Within-Family Obesity Associations

Evaluation of Parent, Child, and Sibling Relationships

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Background: How parent and sibling obesity status comparatively shape a child's obesity is unknown.

Purpose: To investigate how the obesity status of different children within the same family is related to a parent or sibling's obesity.

Methods: A national sample of adults in 10,244 American households was surveyed during 2011; data were analyzed in 2012–2013. Of these households, 1,948 adults had one or two children; provided sociodemographic information; and reported on adult and child height and weight, physical activity, and food environment. Logistic regression models were estimated in which the outcome of interest was child obesity status, with parent and sibling obesity as key predictors, adjusting for a range of both adult and child social and demographic confounders.

Results: In one-child households, it was 2.2 times more likely (SE=0.5) that the child would be obese if a parent was obese. In households with two children, having an obese younger sibling was more strongly associated with elder-child obesity (OR=5.4, SE=1.9) than parent's obesity status (OR=2.3, SE=0.8). Having an obese elder sibling was associated with younger-child obesity (OR=5.6, SE=1.9), and parent obesity status was no longer significant. Within-family sibling obesity was more strongly patterned between siblings of the same gender than between different genders, and child physical activity was significantly associated with obesity status.

Conclusions: Considering offspring composition and sibling gender may be beneficial in childhood obesity prevention and intervention.
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Introduction

Investigators who examine obesity often observe associations between parent and offspring obesity status. This is the case both when one observes the parent and child contemporaneously, and when a child's obesity is compared with a parent's childhood obesity status. Research has revealed a modest within-family parent–child BMI correlation of between 0.25 and 0.35; there appears to be a stronger relationship between mother and child BMI than between father and child.[1–4] Both parents being overweight or obese increases a child's obesity risk,[5] and adult BMI is independently associated with offspring BMI in both the adult's childhood and adulthood, suggesting multi-generational transfer.[6]

Compared with the parent–child obesity link, documentation of a sibling obesity association has been inconsistent. Some studies[7,8] reveal that obesity is common among offspring, whereas other research finds that having siblings may be protective against obesity[9] and that being a last-born child is a risk factor for later obesity.[10] Understanding how obesity correlates among siblings is important to give context to within-family obesity patterning.

Although shared genetic background may play a role, recent research highlights the importance of the food environment,[11–13] broader social environment,[14] and modifiable health behaviors such as food intake and physical activity (PA) in shaping these correlations.[15,16] From an ecologic perspective, the obesity status and unhealthy behaviors of children are shaped in important ways by the family environment and peer, school, and neighborhood contexts,[17–19] which together may influence sibling health differently than parent health.

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Despite prior research on this subject, little effort has been made to integrate parent and sibling studies to compare a child's obesity status with that of a sibling and parent. Moreover, the contribution of a family's shared social and food environments to obesity prevalence is treated inconsistently. An association is to be expected between parent and child obesity, and also between siblings, but the literature offers little guidance for which association may be stronger contextually. To the authors' knowledge, this study is the first to investigate the comparative associations between sibling and parent obesity with a focal child's obesity status in a way that gives attention to within-family social determinants of health, such as shared food environment and PA behaviors.

Methods

Recruitment

During early December 2011, a total of 14,400 households from the Nielsen/Information Resources Inc. National Consumer Panel (NCP, formerly HomeScan) were contacted to participate in a web-based survey about family-based health habits. The NCP is a stratified, proportionate sample of the contiguous 48 states and District of Columbia designed to gather information on food purchasing behaviors of Americans. The response rate from the NCP survey was 71% (n=10,244 households).

Participants were not paid for responding to the survey beyond the normal incentives Nielsen provides for participation in NCP data collection. The IRB at Massachusetts General Hospital determined that this research does not meet the definition of human subjects research because no personally identifiable information was obtained by the research team in a form associable with the participating individual.

