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The impact of maternal occupation and pre-pregnancy weight status on childhood obesity: A comparative analysis of the United States and the United Kingdom

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The impact of maternal occupation and pre-pregnancy weight status on childhood obesity: A comparative analysis of the United States and the United Kingdom

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DEDICATION

I dedicate this work to Craig, my husband and my best friend. Thank you for being willing to pick up your life and move with me so that I could pursue my dream. Your endless support and encouragement and your belief that I am one of the smartest people you know is what got me through six hard years. Thank you for believing in me, even when I didn't always believe in myself, and for pushing me, even when I didn't always like it. I love you.

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ABSTRACT

Previous studies have shown that maternal employment during childhood increases a child's probability of becoming overweight and that the probability increases with the mother's weekly working hours. Current maternal weight status has also been shown to impact a child's weight status. This paper seeks to expand on these relationships by examining the effects of maternal occupation choice and pre-pregnancy weight status on childhood obesity. The analysis will be a comparative one between the United States (U.S.) and the United Kingdom (U.K.). Matched mother-child data from the 2008 surveys of the National Longitudinal Survey of Youth in the U.S. and of the Millennium Cohort Study in the U.K are used. Probit models are specified on the likelihood of a child being obese given certain child, maternal and household characteristics, including maternal occupation and pre-pregnancy weight status. Finally, an additional model is analyzed that replaces maternal occupations with descriptive attributes of the mother's job, from the Occupational Information Network (O*Net).

The results suggest a similar impact of maternal pre-pregnancy weight status on childhood obesity between the two regions, with a mother being overweight or obese before pregnancy increasing her child's risk of obesity later in childhood. The effect is larger in the U.S. but highly significant for both. The impact of maternal occupation on childhood obesity, however, differs between the two regions. In the U.S. several occupation categories are shown to be significant in actually decreasing a child's risk of obesity, relative to if the mother was not employed, and all of the occupation categories are jointly significant. In the U.K. maternal occupations are neither individually nor jointly significant in impacting the risk of a child being obese. These results are equally as evident in the model using the O*Net attributes. Again, in the U.S. many of the O*Net attributes have explanatory power on the child's risk of obesity and these results are robust to several different tests of significance. In the U.K., however, the O*Net attributes have no significant impact on child obesity risk, suggesting that employment conditions in the U.K., specifically possibly through national policies, may be more family-friendly

CHAPTER 1: INTRODUCTION

General Introduction

Childhood obesity[1] is rapidly becoming one of the largest health concerns faced by the United States (the U.S.). During the 1963 to 1970 period, only 4.2% of children ages 6 to 11 years were considered obese while 4.6% of children ages 12 to 19 were obese. By 2007 to 2008, 19.6% of children 6 to 11 years of age and 18.1% of children ages 12 to 19 were classified as obese. Additionally, 10.4% of 2 to 5 year olds were classified as obese by the 2007 to 2008 period, nearly double the rate during 1971 to 1974 (5.0%) (CDC/NCHS, 2010, 1). Health studies show that childhood obesity tends to continue on into adulthood (Dietz, 1997; Bouchard, 1997), which makes it an increasing public health concern. Being overweight or obese is a major risk factor for other chronic diseases including coronary heart disease, hypertension, diabetes, and certain types of cancers. According to Wolf (2002), obesity has a "sizeable economic burden on the health-care system" – the annual cost of obesity in the U.S. has been calculated at approximately $139 billion (Finkelstein et al., 2005). Being overweight or obese also has other direct and indirect social and economic consequences. Women who are overweight in young adulthood obtain less education and have lower incomes and a higher chance of being in poverty over their lifetimes (Gortmaker et al., 1993). Obesity also lowers employee productivity (Wolf, 2002).

At its most fundamental level, this trend is simply caused by consumption of more calories than are expended. The underlying cause of this over-consumption and under-utilization of calories is largely debated. However, one plausible explanation is the influence on the child of the mother. Not only are mother and child clearly strongly related genetically but typically the mother also primarily controls access to food, supervises activities and is an important force in socialization. Thus, it would seem that mother-specific factors could be influencing this rise in child obesity. Two such factors will be considered here. A mother's

[1] Overweight/obesity is classified by using Body Mass Index (BMI), which is a measure of weight relative to height (found by dividing weight in kilograms by the square of height in meters). Adults with a BMI of 25 kg/m^2 or higher are defined as overweight, while adults with a BMI of 30.0 kg/m^2 or higher are defined as obese. In children, overweight is defined as having a BMI between the 85^{th} and 95^{th} percentile of a fixed distribution for the child's age and gender, while obese is defined as having a BMI greater than the 95^{th} percentile of the same fixed distribution.

health, specifically her weight status, would seem to have an influence on her child's weight status. Over the relevant time period, a mother's probability of being overweight or obese has risen. In the 1960 to 1962 period, 31.5% of adults (ages 20-74) were considered overweight, but not obese, and 13.4% were considered obese. By 2007 to 2008, 33.6% of adults were classified as overweight while 34.3% were classified as obese. For women specifically, obesity has increased from 25.4% of the female population in the 1988 to 1994 period to 35.5% in the 2007 to 2008 period (CDC/NCHS, 2010, 2). The second factor in this study that is hypothesized to play a role in increasing child obesity is the rising maternal labor force participation. The increase in maternal employment coincides almost exactly with the rise in childhood overweight/obesity. From 1970 to 1999, employment of married women with children ages 6 to 17 rose substantially, from 49% to 77%, while that of mothers with children under six rose from 30% to 62% (U.S. Bureau of the Census, 2000).

Similar trends have been observed in other developed countries as well. In the United Kingdom (the U.K.), the prevalence of overweight and obesity among children has also been increasing, specifically in the last decade and a half. In 1974, the prevalence of overweight for boys (ages 4 to 11) was 6.4% and for girls (ages 4 to 11) was 9.1%. By 1994, the prevalence of overweight had risen to 9.0% for boys and 13.5% for girls. The prevalence of obesity increased only slightly between 1974 and 1994, from 1.4% to 1.7% for boys and from 1.5% to 2.6% for girls (Chinn and Rona, 2001). However, by 2003, the prevalence of both overweight and obesity were substantially higher. For boys in England, the prevalence of overweight (but not obese) increased to 15% and 14%, for ages 2 to 10 and ages 11 to 15, respectively, while the prevalence of obesity increased to 15% and 20% for ages 2 to 10 and ages 11 to 15, respectively. Girls in England saw similar increases with the prevalence of overweight (but not obese) increasing to 13% and 16% for girls ages 2 to 10 and ages 11 to 15, respectively. The prevalence of obesity also increased, to 12% and 22% for girls ages 2 to 10 and ages 11 to 15, respectively (NCSR, 2006).

The same trends in weight status have been observed for adults in England as in the United States. Overweight and obesity have been on the rise over the last three decades. During 1986 to 1987, 7% of men and 12% of women (ages 16 to 64) were obese. By 1995,

15.3% of men and 17.5% of women (ages 16 and older) were obese. The prevalence of overweight was substantially higher with 44.0% of men and 32.9% of women (ages 16 and older) being classified as overweight (but not obese) (NCSR, 1996). By 2003, the prevalence of overweight and obesity was even higher with 43% of men (ages 16 and older) being overweight (but not obese) and 22% being obese while 33% of women (ages 16 and older) were overweight and 23% were obese (NCSR, 2006).

Maternal employment has also been on the rise. In the U.K. in 1984, only 27% of women with children ages 0 to 5 were employed (Hawkins et al., 2008). By 1991, 43.4% of mothers with pre-school-aged children (ages 0 to 4) were employed, and 58.7% of mothers with any children under age 18 were employed. A decade later, maternal employment had increased to 65.4% for mothers with any children under age 18 and to 53.9% specifically for mothers with children ages 0 to 4 (ONS LMD, 2002). By 2010, maternal employment for mothers with children ages 18 and under had risen slightly higher to 66.5% (ONS LMD, 2011).

Literature Review

Given the trends in childhood obesity, obesity among adult women and maternal employment, there is interest in examining whether the similarly timed increases are more than coincidence. Thus, this paper will examine the relationship between childhood obesity and maternal employment and health in two developed regions, the United States and the United Kingdom. Specifically, this analysis will focus on the lesser explored relationship between child obesity and mother's occupation choice and prenatal health.

Several studies in the U.S. have shown that mother's employment during a child's lifetime increases the child's likelihood of becoming overweight or obese. Using the U.S. National Longitudinal Survey of Youth (NLSY) data, Liu et al. (2009) find that a mother's full-time employment increases her child's likelihood of becoming overweight by approximately 12.3%. Liu et al. examine several other possible contributing factors and find that a child's BMI is not significantly impacted by having been breastfed, by having a father present in the household or by place of residence (Urban vs. Rural). They do find that female and Hispanic children tend to have higher BMIs while children with more highly educated mothers tend to have lower BMIs.

Others have shown that the probability of a child being overweight increases as mother's hours worked per week increase. Anderson, Butcher and Levine (2003) also employ the NLSY data and use it to examine the impact on a child's weight status of the child's mother working a greater number of hours in a week. They find that the probability of a child being overweight is significantly higher for mothers who work more hours per week (measured in a 10 hour increase in the average weekly hours worked). Their findings are subsequently broken down into subgroups by income, education and race; the subgroup findings indicate that the relationship is most significant for the highest income quartile, for more educated mothers and for white mothers. Given a mother in all three of these subgroups, Anderson et al. find that a mother moving from part-time (20 hours per week) to full-time working status (40 hours per week) increases her child's likelihood of being overweight by 2 to 8 percentage points. They also show that for families of higher socioeconomic status, between 12% and 35% of the increase in the proportion of children who are overweight since the 1970s is due to mothers working more hours per week.

Similarly, Ruhm (2008) uses the NLSY data to investigate the impact of a mother's average working hours increasing on child obesity and on the risk of a child becoming overweight. He finds that an additional 20 hours of employment per week for the mother increases her child's likelihood of obesity by 1.6 to 2.7 percentage points and increases the risk of becoming overweight by 3.0 to 4.5 percentage points. Given the overall proportion of children who are obese or at risk of becoming overweight within the sample, these estimates would imply that an additional 20 hours of weekly work time by a mother increases the probability of a child being obese by up to 20% and increases the risk of a child becoming overweight by up to 15%. Ruhm also examines the impact on cognitive development and finds that "advantaged" adolescents (those from families with higher socioeconomic statuses) suffer more deleterious effects from increased material employment hours than do those adolescents from "disadvantaged" families.

Fertig, Glomm and Tchernis (2009) conduct a similar study using the Child Development Supplement of the Panel Study of Income Dynamics. They find that the more hours a mother works, the greater the probability that her child is overweight. They also identify maternal and

child characteristics that significantly impact the likelihood of a child being overweight. They find that race (specifically being black or Hispanic) and the child's birth weight play a significant role in increasing the probability of the child being overweight. Among the factors that decrease the probability of the child being overweight are the child's age, if the child is female, and if the child was breastfed.

Similar studies have been undertaken in the U.K. Hawkins, Cole and Law (2008) utilize the U.K. Millennium Cohort Study to study the relationship between maternal employment and child weight status. They find that any maternal employment since the birth of a child increases the child's likelihood of being overweight at age three. Further, for mothers and children with the highest household income levels, the more hours a mother works, the greater the likelihood that her child will be overweight. Hawkins et al. also examine the relationship between paternal employment or work patterns and child weight status and find no connection. They do, however, identify other maternal and child characteristics that impact the likelihood of a child being overweight. Pre-pregnancy maternal overweight status, maternal smoking during pregnancy, higher child birth weight, television viewing by child and introduction of solid foods before four months of age all increase the child's likelihood of being overweight while breastfeeding decreases the likelihood.

von Hinke Kessler Scholder (2008) finds similar results using data from the U.K. National Child Development Survey (NCDS). Her study, however, focuses on the specific timing of mothers' employment. She finds that full-time employment by the mother during mid-childhood (during the period around age seven) increases the child's probability of being overweight by age 16. Interestingly, the impact from mother's full-time employment during the pre-school period is much smaller, and no effect is found for employment at later ages or on a part-time basis.

