J Fam Econ Iss (2011) 32:233–244
DOI 10.1007/s10834-011-9249-0

ORIGINAL PAPER

Parental Employment, Shared Parent–Child Activities and Childhood Obesity

Lisa Benson · Manouchehr Mokhtari

Published online: 19 February 2011

Abstract We examine the effect of parental employment on child health as measured by children's percentile body mass index (*pBMI*). Our investigation reveals that hours of parental employment are important determinants of child health. We find a highly significant role for the influence of fathers' hours of work on the *pBMI*. Given that work hours of both mothers and fathers impact child health, ignoring parents' joint decision making in child health production may lead to biased results. Additionally, we conclude that parental work hours may impact both the quality and quantity of time that parents spend with their children. Specifically, we find that shared parent–child activities such as building or repair work, and reading influence childhood obesity.

Keywords Child health · Childhood obesity · Family economics · Family policy · Paternal employment

Introduction

Since the 1970s, childhood obesity rates have more than tripled in the United States (Centers for Disease Control and Prevention 2009). Almost one-third (31.9%) of children and adolescents in the United States have body mass indices that qualify them as either overweight or obese (Ogden et al. 2010). Increases in overweight status have been observed across all ages, ethnic groups and both genders, with children from minority and low socioeconomic backgrounds disproportionately affected (Lin et al. 2004; Wang and Beydoun 2007). Although increasing childhood overweight and obesity trends have emerged worldwide, childhood obesity in the United States persists at a level nearly double that observed among other industrialized nations (Sassi et al. 2009). Global and national trends toward increasing childhood obesity and overweight are disconcerting given the pervasiveness of the disorder and its attendant comorbidities.

Pediatric overweight and obesity are anticipated to have long-term health implications. Approximately 70% of obese adolescents are expected to remain obese as adults (U.S. Surgeon's General 2007). Overweight youth face elevated risk for numerous weight-related chronic conditions including cardiovascular disease, type 2 diabetes, pulmonary disease, psychosocial disorders and certain cancers (Daniels 2006; Haslam and James 2005). The early onset of overweight exacerbates systemic damage inflicted by chronic obesity-related disorders and may decrease life expectancies among future generations (Daniels 2006; Olshansky et al. 2005).

In addition to elevated risk for many weight-related chronic conditions, prevalent overweight and obesity also impose numerous direct and indirect costs. Direct costs include preventive, diagnostic, and treatment services. Indirect costs encompass the value of income lost from decreased productivity, loss of utility from restricted activity, increased absenteeism at work, downtime, and loss of future income because of premature death, as well as other losses that the family and the society may incur because of premature death (Wolf 1998; Wolf and Colditz

Lisa Benson and Manouchehr Mokhtari have equally contributed to this paper.

L. Benson · M. Mokhtari (✉)
Department of Family Science, School of Public Health, University of Maryland, College Park, 1142 School of Public Health, College Park, MD 20742, USA
e-mail: mokhtari@umd.edu

L. Benson
e-mail: benson.lisa@gmail.com

1998). Given the long-term social, health, and economic costs associated with obesity, the epidemic rise in childhood overweight and obesity has been identified as a critical public health concern (Koplan et al. 2005).

Changes in family structure and the dramatic rise in dual-earner families and working single parent families are important factors that may contribute to escalating childhood and adolescent obesity rates (Haslam and James 2005). The increasing prevalence of childhood obesity observed over the last several decades coincides with pronounced increases in maternal labor force participation, especially among women with young children (Hoffman and Averett 2010; U.S. Census Bureau 2009). Poverty reduction policies such as the 1996 Personal Responsibility and Work Opportunity Reconciliation Act have led to a marked increase in labor force participation by women with young children, as well as an increase in the number of employed mothers with children under 18 from 47% in 1975 to 71% in 2008 (U.S. Department of Labor, Bureau of Labor Statistics 2009).

As women have steadily moved into the paid labor force, men have increased their contributions to household labor (Gershuny et al. 1994). Over the past 40 years male housework hours have doubled while women's domestic labor hours have decreased by half (Bianchi et al. 2000). Although employed women still perform a larger share of the housework than employed fathers, that gap has been consistently narrowing in recent years, suggesting gradual equalization of paternal contributions to household production functions, including the production of child health (Kroska 2004); see also, Hofferth et al. (2010), Maume (2010), Nakhaie (2009), Astone et al. (2010), Kirkwood (2009) and Borra and Palma (2009).

Recent studies exploring the concurrent expansions in maternal workforce participation and childhood obesity have reported a positive association between maternal employment and childhood obesity rates (Anderson et al. 2003; Cawley and Liu 2007; Fertig et al. 2009). However, scholars have largely ignored the role of fathers in child weight. This relative lack of attention to paternal contributions is surprising given that joint economic decisions and behaviors modeled by both parents are likely to influence child behavior and health (Bronfenbrenner 1994; Bandura 2004). Given the substantial and increasing role that fathers play in domestic and childrearing activities, ignoring paternal involvement in joint economic decisions and child health production may lead to misleading results.

In this paper, we use economic theory (for example, see Becker 1962, 1978), a nationally representative dataset, and proper econometric modeling and analysis to shed light on the joint role of parental employment on children's health as measured by the child percentile body mass index (*pBMI*). Specifically, using the 2007 wave of the Child Development Supplement (CDS) of the Panel Study of Income Dynamics (PSID) for children who live with both parents, our investigation fills the current void in the literature, which ignores the significant role that fathers' work hours play in childhood obesity. Section "Background and Theoretical Framework" of the paper presents background on the problems associated with overweight and obesity in children. In this section, a rational choice model, where parental joint decision making processes influence optimum child health, indicates that the ratio of incremental costs (or hours of work) for both parents is crucial in determining child health. A corollary for this finding is, *ceteris paribus*, that relative hours of work by parents influence child's health. Section "Data and Methodology for Data Analysis" presents the data and the methodology for modeling and analysis. Section "Results and Discussion" presents the result and discussion, and the last section contains the conclusion.

Background and Theoretical Framework

Obesity is a problem of energy imbalance. Caloric consumption that outpaces energy expenditure results in the deposition of unused energy as fat. Thus, a key behavioral risk factor for childhood obesity involves excess caloric intake. Previous research findings indicate that dietary patterns which include frequent meals away from home, omitting breakfast, large portion sizes, consumption of pre-prepared and pre-packaged food, sugar-sweetened beverage consumption and frequent snacking are all associated with increased rates of child and adolescent overweight (Anderson and Butcher 2006; French et al. 2001; Haines et al. 2007; Ludwig et al. 2001).