Survey Methods

Participants completed the Family Health Habits Survey (FHHS) via the Internet. Inclusion criteria for the present analyses were that a family had either one or two children aged $<$18 years currently living at home, and that the responding adult reported height and weight for themselves and their child(ren). Of those in the random NCP sample (n=10,244), a total of 7,072 families had previously provided demographic data to Nielsen (highest level of household education, income, race, marital status, and geographic region). This covariate information was matched to new health survey data.

Of the families who provided health survey and demographic data, 6,019 provided self-reported height and weight: 18.9% (n=1,141) were households with a single child and 13.4% (n=807) were households with two children. These sample proportions are similar to tabulations from the 2012 American Community Survey, which show that about 20% of U.S. families have one child and 17% have two children.

The FHHS was designed to examine obesity correlations in families, with information collected on the social context of the food environment. Questions regarding self-reported height and weight, adults' health behaviors, and their children's health were adapted from a variety of validated sources, including the National Health and Nutrition Examination Survey and the Healthy Eating Active Living (HEAL) survey from the Veronica Atkins Center for Weight and Health.[20,21] The instrument was pretested with a focus group of ten colleagues, after which sequence, wording, and content were clarified.

Measures

The primary outcome measure was a child's binary classification as obese or not obese. Rather than using a continuous BMI measure, this dichotomization allows for examination of a discrete high-risk group. The obesity definition was derived from z-scores externally standardized using height, weight, gender, and age, on the basis of CDC 2000 Growth Chart data.[22] Children were classified using z-scores as "obese" or "not obese" with age- and gender-specific BMI cut-offs recommended by the Childhood Obesity Working Group of the International Obesity Taskforce.[23] In the Supplemental Material, additional analyses are robust to the use of alternative cut-points of "overweight/obese" or "not overweight/obese."

A key predictor is the responding parent's obesity status, derived from a BMI calculation of self-reported height and weight (height/weight[2]). Adult obesity status was dichotomized into obese (BMI $\geq$30) or not obese (BMI $<$30). Other characteristics included adult socioeconomic and demographic background, health behaviors, and food environment, as well as corresponding child attributes reported by the parent. Adult sociodemographic measures include household income, head of household education, age, marital status, and race/ethnicity, as well as a fixed region effect (Pacific, South, Central, East). A subjective measure of SES asks adults to situate their family on a ladder corresponding to their perceived position in society.[24]

Health behaviors could be mediating factors in the within-family obesity correlations we estimate. Adults report sessions/week of moderate PA, sessions/week of vigorous PA, and perceptions of their fitness relative to peers. To adjust for general perceptions of well-being, two questions were asked about overall health. One is a standard 5-item global self-rated health (SRH) measure; here, the bottom two categories are collapsed into "low" and the top two categories into "high" to yield a 3-level measure (low, moderate, high). The question asked about their self-perception of fitness relative to friends.

A next vector of covariates described the adult's food environment: frequency of alcoholic beverages, fast-food meals, meals in front of the TV/computer, and emotional eating. A set of child-related characteristics included parent-reported child sessions/week of vigorous PA, child extracurricular activity, and fast-food consumption.

Data Analysis

Logistic regression models with robust SEs estimated the odds of a child being obese, adjusting for parent and sibling obesity status as predictors, and a broad set of social, demographic, and behavioral characteristics understood to be risk factors for obesity. The dependent variable represented the odds that a child will be obese, with parent obesity (and sibling obesity) status as the key predictor(s). Models were estimated using Stata, version 12 (StataCorp LP, College Station TX).

Results

The distribution of socioeconomic, demographic, and behavioral characteristics of the adult participants by categories of obesity (not obese, obese) are reported in Table 1. Bivariate tests of association indicated significant differences between observed background characteristics and obesity status. Demographically, obese adults in this sample tended to be older, married, more likely to be from the central part of the U.S., more likely to be black, and less likely to be Asian.