Several studies in the U.S. have determined that maternal health, specifically weight status, also impacts a child's weight status. Anderson et al. (2003) find that mother's weight status has a large impact on child's weight status. They examine the impact of a mother being either overweight or obese (BMI ≥ 25) or obese (BMI ≥ 30) and find that each status significantly impacts whether the child is overweight. Specifically, they find that a child whose

mother is obese is 8.1 percentage points more likely to be overweight. Also using the NLSY data, Strauss and Knight (1999) find that children whose mothers are strictly overweight but not obese ($25 \leq BMI < 30$) are 1.5 times as likely to suffer from childhood obesity. For children whose mothers are obese ($BMI \geq 30$), the risk of being obese is three times as great. Fertig et al. (2009) find that children whose mothers who are obese ($BMI > 30$) have a 14.9% higher likelihood of being overweight. They also examine their results by the mother's education level and find that when segmented, the effect is smaller (11.6%) for the less-educated, obese mothers and greater (18.4%) for the more-educated, obese mothers. As mentioned above, Hawkins et al. (2008) examine the impact of maternal pre-pregnancy weight status on child weight status in the U.K. They find that for mothers who were overweight before pregnancy, their children are more likely to be overweight at age three.

Finally, some studies have begun to examine the mechanisms through which maternal employment may increase the likelihood of a child being overweight or obese. Studies thus far have focused primarily on differences in eating patterns and activity levels for children whose mothers are employed. Fertig et al. (2009) find evidence that supervision, or lack thereof, plays an important role in the increase in childhood obesity caused by maternal employment. Cawley and Liu (2007) find that employed women spend less time cooking and less time eating with and playing with their children. Again, these may be supervision issues. More recently, Anderson (2012) uses the Early Childhood Longitudinal Survey to attempt to determine the underlying mechanisms in this relationship. She finds that more hours worked by a mother increases the negative effects on favorable family routines such as family meal times and household rules regarding television watching. However, including such family routines does nothing to dampen the impact of maternal employment hours on child obesity, so she concludes that there is still work to be done in determining the mechanisms behind this relationship. Lastly, Chia (2008) examines some of the mechanisms through which increases in maternal weekly working hours would increase the probability of a child being overweight in Canada. She finds that an increase in mother's average weekly working hours increases the probability that children watch more than three hours of television/video programming a day and decreases the probability of participation in non-organized sports. Since children who

watch more television/video programming a day are more likely to be overweight while those that participate in non-organized sports are less likely to be overweight, these impacts describe one mechanism through which mother's average weekly working hours and child's probability of being overweight are positively correlated.

Research Objective

Much previous work has shown that maternal employment in both the U.S. and the U.K. increases the probability of a child being overweight or obese as do more working hours by the mother in an average work week. However, the decision to return to work after the birth of a child as well as the number of hours worked in a week may be largely dependent on the mother's choice of career field. Viewing career choice as the driving factor is an approach that has largely gone unstudied, especially in the Economics literature. Two physicians, Strauss and Knight, looked briefly at this relationship in a pediatrics study in 1999. Using the NLSY data, they analyze the impact of a parent's occupation falling into one of three groups, not employed, employed in a "nonprofessional" occupation, or employed in a "professional/managerial" occupation, on the likelihood of the child being obese. They find that in comparing the three groups, children with a parent who is not employed or in a nonprofessional occupation are more likely to be obese than those who have a parent in a professional occupation. However, little work has been done beyond that.

Given that a mother's choice of career affects a variety of factors that may drive the mechanisms behind this relationship, looking at the impact of maternal occupation on child obesity is of interest.[2] There are many possible factors specific to one occupation over another that may be driving the relationship between maternal employment and increased childhood obesity. These factors may include the responsibility level of the job – for a woman with greater responsibility at work, it's more likely that she may be called in outside of typical working hours or be required to take work home with her; the mother's use of time in her job – for a woman who has to frequently alternate among tasks or use email in her job, it's more likely she may again be taking work home with her or be distracted when at home; and the physicality of her

[2] It is assumed that a woman makes her choices about education and career/occupation prior to making fertility decisions.

job – for a woman whose job is more physical, she may be more tired at the end of day, making her more likely to turn to passive supervision techniques, such as the television.

Thus, the primary null hypothesis to be tested by this study is that there is no significant difference in child's weight status based on the mother's choice of career field. The expectation is that children of mothers employed in careers that require more responsibility (such as management occupations), nonstandard working hours (such as some healthcare professions) or more physical work (such as construction or production occupations) will have a greater probability of being obese while children of mothers employed in careers with less responsibility, more fixed or flexible hours (for instance teaching professions) or less physical work (such as some office jobs) will have a lower probability of being obese.

A secondary impact that will be considered will be that of maternal health, specifically weight status, on child's weight status. More specifically, the mother's pre-pregnancy weight status will be the variable of interest. Several studies in the U.S. have shown a causal link between current maternal weight status and child's weight status. One study in the U.K. has examined this relationship using the pre-pregnancy weight status of the mother. Pre-pregnancy weight status is interesting because it reflects choices made by the mother prior to making considerations for the child. The choices a mother may make before becoming pregnant with or having the child are different from those she may make once she is pregnant; this is true for a variety of decisions including those regarding her own food consumption and physical activity. Thus, examining pre-pregnancy weight status may provide a means for measuring unhealthy decisions that the mother initially made only for herself but now also makes for her child. It also provides some information about the genetic link between mother and child with respect to weight status. Finally, it helps control for the fact that pregnancy can sometimes lead to a change in weight status (from normal weight to overweight or obese) for a mother. The expectation is that mothers who are overweight or obese before pregnancy will have children who are more likely to be obese.

Dissertation Organization

The remainder of the paper is organized as follows. Chapter 2 outlines the general econometric model, data sources that will be employed and the selected variables that will be

utilized in the analysis. Chapter 3 details the empirical analysis for the U.S., including a description of the data, definitions of the variables, and estimation and results. Two different specifications of the model will be provided, one using whether a child is obese as the dependent variable and a second using whether a child is overweight as the dependent variable. Chapter 4 provides details for the empirical analysis for the U.K., including a description of the data and variable definitions as well as estimation and results for several models. The models on whether a child is obese or overweight are both analyzed in addition to a model that includes Homemaker as an occupation category. Additionally, Chapter 4 includes two specifications of the model by employment type as opposed to occupation, one by country of residence. Chapter 5 presents an approach to understanding the mechanisms behind this trend by analyzing the attributes of occupations as opposed to the occupations themselves. Chapter 5 includes a description of the data source for these job attributes as well as descriptions of the attributes themselves. The attributes are used in the model specification on whether a child is obese and results from the estimation as well as from joint tests of significance are provided. A discussion on the relevance of these job attributes in helping to explain the relationship between maternal occupation and child obesity is also included. Finally, Chapter 6 compares the analysis of the U.S. and of the U.K. and concludes.

CHAPTER 2: GENERAL ECONOMETRIC MODEL AND DATA SOURCES

Econometric Model Specification

Previous work on this topic (see Chia (2008), which is based on Anderson et al. (2003)) uses a model based on the specification of a child's weight. However, the dependent variable of interest here is whether a child is overweight or obese. As mentioned previously, this is determined by whether the child's BMI is above the relevant percentile cut-off for the child's gender and age (above the 85th percentile for overweight or above the 95th percentile for obese). As also mentioned previously, the calculation of a child's BMI is based on his or her weight and height. The specification of the econometric model then, in reduced form, should be one that depends on the factors that determine weight and height as well as includes age and gender, since these are the direct determinants of whether a child is overweight or obese. The variables of interest then are those that determine weight and height.

The factors that contribute to a child's weight are those that affect the child's energy intake (or calorie consumption) and expenditure (or physical activity). Some of these factors are pre-determined through the child's genetics; these factors specifically control the child's basal energy expenditure[3]. The other factors are determined by the environment in which the child is being raised, which influences access to more or less healthy food sources (affecting calorie consumption) and outlets for or requirements of physical activity (affecting energy expenditure above BEE). The factors that contribute to a child's height are almost entirely genetic, except in the case of extreme nutrient deprivation. Since the populations being analyzed here are not suffering from such extreme nutrient deprivation, the factors that determine height will be assumed to be solely genetic. The genetic factors determining both weight and height will be represented by maternal choices and characteristics before or during pregnancy and child characteristics at the time of the child's birth. The environmental factors also include maternal choices made around the time of pregnancy as well as current maternal choices and household characteristics. Two of the maternal choices/characteristics, maternal health and maternal occupation, are the primary independent variables of interest in this study.

[3] A person's basal energy expenditure (BEE) is the average amount of energy (measured in calories) burned by the body in a day, when the body is entirely at rest.

The dependent variable of interest here is whether the child is obese (or potentially overweight, including obese). Thus, the dependent variable that will be measured is an indicator (taking the values of 0 or 1) of whether the child is overweight or obese, and a probit specification of a child being obese will be used for the analysis. Let $D(Obese)_{i,t} = 1$ if child *i* is obese (BMI at or above the 95th percentile for the child's age and gender) in period *t* and $D(Obese)_{i,t} = 0$ otherwise. Then the probability that a child is obese in period *t* is a function of the child's age in period *t* and gender plus certain other child characteristics (X_i^c), maternal characteristics, at the time of birth and in period *t*, including maternal health and occupation, ($X_i^m, X_{i,t}^m$), and household characteristics ($X_{i,t}^h$):

$$Pr[D(Obese)_{i,t} = 1]$$
$$= F(\theta_0 + \theta_1 Age_{i,t} + \theta_2 Gender_i + \theta_3 X_i^c + \theta_4 X_i^m + \theta_5 X_{i,t}^m + \theta_6 X_{i,t}^h)$$

where $F(\cdot)$ is the normal distribution function.

Note that the same model can also be fit with an indicator of whether the child is overweight (BMI at or above the 85th percentile for the child's age and gender) as the dependent variable.

Selected Variables

As mentioned above, the dependent variable used in this analysis will be an indicator variable of whether or not the child is obese. Whether a child in the sample is obese will be determined by finding BMI for every child in the sample with both valid weight and height data. The child's BMI will then be compared to the CDC growth charts for the appropriate child age and gender. Children with a BMI at or above the 95th percentile for their age and gender are considered obese.

The additional child variables used in the analysis will include the child's age, gender, indicators on child race/ethnicity (in the U.S.: whether the child is black (non-Hispanic) or Hispanic; in the U.K.: whether the child is black, Indian, Pakistani/Bangladeshi or of mixed or other ethnicities), birth weight, whether the child was breastfed and whether the child is the firstborn of the family. Previous studies (Anderson et al., 2003) have shown that black children are significantly more likely to be overweight than children of other races and that children who were breastfed are less likely to develop weight problems (von Kries et al., 1999; Gilman et al., 2001). It also seems reasonable to think that being the firstborn child in a family could affect a

child's weight status as the firstborn child gets more individual attention from his/her mother before the addition of siblings to the family. However, it is also possible that a mother may choose to return to work after having her first child but upon having more children chooses to become a homemaker, which would suggest likelihood of obesity is actually higher for the firstborn child. Thus, the impact of being the firstborn is somewhat unpredictable.

