and activities in which parents and non-parental childcare providers are involved with children.

The rest of the paper is organized as follows. Section 2 discusses the dataset and presents the variables that we use in our estimations. We discuss our empirical strategy in section 3 followed by the results and conclusions.

2. Data

We use the 2001 Birth Cohort data of the Early Childhood Longitudinal Study (ECLS-B), conducted by the National Center for Education Statistics (NCES). This longitudinal dataset contains a nationally representative sample of approximately 14,000 children born in the U.S. in 2001. It follows children from birth through kindergarten entry and contains information about these children when they were approximately 9 months old (2001-02), 2 years old (2003-04), 4 years old/preschool age (2005-06), and kindergarten age (2006-07 and 2007-2008). The survey tracks the children's care experiences in parental and non-parental care settings through direct interviews and observational assessments. The data on non-parental care At 2 years and preschool, a subsample of children in regular non-parental care and education arrangements had their arrangements observed to obtain information on the quality of those arrangements.

The first wave in the sample includes 10,675 children. In the subsequent waves, the size is reduced to 9,822 and 8,932 children in 2-year old and preschool age waves, respectively, with the attrition rate of approximately 9 percent. In our final analysis, the sample size of the two waves further drops to 8,700 and 8,212 children, respectively, due to missing values in some variables.

Our dependent variable is a measure of family members' engagement with a child. The information on family engagement is part of the home learning and language environment assessment from parent interviews in 2-year old (2nd) and preschool (3rd) waves. Three questions in the questionnaire that we use are P2 HE075 (A, B, and C) in the 2nd wave and HE100 (A, B, and C) in the 3rd wave: "In a typical week, how often do you or any other family member do the following things with child (and twin)? Would you say not at all, once or twice, 3 to 6 times, or every day?"

- a. Read books to child (and twin)?
- b. Tell stories to {him/her/them}?
- c. Sing songs with {him/her/them}?"

NOT AT ALL	1
ONCE OR TWICE	2
3 TO 6 TIMES	3
EVERY DAY	4
REFUSED.....	
DON'T KNOW.....	

To the extent that this measure includes family member's combined engagement with children, our analysis does not track intrahousehold decisions that take place within families once a child is sent to non-parental childcare. We use mid points of each interval in the linear model estimation². Our primary measure of engagement is reading to children, which shows most variation by children's and household characteristics.

The main explanatory variable of interest is the utilization of non-parental childcare. The categories available in the survey are no non-parental care, relative care in child's home, relative care in another home, nonrelative care in child's home, nonrelative care in another home, center-based program, Head Start (in the 3rd wave), and multiple arrangements with equal hours. The classification of child care arrangements is potentially complicated by the utilization of multiple arrangements with various hours. In this analysis, we adopt the existing classification in the dataset, which identifies the primary care arrangement as the one where the child spends most hours per week. For example, a child is classified as being under the parental care-only arrangement if that is the type of care she spends the most hours per week, even if she may be in some type of non-parental care part of a week. In our basic specification,

² This point is of particular concern for the category "3 to 6 times a week". In robustness analysis, we estimated the basic model using interval regression approach and found that the results are robust.

we evaluate non-parental childcare relative to parental care, assigning the value of 1 if non-parental childcare is used and 0 if parental care is used. In more detailed analysis, we include separate dummy variables for relative-based, non-relative-based and center-based care arrangements (jointly with and separately from Head Start)³.

Other explanatory variables include mother's employment status, mother's education, mother's age at birth, mother's marital status, number of adults in the household, number of children in the household, household poverty status, urban/rural indicator, child's gender and weight at birth. Household poverty status is measured as at or below 185 percent of the Census Bureau poverty threshold. This modified line is the federal poverty guideline used in determining program eligibility.

In the instrumental variables estimation, the main instrument is based on the summer dip dummy variable in Herbst (2013), which takes the value of 1 for the months of June, July and August and 0 otherwise. This instrument captures seasonality in the utilization of non-parental childcare. Herbst (2013) demonstrates its relevance and extensively argues for its validity, both needed for the identification of the impact of nonparental care on family engagement with children.

