Relative-Provided Childcare and Children's Risk of Obesity

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Introduction

Relative-provided childcare is common among elementary school children in the U.S. While some children at ages 5 to 14 years attend day care centers, [1] 14% received care from grandparents, 8% from siblings and 5.5% from other relatives [1]. Several studies have identified associations between formal childcare in day care centers and risks of obesity, but the relationships between relative care and obesity have not been examined. This is an important issue to investigate because obesity is a major health concern for children and adolescents today [2].

While the associations between center-based care and obesity are mixed [3-7], several studies have found that children who are in informal, non-institutional care are more likely to be obese. Obese children are significantly more likely than non-obese children to be in informal care, including care provided by family, friends, and neighbors compared to parent care [3]. Data from the nationally representative ECLS-K indicate that children who received childcare from individuals who were not their parents (referred to here as non-parental care) were more likely to become obese between ages 6 and 10 years [4]. In the UK Millennium Cohort Study, among 3 year-old children, fulltime informal care, which for three-quarters of children was provided by grandparents, was associated with higher overweight risks [5]. During the first 6 months of life, more hours in childcare in someone else's home, including a relative's - but not in center-based childcare or care in the child's own home by someone other than a parent - was associated with higher weight-for-length z-score at age 1 year and higher BMI z-score at age 3 years [6]. On the other hand, among Latino Kindergarteners in the U.S., those in family, friend or neighbor care had lower risks of obesity [3].

The majority of studies looking at informal care focus on childcare provided by grandparents. A study that distinguished between childcare from grandparents and other forms of

informal care found that only children who were cared for by grandparents, either full or part time, were at higher risk of overweight [5]. In a longitudinal study from Hong Kong, childcare arrangements at ages 3, 5 and 11 years (but not at 6 months) were associated with overweight and obesity at age 11; current informal care (at age 11) was the most strongly associated with obesity, followed by informal care at age 5 [7]. The associations were similar when informal care was provided by grandparents, other family members, and domestic helpers [7].

It is relevant that several studies have found that children who live with grandparents have higher risks of obesity than children who do not live with grandparents [8-10]. It has been hypothesized that this may be because grandparents often promote excess eating when caring for children and use food as a reward, [7, 10-12] behaviors which may increase children's obesity risks [11]. These patterns are consistent with reports that parents feel that children's eating habits are altered when they received care at a relative's home compared to their own home [9].

Most studies assessing the relationship between informal care and obesity risks grouped relative care with other types of informal care, such as, nannies, neighbors and friends. Most of these studies were conducted with pre-school aged children. Less is known about the importance of informal care for school-aged children. Yet the context of childcare for school-aged children is different from younger children. It is more limited in duration, occurring for a few hours at the end of each school day. Older children also require less supervision. School aged children may spend more time in afterschool programs, or may spend time at neighbors or friends house until parents reach home rather than having a formal care provider. The implications for health of such arrangements may also be different. We expand this literature by examining, in a nationally representative cohort, whether obesity risks are associated with receipt of childcare after school and

on weekends from a relative. We also examine the implications of being with specific relative care-providers.

Methods

This study used data from The Early Childhood Longitudinal Study- Kindergarten Cohort 1999 (ECLS-K), a nationally representative dataset with information on physical health, social wellbeing, academic performance and family environment among children who were in kindergarten in the U.S. in 1999 or in first grade in 2000, followed through 8th grade. We used data from round 6 of the ECLS-K, collected when the children were in 5th grade. After listwise deletion of observations with missing values, our sample consisted of 9,523 children.

The outcome of interest for the current study was obesity, based on the ECLS-K direct measurements of height and weight. We use the 2000 CDC Growth Reference to calculate each child's BMI z-score, standardized to the reference population for the child's age and gender[13]. Cutoffs for normal weight, overweight, and obese were determined using CDC cut-points of the 85th percentile for overweight and the 95th percentile for obesity. The patterns presented in the results for obesity are consistent for overweight (available on request).