Maternal characteristics will be included from the time surrounding pregnancy with or at the birth of the child as well as from the time the child's weight status is measured. For the variables around the time of pregnancy or the child's birth, alcohol or cigarette use during pregnancy and maternal age at the birth of the child will be included in addition to the mother's weight status before pregnancy. To determine mother's weight status, mother's BMI will be calculated using height and body weight before pregnancy; mothers who have BMIs greater than 25 kg/m^2 will be classified as overweight while mothers who have BMIs greater than 30 kg/m^2 will be classified as obese. For the variables from the time at which the child's weight status is measured, the mother's education (by highest degree completed or highest level attained) and occupation will be included; for most mothers, level of education will affect occupation, thus some of the impact will likely be seen through the education variables. The occupation variable will be detailed below. Finally, the household characteristics will include whether there is a father figure present in the household, as well as if that father figure stays home and cares for the child while the mother is employed, family income, the region of the country (U.S.) or the country (U.K.) in which the family resides and whether they live in an Urban or Rural setting.

The second of the two primary independent variables of interest, mother's career choice, will be represented through a series of occupation category indicator variables. The occupation categories will be defined as in the American Time Use Survey (ATUS). The ATUS is a federally-administered survey on the time use of individuals in the United States. Respondents are randomly selected from among households participating in the Current Population Survey (CPS); after they have completed their final month of interviews for the CPS, these individuals give a one-time interview in which they answer questions on their time use on the previous day. By combining the information obtained from this interview with the information already

known about the household from the CPS, the ATUS is a rich data source of average time use by individuals from a variety of demographics. One of the variables that is available in the ATUS data is the individual's occupation by Census code, grouped into 22 categories. In order to more easily analyze the occupation data and also to ensure no category with too small a sample size, these 22 occupation categories have been grouped further, into 13 categories. See Table 2.1 for the categories; for more details on the occupations included in each category, see Appendix I.

In addition to the Occupation categories, dummy variables will be created for mothers who are full-time homemakers and for mothers who are employed but for whom no occupation code is recorded (which is only an issue in the U.S. data). The dummy variables for the occupation categories plus the homemakers and the employed mothers with no coded occupation fully categorize all mothers in the sample. Thus, one of these groups must be excluded, as the control group. The Homemaker category will be used as the control group for occupation choice and will be excluded from the model estimations. This allows for comparison among the occupation groups as they relate to not being employed.

Data Sources

United States

The National Longitudinal Survey of Youth (NLSY) provides matched mother-child data that are perfect for this analysis. The NLSY is a sample of 12,686 U.S. residents born between 1957 and 1964, of which 6,283 are women. These women were in their teens and early twenties (between 14 and 22) when they were first surveyed in 1979. They continued to be surveyed annually through 1994 and then biannually since 1994. Beginning in 1986, children born to and living with women in the NLSY have been surveyed biannually as well. The most important variables for this study are obviously child's weight status and mother's occupation and pre-pregnancy weight status. The child data (from NLSY79 Children, for children from birth to age 14) includes, most importantly, height, body weight, age and gender of the child. Occupation and industry (by Census code) for all jobs since 1978, including the most recent job, are included in the mother's data, which allows for categorization by occupations across all mothers. The survey is also designed to capture this information for self-employed mothers or

for those in non-traditional work arrangements. The data for mothers also includes mothers' height and body weight as well as the same information before pregnancy with the child.

The survey contains a wealth of additional information on maternal and child characteristics as well as household characteristics, making it a great fit for this study. The child data include race, birth weight, whether the child was breastfed and whether the child is the firstborn in the family. The data for mothers include information about the mother before and during pregnancy with the child, including alcohol or cigarette use during pregnancy, the mother's age at birth of the child as well as up-to-date information, including the mother's education classified by highest degree earned. The household data include whether the mother is married or living with a male adult, whether that male adult is employed and family income as well as region of residence and whether residence is classified as Urban or Rural.

United Kingdom

The U.K. has conducted several national longitudinal birth cohort studies that provide data on children and their parents in the four countries (England, Wales, Scotland and Northern Ireland) of the U.K. The Millennium Cohort Study (MCS) is the fourth such study and provides the variables necessary for this analysis. Similar to the NLSY, the MCS follows a sample of individuals born during a specific period of time over their lives; however, the cohort members, survey timing and other details vary from those in NLSY. The MCS is sample of 18,553 individuals born in the U.K. between late 2000 and the beginning of 2002. The children were all nine months old when they (their parents) were first surveyed in 2001 or 2002. They have continued to be surveyed in 2003/2004, 2005/2006, 2007/2008 and 2011/2012, at ages 3, 5, 7 and 11, respectively. In addition to the wealth of information that is collected on the children in the sample, information is also collected on parental health, employment, education and activities, as well as household demographics.

Again, the variables that are of the most interest are the child's weight status and the mother's occupation and pre-pregnancy weight status. One advantage of the MCS over the NLSY is that child height and body weight data are directly measured (as opposed to reported by the mother), which significantly decreases the potential for measurement or reporting errors. Inclusion of this information in the data along with the child's age and gender allows for

calculation of child weight status. Occupation information is included in the maternal data, classified by the U.K Standard Occupational Classification (SOC) system, which is developed and maintained by the Employment Department Group (EDG) and the Office of Population Censuses and Surveys (OPCS). The SOC system was developed to be the single, standard national classification system that could replace multiple previously incompatible systems. It is the primary occupation-classifying system now used for analysis of occupation-related data in the U.K. The MCS data also includes information on whether the mother classifies herself as a homemaker. Additionally the data provide maternal health information in the first survey year, including height and body weight for use in classifying a mother's pre-pregnancy weight status.

As with the NLSY, the MCS provides an abundance of additional information that will be helpful to this analysis. The child data include ethnicity, birth weight, whether the child was breastfed and whether the child is the firstborn in the family. The maternal data include information about alcohol or cigarette use during pregnancy, including whether the mother stopped smoking because she was pregnant, the mother's age at birth of the child as well as up-to-date information on the mother's education by highest National Vocational Qualification level attained. The household data include whether the mother is married or living with a male adult and whether that male adult is employed, family income and whether there is an additional adult outside of the father figure living in the household as well as the country of residence and whether the family's residence is classified as an Urban location.

Table 2.1: Occupation Categories, from the American Time Use Survey
(Further details in Appendix 1)
Categories listed as they have been grouped for analysis

Occupation Categories
1: Management occupations
2: Business and financial operations occupations 7: Legal occupations
3: Computer and mathematical science occupations 4: Architecture and engineering occupations
5: Life, physical, and social science occupations 8: Education, training, and library occupations
6: Community and social service occupations 11: Healthcare support occupations
9: Arts, design, entertainment, sports, and media occupations
10: Healthcare practitioner and technical occupations
12: Protective service occupations
13: Food preparation and serving related occupations 15: Personal care and service occupations
14: Building and grounds cleaning and maintenance occupations 18: Farming, fishing, and forestry occupations 19: Construction and extraction occupations 20: Installation, maintenance, and repair occupations
16: Sales and related occupations
17: Office and administrative support occupations
21: Production occupations 22: Transportation and material moving occupations

CHAPTER 3: DEFINITIONS OF VARIABLES AND EMPIRICAL ANALYSIS, UNITED STATES

Data

The model will be fit to matched mother-child observations from the 2008 round of the NLSY. In 2008, 3975 women were surveyed, 3356 of whom have children. Among the 3356 mothers, 7247 of their living children were interviewed. However, by 2008, many of these children were young adults (recall, by 2008 the mothers in the survey are between 43 and 51 years of age). The NLSY divides children of mothers in the sample into two groups: "children" (birth to age 15) and "young adults" (ages 16 and older). Since the primary interest of this study is the impact of maternal choices on the child's health, only the "children" of the NLSY sample are used. Once children are 16 years of age or older (especially as they are able to drive), they are able to make many more of their own decisions regarding food intake and physical activity. Additionally, the "young adults" in the sample self-report all of the data that pertain to them, which changes the relationship between the child and maternal/household data. In 2008, there were 1347 children (again, ages 15 and younger) interviewed. Of the 1347 total children, only 1244 (92.4%) have valid data for weight and height by which to determine BMI. There are 13 children in the sample under age two who will be excluded since the distribution by which child weight status is determined starts at two years of age. There are six additional children in the sample who will be excluded due to unreasonable reported heights of less than 28 inches. For the youngest children in the sample (24 months), the CDC growth charts give heights in the third percentile, for girls and boys, between 31 and 32 inches. Even with allowing several inches below that for a child who may be substantially below the growth chart, reported heights below 28 inches seem to be unreasonable. Thus, the total sample size is 1225.

A few other variables of interest are missing observations; however, in the interest of keeping the sample size as large as possible, these observations have been preserved in the data and appropriate fixes have been made. Eight of the mother-child pairs are missing information on whether the child was breastfed. These eight children are assumed to not have been breastfed. The variable for whether the family lives in an Urban setting is missing for 59 mothers, for a total of 76 children. For these 76 observations, the variable indicating Urban residence is assigned the average probability of the family living in an Urban area, based on the

2008 NLSY survey population, a probability of 77.62%. Similarly, region of residence is missing for nine mothers, for a total of fifteen children. The treatment for these 15 observations is the same as for the Urban indicator; the region indicators are assigned the average probability of living in that region, based on the 2008 NLSY survey population, the probabilities of which follow: Northeast 15.08%, North Central 23.29%, South 42.27% and West 19.37%. Birth weight is missing or nonsensical for 386 observations (birth weight must be at least 9 oz. to be considered valid[4]). Since birth weight is a vital variable, an indicator variable of whether the birth weight is missing is included in the regression. The coefficient on that indicator variable is the birth weight effect for the group of 386 children for whom the birth weight variable is missing. Similarly, a large proportion of the sample is missing information on mother's alcohol use (320) or cigarette use (319) during pregnancy, so an indicator variable of whether mother's alcohol or cigarette use is missing is also included in the regression. Again, the coefficient on this indicator variable will be the alcohol/cigarette use effect for the group of children for whom this information is missing.

Definitions of the relevant variables are included below in Table 3.1. Occupation by Census code is included in the mother's data, which allows for categorization by occupations across all mothers (again, as shown in Table 2.1 and in Appendix I). Three women in the sample are employed in Military occupations, which are not classified into any of the ATUS occupation categories. These occupations have been included in Category 12: Protective Service Occupations. In this sample, there are a total of 976 matched mother-child pairs for whom the mother's occupation is known. Additionally recall that dummy variables have been created for mothers who are full-time homemakers and for mothers who are employed but do not have an occupation reported. The homemaker category is defined by examining two different pieces of information about the mothers in the sample. The NLSY data report the number of weeks worked by each respondent since the last interview. If the number of weeks worked since the last interview is zero and no occupation is reported, then the mother is classified as a homemaker; there are 221 such observations in the sample. Similarly, the NLSY data report

[4] The 9 oz. minimum is based on a registry of the world's smallest surviving babies, in which the smallest baby on record was 9.17 oz. at birth. See http://webapps1.healthcare.uiowa.edu/tiniestbabies/index.aspx for more information.

mothers' incomes in the prior year. If a mother reports no occupation but positive weeks worked and yet has zero income, she is likely doing some kind of volunteer work. This sample includes four such observations, and they are also included in the Homemaker occupation group. Finally, if a mother has an no occupation listed but reports both positive weeks worked as well as positive income in the prior year, she is clearly employed but in an unknown occupation. The 24 observations in this group are assigned a dummy variable indicating employment but in an unknown occupation (called OccOther). Overall in the sample of 1225 mother-child pairs, 1000 (81.6%) of the observations have a mother who is employed while 225 (18.4%) of the pairs include a mother who is a Homemaker.