In addition to high caloric intake, low levels of physical activity may also constitute obesogenic behavior. An estimated 58% of American children ages 6–11 do not engage in the recommended amount of daily physical activity, and by adolescence the proportion jumps to 92% (Troiano et al. 2008). Sedentary behavior related to media consumption has been shown to be a significant contributing factor to increased obesity rates among children and adolescents (Crespo et al. 2001; Dennison and Edmunds 2008). Studies indicate that the average child spends 5.5 h per day using some form of media. Media use has been associated with a reduction in metabolic rate, increased exposure to food marketing, snacking during media use, and the expenditure of discretionary time that may have otherwise been allotted to physical activity (Coon and Tucker 2002; Institute of Medicine 2005; Lowry et al. 2002).

While accelerating childhood obesity incidence and prevalence rates have increasingly become the focus of public health research, the etiology of overweight and obesity remains poorly understood. It has long been acknowledged that genes play a role in the onset of obesity, but genetic factors do not operate independently of behavior and the environment (Coady et al. 2002). Recent literature indicates that in addition to genetic influences, shared environmental factors have a substantial effect on observed familial patterns of obesity (Silventoinen et al. 2010). Consequently, behavioral and environmental factors have become the focus of childhood obesity research.

Previous studies have found that maternal employment reduces maternal time investments into child health production, thus leading to elevated childhood obesity rates (Anderson et al. 2003; Cawley and Liu 2007; Fertig et al. 2009). This study examined the importance of paternal employment relative to that of maternal employment in childhood obesity. Moreover, potential behavioral pathways (or channels) by which parents influenced child weight outcomes were also explored and their significance evaluated. This research adds to current knowledge by examining the joint impact of parental behaviors on children's *pBMI*s.

Theory

An important factor in parental satisfaction, or utility, is the health of their children. Consumption of health over the lifecycle is an important element in generating lifetime satisfaction (see Grossman 1972). Hence, production of child health is an important consideration in the parents' joint decision making process for allocating valuable time to raising children. Figure 1 depicts a set of hypothetical standard production functions of child health as a function of individual parental hours of input (H_{mother} and H_{father}). The two product curves represent the total health production curve for mother (TP_{mother}) and the total health production curve for father (TP_{father}). The curve for mother's health production is shifted up to indicate that variations may exist in the effectiveness between mothers and fathers in terms of producing children's health. For example, mothers may have more knowledge or experience in terms of caring for children's health needs. Also, traditional divisions of household labor and family processes such as maternal gatekeeping may limit effective paternal participation in child health producing activities (Allen and Hawkins 1999; Hall and MacDermid 2009).

The shapes of the production functions in Fig. 1 illustrate that parents are not equally skilled at generating child health (Q), which is approximated by the inverse of *pBMI* for empirical analysis in this paper. Accordingly, decisions made by parents about time spent with children do not necessarily result in an equal hours of input (H) by each parent to produce the desired level of child health. This

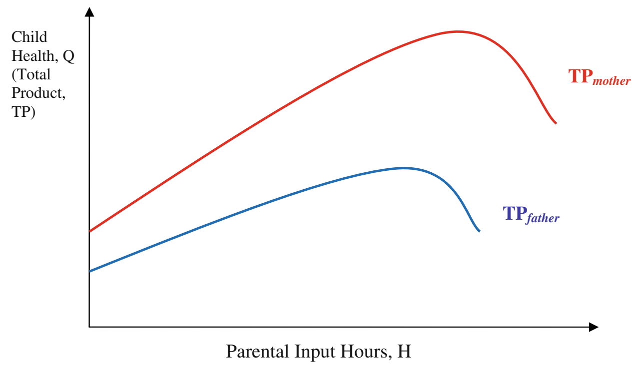

Fig. 1 Producing child's health: total product (TP) curves as a function of parental input hours (H)

model is consistent with the skewed number of hours that mothers typically spend with children relative to hours contributed by fathers (Winkler and Ireland 2009).

According to Grossman's model of health production, each child is endowed at birth with a certain level of health. Based on numerous factors, particularly genetics, this intrinsic level of health varies from individual to individual. While normal depreciation of one's health endowment will eventually lead to aging and death, investment in health during the life-cycle may preserve or improve one's health according to underlying biological, medical, and social parameters. Thus, parental input of time, material, and efforts could be conceptualized as an attempt to maintain and improve the health of children in the household.

A standard two-step procedure summarizes the parental joint decision-making process for producing child health. In the first step, parents determine the optimum level, or quantity (Q*), of child health to produce. In the second step, based on the marginal costs of child health production for each parent, an efficient allocation of effort is established in order to achieve the desired level of Q*. The first step of the joint decision making process is influenced by parental preferences for child health and alternative goods and services, which enter parents' utility function. The second step of the joint decision making process is influenced by the marginal, or opportunity costs of producing child health. An optimum solution is reached when producing an additional unit of child health has the same cost of production, regardless of which parent provides the input. Given the optimum level of child health (Q*), depiction of the mirror image of rising marginal cost (MC) curves leads to the optimum solution for the relative contribution of each parent to child health (see Fig. 2). The optimum solution in Fig. 2 indicates that hours of work by both parents are essential determinants of child health in two-parent families. In general this may be represented as:

$$Q = f(H_{mother}, H_{father}) \quad (1)$$

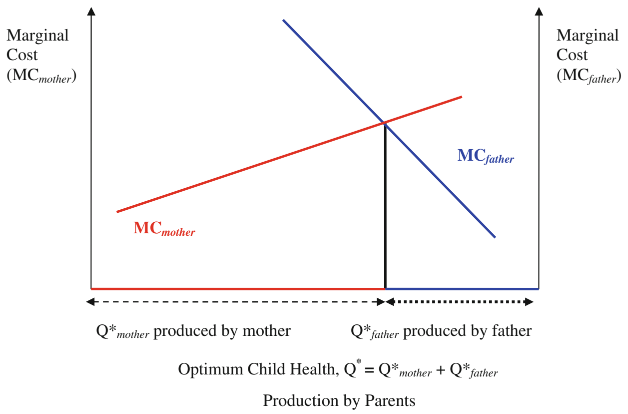

Fig. 2 Optimum level of child health. *Note*: MC_{mother} and MC_{father} denote marginal or incremental costs of additional contributions to child health by mothers and fathers, respectively. The mirror image of father's marginal cost curve is presented for ease of comparison and evaluation

Therefore, paternal input hours do play a role in determining child health, considering the inverse of BMI percentile as a proxy for the child's health.