In terms of socioeconomic characteristics, obese adults were less likely to be highly educated, more likely to have a lower income, and more likely to have lower perceptions of their socioeconomic position than non-obese adults. In terms of food-related characteristics, obese adults consumed more alcohol and fast-food meals, more meals in front of a screen (computer or TV), and reported eating because of stress more often than non-obese adults.

Table 2 presents parent-reported child characteristics across one- and two-child families. Among only children, 11.7% were obese, nearly a fifth never engaged in vigorous PA, and more than a third ate fast food more than twice a week. Two-child households were similar to one-child households demographically. However, only 8.2% of eldest children were obese in two-child homes, and 12% of younger children are obese.

In two-child families, children tended to be slightly less sedentary than single-child families, and less than a third of children ate more than two weekly fast-food meals. Comparing across family configurations, the proportion of obese children in one-child families was similar to the proportion of obese younger children in two-child families, despite only-children being an average of 3 years older. In two-child families, obesity was more prevalent among younger siblings, yet younger siblings also tended to be more active than elder siblings.

Relationship of Child Obesity to Parent and Sibling Obesity

We use three separate logistic regression models to estimate associations between child obesity status (outcome) and parent and sibling obesity status (predictors). Table 3 presents multiple analyses: (1) only-child obesity status in single-child families (Model 1); (2) first-born child obesity status in two-child families (Model 2); and (3) second-born child obesity status in two-child families (Model 3). The analyses reported here were fully adjusted for all aforementioned individual characteristics.

Among households with one child, children with an obese parent were 2.2 times more likely (SE=0.51) to be obese (Model 1). Female children were less likely to be obese among single-child families, and older children were less likely to be obese as well. Higher parent intake of fast food was associated with higher likelihood of only-child obesity, whereas higher levels of child vigorous activity were associated with a lower likelihood of child obesity.

In households with two children, for the elder child (Model 2), having an obese parent was associated with a 2.3 times greater likelihood (SE=0.79) of child obesity, although having an obese younger sibling was associated with a 5.4 times greater obesity likelihood (SE=1.88). Compared to the odds of child obesity in one-child families (Model 1), the elder child's gender, age, and PA were not significant when adjusted for younger-child attributes.

For a younger sibling in a two-child household (Model 3), having an obese parent was not significantly related to obesity status, but having an obese elder sibling was associated with a 5.6 times greater likelihood (SE=1.91) of younger sibling obesity. Younger siblings with more vigorous PA were significantly less likely to be obese, although having an extremely active elder sibling was associated with a higher risk of younger-sibling obesity.

Compared with elder sibling obesity in two-child families (Model 2), parent obesity status was no longer significant, and surprisingly, having a highly active elder sibling was associated with an elevated risk of younger-sibling obesity. Parent fast-food consumption was not significantly associated with either child's obesity in two-child families, in contrast to findings for one-child families. Unadjusted bivariate associations between demographic, socioeconomic, and health covariates are reported in Supplemental Table 1.

Sibling Gender and Obesity Interactions

Although child gender was not related with obesity status in two-child households, female children in one-child households had a lower likelihood of obesity. This prompted us to specify additional models with interaction terms between the gender and obesity of an elder sibling on the younger child's obesity status. Table 4 reports models where the outcomes are second-born male obesity (Model 1) and second-born female obesity (Model 2). For youngest boys in two-child families, obesity was 11.4 times more likely with a male older sibling. If that younger boy's elder sibling was a girl, the boy was 6.6 times more likely to be obese.