Additional indicator variables are created for the length of time the child was breastfed and for the highest degree completed by the mother. The length of time the child was breastfed can fall into one of five categories: not at all, one month or less, between one and three months, between three and six months or greater than six months[5]. For 11 observations, the mothers report that the child was breastfed but fail to report for how long. In these cases, they are assumed to be in the least amount of time (one month or less) group. The highest degree completed is one of seven options: less than high school, high school diploma, Associate's degree (AA), Bachelor's degree (either BA or BS), Master's degree, Doctorate degree (either Doctoral or Professional) or other education. The highest degree completed data are self-reported by the mothers in the sample and are available for all but 10 mothers (with 13 total children). However, all 10 mothers reported their highest grade completed, thus the highest degree earned can be determined from the reported highest grade completed. Those assignments are made as follows, with the grade completed listed first, followed by the degree assigned to that observation: 12th – high school diploma, 14th – Associate's degree, 16th – Bachelor's degree, 18th or 19th – Master's degree, and 20th or greater – Doctorate degree. Generally, childhood obesity is higher among children of less educated mothers, so the group with less than high school education will be used as the control group and excluded from the analysis.

[5] The length of time the child was breastfed is reported by the mother in weeks, so the relevant cut-off points used are: one month or less: 0-4 weeks; one to three months: >4-13 weeks; three to six months: >13-26 weeks; and more than six months: >26 weeks.

The household variables in the analysis include whether there is a male adult present in the household, whether that male adult is not employed while the mother is, and family income, by quartile, as well as the region in which the family resides and whether that residence is classified as Urban. To determine whether there is a male adult present in the household, two sets of applicable variables are used. When the mothers are interviewed, they are asked to list if they have a spouse, partner or other adult of the opposite sex living in the household. If any of these questions are answered in the affirmative, that mother-child pair is recorded as having a male adult in the household. Additionally, if the mother reports employment information about a spouse (occupation information, positive weeks worked in the prior year, positive weekly hours worked or positive income in the prior year), the mother-child pair is also assumed to have a male adult in the household. Of these male adults, for observations in which the mother is employed and the male adult has no occupation information or income in the prior year, the male adult is designated as a "Stay-at-Home Dad" who is not employed while the mother is. Lastly, total family income in the prior year is created using reported income variables. If the mother reports total family income directly, that variable is used for the family's income. If family income is not reported but mother's income and, when applicable, spouse's income are reported, then mother's income is used for the family's income when there is no male adult in the household and the sum of mother's income and spouse's income are used when there is a male adult present in the household. There are five remaining observations for which none of family income, mother's income or spouse's income is reported. However, for each of these five observations, whether the family income is less than or equal to 125% of the poverty level for the relevant family size is reported, as is the family size. In these five cases, the family income is at or below 125% of the poverty level, so the family income in these cases is set equal to 125% of the poverty level for the relevant family size[6]. The income variables used in the analysis will be income quartiles, with the lowest

[6] 2008 poverty levels are available at: http://aspe.hhs.gov/poverty/08poverty.shtml. The relevant family sizes with missing income observations are families of size two, three or four. For a family of two, the income used is $17,500 ($14,000*1.25); for a family of three, the income used is $22,000 ($17,600*1.25) and for a family of four, the income used is $26,500 ($21,200*1.25).

quartile being designated Q1 and the highest being designated Q4. In the analysis, the income quartile used as the control and excluded from the analysis is Q4, so the interpretation of the income variables (IncomeQ1-IncomeQ3) is in comparison to the highest level of income. The state in which the family resides is classified into one of four regions in the NLSY data: Northeast, North Central, South and West (see Table 3.2 for the categorization of states into regions). Collectively, obesity tends to be highest in the states classified into the South region, so this region will be used as the control group and excluded from the analysis. The families' residences are also categorized as Urban versus Rural. The Urban designation is made using one of two criteria. The family must either live directly in a city center or in the adjacent territory of the center, for which the total, combined metro population is at least 50,000, or the family must live in a place with a population greater than 2500.

Finally, mother's pre-pregnancy weight status is determined by calculating BMI before pregnancy for each woman in the sample and then checking the resulting BMIs for reasonableness. An indicator is created as to whether the BMI is valid (positive and less than 100), and only valid BMIs are used for defining weight status. In the sample, 71% of mothers (869 individuals) have a valid BMI. Of the 356 that are excluded, 343 are missing weight information and 13 have unreasonable heights given (all 13 have recorded heights of 1 inch). The resulting BMIs range from 16.0 kg/m^2 (for a mother who was 5'8" and 105 lbs.) to 85.8 kg/m^2 (for a mother who was 5'4" and 500 lbs.) with an average of 25.6 kg/m^2. Overweight and Obese indicators are then created for mothers with valid BMIs greater than 25 kg/m^2 and 30 kg/m^2 respectively, following Anderson et al. (2003). Notice that by these definitions the Overweight category will also include Obese mothers. Also note that since the 356 mothers with non-valid calculated BMIs are assumed to be neither overweight nor obese, these categories may be understated.

Descriptive Statistics

For summary statistics (including minimum, maximum, mean and standard deviation) for the sample (n = 1225) being used in this analysis see Table 3.3. In this sample 24.9% of the children are obese and 40.8% are overweight (including obese), child age ranges from two years and three months to almost 15 years, with the average child age being 10.6 years and 48.2% of

the children are girls. By race, 21.4% of children in the sample are Hispanic and 22.6% are black. In the entire NLSY population 19.2% of the children are Hispanic and 27.7% are black, so the sample is fairly representative but may be under-sampling black children a bit. Children who were breastfed appear to have potentially been under-sampled as well in the sample, with 68.1% ever having been breastfed. By length of time, 10.7%% of the children in the sample were breastfed for a month or less (meaning 57.5% of children were breastfed past one month), 16.2% for one to three months (41.3% of children were breastfed past three months), 14.8% for three to six months and 26.5% for more than six months. Comparing breastfeeding rates to the population is a bit more difficult since these children were born between 1994 and 2005, a time period during which breastfeeding rates were increasing. However, the year 2000 can be used as a representative middle point, by which to make some population comparisons. For children born in 2000, 70.9% were ever breastfed, with 61.9% still being breastfed at one month, 50.5% still being breastfed at three months and 34.2% being breastfed at six months[7]. Average birth weight for the children for whom it is reported (68.5% of the sample) is 7 pounds, 6.8 ounces and 23.3% of the children in the sample are firstborns.

For the maternal variables, 26.1% of the sample is missing information on whether the mother used alcohol or cigarettes during pregnancy. Of the 905 children for whom this information is reported, 40.2% and 19.0% have mothers who used alcohol and cigarettes, respectively, during pregnancy. Mothers ranged from 29 to 45 years of age at birth of the child, with the average being 35. Note that the older than average maternal age at birth is due to the specific data being used. Since the focus is on only children in the NLSY data, all children were no older than 15 years of age in 2008. The oldest of the children in the sample was born in 1994. Recall that mothers in this survey were all born between 1957 and 1964, so the youngest a mother could possibly be at the birth of a child in this sample is 27 years of age. Before pregnancy, 30.0% of mothers in the sample were overweight and 12.9% of the mothers were obese (keeping in mind that the mothers who are obese are also overweight, so the percentage of mothers who were overweight but not obese is 17.1%). With regards to education, the

[7] Breastfeeding rates for the U.S. population taken from the Centers for Disease Control and Prevention National Immunization Survey, available at: http://www.cdc.gov/breastfeeding/data/NIS_data/index.htm

largest proportions of mothers in the sample were high school (41.9%) or college graduates (23.8%) followed by those with Associate's (10.0%), Master's (10.0%), or Doctorate (1.6%) degrees. Additionally, 8.3% of mothers in the sample are less than high school educated while 1.6% report having a degree other than those listed.

For the household variables, 76.6% of households (938 total) have a male adult in addition to the mother; 855 are spousal relationships, 69 are partner relationships and 14 are other relationships. Furthermore, 4.2% of observations have a male adult in household who is not employed while the mother is employed; thus these father figures are likely taking on greater responsibility with regard to child-rearing. In the 2010 Census, 3.4% of stay-at-home parents were fathers (Harrington et al., 2013), so it's likely that at least some of these father figures who are not employed are taking primary, or at least greater, care of their children. Average family income for the sample is $90,024, with quartile cut-offs at $29,500, $69,000, and $115,300. Families are distributed more heavily in the South region (32.6%) followed almost equally by the North Central (21.9%), West (20.0%) and Northeast (19.5%) regions, and 74.5% of families live in an Urban area. Finally, Table 3.3 also includes information on all of the occupation categories. Homemakers comprise 18.4% of the sample; 14.9% are homemakers who have a male adult in the household (13.3% with a spouse, 1.1% with a partner) and 3.4% are those who do not. After that, Office and Administrative Support occupations is by far the largest category, with 14.9% of the sample, followed by Education, Training and Library or Life, Physical, or Social Science occupations (9.9%), Food Preparation/Serving-Related or Personal Care/Service occupations (8.7%), Management occupations (8.1%) and Sales and Related occupations (7.3%). In this sample, there are 18 mothers, with a total of 24 children (for a total of 2.0% of the sample), that are employed but who did not report an occupation. Employment proportions here are given relative to the entire sample. If, however, they were calculated relative to the number of women who are employed, the proportions in each occupation would obviously be higher.

Since the primary variable of interest in this analysis is mother's occupation choice, it is interesting to compare the descriptive statistics of the variables for mothers who are employed with those for mothers who are not employed. These summary statistics are available in Table

3.4 and Table 3.5. Many of the variables are similar between the two groups. Those that are noticeably different will be highlighted here. Most substantially, the rates of child obesity and overweight are higher among the Homemaker group, with 9.8% and 10.4% more children being obese and overweight, respectively, in the Homemaker group. The overweight result is being driven almost entirely by the relative proportion of obese children, with only 0.6% more children of Homemakers being strictly overweight than those of Employed mothers. The children of Homemakers are slightly younger on average, by about six months, which seems reasonable as many women re-enter the workforce as their children age into school. More mothers of Hispanic children (5.4% more) are Homemakers while more mothers of Black children (7.0% more) are employed. Approximately 5% more children of Homemakers do not have a reported birth weight, which seems a bit surprising. Even more surprising is that breastfeeding rates are higher among employed women, by about 6.6%. However, Homemakers tend to breastfeed their children longer. Homemakers also use cigarettes at a higher rate during pregnancy, by 3.8%, than do employed women, but employed women tend to drink alcohol more during pregnancy, by 6.6%.

Pre-pregnancy weight status is similar between the two groups, though employed women tend to have about 4.1% more valid BMIs reported. By education, Homemakers appear to be less educated, with 7.8% more mothers who are Homemakers having less than a high school education while 6.5% more employed women have a Master's degree. Interestingly the proportions of mothers with Associate's degree or with Doctorate degrees are similar between the two groups with slightly more employed mothers having Bachelor's degrees. As might be expected, the proportion of households with a male adult is higher for Homemakers though not hugely so (about 2.2%). Family income is also higher on average for Homemakers, by about $14,000; however, more Homemakers' families are in the first (lowest) income quartile while more employed mothers' families are in the second income quartile. Finally, it appears more employed mothers live in the North Central region while more Homemakers live in the West region and in Urban areas.