Based on the heterogeneously rising marginal cost curves presented in Fig. 2, mother in this calculation produces Q^*_{mother} of the optimum level of child health (Q^*) and father produces the reminder $Q^*_{father} = Q^* - Q^*_{mother}$. Given Q^*, in Fig. 2, a mirror image of father's marginal cost curve is presented in order to identify the intersection with mother's marginal cost curve. The intersection of two curves indicates the point at which the optimum level of child health is likely to occur.

Given hypothetical differences in abilities, skills, and wages (which must be, at least, substantiated by the empirical investigation), Fig. 2 shows that the father in this hypothetical example produces a smaller share of the child's total optimum health than the mother. The marginal cost curves presented take into account the various factors that may influence opportunity cost for each parent in terms of child health production including economic factors, institutions, gender, and skills. Figure 2 suggests such factors should be considered in determining the specific roles and responsibilities of each parent in producing child health.

Data and Methodology for Data Analysis

Previous studies of associations between maternal employment and childhood obesity have primarily utilized child height, weight, and maternal employment data from the National Longitudinal Survey of Youth (Anderson et al. 2003; Cawley and Liu 2007; Miller and Han 2008). This research examines information from the Child Development Supplement (CDS) of the Panel Study of Income Dynamics (PSID). The CDS is useful for studying childhood overweight, obesity and related health behaviors because in addition to child height and weight variables, it provides information on children's daily activities and interactions with their parents. The CDS can be linked to the main PSID household survey to examine mechanisms and pathways by which parental practices, particularly mothers' and fathers' employment and shared parent–child activities, may impact child health outcomes.

The CDS 2007–2008 wave used in this study consists of a total sample of 1,506 children now aged 10–19 (Insolera 2010). Given that the focus of this investigation was the relationship between parental employment and childhood obesity, children with incomplete or missing data related to height, weight, parental work hours, or who were not residing with at least one biological parent were omitted, producing a target sample of 1,099 children. Children's age ranged from 10.4 to 18.9 years, with an overall average of 14.5 years. The key outcome variable in our analyses was child's percentile body mass index (*pBMI*). The acronym '*pBMI*' was used because children's BMI scores are highly dependent upon the sex and age of a child, thus those characteristics have been taken into account in reporting the child's percentile ranking.

Obesity and *pBMI*

Application of standard adult obesity measures to children has proven problematic given the considerable variation that occurs in BMI as children grow (Cole et al. 2000). Thus, BMI-for-age growth charts have been developed for boys and girls based on nationally representative National Health and Nutrition Examination Survey (NHANES) data from the 1960s–1980s (Bini et al. 2000). In contrast to crude anthropometric measures, percentile rankings provide relative estimates of child weight categories (underweight, normal, overweight, or obese) which take into account the child's sex and age. Based upon Centers For Disease Control And Prevention definitions, children with relative BMI percentages below the 5th percentile are considered underweight. Children in the 5th through 85th percentile are defined as having normal weight. A BMI score falling between the 85th and 95th percentile qualifies a child as overweight. Children with *pBMI*s in 95th to 97th percentile range are considered obese. Extreme obesity is defined as having a *pBMI* of 97 or greater (see Table 1).

While recent trends indicate that overweight and obesity prevalence may be leveling off for most children except the heaviest boys, Ogden et al. (2010) reported that during 2007–2008 nearly one-third (31.7%) of American children and adolescents aged 2 through 19 years had body mass indices that qualify as either overweight or obese.

Table 1 Classification of child overweight and obesity by BMI

Category	Percentile rank	U.S. prevalence (ages 2–19) (%)
Underweight	<5th	3.3
Normal	5th to 85th	60.0
Overweight (at risk of overweight)	85th to 95th	14.8
Obese (overweight)	95th to 97th	5.0
Extremely obese (overweight)	≥97th	11.9

Source: CDC (2009); Ogden et al. (2010)

Approximately 15% of children fell between the 85th and 95th percentile and 5% of American children fell between the 95th and 97th percentiles. An additional 12% of US children had *pBMI*s at or above the 97th percentile, the cutoff for extreme obesity.

The phrase "at risk of overweight" is sometimes substituted for overweight, but recent expert panels have advocated the use of the terms "overweight" and "obese" as standard nomenclature for references to high body mass among children (Krebs et al. 2007). Thus, in the interest of conciseness and in order to be consistent with adult terminology, the child weight status categories between the 85th and 95th percentile and above the 95th percentile are designated here, respectively, as overweight and obese.

Descriptive Analysis

Descriptive statistics including socio-economic and demographic characteristics for the full sample are presented in Table 2. Due to differential sampling rates for targeted PSID subsamples such as low-income households, compensatory weights have been developed to account for unequal selection probabilities. Accordingly, all of the analysis in this paper use proper weights to compensate for the CDS's complex design. Nonetheless, because of the oversampling of certain subpopulations specified in the design of the PSID, weighted means and standard errors (SE) reported in Table 2 must be analyzed in context. In particular, we observe that SEs do not indicate high variation in the reported weighted means. Accordingly, given the size of SEs, as well as the sample size, reported means are significantly different from zero for all variables.

Table 2 shows that the average *pBMI* for children in this sample placed them in approximately the 68th percentile for body mass. A full 39% of the children in the sample were overweight, having *pBMI*s of 85 or greater, and nearly one quarter of children in the sample (22.54%) had *pBMI*s in the 95th percentile or above, thus qualifying as obese.

Table 2 Descriptive statistics for full sample ($n = 1{,}099$): 2007 wave of the Child Development Supplement of the Panel Study of Income Dynamics

	Mean[a]	SE[b]
Child BMI percentile (*pBMI*)[c]	67.90	1.203
Child is overweight	39.22%	0.020
Child is obese	22.54%	0.017
Weekly hours worked by mother in 2006	20.50	0.824
Weekly hours worked by father in 2006	33.90	0.957
Hourly wage of mother	$10.16	0.543
Hourly wage of father	$20.45	1.079
Annual family labor income in 2006 ('000)	$80.96	3.223
Age of child	14.53	0.094
Black	17.39%	0.011
Hispanic	23.12%	0.020
Female	46.00%	0.021
Birth weight (pounds)	7.28	0.062
Northeast	16.37%	0.016
North Central	21.77%	0.016
South	31.03%	0.019
West	30.83%	0.020

[a] Weighted means

[b] Weighted standard error

[c] Percentiles based on 2000 CDC growth charts by gender and child's age in months

Fathers averaged 34 h per week and mothers averaged slightly over 20 h of weekly paid labor. The mean hourly wage was $20.45 for fathers and $10.16 for mothers. The mean household income was slightly higher than seventy-six thousand dollars.