In the more detailed analysis we assess the impact of quality characteristics of non-parental childcare arrangements on family engagement with children. In order to do that we use measures of quality available in the survey. These include the Family Day Care Rating Scale (FDCRS) for home-based settings at 2 years and preschool, the Infant-Toddler Environment Rating Scale (ITERS) for center-based settings at 2 years, and the Early Childhood Environment Rating Scale (ECERS) for center-based settings at preschool. We classify as high-quality the arrangements with the score above the median and as low-quality the arrangements with the score below the median⁴. We must note that non-parental care quality information is available only for a subset of families whose non-parental care providers were interviewed. In particular, we have data on the non-parental child care characteristics of 1,293 and 1,643 children for waves 2 and 3 respectively. The sample size is larger in the third wave because nonparental care arrangements increased sharply in wave 3, as shown in Table 1.

On average, families read to their children close to 5 times a week. About 49 percent of children are girls. Close to 13 percent of children had very low birth weight. Families on average have 2.3 children and 2.1 adults. Among the children in the sample, 85.3 percent live in urban areas and 46.4 percent live in the families with income below 185% of the poverty threshold. In terms of maternal characteristics, mothers' average age at birth is 27 years old and 68.1 percent of them are married. About 37.03 percent of mothers work full-time, 20.26 percent work part-time, 6.07 percent are unemployed, and the remaining 36.64 percent are not in the labor force. Close to half of mothers have high-school education or less, 25.47 percent have some college education and the remaining 25.34 percent have college education or higher.

³ In robustness analysis, we test the sensitivity of the results to the inclusion of Head Start as a separate category and to the inclusion of multiple arrangements with equal hours (which is the smallest category) in the center-based care category.

⁴ We assess the robustness of the results to this classification by considering as low-quality the arrangements with the score below one standard deviation from the mean and as high-quality those with the score above one standard deviation from the mean.

As Table 1 demonstrates, 55.8 percent of children are in parental care. There appears to be no statistical difference in the reading frequency between the families that utilize primarily parental versus non-parental care. However, differences are present in other dimensions. For example, close to half or more of mothers that utilize mainly non-parental care are employed full-time compared to less than 20 percent of mothers that utilize mainly non-parental care. Moreover, more than 60 percent of mothers that utilize mainly parental care are not in the labor force compared to less than 30 percent of mothers that utilize mainly non-parental care. Mother's educational attainment is also correlated with the care arrangement. In particular, close to 60 percent or more of mothers that utilize mainly parental care have high school education of less compared to only 43 percent of mothers that utilize mainly nonparental care arrangements. The utilization of non-parental care is also correlated with the household poverty status as more than half of children that are mainly in parental care live in poor families compared to less than 43 percent of children that utilize mainly non-parental care.

Table 1 Summary Statistics

	Wave 2 (n=8,700)				Wave 3 (n=8,212)				Full sample (n=17856)	
	Parental care only (n=4,407)		Nonparental care (n=4,293)		Parental care only (n=1,528)		Nonparental care (n=6,684)		(%)	S.E.
<i>Dependent variable</i>	(%)	S.D.	(%)	S.D.	(%)	S.D.	(%)	S.D.	(%)	S.E.
Reading (number per week)	4.75	2.41	4.74	2.34	4.33	2.35	4.64	2.28	4.66	(0.03)
<i>Child's characteristics</i>										
Girl	49.61	50.00	47.80	49.96	50.95	50.01	48.17	49.97	48.72	(0.12)
Very low birth weight	12.85	11.26	12.86	11.26	11.88	10.84	12.91	11.29	12.78	(0.11)
<i>Mother's characteristics</i>										
Mother's age at birth	27.27	6.21	27.43	6.16	26.49	6.08	27.62	6.19	27.37	(0.03)
Employment										
Full-time	10.90	31.16	59.25	49.14	16.08	36.75	45.27	49.78	37.03	(0.65)
Part-time	14.39	35.10	26.67	44.23	13.71	34.41	21.64	41.18	20.26	(0.49)
Unemployed	8.73	28.23	3.75	19.00	8.28	27.57	5.26	22.32	6.07	(0.27)
Inactive	65.99	47.38	10.33	30.44	61.93	48.57	27.83	44.82	36.64	(0.69)
Education										
High School or less	58.54	49.27	43.12	49.53	64.12	47.98	43.18	49.54	49.2	(0.47)
Some college	20.21	40.16	28.51	45.15	22.86	42.01	27.65	44.73	25.47	(0.54)
College or higher	21.25	40.91	28.37	45.08	13.02	33.66	29.17	45.46	25.34	(0.29)
Married	71.79	45.01	64.04	47.99	71.06	45.36	67.64	46.79	68.14	(0.55)
<i>Family characteristics</i>										
Family income below 185% of poverty threshold	53.26	49.90	38.76	48.73	64.08	47.99	42.44	49.43	46.43	(0.57)
Number of children	2.41	1.24	2.02	1.06	2.77	1.28	2.36	1.08	2.33	(0.01)
Number of adults	2.17	0.77	2.11	0.77	2.18	0.76	2.06	0.72	2.11	(0.01)
Urban residence	85.76	34.95	84.19	36.49	81.05	39.20	85.14	35.57	85.32	(0.80)