We measured childcare experiences in terms of three measures: The first variable was whether the child received childcare from a relative regularly (yes, no), that is occurring on a routine schedule before or after school at least once a week. We excluded care by a parent who did not reside in the household and occasional babysitting or back-up arrangements with relatives. The second variable was type the relationship of the relative providing care (grandparent; sibling; aunt, uncle or other relative; none). The third variable was the child's primary regular non-parental childcare arrangement in which the child spent the most hours per week (care from relative in the child's home or other home; care from a non-relative in the child's or other home; child-care center; multiple arrangements; various locations of relative provided care varies).

The following characteristics were accounted for in multivariate regressions: socio-demographic characteristics (gender, race, U.S. region, urban area), family socioeconomic status (wealth quintile, poverty status, maternal employment, and maternal education) and household structure (foreign born parents, parental marital status, number of siblings, number of adults in the household, hours spent in non-parental care per week).

All descriptive statistics and regression estimates were survey-adjusted to be nationally representative. The data were analyzed using STATA 12. Survey-adjusted descriptive statistics were used to examine variable distributions and t-tests were used to identify significant differences. Survey adjusted logistic regressions were nested, beginning with bivariates and then adding control variables in the sequence above to identify which set of characteristics may mediate the relationship between childcare arrangements and children's obesity risks.

Results

-Table 1 here-

The majority of fifth-graders (65.0%) received only care from parents after school and on-weekends (Table 2). This includes children who are at home without their parents. Of children who received care from individuals who were not their parents, the largest number received care from relatives (22.7%), most commonly from grandparents (11.7%) or siblings (5.9%) (Table 2). Care from relatives was primarily provided at the child's own home (11.0%) on weekdays after school (19.34%). Children who received care from relatives were significantly more often obese than children who did not (26.05% vs. 21.42%, p=0.012).

-Table 2 here-

In bivariate analysis, children who received care from a relative were 30% more likely to be obese than children who did not (Table 3). When we add family structure variables we find that children with siblings are less likely to be obese while the odds of obesity increase with the number of adults in the household. The association between care from relatives and obesity is robust to the inclusion of these variables (Model 3, as it was to the inclusion of socio-demographic characteristics (Model 2). However, this relationship was explained by the addition of family socioeconomic variables (Model 4).

-Table 3 here-

Compared with children who did not receive childcare from a relative regularly, it was only children who regularly received care from a sibling who were significantly more likely to be obese, and this relationship is robust to the addition of all explanatory variables. In the meantime, children who received care from grandparents, aunts, uncles or other relatives had similar risks of obesity to those who received no care from relatives.

-Table 4 here-

Looking more broadly at types of childcare and comparing those who did and did not receive non-parental care, most types of non-parental care were not associated with obesity risks. It was only children who received childcare at varying locations who experienced significantly higher obesity risks than children with no non-parental care (Table 5).

-Table 5 here-

After accounting for childcare arrangements, several other characteristics were associated with obesity risks: boys were more likely to be obese than girls; Hispanic, Native American, and multi-race children were more likely to be obese than Non-Hispanic white children. whose mothers did not work full time had lower likelihood of obesity than children whose mother worked full time, as

well as, children who lived in the western census region. Children from Hispanic, American Indian, and multi-racial backgrounds were all significantly associated with obesity when controlling for child characteristics and Hispanic and American Indian children maintained this relationship after the addition of SES and household structure characteristics. Those with more adults living in the home also had higher likelihood of obesity. Females showed lower likelihood of obesity.

Discussion

This study examined the associations between regularly receiving childcare from a relative and risks of obesity in a nationally representative cohort of fifth-graders. Previous studies of childcare arrangements and obesity focused primarily on younger children, generally ages 3 to 6 years [3, 6, 14-16]; these studies frequently found that informal childcare was associated with obesity. Many children, receive informal childcare in addition to or in place of center-based care. Such care, provided by relatives, nannies, or neighbors, has remained under-explored, though there is reason to believe that it may be associated with higher obesity risks [17, 18]. Therefore, it is important to understand whether receiving childcare from family, a major source of childcare, is associated with obesity [19].