The sample of 1,099 children, included 526 females, 573 males, and averaged 14.5 years of age. Black or Hispanic children comprised around 17 and 23% of the sample, respectively. The mean birth weight of the sample was about 7.28 lb. Roughly 16% of the sample resided in the Northeast, 22% in the North Central states, 31% in the South, and the remaining 31% resided in the West.

Table 3 presents descriptive characteristics by living arrangement for children living with at least one parent. Half of the children residing with a parent lived with both parents (n = 542), 519 lived with their mothers only, and 38 children lived in the custody of their fathers. The highest *pBMI*s were observed among children living with only their mothers (69.55), while children living with only their fathers had a slightly lower average *pBMI* of 69.10. The lowest *pBMI*s were observed among children living with both parents, who reported *pBMI*s of 67.06 on average.

Hours of weekly maternal paid labor were highest for mothers who lived with the father of their children.

Table 3 Descriptive statistics by living arrangement: 2007 wave of the CDS of the PSID

	Lives with both parents[a] ($n = 542$)	Lives with mother only[a] ($n = 519$)	Lives with father only[a] ($n = 38$)
Child BMI percentile (*pBMI*)[b]	67.06	69.55	69.1
Child is overweight	37.47%	41.70%	49.36%
Child is obese	20.26%	27.47%	22.73%
Weekly hours worked by mother in 2006	26.35	9.28	9.27
Weekly hours worked by father in 2006	43.64	12.49	36.10
Hourly wage of mother	$13.19	$4.38	$4.15
Hourly wage of father	$27.27	$5.97	$18.10
Annual family income in 2006 ('000)	$98.65	$44.62	$65.38
Age of child	14.50	14.74	13.54
Black	6.56%	42.43%	6.04%
Hispanic	27.06%	17.61%	0.00%
Female	45.56%	45.03%	60.67%
Birth weight (pounds)	7.44	6.96	7.10
Northeast	15.33%	20.79%	0.00%
North Central	20.67%	22.93%	31.19%
South	27.78%	36.29%	44.69%
West	36.23%	19.99%	24.12%

[a] Weighted means

[b] Percentiles based on 2000 CDC growth charts by gender and child's age in months

Children living with both parents had mothers who worked an average of 26.35 h per week. Women who did not live with their children's father worked an average of 9.27 h per week. Fathers who resided with both their biological children and the children's mother reported the highest weekly hours of paid labor, with an average of 43.64 h per week. Fathers residing away from their children worked an average of 12.49 h per week, and fathers living with their children, but not with the children's mother, worked an average of 36.10 h weekly.

Children living in the custody of their fathers were younger than children living who lived with both parents, with mean ages of 13.54 and 14.50 years for each group, respectively. Children living with their biological mother only were the oldest among this sample, averaging 14.74 years of age.

Black children were more likely than other racial or ethnic groups to live with only their mothers than with their fathers or both parents. Only 6.55% of children sampled that lived with both their parents were Black, whereas 42.43% of the female headed families in this sample were headed by Black mothers. Thus, Black children, who make up only 21.86% of the overall sample, are overrepresented in female headed households. Of children living in families headed by single fathers, 6.04% were Black.

Hispanic children in this sample, who make up 19.88% of the full sample, were overrepresented among families having both a mother and a father present, with 27.06% of children from two-parent being identified as Hispanic. Among children residing in female headed families, 17.61% were Hispanic, and none of the children in this sample living solely with their biological father were Hispanic.

Just under half of all children living in either two-parent or female headed families were girls (45.56 and 45.03%, respectively). Girls made up a larger proportion of the children living in single-parent male-headed households, with 60.67% of these children being female.

Mean birth weights for the sample ranged from 7.44 to 6.96 lb. Children living with both their mother and father at the time of the 2007 CDS survey had the highest mean birth weights, and children residing with their mothers only had the lowest. Children living solely with their fathers had an average birth weight of 7.10 lb.

Hourly wages were highest among families that had both a mother and a father present, with a maternal wage of $13.19 and a paternal wage of $27.27 observed, respectively. The lowest mean wages for fathers were observed among non-residential fathers who averaged $5.97 per hour. Non-residential mothers were lowest earners among the maternal counterparts, averaging $4.15 per hour. Single mothers who lived with their children and single fathers who lived with their children reported intermediate average wages of $4.38 and $18.10, respectively.

Annual family incomes were highest for two parent families, with reported mean yearly incomes of $98,650. Female headed households averaged less than half that reporting incomes of $44,620 per year. Male headed single parent families fared better amount with an average income of $65,380 per year.

In terms of regional distribution, children living in two parent families were most likely to reside in the Western U.S. (36.23%), followed by the South (27.78%), the North Central states (20.67%), and finally the Northeast (15.33%).

Children living in female headed households were most often found in the South (36.29%), the North Central region (22.93%), the Northeast (20.79%), and least frequently in the West (19.99%). The greatest proportion of children living in male-headed single-parent households were found in the South (44.69%), followed by the North Central states (31.19%) and the West (24.12%), with none among this sample residing in the Northeast.

Data Analyses

Application of a rational choice theory of child health production provides a useful framework for understanding relevant variables that may influence child health (as approximated by the inverse of *pBMI*). Moreover, this theory allows researchers to consider behavioral variables that may otherwise be confounding factors in determining *pBMI*. Standard econometric estimation techniques, such as multiple regression (Ordinary Least Squares) provide suitable tools and framework for exploring the relationship between paternal inputs and child *pBMI* while controlling for the numerous potential parent–child activities, maternal and paternal hourly wage, annual household income, region of residence, and other related variables.

A general model of child's health as the dependent variable (captured by the inverse of *pBMI*) includes variables indicated by our theoretical model (hours of work by the mother and the father), as well as other important and explanatory variables:

$$pBMI = \mathrm{f}(\mathrm{H}_{\mathrm{mother}}, \ \mathrm{H}_{\mathrm{father}}, \ \mathrm{X}) \tag{2}$$

where X represents all other factors that influence *pBMI* of children. Given our theoretical model, prior literature, and the CDS dataset, the following multiple regression model was developed for children living with both parents:

$$\begin{aligned}\ln(pBMI_i) = {} & \beta_0 + \beta_{1\mathrm{m}} \ln(H_{\mathrm{mother}})_i + \beta_{1\mathrm{f}} \ln(H_{\mathrm{father}})_i \\ & + \beta_2 \ln(\text{relative wages of mother to father})_i \\ & + \beta_3(\text{South})_i + \beta_4(\text{Black})_i \\ & + \beta_5(\text{Hispanic})_i + \beta_6(\text{Girl})_i + \beta_7(\text{Child age})_i \\ & + \beta_8(\text{birth weight})_i + \beta_9(\text{yard work})_i \\ & + \beta_{10}(\text{laundry})_i + \beta_{11}(\text{dishes})_i + \beta_{12}(\text{shopping})_i \\ & + \beta_{13}(\text{building/repairs})_i \\ & + \beta_{14}(\text{preparing food})_i + \beta_{15}(\text{playing sports})_i \\ & + \beta_{16}(\text{cleaning house})_i + \beta_{17}(\text{video games})_i \\ & + \beta_{18}(\text{talking})_i + \beta_{19}(\text{crafts})_i + \beta_{20}(\text{reading})_i \\ & + \beta_{21}(\text{homework})_i + \beta_{22}(\text{board games})_i + \varepsilon_i\end{aligned}$$

where ε_i is the error term, and β represent the relevant parameters of interest. Log of $\mathrm{pBMI_i}$ ensures that the predicted values of this variable to remain positive. Additionally, in this model, logarithmic values of hours of work by mothers and fathers are used to reflect the attenuation of the impact of higher work hours on the *pBMI*. In other words, the first few hours are more valuable in promoting a child's health than subsequent hours, which are subject to the law of diminishing returns.

Results and Discussion

Table 4 depicts estimates from a multiple regression of log of *pBMI* on the log of maternal and paternal weekly work hours and other related variables. The estimated model also includes demographic and socioeconomic variables related to *pBMI* outcomes, including child age, gender, race, parental wage, log of relative wages of mother to that of father, and region of residence. These variables control for a range of potential variations in the child's *pBMI* that are not accounted for by either the transformations of the child's BMI to *pBMI* (using age and sex), or the parental related factors.

Several features of the reported estimated models in Table 4 and thereafter bear mentioning. First, the inclusion of the demographic and socioeconomic variables reduces the potential for the misspecification of the underlying model. One must be cognizant of the fact that socioeconomic variables are generally correlated. Thus, studies that do not start with a highly parameterized general model are always subject to the omitted variable bias problem. Specifically, in modeling $\mathrm{Y_i}$, if only a set of $\mathrm{X_i}$ variables are included and another set of variables, say, $\mathrm{Z_i}$, are excluded from the regression, then the parameter estimates from the specific (short) model (β*) may not be equal to their true population counterparts (β). In particular, $\beta^* = \beta + \mathrm{E}\left[\mathrm{X_i X_i^*}\right]^{-1}\mathrm{E}\left[\mathrm{X_i Z_i^*}\right]\gamma$, where, γ is the parameter on the excluded variables ($\mathrm{Z_i}$) in the general model. On the other hand, starting with a general model that may include irrelevant variables is not as damaging to the modeling and statistical analysis of the data. Therefore, based on the cost-benefit analysis, in social sciences, it is highly recommended to begin with a highly parameterized general model (see Angrist and Pischke 2009); but, see Fertig et al. (2009).

Second, using the coefficients ($\beta_{1\mathrm{m}}$ and $\beta_{1\mathrm{f}}$) of the log of hours of work ($\mathrm{lnH_{mother}}$, $\mathrm{lnH_{father}}$) the percentage change in *pBMI* per one percentage point change in mother's or father's work (i.e., *H*-elasticity of *pBMI*) may be determined.

Finally, Table 4 shows that the R^2 value of this model is 0.10. Thus, the specified parental employment variables and related parent–child activities account for 10% of the variance observed in child health, measured inversely as child percentile BMIs.

Table 4 Multiple regression: impact of parental hours on the log of adjusted BMI

Predictor variables	Coefficient estimates[a]	*t*-Values	*p*-Values
Intercept	8.54	0.27	0.78
Parental employment & relative wages			
Log of hours worked by mother	2.99	1.54	0.12
Log of hours worked by father	7.00	2.22	0.02
Log of relative parental wages	−2.43	−1.25	0.21
Sociodemographics			
South (= 1; else = 0)	−5.80	−1.61	0.10
Black (= 1; else = 0)	4.11	0.68	0.49
Hispanic (= 1; else = 0)	9.22	2.47	0.01
Girl (= 1; else = 0)	3.43	1.12	0.26
Child age	−1.24	−1.57	0.11
Birth weight	0.44	0.39	0.70
Child's activities with parents			
Yard work (= 1; else = 0)	−5.44	−0.89	0.37
Laundry (= 1; else = 0)	0.33	0.09	0.92
Washing dishes (= 1; else = 0)	−1.47	−0.41	0.68
Shopping (= 1; else = 0)	1.36	0.42	0.67
Building (= 1; else = 0)	−7.68	−2.06	0.03
Cooking food (= 1; else = 0)	3.64	0.91	0.36
Sport (= 1; else = 0)	−2.37	−0.60	0.54
Cleaning (= 1; else = 0)	3.07	0.60	0.55
Video game (= 1; else = 0)	−3.10	−0.72	0.47
Talking (= 1; else = 0)	−5.76	−1.69	0.09
Hand crafts (= 1; else = 0)	−4.44	−0.76	0.44
Reading (= 1; else = 0)	−10.49	−2.38	0.01
Homework (= 1; else = 0)	−0.52	−0.14	0.89
Board game (= 1; else = 0)	6.83	1.35	0.17

[a] Weighted estimates; $R^2 = 0.10$; * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$

Table 4 shows that, consistent with main study hypotheses, both mothers and fathers weekly work hours influence child *pBMI*. The *p*-values for the coefficient estimates on the hours of work by mothers, $\ln(H_{mother})$, hours of work by fathers, $\ln(H_{father})$, are 12 and 2%, respectively. The positive coefficient estimates on mothers' and fathers' hours of work are consistent with the joint decision making process by both parents in optimizing production of child health. These coefficient estimates clearly support the theory that the relative hours of work by both parents are crucial determinants of *pBMI*. These findings buttress the view that studies which do not take both paternal contribution into account potentially suffer from the omitted variable problem. The parameter estimates on $\ln(H_{mother})$ and on $\ln(H_{father})$ indicate that the *H*-elasticities of *pBMI* are 3 and 7, respectively. Thus, the fathers' hours of work play a significant and substantive role in the health of children (as measured by the inverse of *pBMI*). In particular, our estimated model for the sample data shows that the influence of fathers' hours of work is more than two times that of mothers'. Nonetheless, this is a further indication that joint decision making processes of parents are at work in the production of child health and, thus, the impact of father's hours of work on children's health should not be ignored.

Another predictor of *pBMI* scores was parental wages (log of mother's wage relative to that of father's). Higher hourly wage for mothers (relative to those of fathers) were predictive of lower *pBMI* outcomes for their children. In Table 4, the coefficient estimate on the log of relative parental wages is −2.43, but attains significance only approaching the 20% level (*p*-value = 0.21). Thus, higher wages for mothers, or lower wages for fathers, are associated with lower *pBMI* for their children.