Estimation and Results, Child Obese

As discussed, the econometric model will be fit with a probit on the dependent variable that the child is obese, based on mother's occupation category and a variety of other child, mother (including mother's pre-pregnancy weight status), and household characteristics. The Homemaker occupation category is used as the control variable for the occupation categories. The probit results are presented in Table 3.6 with marginal effects in Table 3.7. As in previous results, black children are significantly more likely (14.8%) to be obese, while children who were breastfed are less likely to be obese. Breastfeeding a child more than three months seems to be most significant in this model and decreases a child's likelihood of obesity by 7.2%. Obesity risk for children does not appear to significantly differ between genders. Child age is negatively correlated with obesity, with every one month increase resulting in a 0.3% decrease in obesity risk, while birth weight is positively correlated with obesity. For children for whom birth weight is reported, every additional ounce at birth is correlated with a 0.2% increase in obesity risk. The birth weight effect for the group for whom birth weight is missing is most substantial, though, with the children in that group being 32.4% more likely to be obese. The relationship here is largely unknown, but it could be that children whose mothers do not remember or do not report their children's birth weights are also making neglectful choices when it comes to their children's health.

As a mother's age at the time of her child's birth increases, the child's risk of obesity later in life decreases, with every one year increase being correlated with a 1.3% decrease in obesity risk. Neither a mother's cigarette use during pregnancy nor her use of alcohol during pregnancy is shown to have a significant impact on child obesity later in childhood. With the inclusion of a mother's pre-pregnancy weight status, previous results for the U.S. are strengthened with an additional dimension. Previous results for the U.S. have shown that current overweight or obesity of a mother increases her child's risk for obesity. The findings here suggest a similar relationship between a mother's pre-pregnancy weight status and her child's likelihood of obesity. A mother being overweight (BMI $\geq$ 25 kg/m^2) or obese (BMI $\geq$ 30 kg/m^2) before she became pregnant with the child increases her child's probability of being obese by 6.2% and 13.5%, respectively. A mother's education seems to have the most

beneficial effect on child health when the mother's highest education is among the upper levels. A mother having any of a Bachelor's, Master's or Doctorate degree is associated with her child being at a lower risk of obesity, with the risk getting lower as a mother obtains more education. A child of a mother with a Bachelor's degree is 9.8% less likely to be obese, as compared to a child of a mother with less than a high school education; for a Master's or Doctorate degree, the impact is strengthened to the risk dropping by 12.5% or 15.0%, respectively. Jointly, the education variables are found to be significant at the 1% level.

Neither the presence of a male adult in the household (whether of spousal, partner or "other" relationship) nor whether that adult male is not employed is significant in this model at the 10% level. However, a joint test of significance of the two together shows them to be significant at about the 12.9% level. The income variables are jointly not significant though children of families in the second income quartile do seem to be at a disadvantage as compared to children in the fourth (the upper-most) quartile, with children in the second quartile being 8.3% more likely than those in the fourth quartile to be obese. The region in which the family resides does not seem to have an impact on a child's risk of obesity, given the other controlling factors; however, residing in an Urban area makes a child 8.6% less likely to be obese.

Finally, the results on mother's occupation turn out to be somewhat surprising. There are three of the combined occupation categories for mothers who are employed that are significant: Occupation categories 2 and 7, Business and Financial Operations or Legal; Occupation category 17, Office and Administrative Support; and Occupation categories 21 and 22, Production or Transportation and Material Moving. A mother being employed in an occupation in any of these categories actually decreases her child's risk of obesity relative to children whose mothers are Homemakers. Children of mothers in Occupation categories 2 or 7 are 13.7% less likely to be obese, while those of mothers in category 17 or categories 21 or 22 are 11.0% and 10.0% less likely to be obese, respectively. Chapter 5 will detail a model that looks at the specific attributes of each of these occupations. Part of the discussion around that model will detail why these occupations may be better for children's health, specifically as they relate to the mother's level of responsibility, her use of time and the required level of physical

activity in her job but also as they involve gaining complementary skills. The occupation results are jointly significant at approximately the 8% level.

Estimation and Results, Child Overweight

While the primary variable of interest here is child obesity, it is also interesting to look at children who are of overweight status, which includes those who are obese as well as another ten percent of children who are the next most unhealthy as measured by weight-for-height, by age and gender. The children who are overweight but not obese face similar negative consequences of being less healthy as those children who are obese. They also have a higher likelihood than normal weight children of becoming obese. Given the way the econometric model has been designed, an indicator of whether a child is overweight can be used in place of the indicator of whether a child is obese as the dependent variable in the model. As in the Child Obese specification, the Homemaker occupation category will be used as the control group and excluded from the analysis. The marginal effects of this model are presented in Table 3.8.

When this model, Child Overweight, is estimated, many of the same results hold that held for the Child Obese model. There are, however, some changes. Black children are still significantly more likely to be overweight or obese as are Hispanic children. Children who were breastfed still appear less likely to be so but breastfeeding is not significant at the 10% level in this specification, on a child's risk of being overweight. Child age continues to be negatively correlated with overweight or obesity while birth weight is positively correlated with it. The birth weight effect for the group for whom birth weight is missing continues to increases a child's risk of being overweight; however, the effect is even larger in this specification, with children for whom birth weight is not reported being 48.3% more likely to be overweight. The risk of being overweight is not significantly different by gender or whether a child is firstborn in this specification either. This is consistent with previously published results regarding the impact of being the firstborn child on being overweight or obese.

The variables concerning maternal choices and characteristics see a few more changes in this specification. A mother's age at the time of her child's birth is no longer significant while a mother being either overweight or obese before pregnancy is even more so. A child's risk of being overweight or obese later in childhood increases 10.1% and 18.3%, respectively, for

children of mothers who were overweight or obese before pregnancy. A mother's education continues to have the largest impact at the higher levels. A mother having an Associate's degree is now significant and decreases her child's likelihood of being overweight or obese by 15.6%. The impact of a mother having any of a Bachelor's degree, a Master's degree or a Doctorate degree is even more pronounced in this specification on the child's risk of being overweight, including obese, with the risk decreasing by 19.6%, 16.6% and 28.9%, respectively, for children of mothers with a Bachelor's, Master's, or Doctorate degree. The presence of a male adult in the household in addition to the mother (regardless of the status of the relationship between the mother and father figure) is still not significant by itself. However, if there is a male adult present who is not working while the mother is working, that decreases the child's risk of being overweight or obese by 14.8%. Additionally, these two variables, whether there is a male adult in the household and whether that male adult is not employed while the mother is, are jointly significant at about the 6.5% level. Family income continues to have a similar impact with children of families in the second income quartile being 12.2% more likely to be overweight or obese as compared to children of families in the fourth (highest) income quartile. This specification also sees income become jointly significant at the 8% level. While the region of residence is still not statistically significant, residing in an Urban area continues to decrease a child's likelihood of being overweight or obese.

Finally, the results on mother's occupation category for employed mothers show three occupation categories are statistically significant, two of which were significant for child obesity. The three occupation categories for mothers who are employed that are significant are Occupation category 16, Sales and Related; Occupation category 17, Office and Administrative Support; and Occupation categories 21 and 22, Production or Transportation and Material Moving. Again, a mother being employed in an occupation in any of these categories decreases her child's risk of obesity relative to children whose mothers are Homemakers. Children of mothers in Occupation categories 21 or 22 are 18.6% less likely to be overweight or obese, while those of mothers in category 17 or category 16 are 14.2% and 12.3% less likely to be overweight or obese, respectively. Interestingly, Occupation categories 2 and 7, Business and Financial Operations or Legal, are no longer statistically significant at the 10% level when the

dependent variable also includes children who are only overweight. Again, Chapter 5 will go into more detail regarding attributes of these occupations that may make them more family-friendly or lead to the children of mothers employed in them having a lower risk of being overweight or obese.

Table 3.1: Variable Definitions for Variables included in U.S. Analysis

Variable	Definition
Obese	=1 if the child is obese; =0 otherwise
Overweight	=1 if the child is overweight; =0 otherwise
ChildAgeMos	The child's age in months, as of the 2008 survey
FemaleChild	=1 if the child is girl; =0 otherwise
ChildHispanic	=1 if the child is Hispanic; =0 otherwise
ChildBlack	=1 if the child is Black; =0 otherwise
MissingBirthWght	=1 if the child's birth weight is not reported; =0 otherwise
ChildBirthWght	The child's birth weight in ounces, for the children for whom birth weight is reported
ChildBreastfed	=1 if the child was breastfed; =0 otherwise
BFLessOneMo	=1 if the child was breastfed for a month or less; =0 otherwise
BFOnetoThreeMos	=1 if the child was breastfed more than one month, up to three months; =0 otherwise
BFThreetoSixMos	=1 if the child was breastfed more than three months, up to six months; =0 otherwise
BFPastSixMos	=1 if the child was breastfed more than six months; =0 otherwise
Firstborn	=1 if the child is the firstborn in the family; =0 otherwise
MissingAlclCigUse	=1 if the mother's alcohol or cigarette use during pregnancy is not reported; =0 otherwise
AlcoholDurPreg	=1 if the mother drank alcohol during pregnancy with the child; =0 otherwise
CigDurPreg	=1 if the mother smoked cigarettes during pregnancy with the child; =0 otherwise
MotherAgeBirth	The mother's age, in years, at the time of birth of the child
MotherOverwtPreChild	=1 if the mother was overweight before becoming pregnant with the child; =0 otherwise
MotherObesePreChild	=1 if the mother was obese before becoming pregnant with the child; =0 otherwise
Mother's Education	
MotherLessthanHS	=1 if the mother does not have a highest degree completed; =0 otherwise
MotherHSGrad	=1 if the mother's highest degree completed is a high school diploma; =0 otherwise
MotherAssocGrad	=1 if the mother's highest degree completed is an Associate degree; =0 otherwise
MotherCollegeGrad	=1 if the mother's highest degree completed is a Bachelor's degree; =0 otherwise
MotherMastersGrad	=1 if the mother's highest degree completed is a Master's degree; =0 otherwise
MotherDoctorateGrad	=1 if the mother's highest degree completed is a Doctoral or Professional degree; =0 otherwise
MotherOtherEd	=1 if the mother reports having a highest degree other than the choices available; =0 otherwise

Table 3.1: (Continued)

Variable	Definition
MaleAdultinHH	=1 if the mother reports living with a spouse, partner or other male adult; =0 otherwise
StayHomeDad	=1 if the mother is employed, reports a spouse/partner and the partner has no reported occupation or income in the prior year; =0 otherwise
FamilyIncome	The family's total income in the prior year (2007)
IncomeQ1	=1 if the family's total income is in the first (lowest) quartile; =0 otherwise
IncomeQ2	=1 if the family's total income is in the second quartile; =0 otherwise
IncomeQ3	=1 if the family's total income is in the third quartile; =0 otherwise
IncomeQ4	=1 if the family's total income is in the fourth (highest) quartile; =0 otherwise
Region	
Northeast	=1 if the family resides in the Northeast region; =0 otherwise
NorthCentral	=1 if the family resides in the North Central region; =0 otherwise
West	=1 if the family resides in the West region; =0 otherwise
South	=1 if the family resides in the South region; =0 otherwise
Urban	=1 if the family resides in an Urban area; =0 otherwise
OccupationHome	=1 if the mother is a full-time homemaker; =0 otherwise
Occupation Indicators	
Occupation1	=1 if the mother's occupation is *Management;* =0 otherwise
Occupation2_7	=1 if the mother's occupation is *Business/Financial Operations or Legal*; =0 otherwise
Occupation3_4	=1 if the mother's occupation is *Computer/Mathematical or Architecture/Engineering*; =0 otherwise
Occupation5_8	=1 if the mother's occupation is *Life, Physical, or Social Science or Education, Training, or Library*; =0 otherwise
Occupation6_11	=1 if the mother's occupation is *Community/Social Service or Healthcare Support;* =0 otherwise
Occupation9	=1 if the mother's occupation is *Arts, Design, Entertainment, Sports or Media;* =0 otherwise
Occupation10	=1 if the mother's occupation is *Healthcare Practitioner or Technical;* =0 otherwise
Occupation12	=1 if the mother's occupation is *Protective Service or Military;* =0 otherwise
Occupation13_15	=1 if the mother's occupation is *Food Preparation/Serving-Related or Personal Care/Service;* =0 otherwise
Occupation14_1820	=1 if the mother's occupation is *Building/Grounds Cleaning/Maintenance, Farming/Fishing/Forestry, Construction/Extraction, or Installation/Maintenance/Repair;* =0 otherwise
Occupation16	=1 if the mother's occupation is *Sales or Related;* =0 otherwise
Occupation17	=1 if the mother's occupation is *Office or Administrative Support;* =0 otherwise
Occupation21_22	=1 if the mother's occupation is *Production or Transportation/Material Moving;* =0 otherwise
OccupationOther	=1 if the mother is employed but no occupation is reported*;* =0 otherwise

Table3.2: Classification of States of Residence into Regions in the U.S.