We found that about a quarter of U.S. fifth graders receive regular non-parental care, and for 22.7% of them, this care is provided by a relative. Among children who receive care from a relative, grandparents are the most common care providers at 11.7%, followed by siblings at 5.86%. Children spent on average of 3.96 hours per week in non-parental care. Consistent with other studies, [5-7, 20, 21] children who were not Non-Hispanic white, had mothers who worked full time and lived in less affluent families were more likely to receive care from relatives and also had higher likelihood of obesity [4, 10, 14, 15, 22-25].

In this nationally representative study, children who received care from relatives were heavier and were more often obese. These higher risks of obesity were largely explained by mother's employment and education and family socio-economic status.

Only children who received care from siblings showed an association with obesity across all models. Among sources of childcare from relatives, it was children who were cared for by a sibling who were at particularly high risks of obesity, controlling for the fact that living with siblings is associated with lower obesity risks. It may be that siblings provide less care and supervision when they're baby-sitting than do adults. Parents may ask older siblings to provide care, but may not allow them to go to parks or other areas to be physically active without adult supervision. While previous studies have indicated that grandparents often have care practices that may promote obesity [7, 10-12], little is known about the childcare behaviors of siblings in the U.S. Our findings indicate that studies are needed to understand the behaviors of sibling care providers in the context of obesity.

Previous studies that found that informal childcare was associated with obesity often grouped relatives providing childcare with other types of informal care, for example from neighbors and friends.

Another consideration is that, unlike previous studies, which have focused on younger children, our focus here is on fifth-graders, who are on average 11 years old.

A limitation of this study is that it uses cross-sectional data. We do not account for child-care arrangements at younger ages, the quality of care, such as type of activities or snacks provided, or other characteristics of the care provider.

This study also offers several strengths, using a large nationally representative dataset with direct anthropometric measures and extensive indicators of the family environment and of childcare. We provide information on childcare at ages that have received little attention previously. Relative-provided childcare is also an under-studied area. This study adds to our understanding of the

association between childcare and childhood obesity and provides insights into the role of extended family for health among elementary school children in the United States.

One fifth of children under the age of 15 years in the US receive care from people other than their parents. Care from relatives is more common among children who are at risk of obesity, including minority children and those have working mothers. Therefore, it is important to understand whether relative-provided childcare is a risk factor or a protective factor for obesity, one of the major health concerns for children today. Our findings indicate that elementary school children who receive regularly provided childcare from siblings are at higher risks of obesity after accounting for other characteristics. Receiving relative-provided care in multiple settings is also associated with higher odds of obesity. The use of relative-provided childcare may be a function of family characteristics that are also shown to be independently associated with obesity in the literature, such as race, maternal employment, and socioeconomic status, which may cause parents to have less time to spend with their children and to utilize other forms of childcare. More research is needed on the cumulative effects of sources of child care for child wellbeing and the importance of level and quality of care provided by relatives to school-aged children.

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Table 1 Socio-demographic, household, and family SES characteristics stratified by whether a child received any relative care, 5th grade children (n=9523)

Variables	Relative Care % or mean (SE)	No Relative Care % or mean (SE)	p value
Socio-Demographic Characteristics			
Obese	26.05 (1.69)	21.42 (0.74)	0.012
Male	52.66 (2.02)	50.53 (0.98)	0.332
Race			
White	47.71 (2.81)	60.12 (1.73)	<0.001
Black	21.79 (2.29)	14.31 (1.16)	0.001
Hispanic	21.93 (2.31)	18.62 (1.31)	0.055
Asian	3.59 (0.54)	2.60 (0.26)	0.078
Pacific Islander	0.62 (0.29)	0.63 (0.27)	0.967
American Indian	2.18 (1.57)	1.36 (0.83)	0.307
More than one race	2.18 (0.49)	2.36 (0.30)	0.747
Urban Status			
Large city	36.42 (2.35)	35.17 (1.62)	0.577
Large town or suburb	40.40 (3.75)	41.67 (2.36)	0.589
Small town or rural	23.18 (3.18)	23.16 (2.23)	0.992
Region			
Northeast	20.16 (1.82)	18.36 (1.20)	0.278
Midwest	24.37 (2.02)	24.70 (1.34)	0.827
South	34.80 (2.25)	34.94 (1.50)	0.945
West	20.68 (1.77)	22.00 (1.12)	0.458
Household Characteristics			