Source: Authors' calculations from the 2-year and preschool waves of the ECLC-B. The means are estimated from the pooled data. Survey weights are applied.

Care arrangements change over time as children become older. In the 2nd wave, at 50.6 percent the majority of children received mainly parental care. In the 3rd wave, this share drops to 19.9 percent and center-based care becomes the primary care type at 57.4 percent. Table 2 shows transitions in care arrangements between the 2nd and the 3rd waves. For example, 29.5 percent of children in mainly parental care stayed in parental care whereas 55.7 percent of them transitioned into center-based care. In fact, transition into center-based was the most common form of transition between the 2nd and the 3rd waves.

Table 2. Transitions among care arrangements

Wave 2	Wave 3					Total (wave 2)
	Parental care	Relative care	Nonrelative care	Center-based care	Multiple care	
Parental care	29.5	9.3	3.8	55.7	1.4	50.6
Relative care	10.9	32.5	6.4	48.3	1.7	19.5
Nonrelative care	9.9	5.8	27.5	53.3	3.5	14.4
Center-based care	9.5	6.4	3.8	77.5	2.4	15.0
Multiple care	8.4	23.7	17.5	48.6	1.9	0.5
Total (wave 3)	19.9	12.7	7.8	57.4	1.9	100

3. Empirical Framework

Our model specification can be expressed as follows:

$$P_{it} = C_{it}\beta_1 + X_{it}\beta_2 + \mu_i + \varphi_t + v_{it}, i=1,\dots,N; t=1,2. \quad (1)$$

where subscript i represents individual i and t represents the time period, μ_i represents time-invariant unobserved characteristics, φ_t represents the time-variant unobserved characteristics and v_{it} represents the residual error term assumed to be uncorrelated with X_{it}, Q_{it}, μ_i and φ_t .

Our primary variable of interest is P_{it} , which is a measure of family engagement with children and in the main specification it is the frequency of reading to a child. C_{it} is a dummy variable for parental/non-parental childcare. In the detailed analysis, we also consider several non-parental childcare types including center-based care, Head Start, relative-based care and non-relative-based care. In addition, we differentiate between low and high quality non-parental care arrangements by utilizing the quality measures provided in the dataset⁵. X_{it} is individual and household characteristics. We also state fixed effects to account for economic, political and cultural factors that may influence frequency of reading to a child, and the wave dummy.

⁵ Kalenkoski and Foster (2008) find that outcomes commonly depend on the measure of quality used. As an additional measure of quality we use the degree of parent-teacher communication, which is available in the 2nd wave of the survey (also see Kraft and Rogers 2015). The impact of parental care quality and its variation by household type are discussed in Carlson and Berger (2013). The impact of the intensity of childcare utilization (e.g. part-time (<30 weekly hours) and full time (>=30 weekly hours)) is discussed in Coley and Lombardi (2013).