Northeast Region	North Central Region	West Region	South Region
Connecticut	Illinois	Alaska	Alabama
Maine	Indiana	Arizona	Arkansas
Massachusetts	Iowa	California	Delaware
New Hampshire	Kansas	Colorado	District of Columbia
New Jersey	Michigan	Hawaii	Florida
New York	Minnesota	Idaho	Georgia
Pennsylvania	Missouri	Montana	Kentucky
Rhode Island	Nebraska	Nevada	Louisiana
Vermont	North Dakota	New Mexico	Maryland
	Ohio	Oregon	Mississippi
	South Dakota	Utah	North Carolina
	Wisconsin	Washington	Oklahoma
		Wyoming	South Carolina
			Tennessee
			Texas
			Virginia
			West Virginia

Table 3.3: Summary Statistics for Variables Included in U.S. Analysis

Variable	Obs	Mean	Std. Dev.	Min	Max
Obese	1225	0.2490	0.4326	0	1
Overweight	1225	0.4082	0.4917	0	1
ChildHeight (in inches)	1225	55.96	8.55	28	74
ChildWeight (in lbs)	1225	93.59	38.04	26	350
BMI (kg/m^2)	1225	20.62	6.26	7.32	90.57
ChildAgeMos	1225	127.47	32.75	27	178
FemaleChild	1225	0.4816	0.4999	0	1
ChildHispanic	1225	0.2139	0.4102	0	1
ChildBlack	1225	0.2261	0.4185	0	1
MissingBirthWght	1225	0.3151	0.4648	0	1
ChildBirthWght	839	118.82	31.50	17	768
ChildBreastfed	1225	0.6808	0.4664	0	1
BFLessOneMo	1225	0.1069	0.2974	0	1
BFOnetoThreeMos	1225	0.1624	0.3690	0	1
BFThreetoSixMos	1225	0.1478	0.3550	0	1
BFPastSixMos	1225	0.2645	0.4412	0	1
Firstborn	1225	0.2327	0.4227	0	1
MissingAlclCigUse	1225	0.2612	0.4395	0	1
AlcoholDurPreg	905	0.4022	0.4906	0	1
CigDurPreg	905	0.1901	0.3926	0	1
MotherAgeBirth	1225	35.01	3.08	29	45
ValidBMI	1225	0.7094	0.4542	0	1
MotherWtBeforePreg (in lbs)	869	149.96	38.14	90	500
MotherHeight (in inches)	869	64.17	2.76	56	76
MotherBMIBeforePreg (kg/m^2)	869	25.60	6.27	15.96	85.82
MotherOverwtPreChild	1225	0.2996	0.4583	0	1
MotherObesePreChild	1225	0.1290	0.3353	0	1
MotherLessthanHS	1225	0.0833	0.2764	0	1
MotherHSGrad	1225	0.4188	0.4936	0	1
MotherAssocGrad	1225	0.0996	0.2996	0	1
MotherCollegeGrad	1225	0.2376	0.4258	0	1
MotherMastersGrad	1225	0.1004	0.3007	0	1
MotherDoctorateGrad	1225	0.0163	0.1268	0	1
MotherOtherEd	1225	0.0155	0.1236	0	1
MaleAdultinHH	1225	0.7657	0.4237	0	1
StayHomeDad	1225	0.0424	0.2017	0	1

Table 3.3: (Continued)

Variable	Obs	Mean	Std. Dev.	Min	Max
FamilyIncome	1225	90024	93673	0	454,737
IncomeQ1	1225	0.2506	0.4335	0	1
IncomeQ2	1225	0.2498	0.4331	0	1
IncomeQ3	1225	0.2506	0.4335	0	1
IncomeQ4	1225	0.2490	0.4326	0	1
Northeast	1225	0.1951	0.3964	0	1
NorthCentral	1225	0.2188	0.4136	0	1
South	1225	0.3257	0.4688	0	1
West	1225	0.2000	0.4002	0	1
Urban	1225	0.7453	0.4359	0	1
Occupation Categories					
OccupationHome	1225	0.1837	0.3874	0	1
Occupation1	1225	0.0816	0.2739	0	1
Occupation2_7	1225	0.0547	0.2275	0	1
Occupation3_4	1225	0.0278	0.1643	0	1
Occupation5_8	1225	0.0988	0.2985	0	1
Occupation6_11	1225	0.0694	0.2542	0	1
Occupation9	1225	0.0163	0.1268	0	1
Occupation10	1225	0.0522	0.2226	0	1
Occupation12	1225	0.0204	0.1414	0	1
Occupation13_15	1225	0.0865	0.2813	0	1
Occupation14_1820	1225	0.0155	0.1236	0	1
Occupation16	1225	0.0727	0.2597	0	1
Occupation17	1225	0.1494	0.3566	0	1
Occupation21_22	1225	0.0514	0.2210	0	1
OccupationOther	1225	0.0196	0.1386	0	1

Table 3.4: Summary Statistics for U.S. Variables, for Employed Mothers Only

Variable	Obs	Mean	Std. Dev.	Min	Max
Obese	1000	0.2310	0.4217	0	1
Overweight	1000	0.3890	0.4878	0	1
ChildHeight (in inches)	1000	56.36	8.39	28	74
ChildWeight (in lbs)	1000	94.56	38.19	28	350
BMI (kg/m^2)	1000	20.57	6.41	10.50	90.57
ChildAgeMos	1000	128.69	32.15	28	178
FemaleChild	1000	0.4760	0.4997	0	1
ChildHispanic	1000	0.2040	0.4032	0	1
ChildBlack	1000	0.2390	0.4267	0	1
MissingBirthWght	1000	0.3060	0.4611	0	1
ChildBirthWght	694	118.41	21.51	24	193
ChildBreastfed	1000	0.6930	0.4615	0	1
BFLessOneMo	1000	0.1110	0.3143	0	1
BFOnetoThreeMos	1000	0.1630	0.3696	0	1
BFThreetoSixMos	1000	0.1570	0.3640	0	1
BFPastSixMos	1000	0.2630	0.4405	0	1
Firstborn	1000	0.2330	0.4230	0	1
MissingAlclCigUse	1000	0.2530	0.4349	0	1
AlcoholDurPreg	747	0.4137	0.4928	0	1
CigDurPreg	747	0.1834	0.3873	0	1
MotherAgeBirth	1000	34.91	3.01	29	44
ValidBMI	1000	0.7170	0.4507	0	1
MotherWtBeforePreg (in lbs)	717	149.10	34.93	90	326
MotherHeight (in inches)	717	64.21	2.73	56	73
MotherBMIBeforePreg (kg/m^2)	717	25.41	5.62	16.46	55.95
MotherOverwtPreChild	1000	0.3010	0.4589	0	1
MotherObesePreChild	1000	0.1280	0.3343	0	1
MotherLessthanHS	1000	0.0690	0.2536	0	1
MotherHSGrad	1000	0.3590	0.4799	0	1
MotherAssocGrad	1000	0.1500	0.3573	0	1
MotherCollegeGrad	1000	0.2420	0.4285	0	1
MotherMastersGrad	1000	0.1360	0.3430	0	1
MotherDoctorateGrad	1000	0.0260	0.1592	0	1
MotherOtherEd	1000	0.0180	0.1330	0	1
MaleAdultinHH	1000	0.7910	0.4068	0	1
StayHomeDad	1000	0.0520	0.2221	0	1

Table 3.4: (Continued)

Variable	Obs	Mean	Std. Dev.	Min	Max
FamilyIncome	1000	87483	83337	0	454,737
IncomeQ1	1000	0.2160	0.4117	0	1
IncomeQ2	1000	0.2800	0.4492	0	1
IncomeQ3	1000	0.2580	0.4378	0	1
IncomeQ4	1000	0.2460	0.4309	0	1
Northeast	1000	0.1839	0.3866	0	1
NorthCentral	1000	0.2524	0.4334	0	1
South	1000	0.3515	0.4762	0	1
West	1000	0.2122	0.4079	0	1
Urban	1000	0.7931	0.3917	0	1

Table 3.5: Summary Statistics for U.S. Variables, for Not Employed Mothers Only

Variable	Obs	Mean	Std. Dev.	Min	Max
Obese	225	0.3289	0.4709	0	1
Overweight	225	0.4933	0.5011	0	1
ChildHeight (in inches)	225	54.18	9.03	35	71
ChildWeight (in lbs)	225	89.28	37.10	26	200
BMI (kg/m^2)	225	20.85	5.58	7.32	40.68
ChildAgeMos	225	122.03	34.83	27	170
FemaleChild	225	0.5067	0.5011	0	1
ChildHispanic	225	0.2578	0.4384	0	1
ChildBlack	225	0.1689	0.3755	0	1
MissingBirthWght	225	0.3556	0.4797	0	1
ChildBirthWght	145	120.80	59.51	17	768
ChildBreastfed	225	0.6267	0.4848	0	1
BFLessOneMo	225	0.0889	0.2852	0	1
BFOnetoThreeMos	225	0.1600	0.3674	0	1
BFThreetoSixMos	225	0.1067	0.3094	0	1
BFPastSixMos	225	0.2711	0.4455	0	1
Firstborn	225	0.2311	0.4225	0	1
MissingAlclCigUse	225	0.2978	0.4583	0	1
AlcoholDurPreg	158	0.3481	0.4779	0	1
CigDurPreg	158	0.2215	0.4166	0	1
MotherAgeBirth	225	35.48	3.32	29	45
ValidBMI	225	0.6756	0.4692	0	1
MotherWtBeforePreg (in lbs)	152	154.01	50.57	95	500
MotherHeight (in inches)	152	63.95	2.92	57	76
MotherBMIBeforePreg (kg/m^2)	152	26.51	8.67	15.96	85.82
MotherOverwtPreChild	225	0.2933	0.4563	0	1
MotherObesePreChild	225	0.1333	0.3407	0	1
MotherLessthanHS	225	0.1467	0.3546	0	1
MotherHSGrad	225	0.3956	0.4901	0	1
MotherAssocGrad	225	0.1422	0.3501	0	1
MotherCollegeGrad	225	0.2178	0.4137	0	1
MotherMastersGrad	225	0.0711	0.2576	0	1
MotherDoctorateGrad	225	0.0222	0.1477	0	1
MotherOtherEd	225	0.0044	0.0667	0	1
MaleAdultinHH	225	0.8133	0.3905	0	1
StayHomeDad	225	0.0000	0.0000	0	0

Table 3.5: (Continued)