In two-child families, youngest-girl obesity was 8.6 times more likely with a female older sibling and not

Table 1. Parent characteristics by obesity status, *n* (within-category %)

	Total (*n*=1,948)	Not obese: BMI <29.9 (*n*=1,364 [68.3%])	Obese: BMI >30 (*n*=634 [31.7%])	*p*-value
Age (years)				
21–39	335 (17.2)	248 (18.7)	87 (13.9)	**0.008***
40–49	910 (46.7)	627 (47.4)	283 (45.3)	0.383
50–59	566 (29.1)	374 (28.3)	192 (30.7)	0.266
≥60	137 (7.0)	74 (5.6)	63 (10.1)	<**0.001***
Race/ethnicity				
White	1,564 (80.3)	1,061 (80.2)	503 (80.5)	0.883
Black	176 (9.0)	102 (7.7)	74 (11.8)	**0.003***
Asian	124 (6.4)	105 (7.9)	19 (3.0)	<**0.001***
Other	84 (4.3)	55 (4.2)	29 (4.6)	0.625
Income, household ($)				
<30,000	243 (12.5)	141 (10.7)	102 (16.3)	<**0.001***
30,000–45,000	287 (14.7)	178 (13.5)	109 (17.4)	**0.021**
45,000–70,000	505 (25.9)	324 (24.5)	181 (29.0)	**0.036**
≥70,000	913 (46.9)	680 (51.4)	233 (37.3)	<**0.001***
Education, highest household				
<High school	41 (2.1)	28 (2.1)	13 (2.1)	0.958
High school graduate	401 (20.6)	248 (18.7)	153 (24.5)	**0.003***
Some college	511 (26.2)	328 (24.8)	183 (29.3)	**0.036**
≥College	995 (51.1)	719 (54.3)	276 (44.2)	<**0.001***
Subjective social status (M [SD])	1,948 (100.0%)	1,323 (5.9 [1.7])	625 (5.3 [1.7])	<**0.001***
Marital status				
Married	353 (18.1)	221 (16.7)	132 (21.1)	**0.018**
Other	1,595 (81.9)	1,101 (83.2)	493 (78.9)	**0.018**
Region				
East	374 (19.2)	264 (20.0)	110 (17.6)	0.218
Central	532 (27.3)	342 (25.9)	190 (30.4)	**0.035**
South	685 (35.2)	453 (34.2)	232 (37.1)	0.214
West	357 (18.3)	264 (20.0)	93 (14.9)	**0.007***
Alcohol, weekly				
Never	736 (37.8)	554 (41.9)	182 (29.1)	<**0.001***
<2/month	648 (33.3)	447 (33.8)	201 (32.2)	**0.032**
1–6/week	455 (23.4)	271 (20.5)	184 (29.4)	<**0.001***
1 or 2 drinks/day	109 (5.6)	51 (3.9)	58 (9.3)	**0.006***

(continued on next page)

Table 1. Parent characteristics by obesity status, *n* (within-category %) *(continued)*

	Total (*n*=1,948)	Not obese: BMI <29.9 (*n*=1,364 [68.3%])	Obese: BMI >30 (*n*=634 [31.7%])	*p*-value
Fast-food meals/week				
None	624 (32.0)	554 (41.9)	182 (29.1)	<**0.001*****
1	811 (41.6)	447 (33.8)	201 (32.2)	0.477
2–3	421 (21.6)	271 (20.5)	184 (29.4)	<**0.001*****
≥4	86 (4.4)	51 (3.9)	58 (9.3)	<**0.001*****
Meals in front of computer or TV/week				
None	555 (28.5)	423 (32.0)	132 (21.1)	<**0.001*****
1–6	904 (46.4)	616 (46.6)	288 (46.1)	0.843
7 (1/day)	311 (16.0)	203 (15.3)	108 (17.3)	0.276
14–21 (2–3/day)	178 (9.1)	81 (6.1)	97 (15.5)	<**0.001*****
Eating because of stress				
Never/rarely	880 (45.2)	670 (50.6)	210 (33.6)	<**0.001*****
Sometimes	641 (32.9)	442 (33.4)	199 (31.8)	0.492
Often/very often	425 (21.8)	209 (15.8)	216 (34.6)	<**0.001*****
Moderate physical activity/week				
Never	505 (25.9)	285 (21.5)	220 (35.2)	<**0.001*****
1–3 times	889 (45.6)	619 (46.8)	270 (43.2)	0.138
≥4 times	554 (28.4)	419 (31.7)	135 (21.6)	<**0.001*****
Vigorous physical activity/week				
Never	948 (48.7)	567 (42.9)	381 (61.0)	<**0.001*****
1–3 times	713 (36.6)	518 (39.2)	195 (31.2)	**0.001*****
≥4 times	287 (14.7)	238 (18.0)	49 (7.8)	<**0.001*****
Relative fitness				
Most are more fit	536 (27.5)	213 (16.1)	323 (51.7)	<**0.001*****
More fit than most	610 (31.3)	528 (39.9)	82 (13.1)	<**0.001*****
About same	802 (41.2)	582 (44.0)	220 (35.2)	<**0.001*****
Self-rated health				
Low	90 (4.6)	29 (2.2)	61 (9.8)	<**0.001*****
Moderate	420 (21.6)	209 (15.8)	211 (33.8)	<**0.001*****
High	1,438 (73.8)	1,085 (82.0)	353 (56.5)	<**0.001*****