We first estimate coefficient β_1 in equation (1) using the OLS pooled regression and including the wave dummy. As such, the coefficient can be interpreted as the average difference in the reading frequency between the families that utilize mostly non-parental care compared to the families that utilize mostly parental care, with the coefficient being identified through the cross-sectional difference between the two groups. This is the most common empirical strategy used in the related literature (Bittman et al. 2004, Booth et al. 2002).

However, this coefficient estimate is likely to be inconsistent as a measure of the impact of non-parental care on the frequency of reading. This inconsistency is caused by the presence of correlation between the combined error term ($\mu_i + \varphi_t + v_{it}$) and non-parental childcare utilization that stems from unobserved heterogeneity. For example, a career-oriented mother may be more likely to utilize non-parental care arrangement and read less frequently to her child, downward biasing the coefficient. Child's characteristics, too, may bias the results. For example, if children with developmental delays are less likely to be enrolled in non-parental care arrangements and are more often read to, the coefficient on non-parental care may once again be downward biased.

To the extent that such unobserved factors are time-invariant, we account for them by exploiting the panel structure of the dataset and conducting a fixed-effects estimation that eliminates the presence of μ_i . In this estimation, the role of the time-invariant unobserved (as well as observed) factors is cancelled out and the variation in variables is obtained by assessing the differences not across families, which likely compound the role of unobserved factors and are the source of endogeneity, but rather over time for each family.

However, unobserved heterogeneity in the sample may be time-variant in that the changes over time themselves may vary heterogeneously in the sample. Time-variant heterogeneity may be specific to economic environment. For example, childcare policy shifts may simultaneously influence the availability of non-parental care as well as family engagement with children. To the extent that such heterogeneity is state-dependent, it can be addressed using state dummy variables. However other relevant factors may be more difficult to control. For example, compared to the families with children who have no developmental delays, families with children who do may reduce by less or increase by more the frequency of reading to children once they send children to non-parental childcare. If that is the case, the lower likelihood of sending a child to non-parental childcare will be associated with a smaller reduction (or greater increase) in the frequency of reading. This would imply that the coefficient on non-parental care may be downward biased even after eliminating time-invariant heterogeneity⁶.

Instrumental variables estimation can address both time-invariant and time-variant heterogeneity combined in $\mu_i + \varphi_t$. The goal is to isolate the variation in childcare arrangement choice

⁶ Other sources of time-variant heterogeneity may exist. See, for example, Ansari and Crosnoe (2015) for elicited parental behavior; Zuppann (2013) for evidence of parents responding to improvements in their child's ability by devoting more resources; Loughran, Datar and Kilburn (2008) for evidence that parental investments compensate for children's low endowments, proxied by low birth weight. Another source of time-variant heterogeneity is parents' flexibility. People who are more flexible may be more likely to choose particular non-parental childcare arrangements, and also to modify their parental engagement patterns.

that is net of unobserved heterogeneity by finding variables which are correlated with the right hand side endogenous variable(s) but are uncorrelated with the dependent variable, except through the right hand side endogenous variables (hence eliminating the unobserved heterogeneity). We note that the coefficient estimates are local average treatment effects and are specific to the choice of the instrumental variable and the nature of its impact on the endogenous variable. As instrument we use the summer participation dip proposed in Herbst (2011)⁷.

4. Results

The results of the OLS estimation without controlling for individual and household variables indicate that families that use non-parental care do not necessarily spend less time reading to children compared to the families that use only parental care (Table 3, col. 1). This finding is consistent with Bittman et al. (2004) who find in the Australian context that children in non-parental and parental care receive similar input in terms of enrichment activities. We also find the evidence of heterogeneity by non-parental care type (Table 3, cols. 2 – 5). In particular, families that utilize non-relative and center-based childcare arrangements read more frequently to their children than families that utilize only parental care. On the other hand, families that utilize Head Start and relative childcare arrangements read less frequently to their children than their counterparts that utilize only parental care.