Variable	Obs	Mean	Std. Dev.	Min	Max
FamilyIncome	225	101,314	129,677	0	454,737
IncomeQ1	225	0.4044	0.4919	0	1
IncomeQ2	225	0.1156	0.3204	0	1
IncomeQ3	225	0.2178	0.4137	0	1
IncomeQ4	225	0.2622	0.4408	0	1
Northeast	225	0.1794	0.3778	0	1
NorthCentral	225	0.1960	0.3887	0	1
South	225	0.3769	0.4755	0	1
West	225	0.2477	0.4254	0	1
Urban	225	0.8127	0.3768	0	1

Table 3.6: Probit Estimates of the Impact of Maternal Occupation on Whether Child is Obese in the U.S. (z-statistics in parentheses)

Variable	*Obese*		Variable	*Obese*	
ChildAgeMos	-0.012***	(-5.44)	*MaleAdultinHH*	-0.152	(-1.32)
FemaleChild	-0.088	(-1.01)	*StayHomeDad*	-0.318	(-1.35)
ChildHispanic	0.182	(1.48)	*IncomeQ1*	0.200	(1.25)
ChildBlack	0.475***	(3.96)	*IncomeQ2*	0.279*	(1.93)
MissingBirthWght	1.022***	(3.05)	*IncomeQ3*	0.107	(0.78)
ChildBirthWght	0.006**	(2.43)	*Northeast*	0.059	(0.46)
BFLessOneMo	-0.014	(-0.09)	*NorthCentral*	-0.060	(-0.50)
BFOnetoThreeMos	-0.160	(-1.19)	*West*	-0.045	(-0.36)
BFThreetoSixMos	-0.278*	(-1.86)	*Urban*	-0.301***	(-2.64)
BFPastSixMos	-0.135	(-1.06)	*Occupation1*	-0.056	(-0.30)
Firstborn	-0.182	(-1.62)	*Occupation2_7*	-0.634**	(-2.47)
MissingAlclCigUse	0.016	(0.10)	*Occupation3_4*	0.211	(0.78)
AlcoholDurPreg	-0.026	(-0.23)	*Occupation5_8*	-0.301	(-1.52)
CigDurPreg	0.199	(1.49)	*Occupation6_11*	-0.149	(-0.80)
MotherAgeBirth	-0.047**	(-2.03)	*Occupation9*	-0.620	(-1.35)
MotherOverwtPreChild	0.212*	(1.70)	*Occupation10*	0.054	(0.25)
MotherObesePreChild	0.425***	(2.81)	*Occupation12*	-0.150	(-0.50)
MotherHSGrad	0.043	(0.27)	*Occupation13_15*	-0.145	(-0.84)
MotherAssocGrad	-0.243	(-1.29)	*Occupation14_1820*	-0.007	(-0.02)
MotherCollegeGrad	-0.379*	(-1.93)	*Occupation16*	-0.153	(-0.81)
MotherMastersGrad	-0.529**	(-2.25)	*Occupation17*	-0.445***	(-2.86)
MotherDoctorateGrad	-0.752*	(-1.73)	*Occupation21_22*	-0.420**	(-2.05)
MotherOtherEd	-0.498	(-1.27)	*OccupationOther*	0.226	(0.74)
Joint Tests of Significance: Chi^2 statistic given, with ($Pr>Chi^2$)in parentheses					
Occupations	21.89 (0.0809)*				
Highest Degree	17.97 (0.0063)***				
Income	3.93 (0.2697)				
Pseudo R^2	0.1652				
Number of Observations	1225				

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10% level

Table 3.7: Probit Marginal Effects of the Impact of Maternal Occupation on Whether Child is Obese in the U.S. (z-statistics in parentheses)

Variable	*Obese*		Variable	*Obese*	
ChildAgeMos	-0.003***	(-5.44)	*MaleAdultinHH*	-0.045	(-1.32)
FemaleChild	-0.025	(-1.01)	*StayHomeDad*	-0.079	(-1.35)
ChildHispanic	0.054	(1.48)	*IncomeQ1*	0.059	(1.25)
ChildBlack	0.148***	(3.96)	*IncomeQ2*	0.083*	(1.93)
MissingBirthWght	0.324***	(3.05)	*IncomeQ3*	0.031	(0.78)
ChildBirthWght	0.002**	(2.43)	*Northeast*	0.017	(0.46)
BFLessOneMo	-0.004	(-0.09)	*NorthCentral*	-0.017	(-0.50)
BFOnetoThreeMos	-0.043	(-1.19)	*West*	-0.013	(-0.36)
BFThreetoSixMos	-0.072*	(-1.86)	*Urban*	-0.086***	(-2.64)
BFPastSixMos	-0.037	(-1.06)	*Occupation1*	-0.016	(-0.30)
Firstborn	-0.050	(-1.62)	*Occupation2_7*	-0.137**	(-2.47)
MissingAlclCigUse	0.005	(0.10)	*Occupation3_4*	0.065	(0.78)
AlcoholDurPreg	-0.007	(-0.23)	*Occupation5_8*	-0.077	(-1.52)
CigDurPreg	0.060	(1.49)	*Occupation6_11*	-0.040	(-0.80)
MotherAgeBirth	-0.013**	(-2.03)	*Occupation9*	-0.132	(-1.35)
MotherOverwtPreChild	0.062*	(1.70)	*Occupation10*	0.016	(0.25)
MotherObesePreChild	0.135***	(2.81)	*Occupation12*	-0.040	(-0.50)
MotherHSGrad	0.012	(0.27)	*Occupation13_15*	-0.039	(-0.84)
MotherAssocGrad	-0.064	(-1.29)	*Occupation14_1820*	-0.002	(-0.02)
MotherCollegeGrad	-0.098*	(-1.93)	*Occupation16*	-0.041	(-0.81)
MotherMastersGrad	-0.125**	(-2.25)	*Occupation17*	-0.110***	(-2.86)
MotherDoctorateGrad	-0.150*	(-1.73)	*Occupation21_22*	-0.100**	(-2.05)
MotherOtherEd	-0.113	(-1.27)	*OccupationOther*	0.070	(0.74)

Joint Tests of Significance: Chi^2 statistic given, with ($Pr>Chi^2$)in parentheses

Occupations	21.89 (0.0809)*
Highest Degree	17.97 (0.0063)***
Income	3.93 (0.2697)
Pseudo R^2	0.1652
Number of Observations	1225

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10% level

Table 3.8: Probit Marginal Effects of the Impact of Maternal Occupation on Whether Child is Overweight in the U.S. (z-statistics in parentheses)

Variable	*Overweight*		Variable	*Overweight*	
ChildAgeMos	-0.003***	(-4.38)	*MaleAdultinHH*	-0.041	(-0.97)
FemaleChild	-0.004	(-0.13)	*StayHomeDad*	-0.148**	(-1.97)
ChildHispanic	0.085*	(1.93)	*IncomeQ1*	0.064	(1.17)
ChildBlack	0.124***	(2.87)	*IncomeQ2*	0.122**	(2.46)
MissingBirthWght	0.483***	(4.31)	*IncomeQ3*	0.031	(0.69)
ChildBirthWght	0.004***	(4.14)	*Northeast*	0.035	(0.78)
BFLessOneMo	-0.081	(-1.52)	*NorthCentral*	-0.027	(-0.64)
BFOnetoThreeMos	-0.072	(-1.56)	*West*	-0.063	(-1.42)
BFThreetoSixMos	-0.066	(-1.34)	*Urban*	-0.120***	(-2.98)
BFPastSixMos	-0.053	(-1.20)	*Occupation1*	0.020	(0.31)
Firstborn	-0.030	(-0.80)	*Occupation2_7*	-0.055	(-0.74)
MissingAlclCigUse	0.037	(0.65)	*Occupation3_4*	0.096	(0.98)
AlcoholDurPreg	0.032	(0.83)	*Occupation5_8*	-0.086	(-1.38)
CigDurPreg	0.056	(1.13)	*Occupation6_11*	-0.091	(-1.40)
MotherAgeBirth	-0.006	(-0.80)	*Occupation9*	-0.104	(-0.84)
MotherOverwtPreChild	0.101**	(2.35)	*Occupation10*	-0.037	(-0.49)
MotherObesePreChild	0.183***	(3.24)	*Occupation12*	-0.020	(-0.18)
MotherHSGrad	-0.080	(-1.35)	*Occupation13_15*	-0.078	(-1.29)
MotherAssocGrad	-0.156**	(-2.40)	*Occupation14_1820*	-0.019	(-0.15)
MotherCollegeGrad	-0.196***	(-2.95)	*Occupation16*	-0.123*	(-1.92)
MotherMastersGrad	-0.166**	(-2.22)	*Occupation17*	-0.142***	(-2.77)
MotherDoctorateGrad	-0.289***	(-2.73)	*Occupation21_22*	-0.186***	(-2.77)
MotherOtherEd	0.029	(0.21)	*OccupationOther*	0.002	(0.02)
Joint Tests of Significance: Chi^2 statistic given, with ($Pr>Chi^2$)in parentheses					
Occupations	20.51 (0.1149)				
Highest Degree	16.36 (0.0119)***				
Income	6.76 (0.0799)*				
Pseudo R^2	0.1306				
Number of Observations	1225				

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10% level

CHAPTER 4: DEFINITIONS OF VARIABLES AND EMPIRICAL ANALYSIS, UNITED KINGDOM

Data

The model will be fit to matched child-mother data from the 4th survey (2008) of the MCS. The 4th survey had 17,031 total families of whom 13,857 answered all questionnaires for a total of 14,043 cohort children (some families have twins or triplets). Of the 14,043 total children, 500 do not have information available from the first survey year regarding pregnancy and birth circumstances, leaving 13,543 observations. For 422 of those 13,543 children, someone other than the mother answered the survey (meaning mother's employment data will not be available) and for an additional 5124 children, the mother's employment status and occupation information is unknown; deleting these observations results in a sample size of 7997. Of the remaining children, 133 are missing either height or weight data (104 are missing both, 28 are missing only weight data and one is missing only height data) necessary to determine BMI. Finally, four of the remaining observations are missing information on family income and poverty status; thus, the total sample size is 7860.

Observations of a few other variables of interest are missing as well, but in order to keep the sample size as large as possible, these observations have been maintained in the data and appropriate measures have been taken. For six children in the sample, whether the child was breastfed is not reported. These children are assumed to not have been breastfeed. One observation is missing mother's equivalent education level, which is a discrete variable, so the observation missing this variable is not assigned a value for this category. Since the education category used as a control is the lowest level of equivalent education, this observation ends up being included with that group. As in the U.S. analysis, indicator variables of whether the child's birth weight or the mother's alcohol or cigarette use are not reported are included in the regression. The coefficients on those indicator variables represent the birth weight and alcohol/cigarette use during pregnancy effects for the children for whom these variables are not reported. In total, 13 children are missing the birth weight variable while one and two, respectively, are missing mother's alcohol and cigarette use during pregnancy. A relatively larger portion of the sample (1549 observations or 19.7%) is missing the information on whether the family resides in an Urban setting. Since this is a relatively large proportion, an

indicator variable is also created for the observations that are missing information about the family residence being in an Urban or Rural area. Again, the coefficient on this variable represents the impact of living in an Urban area for the children for whom the variable is not reported.