Note: Boldface indicates statistical significance. *p*-values were calculated with dummy variable regressions (*t* test), with the exception of subjective social status (*F* statistic in ANOVA). *p*-value shows test of equality between obese and non-obese percentages for each characteristic.
**p*<0.10, ***p*<0.05, ****p*<0.01.

significantly more likely if the older sibling was male. Thus, for younger children, there was a discernible gender correlation in sibling obesity status: Having an obese elder same-gender sibling was associated with an increased likelihood of the younger child being obese.

Discussion

This study finds that the obesity status of a younger child's elder sibling is more strongly associated with a child's obesity than is the parent's obesity status. This

Table 2. Child characteristics, reported by parent

	One-child families			Two-child families		
	n	M (SD) or %	Range	*n*	M (SD) or %	Range
Child 1 age	1,141	12.1 (4.4)	2, 17	807	12.3 (3.9)	2, 17
Child 1 gender						
Male	605	53.0		442	54.8	
Female	536	47.0		365	45.2	
Child 1 BMI *z*-score	1,141	0.3 (1.4)	−4.9, 4.9	807	0.1 (1.4)	−4.9, 3.0
Child 1 obesity status						
Not obese	1,007	88.3		741	91.8	
Obese	134	11.7		66	8.2	
Child 1 vigorous physical activity/week						
Never	215	18.8		149	18.5	
1–3 times	452	39.6		304	37.7	
4–6 times	274	24.0		245	30.4	
≥7 times	200	17.5		109	13.5	
Child 2 (younger) age				807	9.1 (4.1)	2, 17
Child 2 (younger) gender						
Male				406	50.3	
Female				401	49.7	
Child 2 (younger) BMI *z*-score				807	0.2 (1.6)	−5.0, 4.4
Child 2 (younger) obesity status						
Not obese				710	88.0	
Obese				97	12.0	
Child 2 (younger) vigorous physical activity/week						
Never				125	15.5	
1–3 times				333	41.3	
4–6 times				234	29.0	
≥7 times				115	14.3	
Children's weekly fast-food meals						
0 times	346	30.3		264	32.7	
1 time	412	36.1		303	37.6	
2–3 times	314	27.5		198	24.5	
≥4 times	69	6.1		42	5.2	

association is independent of a host of socioeconomic and demographic attributes, health behaviors, and overall health status. Consistent with prior research, this study also shows that parent obesity status is associated with child obesity. Examining sibling birth order and gender reveals that child obesity within pairs of brothers and sisters is more concordant than within mixed-gender siblings in two-child families.