Controlling for observable individual and household characteristics allows us to assess the extent to which these findings are driven by selection on observable characteristics. The coefficient on non-parental care becomes negative but remains insignificant (Table 3 col. 8). This potentially implies that selection on observable characteristics even if present may not be considerable. However, this conclusion masks substantial variation by non-parental care type (Table 3, cols. 9 – 12). In particular, the coefficient on nonrelative care, such as hiring a full-time nanny, becomes negative and significant. This implies that the higher family engagement with children among the families that utilize primarily nonrelative care that was observed in the unconditional results is due to these families' characteristics rather than the utilization of nonrelative care per se. In fact, once these factors are controlled for, families that utilize primarily nonrelative childcare appear to spend less time compared to the otherwise similar families that utilize primarily parental care. In the case of the coefficient on center-based care, although it does not turn negative similar to the coefficient on nonrelative care, the statistically significant positive coefficient in the unconditional specification loses its significance. This suggests that in the case of families that utilize primarily center-based childcare it is once again their observed characteristics that explain their greater frequency of reading to children. In turn, the lower frequency of reading to their children observed among the Head Start families also appears to be driven by their

⁷ Other potential instruments for non-parental childcare that we have evaluated include 1) **state-level childcare quantities**, e.g. employment in daycare services per child under 5 from the nonemployer establishment survey conducted annually by the Census Bureau; number of daycare service establishments per child under 5 from the Economic Census conducted by the Census Bureau every five years; employment in child care related occupations from the Occupational Employment Survey; 2) **state-level child-care quality regulations**, such as teacher and assistant teacher degree requirements, teacher specialized training requirements, teacher in-service requirement, maximum class size, staff-child ratio, and screening/referral requirements, available through the database of the National Institute for Early Education Research (NIEER), and 3) **policy variables**, such as Child Care Development Fund's (CCDF) expenditure per covered child (also available through NIEER database).

characteristics. Once these characteristics are controlled for, the negative coefficient on the utilization of Head Start loses its significance. Finally, the finding that the negative coefficient on relative care remains statistically significant suggests that the relationship between relative care and family engagement with children is negative beyond the role of observable characteristics.

Although these findings establish heterogeneity in the relationship between family engagement and non-parental care by non-parental care type and underscore the role of selection on observable characteristics, as previously discussed the coefficients are likely to be inconsistent due to the presence of unobserved heterogeneity.

In order to address time-invariant unobserved heterogeneity, we implement the fixed effects estimation (Table 4). In a specification without individual and household controls, the fixed effects model yields a negative and significant coefficient on non-parental care. This result is largely driven by the center-based care (relative to parental care). This is a notable finding because in the corresponding OLS specification the coefficient on center-based care was positive and significant. The finding that once time-invariant factors are controlled for, the coefficient becomes negative confirms that the selection into center-based care is positive. That is, families who send their kids to center-based care have characteristics that contribute to the greater frequency of reading to children, upward biasing the coefficient on center-based childcare. The coefficient on nonrelative care switches from positive to negative but loses significance also indicating that time-invariant factors biased the coefficient upward, that is families that use nonrelative care arrangement have time-invariant factors (both observed and unobserved) that explain their greater frequency of reading to children. On the other hand, the negative coefficients on the relative care and Head Start lose significance, indicating that the bias was downward, that is families that send their children to relative care and Head Start read less frequently to their children due to time-invariant characteristics. We note that these findings are consistent with the OLS findings controlling for individual and household characteristics (Table 3, cols. 8 – 12), implying that time-invariant unobserved heterogeneity may not be a substantial source of bias.

However, as we have indicated above, heterogeneity in the sample may be time-variant in that the changes over time themselves vary heterogeneously in the sample. Instrumental variables estimation can address both time-invariant and time-variant heterogeneity and serves as our preferred specification. The findings of the instrumental variable estimation suggest that time-variant heterogeneity is likely considerable and its direction is consistently downward because families that are more likely to utilize non-parental care are also more likely to reduce the frequency of reading to children (Table 5). Eliminating this heterogeneity reveals that the causal impact of sending a non-parental childcare on the family engagement with a child is in fact positive: utilizing mostly non-parental care results in families reading 3 more times a week compared to families that utilize mostly parental care. Hence, rather than diminish, sending a child to non-parental care may improve the quality of interaction between parents and children. We observe no differences by care type (although the results by care type are not individually significant), suggesting that across the board parents appear to view childcare not as a substitute but as a complement to their own enrichment activities.