Foreign born mother	19.10 (1.86)	15.63 (0.88)	0.032
Foreign born father	13.67 (1.22)	13.34 (0.69)	0.759
Married parents	49.55 (1.81)	70.65 (1.09)	<0.001
Number of siblings	1.52 (0.049)	1.59 (0.030)	0.192
Number of adults in household	2.07 (0.038)	2.02 (0.012)	0.195
Hours in non-parental care per week	12.03 (0.44)	1.59 (0.10)	<0.001
Family SES Characteristics			
Mother's education level			
No education	5.18 (0.93)	2.08 (0.31)	0.001
Up to or completed high school	40.71 (2.12)	37.82 (1.33)	0.193
Up to college degree	48.68 (2.06)	49.97 (1.21)	0.571
Up to professional or graduate degree	5.42 (0.84)	10.13 (0.62)	<0.001
Mother's Employment			
Full time	71.37 (1.97)	43.90 (1.00)	<0.001
Part time	14.95 (1.36)	23.24 (0.94)	<0.001
Looking for work	3.14 (0.84)	3.65 (0.41)	0.578
Not in labor force	5.36 (1.00)	27.14 (0.98)	<0.001
Wealth Quintile			
First (Lowest)	23.91 (1.78)	19.91 (1.10)	0.033
Second	23.54 (1.67)	19.20 (0.79)	0.020
Third	23.96 (1.62)	19.03 (0.85)	0.006
Fourth	16.76 (1.16)	20.37 (0.90)	0.013
Fifth (Highest)	11.82 (1.20)	21.49 (1.08)	<0.001
Below poverty status	25.67 (1.96)	23.03 (1.30)	0.218

Data Source: Round 6 data of ECLS-K, collected in spring of 2004

Note: P-values were obtained used two sample t-tests.

Table 2 Characteristics of non-parental care, 5th grade children (n=9,523)

Variables	**%**	**SE**
Receives relative care	22.70	0.69
Relative care provider		
No relative care	77.30	0.69
Grandparents	11.70	0.62
Aunt or uncle	5.14	0.43
Siblings	5.86	0.44
Non-parental care location		
No non-parental care	65.00	0.94
Relative care in child's home	11.00	0.48
Relative care in another home	8.03	0.62
Non-relative care in child's home	1.35	0.21
Non-relative care in another home	2.92	0.34
Center-based program	9.89	0.65
2 or more locations	0.75	0.19
Location of care varies	1.05	0.18
Hours spent in non-parental care	3.96	0.15

Data Source: Round 6 data of ECLS-K, collected in spring of 2004

Table 3 Association between receiving relative care and obesity in children, 5th grade children (n=9,523)

	Bivariate	Model 2	Model 3	Model 4
Received childcare from relative	**0.26** ** **(0.10)**	**0.21** * **(0.10)**	**0.23** * **(0.11)**	**0.17 (0.11)**
Socio-Demographic Characteristics				
Male		0.36 *** (0.09)	0.34 *** (0.09)	0.35 *** (0.09)
Race				
Black		0.14 (0.14)	0.14 (0.14)	-0.02 (0.15)
Hispanic		0.57 *** (0.12)	0.53 *** (0.14)	0.40 * (0.16)