Reported parameter estimates of the sociodemographic factors in Table 4 show that, being Hispanic has positive and significant influence on *pBMI*. Similarly, being Black, female, and having higher birth-weight have positive, but insignificant, influence on *pBMI*. On the other hand, residing in the south and increasing child age are associated with the lower pBMI; although, both are marginally significance (their *p*-values are 10 and 11%, respectively).

Of the hypothesized joint activities of children and parents, only two parent–child activities had a statistically significant impact (*p*-values are less than 5%) on of the *pBMI* outcomes of children in the sample. Children who worked on building and repair projects with their parents had significantly lower *pBMI*s. Children reading regularly with their parents had lower *pBMI*s among children in the sample.

Discussion

This study contributes to the body of research that addresses the role of maternal work hours on child body mass outcomes. Consistent with previous research (Anderson et al. 2003; Cawley and Liu 2007; Fertig et al. 2009; Miller and Han 2008), maternal employment was found to be a risk factor for childhood obesity. Additionally, paternal employment was also found to be also a crucial determinant of obesity in children. The rational choice model indicates that decreases in overall parental contributions to child health (associated with increased parental labor force participation) will impact child health, observed here as increases in childhood obesity.

In the last few decades, the proportion of parental (mothers' and fathers') time spent on domestic and child-rearing duties has been in the state of flux. Employed mothers continue to fulfill a disproportionate amount of domestic and child-rearing duties within families (Bianchi et al. 2000; Coltrane 2000). Thus, the marginal impact of one more hour of work by an employed mother on child health should not be substantial, if hours spent with a child are subject to diminishing returns. On the other hand, given that only a small proportion of child-rearing rearing activities are performed by fathers, one more hour of work by an employed father may have a higher impact on the child health. Reported results in Table 4, indeed, buttress this view. Table 4 shows that paternal hours available for child health inputs yield more positive child health outcomes than those of maternal hours. While, mothers may have a comparative advantage over fathers in terms of child health production, disproportionate time spent with a child appears to have been subject to diminishing returns in this study. Hence, greater health benefits for children in terms of maintaining a healthy weight may be realized when fathers spend more time on producing children's health than that of mothers.

In addition to substantiating the observed significant positive relationship between maternal work hours and children's *pBMI* rankings (Anderson et al. 2003; Cawley and Liu 2007; Fertig et al. 2009), this research adds new detail on the contributions of paternal work hours to children's health outcomes. It was determined that time spent in the labor force by fathers was associated with increases in childhood obesity. In particular, additional labor force participation by fathers increased the likelihood that children would develop elevated *pBMI*s (i.e., more than that of mothers). It must be understood that parents engage in a joint decision making process in order to determine relative work hours and the optimum level of childhood health production, rather than deciding in isolation. The present findings suggest that, at the margin, child health production is hindered by fathers' labor force participation to a greater extent than that of mothers' work hours. While fathers may have a comparative advantage in terms of producing indirect inputs related to child health production, such as increasing overall household income or access to health care benefits, the disproportionately fewer hours spent on child-rearing might be the cause for observing a highly significant marginal impact of father's hour of work on child's *pBMI*.

Numerous parent–child activities were investigated as potential risk or protective factors for childhood overweight and obesity (Anderson and Butcher 2006; Lin et al. 2004; Wang and Beydoun 2007; Sassi et al. 2009). Two behaviors were identified in this study that may affect energy balance and help children maintain a healthy weight. Specifically, we find that shared parent–child activities such as building or repair work and reading influence childhood obesity. The physically demanding activity of building/repair work with one's parents was associated with decreased risk for childhood overweight and obesity, presumably related to increased caloric expenditures. The observation that shared reading reduced the likelihood of child overweight or obesity indicates that this activity may serve as a proxy for engagement with children and education. Engagement with children has been identified in the current literature as an important source of motivation and support in terms of adopting physical activity and achieving weight control goals (Gruber and Haldeman 2009). Recent research also indicates that nutritional knowledge and literacy skills lead to better dietary choices (Finke and Huston 2003), suggesting that parents should be provided with tools that foster greater involvement with their children and health literacy skills.

Given the impacts of maternal and paternal inputs on child health production, measured here inversely as child percentile BMI, national family policies should support the crucial roles that both parents play in child health production. Although the responsibility for child health is widely regarded as a feminine activity, socioeconomic changes in recent decades have led to an increase in paternal participation in domestic activities (Garfield and Isacco 2006). The findings of this research indicate that on the margin, fathers' household production input hours may be more efficient than maternal time spent on child health production. However, perhaps due to traditional and family processes such as maternal gatekeeping, which actively exclude fathers from making consistent, effective contributions to child wellbeing (Allen and Hawkins 1999), fathers may face a degree of external social stigma related to assuming more active roles in child health production (Gavanas 2004). To the extent that traditional role and stigma lead to disproportionate number of hours spent with children by either parent, *ceteris paribus*, a rebalancing of the roles may lead to more efficient child health production (Hall and MacDermid 2009; Winkler and Ireland 2009).

Based on the evidence found in this study, it is imperative that fathers' contributions within the home be validated and supported to facilitate the assumption of a more substantial role in household production of child health as mothers continue to steadily transition into full-time paid labor. Fathers may also benefit from social supports, training, and educational resources focused on children's health issues, including nutrition, meal preparation, and the promotion of healthy physical activities for children.

Mothers should be supported in ways that will allow for adequate investments in child health, while meeting the demands associated with increased labor force participation. Although fathers are contributing more time to domestic tasks than in previous decades, child health outcomes, as measured by increasing childhood obesity rates, have continued to worsen.

One possible remedy that has recently gained prominence in the national debate about family policy is the expansion of flex time work schedules. Flexible work schedules assist mothers and fathers in balancing time constraints associated with labor market participation and child rearing, and have been shown to improve the overall well-being of household members (Hill et al. 2001). Given that both parents are increasingly engaged in full-time breadwinning roles, adjustments to current patterns of employment are advisable in order to provide both mothers and fathers with sufficient flexibility to meet occupational demands and provide adequate investments into the health of their children. Further research is needed to determine if, in addition to improving parents' perceived work-life balance, childhood obesity rates may be reduced by allowing for additional parental monitoring and encouragement of healthy dietary and physical activity choices during the after schools periods when most parents are currently occupied outside the home in paid labor activities. Finally, as parental employment hours and labor force participation continue to increase, the role of third-party caregivers in childhood obesity outcomes should be examined further.