Quality

Do particular characteristics of non-parental childcare facilities have an impact on the frequency of reading to children? Given the importance of parental input in children's developmental outcomes, interventions that can improve it have the potential to improve the design of childcare policies. Focusing on quality variations in the unconditional OLS framework, we find that unlike families that utilize high-quality non-parental care, families that utilize low-quality non-parental care arrangements spend less time reading to their children than families utilizing only parental care. Controlling for observed characteristics, the coefficient on high-quality non-parental care becomes statistically insignificant. Hence parents that send their children to high-quality non-parental care have observed characteristics that contribute to them reading more often to their children. On the other hand, the coefficient on low-quality childcare remains unchanged, indicating that either low-quality childcare has a negative impact on the frequency of reading to children or that unobservable characteristics are playing a role.

Conducting a fixed-effects estimation yields statistically insignificant coefficients on both high-quality and low-quality non-parental childcare (relative to parental care). We note that the sample size is smaller because only a subset of the sample includes detailed characteristics of childcare facilities. Similarly, implementing instrumental variables estimation yields statistically insignificant results. To identify the quality variable, in addition to the summer dip instrument, we use the student teacher ratio. However, in this specification the instruments are weak. Therefore, these results are only suggestive.

We also consider the role of interaction between parents and childcare providers in potentially influencing the frequency of reading to children. We find that families that use non-parental childcare arrangements in which parents and teachers interact on a daily basis spend more time reading to their children compared to families whose children have no non-parental care. However, this relationship appears to be driven by the better characteristics of the families that interact with day care providers. Once observable characteristics are accounted for, the relationship becomes insignificant. Moreover, the coefficient on infrequent interactions with child care providers becomes negative and significant. Hence, observable characteristics bias the unconditional OLS results upwards. We note that these results are not directly comparable to the full-sample OLS results because the parent-teacher interaction information is available only for the second wave, which is the reason we cannot conduct fixed-effects estimation to assess this question. In the instrumental variables estimation, we instrument for the interactions variable with the summer dip instrument and student teacher ratio. The significance of the coefficients disappears, suggesting that interactions with child care providers may not influence the frequency of reading to children. However, the instruments jointly are weak and hence these results are only suggestive.

Table 3. Ordinary Least Squares estimation.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Non-parental	0.0433 (0.0505)							-0.0639 (0.0503)						
Center-based		0.334*** (0.0613)							0.0188 (0.0687)					
Head start			-0.800*** (0.0994)							-0.0472 (0.115)				
Non-relative				0.201** (0.0983)							-0.204** (0.0957)			
Relative					-0.299*** (0.0747)							-0.187** (0.0748)		
Low quality non-parental care						-0.348*** (0.0831)							-	0.311*** (0.0942)
High quality non-parental care						0.327*** (0.0864)								0.0109 (0.0790)
Daily interactions with care providers							0.165* (0.0888)							-0.158* (0.0918)
Non-daily interactions with care providers							-0.0618 (0.125)							-0.229* (0.128)
Family and child controls	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y
Family and child controls interacted with waves	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N
State dummies	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y
Observations	16,912	11,096	6,994	7,821	8,603	8,871	7,285	16,912	11,096	6,993	7,820	8,602	8,871	7,284
R-squared	0.000	0.005	0.014	0.001	0.003	0.007	0.001	0.180	0.189	0.183	0.194	0.167	0.188	0.187

Notes: *** p<0.01, ** p<0.05, * p<0.1; all specifications include the wave dummy.