Child propensity for vigorous PA is strongly associated with being non-obese. However, other food-related attributes, such as fast-food consumption, are less clearly associated with child obesity, perhaps because fast-food

Table 3. Association between parent and child obesity in one- and two-child families, AOR (robust SE)

	One-child families	Two-child families	
	(1) Child is obese	(2) First-child obese	(3) Second-child obese
Parent obese	**2.2 (0.51)*** **	**2.3 (0.79)** **	1.4 (0.40)
Child 1 (older) obese			**5.6** (1.91)***
Child 2 (younger) obese		**5.4** (1.88)***	
Adult fast-food meals/week			
None (ref)			
1	1.3 (0.39)	0.9 (0.37)	0.6 (0.19)*
2–3	**2.6** (0.78)***	1.0 (0.50)	0.9 (0.35)
≥4	**3.0** (1.41)**	1.0 (0.70)	0.5 (0.32)
Child 1 age	**0.9** (0.02)***	1.1 (0.09)	0.9 (0.05)
Child 1 female	**0.6** (0.13)**	1.3 (0.37)	1.4 (0.35)
Child 1 vigorous physical activity/week			
Never (ref)			
1–3 times	0.9 (0.24)	1.5 (0.80)	1.4 (0.58)
4–6 times	0.6 (0.17)*	1.0 (0.65)	1.4 (0.63)
≥7 times	**0.4** (0.13)***	1.1 (0.84)	**3.2** (1.71)**
Child 2 age		0.9 (0.07)*	0.9 (0.05)
Child 2 female		1.0 (0.28)	1.0 (0.26)
Child 2 vigorous physical activity/week			
Never (ref)			
1–3 times		0.6 (0.35)	0.5 (0.23)
4–6 times		0.6 (0.43)	0.6 (0.28)
≥7 times		1.2 (0.89)	**0.3** (0.15)**
Children's fast-food meals/week			
0 times (ref)			
1 time	0.9 (0.27)	1.1 (0.46)	0.9 (0.29)
2–3 times	0.8 (0.27)	0.9 (0.45)	1.4 (0.56)
≥4 times	0.5 (0.28)	0.6 (0.53)	2.7 (1.57)*
Observations	1,135	801	801

Note: Boldface indicates statistical significance. Models are adjusted for adult demographics (parent age, race/ethnicity, marital status, geographic region); SES (income, education, subjective social status); food environment (alcohol consumption, meals in front of a screen, stress eating); health behaviors (vigorous physical activity, moderate physical activity); and health status (self-rated health, relative fitness).
*$p<0.10$, **$p<0.05$, ***$p<0.01$.

intake constitutes a small part of a child's overall diet. Or perhaps children, like some adults, offset their unhealthy choices with an abundance of healthy foods.[25]

The family environment is known to exert a strong influence on the trajectory of children's health, and prior research has done a great deal to illuminate connections between parent and offspring obesity.[26–29] This study extends these findings by integrating data on sibling relationships. A unique contribution of this paper is its examination of the effect of sibling gender homogeneity versus heterogeneity, an under-studied relationship. The fact that second-child obesity was found to be greater when two children's genders are the same indicates a role for sibling influence on obesity outcomes that differs from parent influence.

Table 4. Interactions between elder sibling obesity and child gender in two-child families, AOR (robust SE)

	(1) Obese male second child	(2) Obese female second child
Child 1 obesity status × Child 1 gender		
Not obese × male (ref)		
Not obese × female	1.2 (0.52)	2.1 (0.89)*
Obese × male	**11.4** (8.83)***	3.4 (2.48)*
Obese × female	**6.6** (4.93)**	**8.6** (6.45)***
Observations	387	398

Note: Boldface indicates statistical significance. Models adjust for adult demographics (parent age, race/ethnicity, marital status, geographic region); SES (income, education, subjective social status); food environment (alcohol consumption, meals in front of a screen, stress eating); health behaviors (vigorous physical activity, moderate physical activity); and health status (self-rated health, relative fitness); child 1's age; child 1's vigorous physical activity; child 2's age; child 2's vigorous physical activity; and children's weekly fast-food consumption.
*$p<0.10$, **$p<0.05$, ***$p<0.01$.