Conclusion

Our econometric investigation of the 2007 wave of the Child Development Supplement of the Panel Study of Income Dynamics reveals that paternal work hours are significant predictors of childhood obesity. Thus, overlooking parental joint decision making, specifically, ignoring the significant role of fathers in the production of child health may lead to biased and inconsistent results. Additionally, we conclude that parental work hours may impact both the quality and quantity of time that parents spend with their children. In particular, we find that shared parent–child activities such as building or repair work, and reading reduce childhood obesity rates. Given that parents are increasingly expected to balance concurrent work and family responsibilities, policies that support household production of child health are needed to foster positive child outcomes.

Acknowledgments We are grateful to the Editor-in-Chief: Jing J. Xiao, two anonymous referees, Elaine Anderson, Robert S. Gold, Samuel 'Woodie' Kessel, and Elisabeth Maring for useful comments and discussions.

References

Allen, S., & Hawkins, A. (1999). Maternal gatekeeping: Mothers' beliefs and behaviors that inhibit greater father involvement in family work. *Journal of Marriage and the Family, 61*, 199–212.

Anderson, P. M., & Butcher, K. F. (2006). Childhood obesity: Trends and potential causes. *The Future of Children, 16*, 19–45.

Anderson, P. M., Butcher, K. F., & Levine, P. B. (2003). Maternal employment and overweight children. *Journal of Health Economics, 22*, 477–504.

Angrist, J. D., & Pischke, J. S. (2009). *Mostly harmless econometrics: An empiricist's companion*. Princeton, NJ: Princeton University Press.

Astone, N. M., Dariotis, J. K., Sonenstein, F. L., Pleck, J. H., & Hynes, K. (2010). Men's work efforts and the transition to fatherhood. *Journal of Family and Economics Issues, 31*(1), 3–13.

Bandura, A. (2004). Modeling. In E. W. Craighead & C. B. Nemeroff (Eds.), *The concise Corsini encyclopedia of psychology and behavioral sciences* (pp. 575–577). New York: Wiley.

Becker, G. S. (1962). Irrational behavior and economic theory. *Journal of Political Economy, 70*(1), 1–13.

Becker, G. S. (1978). *The economic approach to human behavior*. Chicago: University Of Chicago Press.

Bianchi, S. M., Milkie, M. A., Sayer, L. C., & Robinson, J. P. (2000). Is anyone doing the housework? Trends in the gender division of household labor. *Social Forces, 79*(1), 191–228.

Bini, V., Celi, F., Berioli, M. G., Bacosi, M. L., Stella, P., Giglio, P., et al. (2000). Body mass index in children and adolescents according to age and pubertal stage. *European Journal of Clinical Nutrition, 54*, 214–218.

Borra, C., & Palma, L. (2009). Child care choices in Spain. *Journal of Family and Economic Issues, 30*(4), 323–338.

Bronfenbrenner, U. (1994). Ecological models of human development. In T. Husen & T. N. Postlethaite (Eds.), *International encyclopedia of education* (2nd ed., Vol. 3, pp. 1643–1647). Oxford: Pergamon Press/Elsevier Science.

Cawley, J., & Liu, F. (2007). Maternal employment and childhood obesity: A search for mechanisms in time use data. NBER Working Paper 13600.

Centers for Disease Control and Prevention. (2009). Prevalence of underweight among children and adolescents: United States, 2003–2006. Retrieved March 20, 2010, from http://www.cdc.gov/nchs/data/hestat/underweight_children.pdf.

Coady, S. A., Jaquish, C. E., Fabsitz, R. R., Larson, M. G., Cupples, L. A., & Myers, R. (2002). Genetic variability of adult body mass index: A longitudinal assessment in Framingham families. *Obesity Research, 10*(7), 675–681.

Cole, T. J., Bellizzi, M. C., Flegal, K. M., & Dietz, W. H. (2000). Establishing a standard definition for child overweight and obesity worldwide: International survey. *British Medical Journal, 320*, 1240–1243.

Coltrane, S. (2000). Research on household labour: Modeling and measuring the social embeddedness of routine family work. *Journal of Marriage and the Family, 62*, 1208–1233.

Coon, K. A., & Tucker, K. L. (2002). Television and children's consumption patterns: A review of the literature. *Minerva Pediatrics, 54*, 423–436.

Crespo, C. J., Smit, E., Troiano, R. P., Bartlett, S. J., Macera, C. A., & Andersen, R. E. (2001). Television watching, energy intake, and obesity in US children: Results from the third National Health and Nutrition Examination Survey, 1988–1994. *Archives of Pediatrics Adolescent Medicine, 155*(3), 360–365.

Daniels, S. R. (2006). The consequences of childhood overweight and obesity. *The Future of Children, 16*(1), 47–67.

Dennison, B. A., & Edmunds, L. S. (2008). The role of television in childhood obesity. *Progress in Pediatric Cardiology, 25*(2), 191–197.

Fertig, A., Glomm, G., & Tchernis, R. (2009). The connection between maternal employment ad childhood obesity: Inspecting the mechanisms. *Review of Economics of the Household, 7*, 227–255.

Finke, M. S., & Huston, S. J. (2003). Factors affecting the probability of choosing a risky diet. *Journal of Family and Economic Issues, 24*(3), 291–303.

French, S. A., Story, M., Neumark-Sztainer, D., Fulkerson, J. A., & Hanna, P. (2001). Fast food restaurant use among adolescents: Associations with nutrient intake, food choices and behavioral and psychosocial variables. *International Journal of Obesity and Related Metabolic Disorders, 25*, 1823–1833.

Garfield, C. F., & Isacco, A. (2006). Fathers and the well child visit. *Pediatrics, 116*(4), 1–9.

Gavanas, A. (2004). Domesticating masculinity and masculinizing domesticity in contemporary U.S. fatherhood politics. *Social Politics, 11*(2), 247–266.

Gershuny, J., Godwin, M., & Jones, S. (1994). The domestic labour revolution: A process of lagged adaptation. In M. Anderson, F. Bechhofer, & J. Gershuny (Eds.), *The social and political economy of the household*. Oxford: Oxford University Press.

Grossman, M. (1972). On the concept of health capital and the demand for health. *Journal of Political Economy, 80*, 223–255.

Gruber, K. J., & Haldeman, L. A. (2009). Using the family to combat childhood and adult obesity. *Preventing Chronic Diseases*, *6*(3). Retrieved September 18, 2010, from http://www.cdc.gov/pcd/issues/2009/jul/08_0191.htm.