Table 4. Fixed Effects Estimation

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Non-parental	-0.117** (0.0561)					0.00607 (0.0721)					
Center-based		-0.170** (0.0688)					-0.0134 (0.0963)				
Head start			-0.0754 (0.155)					0.153 (0.196)			
Non-relative				-0.135 (0.195)					0.0982 (0.216)		
Relative					0.0211 (0.151)					0.0648 (0.164)	
Low quality non-parental care											0.103 (0.149)
High quality non-parental care											-0.108 (0.158)
Child and household controls	N	N	N	N	N	Y	Y	Y	Y	Y	Y
Child and household controls with waves	N	N	N	N	N	Y	Y	Y	Y	Y	Y
State dummies without waves	N	N	N	N	N	N	N	N	N	N	N
Observations	16,912	11,096	6,993	7,820	8,602	16,912	11,096	6,993	7,820	8,602	8,871
R-squared	0.001	0.003	0.000	0.000	0.000	0.009	0.016	0.024	0.028	0.023	0.023
Number of id	8,725	7,167	5,261	6,103	6,432	8,725	7,167	5,261	6,103	6,432	6,440

Notes: *** p<0.01, ** p<0.05, * p<0.1; all specifications include the wave dummy.

Table 5. Instrumental Variables estimation

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Non-parental	3.136*						
	(1.640)						
Center-based		2.608					
		(1.831)					
Head start			12.45				
			(9.126)				
Non-relative				5.582			
				(3.838)			
Relative					4.009		
					(2.742)		
Low quality non-parental care						-2.833	
						(8.162)	
High quality non-parental care						3.650	
						(2.615)	
Daily interactions with care providers							5.165
							(3.221)
Non-daily interactions with care providers							1.772
							(5.090)
Child and household	Y	Y	Y	Y	Y	Y	Y
Child and household with waves	Y	Y	Y	Y	Y	Y	N
State dummies	Y	Y	Y	Y	Y	Y	N
Observations	16,912	11,096	6,993	7,820	8,602	8,871	7,285
R-squared		0.015					

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; all specifications include the wave dummy; standard errors clustered by child.

5. Conclusions

The goal of this paper is to assess the relationship between the utilization of non-parental care arrangements and family engagement with children. The relatively small literature evaluating this question suggests that, when parents send a child to day care, they maintain their engagement in enrichment activities with children whereas the time spent on other activities decreases (Bittman et al. 2004; Booth et al. 2002). However, coefficient estimates in these studies are likely to be inconsistent as indicators of the impact of sending a child to day care on parental engagement with children. This is the case due to the unobserved heterogeneity that results in the presence of correlation between the error terms and explanatory variables.

In this paper, we address this problem in two ways. The first involves taking advantage of the panel structure of our dataset, the 2001 Birth Cohort dataset of the Early Childhood Longitudinal Study (ECLS-B), by conducting the fixed effects estimation, which eliminates time-invariant heterogeneity. In the second approach, we conduct an instrumental variables estimation, which allows us to control for both time-invariant and time-variant heterogeneity.

We examine family engagement with children in terms of the frequency of reading to a child. We start our analysis by estimating an OLS model, the results of which are in line with the findings of the

literature in that non-parental care is not associated with a decrease in the enrichment activities with children. Fixed effects estimation confirms this finding, potentially indicating that time-invariant unobserved heterogeneity is not influential at biasing the results. On the other hand, instrumental variables estimation indicates that sending a child to non-parental childcare increases the frequency of reading to a child, suggesting that the main source of bias may be time-variant heterogeneity. This finding reveals that the OLS estimates are downward biased, and that, rather than the decrease, sending a child to non-parental care may result in the enhancement of the quality of family members' engagement with children.

We also explore the presence of heterogeneity by non-parental care type. We find that, despite the lack of association between non-parental child care and the frequency of reading to a child in the OLS model, the families that send their children to relative and non-relative care read less frequently to their children, potentially suggesting that the negative relationship may in fact be present for certain sub-groups. However, the significance of the negative coefficients disappears in the fixed-effects estimation and in the instrumental variables estimation. The IV findings, in particular, are indicative of the strong downward bias in the OLS estimates of the relationship between non-parental care and frequency of reading to children.

Finally, we examine whether the quality of non-parental childcare has impact on the frequency of reading to a child. Although the OLS results suggest that families that send their children to low-quality childcare read less frequently to children, fixed effects and instrumental variables results are inconclusive indicating that the OLS results are driven by unobserved heterogeneity. More work is needed in order to better identify the measures of the quality of non-parental care. Nevertheless, the results of this paper demonstrate that the impact of non-parental care on the quality of engagement with children at home appears to be positive.

6. References

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