Pacific islander	0.70 (0.40)	0.51 (0.41)	0.36 (0.44)
Asian	0.20 (0.22)	0.12 (0.24)	0.09 (0.25)
American Indian	0.72*** (0.22)	0.69** (0.23)	0.65** (0.23)
More than one race	0.49* (0.23)	0.50* (0.24)	0.48* (0.23)
Urbanicity			
Large town or suburb	-0.15 (0.11)	-0.16 (0.11)	-0.14 (0.11)
Small town or rural	0.15 (0.14)	0.16 (0.14)	0.06 (0.15)
U.S. Region			
Midwest	-0.23 (0.12)	-0.21 (0.12)	-0.25* (0.12)
South	-0.25 (0.14)	-0.24 (0.13)	-0.25 (0.13)
West	0.06 (0.12)	0.06 (0.11)	-0.02 (0.11)
Household Characteristics			
Foreign born mother		-0.05 (0.13)	-0.10 (0.14)
Foreign born father		0.16 (0.16)	0.16 (0.17)
Married parents		-0.33*** (0.10)	-0.19 (0.11)
Number of siblings		-0.15*** (0.04)	-0.18*** (0.05)
Number of adults in household		0.22*** (0.06)	0.20*** (0.06)
Hours in non-parental care per Week		-0.01 (0.01)	-0.01 (0.01)
Family SES			
Mother's Employment			
Part time			-0.25* (0.10)
Looking for work			-0.16 (0.19)
Not in labor force			-0.22 (0.12)
Mother's Education Level			

Up to or completed high school	0.59 (0.30)
Up to college degree	0.71* (0.31)
Up to professional or graduate degree	0.60 (0.37)
Wealth Quintile	
Second	0.17 (0.13)
Third	0.05 (0.17)
Fourth	-0.48* (0.21)
Fifth	-0.43 (0.26)
Below poverty status	-0.22 (0.12)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Results were estimated using logistic regression models. Coefficients are presented as marginal effects with standard errors in parentheses. Models are survey adjusted by weight, strata, and primary sampling unit. Categorical variables were entered as dummies with one group omitted.

Table 4 Association between relative care provider and obesity in children, 5th grade children (n=9,523)

	Bivariate	Model 2	Model 3	Model 4
Relative care provider				
Reference: No relative care				
Grandparents	0.20 (0.12)	0.20 (0.12)	0.19 (0.13)	0.14 (0.14)
Aunt or uncle	0.15 (0.20)	0.03 (0.19)	-0.02 (0.21)	-0.06 (0.22)
Siblings	0.45* (0.19)	0.39* (0.18)	0.47* (0.19)	0.39* (0.18)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Results were estimated using logistic regression models. Coefficients are presented as marginal effects with standard errors in parentheses. Models are survey adjusted by weight, strata, and primary sampling unit. Categorical variables were entered as dummies with one group omitted.

Model 2 additionally controls for gender, race/ethnicity, urban status, and census region.

Model 3 additionally controls for parental marital status, whether parents were foreign born, number of siblings, number of adults in the household, and number of hours spent in relative care.

Model 4 additionally controls for maternal employment status, maternal education, household poverty status, and household wealth quintiles.

Table 5 Association between type of non-parental care and obesity in children, 5th grade children (n=9,523)

	Bivariate	Model 2	Model 3	Model 4
Type of non-parental care				
Reference: No non-parental care				
Relative care in child's home	0.27 (0.14)	0.21 (0.14)	0.22 (0.16)	0.16 (0.16)
Relative care in another home	0.19 (0.15)	0.15 (0.15)	0.22 (0.17)	0.14 (0.16)
Non-relative care in child's home	-0.14 (0.38)	-0.12 (0.36)	-0.08 (0.36)	-0.07 (0.34)
Non-relative care in another home	-0.34 (0.27)	-0.30 (0.25)	-0.30 (0.27)	-0.36 (0.28)
Center-based program	0.09 (0.13)	0.07 (0.13)	0.11 (0.16)	0.09 (0.16)
2 or more programs	-0.33 (0.68)	-0.30 (0.67)	-0.31 (0.67)	-0.40 (0.72)
Location of care varies	0.88* (0.34)	0.87* (0.34)	0.93** (0.35)	0.91** (0.34)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Results were estimated using logistic regression models. Coefficients are presented as marginal effects with standard errors in parentheses. Models are survey adjusted by weight, strata, and primary sampling unit. Categorical variables were entered as dummies with one group omitted.

Model 2 additionally controls for gender, race/ethnicity, urban status, and census region.

Model 3 additionally controls for parental marital status, whether parents were foreign born, number of siblings, number of adults in the household, and number of hours spent in relative care.

Model 4 additionally controls for maternal employment status, maternal education, household poverty status, and household wealth quintiles.