Siblings are claimed to have a greater influence on informal behaviors, whereas parents have a greater influence on formal norms. Prior sibling research investigated the influences that siblings have because of behavior modeling by older siblings for younger siblings, efforts by older siblings to influence the attitudes and behavior of younger siblings, and by virtue of the greater amount of time siblings spend together relative to that with their parents.[30]

However, this is an area of research that would benefit from additional attention with respect to obesity-related behaviors. Although the present findings of sibling obesity associations comport with prior research, few studies have investigated how obesity status correlates among siblings of the same gender. Siblings often eat and participate in PA together, which offers a pathway for social influence aside from parent modeling. Social influence may be amplified among same-gender siblings.

Of course, there may be a number of unobserved genetic, economic, and social factors that confound the finding that sibling obesity associations are stronger than parent–child obesity associations. It is unclear why child's age was not associated with obesity in two-child families. Sensitivity analyses (available from the authors) tested plausible alternative explanations of birth spacing between children, child's stage of development, and non-reporting parent's health, with no appreciable differences in main findings.

Limitations

This study was limited by its cross-sectional design. As exogenous variation in obesity status across household members is lacking, causal claims cannot be evaluated. Although this study relied upon a proportionate national sample, it was not a representative population sample. Specifically, this sample has a greater proportion of college-educated adults (51.1%) versus 29.1% reported in the 2012 American Community Survey (ACS), and slightly different minority representation: 9.0% African American (vs 12.6% in the ACS) and 6.4% Asian American (vs 5.0% in the ACS).

Child obesity prevalence in this sample was 11.7% in one-child households, and in two-child households was 8.2% among first-born and 12.0% among second-born children. These rates are low compared to recent studies employing representative population data. For instance, in one study, child obesity ranged from 12.4% at age 5 years to 20.8% at age 14 years between 1998 and 2007.[31] In another study, the obesity prevalence among children aged 2–19 years was 16.9%.[32]

Adult obesity prevalence was 32.1%, similar to a recent representative study that found adult obesity prevalence of 35.5%.[33] Because obesity rates here are lower than in these larger studies, these findings, which do not reflect a broader pattern of socioeconomic and racial/ethnic disadvantage among low-income and minority populations, may underestimate the magnitude of both child–parent and sibling obesity associations in the broader population.

Another limitation is reliance upon self-reported data for all participants, and proxy reports for children. Research on self-report bias indicates that men over-report and women under-report weight, and that lower-income individuals tend to underestimate their height.[34,35] However, if reporting error is constant within a household owing to the fact that height and weight are reported by the same individual, measurement error should have little impact on estimated correlations. As long as self-report error is not systematically related to the number or gender mix of children, such error will not exert a large influence on these results. The inclusion of objective anthropomorphic measures in future studies can help to extend these findings.

This study was restricted to families with only one or two children; different results might be found in larger family configurations. The responding parent's gender was not available, preventing scrutiny of which parent is more strongly associated with offspring obesity status. Child puberty status, an important indicator of metabolic changes in adolescents, was also not available. Future research will benefit from additional attention to peer, school, and neighborhood contexts.

Conclusions

Although parent health behaviors and modeling matter to child health, this study also considers the role of sibling relationships. It has been established that food consumption habits and opportunities for PA are controlled largely by parents during early childhood. Yet, as children transition toward adolescence and beyond, the influence of peers and siblings may replace parental influence.[36] The finding that a sibling may be a better predictor of a child's obesity than his or her parents (especially for same-gender siblings) contributes to a growing body of work regarding the influence of siblings on a variety of children's health behaviors, including smoking, antisocial behavior, and substance use.[37–39]

Though we cannot claim that these particular siblings are responsible for one another's weight status, these findings are consistent with research showing that siblings tend to eat alike[25,40] and have similar levels of PA.[41] In seeking to reduce the prevalence of childhood obesity, it may be productive to consider prevention and treatment models that meaningfully recognize siblings as interconnected.[16,42,43]

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Appendix

Supplementary data

Supplementary data associated with this article can be found at http://dx.doi.org/10.1016/j.amepre.2014.05.018.