Haines, J., Neumark-Sztainer, D., Wall, M., & Story, M. (2007). Personal, behavioral, and socio-environmental risk and protective factors for adolescent overweight. *Obesity, 15*, 2748–2760.

Hall, S. S., & MacDermid, S. M. (2009). A typology of dual earner marriages based on work and family arrangements. *Journal of Family and Economic Issues, 30*(3), 215–225.

Haslam, D. W., & James, W. P. T. (2005). Obesity. *Lancet, 366*, 1197–1209.

Hill, E. J., Hawkins, A. J., Ferris, M., & Weitzman, M. (2001). Finding an extra day a week: The positive influence of perceived job flexibility on work and family life balance. *Family Relations, 50*, 49–58.

Hofferth, S. L., Forry, N. D., & Peters, H. E. (2010). Child support, father–child contact, and preteens' involvement with nonresidential fathers: Racial/ethnic differences. *Journal of Family and Economic Issues, 31*(1), 14–32.

Hoffman, S. D., & Averett, S. L. (2010). *Women and the economy: Family, work, and pay*. Boston: Addison-Wesley.

Insolera, N. (2010). The panel study of income dynamics child development supplement user guide for CDS-III. Retrieved February 16, 2010, from http://psidonline.isr.umich.edu/CDS/cdsiii_userGd.pdf.

Institute of Medicine. (2005). *Preventing childhood obesity: Health in the balance*. Washington, DC: The National Academies Press.

Kirkwood, J. (2009). Spousal roles on motivations for entrepreneurship: A qualitative study in New Zealand. *Journal of Family and Economic Issues, 30*(4), 372–385.

Koplan, J. P., Liverman, C. T., & Kraak, V. I. (Eds.). (2005). *Preventing childhood obesity: Health in the balance*. Washington: National Academies Press.

Krebs, N. F., Himes, J. H., Jacobson, D., Nicklas, T. A., Guilday, P., & Styne, D. (2007). Assessment of child and adolescent overweight and obesity. *Pediatrics, 120*(supplement 4), S193–S228.

Kroska, A. (2004). Divisions of domestic work: Revising and expanding theoretical explanations. *Journal of Family Issues, 25*, 900–932.

Lin, B. H., Huang, C. L., & French, S. A. (2004). Factors associated with women's and children's body mass index by income status. *International Journal of Obesity, 28*, 536–542.

Lowry, R., Wechsler, H., Galuska, D. A., Fulton, J. E., & Kann, L. (2002). Television viewing and its associations with overweight, sedentary lifestyle, and insufficient consumption of fruits and vegetables among U.S. high school students: Differences by race, ethnicity, and gender. *Journal School Health, 72*, 413–421.

Ludwig, D. S., Peterson, K. E., & Gortmaker, S. L. (2001). Relation between consumption of sugar-sweetened drinks and childhood obesity: A prospective, observational analysis. *Lancet, 357*, 505–508.

Maume, D. J. (2010). Reconsidering the temporal increase in fathers' time with children. *Journal of Family and Economic Issues*. doi: 10.1007/s10834-010-9227-y.

Miller, D. R., & Han, W. J. (2008). Maternal nonstandard work schedules and adolescent overweight. *American Journal of Public Health, 98*(8), 1495–1502.

Nakhaie, M. R. (2009). Professors, ideology and housework. *Journal of Family and Economic Issues, 30*(4), 399–411.

Ogden, C., Carroll, M., Curtain, L., Lamb, M., & Flegal, K. (2010). Prevalence of high body mass index in US children and adolescents, 2007–2008. *Journal of the American Medical Association, 303*(3), 242–249.

Olshansky, S. J., Passaro, D. J., & Hershow, R. C. (2005). A potential decrease in life expectancy in the United States in the 21st century. *New England Journal of Medicine, 352*, 1138–1145.

Sassi, F., Devaux, M., Cecchini, M., & Rusticelli, E. (2009). The obesity epidemic: Analysis of past and projected future trends in selected OECD countries. OECD Health Working Paper 45. Retrieved October 21, 2010, from http://www.oecd-ilibrary.org/docserver/download/fulltext/5ksm2rwz9z7k.pdf?expires=1287688846&id=0000&accname=guest&checksum=D9EEDBDFB8BBBBA958D607B817252576.

Silventoinen, K., Rokholm, B., Kaprio, J., & Sorenson, T. I. A. (2010). The genetic and environmental influences on childhood obesity: A systematic review of twin and adoption studies. *International Journal of Obesity, 34*, 29–40.

Troiano, R. P., Berrigan, D., Dodd, K., Masse, L. C., Tilert, T., & McDowell, M. (2008). Physical activity in the United States

measured by accelerometer. *Medicine and Science in Sports and Exercise, 40*(1), 181–188.
U.S. Census Bureau. (2009). *The 2009 statistical abstract: The national data book*. Retrieved October 23, 2009, from http://www.census.gov/compendia/statab.
U.S. Department of Labor, Bureau of Labor Statistics. (2009). Women in the labor force: A databook, Report 1018. Washington, DC.
U.S. Surgeon's General. (2007). The surgeon general's call to action to prevent and decrease overweight and obesity. Retrieved August 17, 2009, from http://www.surgeongeneral.gov/topics/obesity/calltoaction/fact_adolescents.htm.
Wang, Y., & Beydoun, M. A. (2007). The obesity epidemic in the United States—gender, age, socioeconomic, racial/ethnic, and geographic characteristics: A systematic review and meta-regression analysis. *Epidemiologic Reviews, 29*, 6–28.
Winkler, A. E., & Ireland, T. R. (2009). Time spent in household management: Evidence and implication. *Journal of Family and Economic Issues, 30*(3), 293–304.
Wolf, A. (1998). What is the economic case for treating obesity? *Obesity Research, 6*(supplement), 2S–7S.
Wolf, A. M., & Colditz, G. A. (1998). Current estimates of the economic cost of obesity in the United States. *Obesity Research, 6*(2), 97–106.

Author Biographies

Lisa Benson is an adjunct professor in the Department of Family Science at the School of Public Health, University of Maryland, College Park. Her current research projects focus on childhood obesity, maternal and child health, and health policy reform. Most recently she has taught coursework in health and human service delivery, family theory, child development and psychology at Georgetown University and the University of Maryland where she recently completed a Ph.D. in maternal and child health.

Manouchehr Mokhtari is an associate professor in the Department of Family Science at the School of Public Health, University of Maryland, College Park. His research focus is on health economics, health system strengthening, and MCH. He has taught at Princeton University and has been senior adviser to the governments of several countries in transition. He is currently directing USAID's Enabling Equitable Health Reforms Project in Albania. Mokhtari received a Ph.D. in economics from the University of Houston in 1986.