Definitions of all variables in the U.K. analysis are included in Table 4.1. The variables being used closely follow those used in the U.S. analysis with a few variations or exceptions, which will be described. Occupation by U.K. SOC 1990 code is included in the mother's data. For comparison purposes, it is desirable to group occupations into the same categories as used in the U.S. data, which are classified by U.S. Census codes. Unfortunately there are no direct crosswalks between the U.K. SOC codes and the U.S. Census occupation codes. The U.S. also has its own Standard Occupational Classification (SOC) system, but there is also no direct crosswalk between the U.S. and U.K. SOC codes. The U.K. SOC was first created in 1990 as a replacement for the Classification of Occupations 1980 (CO80) and the Classification of Occupations and Directory of Occupational Titles (CODOT). Thus, many of the U.K. SOC 1990 occupation classifications closely follow CO80 or CODOT nomenclature, and while similar to U.S. SOC or Census codes, there are no exact translations. Therefore, the U.K. SOC 1990 codes have to be translated into their Census 2002 equivalents. See Appendix II for all U.K. SOC 1990 occupation codes as well as the full created crosswalk between the U.K. SOC 1990 and the U.S. Census 2002 codes.

Once the U.K. SOC 1990 codes have been translated into the applicable U.S. Census code, they can be grouped in the 13 occupations categories used previously (again, as shown in Table 2.1). Some of the U.K. SOC 1990 codes translate into more than one U.S. Census code. The majority of the time, the relevant U.S. Census codes all fall within the same major occupation category, presenting no issue for classification. In one instance, though, for U.K. SOC 1990 code 252 (Actuaries, Economists and Statisticians) this is not the case. The relevant U.S. Census translation is three separate occupation codes: 1200 (Actuaries), 1230 (Statisticians) and 1800 (Economists). While codes 1200 and 1230 fall under Occupation 3 (Computer and Mathematical Science), code 1800 falls under Occupation 5 (Life, Physical and Social Science). Given the close relationship of Economics to Mathematics, U.K. SOC 1990 code 252 is

categorized into Occupation 3(Computer and Mathematical Science); there is only one mother in the sample in this specific occupation.

An indicator variable is created for mothers who are full-time Homemakers. This category is defined directly by a variable collected in the MCS data. For any mothers who are not currently working (at the time of the interview), a follow-up question is asked to ascertain why they are out of the labor force. One possible reason is “looking after the family” or full-time homemaking. Thus, women who are not employed and answer that they are looking after the family are classified as Homemakers. There are 4139 Homemakers in the sample. There are also an additional 608 observations in which the mother is not working but she reports that her primary reason for not being employed is for another reason than taking care of her family. As in the U.S. analysis, whether there is a male adult present in the household and whether that father figure is employed are variables of interest. The MCS directly reports a summary of parents in each household as well as the relationship between those parents. A male adult is considered to be in the household if the list of parents includes a natural father, step-father or “other parent”. Whether the male adult is not employed is determined by a “combined labor market status” variable reported by the MCS. If the mother is employed while the male adult is not, then the child is considered to have a father figure who is not employed. The MCS data also provide information on whether there is another adult living in the household in addition to the parents (for instance a grandparent or other relative). This variable will be included to study the impact of a third (or possibly more) adult(s) in the household on the child’s health.

Additional dummy variables are created for the child’s ethnicity, whether and for how long the child was breastfed, the mother’s education level, and the family’s total income, by income quartile, as well as the country in which the family resides and whether that residence is classified as Urban. The child’s possible ethnicity as directly reported varies slightly depending on the child’s country of residence; thus, the final MCS data include an aggregation of the possible ethnicities into six categories: White, Mixed Ethnicity, Indian, Pakistani and Bangladeshi, Black or Black British and Other Ethnic group. These categories as defined in each of the four countries are reported in Table 4.2. Since the impact of breastfeeding appears to vary with length of time the child is breastfed, whether the child is breastfed is divided up into

several dummy variables, by length of time. Whether the child was breastfed then falls into one of four categories by length of time the child was breastfed: for one month or less, for more than one month but no more than three months, for more than three months but no more than six months and for more than six months. In the MCS, the data on length of time breastfed are given in any of days, weeks or months, so the data are all converted to the equivalent number of weeks before being classified. The control group for breastfeeding is if the child was not breastfed at all. The education level of the mother is categorized as it is recorded in the MCS data. Education is represented through levels of National Vocational Qualifications (NVQ), of which there are five possibilities, Level 1 being the lowest and Level 5 being the highest; see Table 4.3 for the training and qualifications included in each level. Level 1 and 2 qualifications are roughly based on achieving certain minimum grades on General Certificates of Secondary Education (GCSEs); these are primarily completed while individuals are still in secondary school. Level 3 qualifications may include A-levels, which are generally finished towards the end of secondary school and upon which university admittance may rely, or a Leaving Certificate (similar to a high school diploma). Level 4 qualifications include post-secondary education, though not necessarily ending in a degree, and Level 5 qualifications include postgraduate education, at either the Master's or Doctoral/Professional level. In addition to the variables created for the five NVQ levels, education variables are also created for mothers who report "Overseas academic qualifications" (291 observations) and for mothers who report that they have attained none of the NVQ levels (1189 observations). The control group will be those mothers who have obtained none of the NVQ levels.

The family's total income is reported in the MCS as the OECD Equivalised weekly net income. These income data are used to create appropriate income quartiles, with the first income quartile being the lowest and the fourth being the highest. The relevant income cut-offs are £172.02, £275.31 and £433.63 (weekly incomes, measured in pounds). For the 76 observations for which family income is not reported, poverty status is reported, specifically if the family's income falls below the 60% median income level. These observations are split according to whether their family incomes are above or below the 60% median. If the family is not in poverty (above 60%), they have a 37.5% chance of being in the third income quartile and

a 62.5% likelihood of being in the fourth income quartile, so the third and fourth quartile indicators are assigned those relative probabilities. If they are in poverty (below the 60% median), they have a 16.7% chance of being in the third quartile and a 41.7% chance each of being in the first or second quartiles; thus the appropriate probabilities are assigned to each of those income quartiles for the observations in which the family is in poverty. Of the income quartiles, the fourth (the highest) is used as the control group and excluded from the analysis so that the interpretation of the other three income quartiles is relative to the highest one. The country in which the family resides is reported from among England, Wales, Scotland and Northern Ireland; every family in the sample reports a country. Northern Ireland will be used as the control group among the countries and excluded from the analysis. The families' residences are also categorized as Urban versus Rural. The MCS data utilize a settlement-based approach in which there are four types of settlements: Urban (population greater than 10,000), Town and Fringe, Village or Hamlet and Isolated Dwellings. The first designation is considered to be Urban while the remaining three are Rural. There are 1549 families for whom the Urban/Rural designation is not known who are captured by the variable for missing Urban/Rural designation.

Mother's weight status (either Overweight, including Obese, or Strictly Obese) is determined by calculating BMI before pregnancy (using pre-pregnancy weight and height) for each woman in the sample. The resulting BMIs must be checked for reasonableness, so an indicator for valid BMI (positive and less than 100) is used as so that only valid BMIs are used for defining weight status. In the sample, 7090 mothers (90.2%) have a valid BMI. Of the 770 that are excluded, 623 are missing only weight information, 74 are missing only height information and the remaining 73 are missing both height and weight information. The resulting BMIs range from 11.7 kg/m^2 (for a mother who was 1.65 m and 31.8 kilos) to 59.2 kg/m^2 (for a mother who was 1.6 m and 151.5 kilos) with an average of 23.7 kg/m^2. Overweight and Obese indicators are then created for mothers with valid BMIs at or above 25 kg/m^2 and 30 kg/m^2 respectively. Recall by these definitions that the Overweight category will also include Obese mothers. Since the 770 mothers (9.8%) with non-valid calculated BMIs are assumed to be neither overweight nor obese, these categories may be understated. Finally, the MCS includes information on if a mother stopped smoking specifically because she was pregnant, so

this information will be included along with the indicator for smoking during pregnancy. It may be that a mother who previously smoked and stopped for the health of her child in utero will also make healthier considerations for her child once he or she is born. However, it may also be that prior smoking is indicative of other unhealthy behaviors.

Descriptive Statistics

For summary statistics (including minimum, maximum, mean and standard deviation) for the sample (n = 7860) being used in this analysis see Table 4.4. In this sample 10.4% of the children are obese and 24.3% are overweight (including obese, so 13.9% are strictly overweight), child age ranges from six years and almost six months to just over eight years, with the average child age being seven years and three months, and 49.5% of the children are girls. In the total MCS population, 49.3% of the children are girls while 6% of the children are obese and another 15% are strictly overweight. Of the children in this sample, 66.6% were breastfed with the largest proportion having been breastfed for less than a month (21.2%) followed by more than six months (17.1%), one to three months (16.4%) and three to six months (12.0%). By ethnicity, 8.1% are Pakistani or Bangladeshi, 3.6% are Black, 2.3% are Indian and 4.3% are of mixed or of other ethnicities. In the entire MCS population, 6.4% are Pakistani or Bangladeshi, 3.3% are Black, 2.5% are Indian and 4.1% are of mixed or of other ethnicities and 66.9% were breastfed. The sample seems to be fairly representative both in terms of ethnicity and by breastfed status. Average birth weight for the children for whom it is reported (99.8% of the sample) is 3.33 kilograms or 7 pounds, 5.4 ounces and 40.3% of the children in the sample are firstborns.

For the mothers' statistics, 28.17% used alcohol while pregnant with the child, while 13.1% and 18.1%, respectively, stopped smoking or continued smoking cigarettes during pregnancy with the child. Mothers ranged from 14 to 51 years of age at birth of the child, with the average being 27.9 years. Before pregnancy, 26.8% of mothers in the sample were overweight and 8.5% of the mothers were obese (keeping in mind that the mothers who are obese are also overweight, so the percentage of mothers who were overweight but not obese is 18.3%). With regards to education, the largest proportions of mothers in the sample have NVQ of Level 2 (28.3%) or Level 4 (25.1%) followed by those with Level 3 (14.5%), Level 1

(8.5%), or Level 5 (4.8%). The same is generally true of the population with the proportion of mothers with Level 4 qualifications (30.3%) being slightly higher than those with Level 2 (26.4%), followed by Level 3 (15.2%), Level 1 (7.0%) and Level 5 (6.8%). There are also 15.1% of mothers in the sample with none of those NVQ levels as well as 3.7% who obtained their education "overseas". In terms of household composition, a total of 561 (7.1%) of the children are growing up with another non-parent adult (grandparent, other relative, etc.) in the household. With regards to a father figure in the child's life, 75.4% of the mother-child pairs in the sample have a male father figure present in the household with 71.6% of these father figures being the child's natural father, 21.6% being stepfathers and 6.7% being of some other relationship. For 1.3% of the children, the father figure is not employed while the mother is employed. Among the parental couples, 54.0% are married, 16.3% are cohabiting and 5.1% define their relationship in some other way. In the entire MCS population, 69.4% of households have both natural parents (54.7% married, 13.4% cohabiting) and 5.7% have the natural mother and a stepfather while 21.5% have a single natural mother. Thus, single-mother households may be slightly oversampled here (24.6%) but overall the sample seems fairly representative by household composition. Family income ranges from £11.67 per week to £1282.54 a week, with the average being a weekly income of £333.87. Families reside primarily in England (65.8%) followed by Wales (14.5%), Scotland (10.9%) and Northern Ireland (8.8%), and 67.3% of families live in an Urban area. This closely approximates the MCS population in which 64.1% of families live in England, 14.2% in Wales, 11.7% in Scotland and 9.9% in Northern Ireland and in which 64.5% live in Urban areas.

Finally, Table 4.4 also includes information on all of the occupation categories. Homemakers comprise 52.7% of the sample; among the homemakers, 73.7% provide information on their relationship with their male partner: 52.2% are married, 16.5% are cohabiting and 5.0% have some other relationship. In the MCS population, 33.8% of women are not employed because they are homemakers and 4.7% are not employed for other reasons while 61.5% are employed. Comparatively, only 39.6% of the women in this sample are employed and 7.7% are not employed for reasons other than homemaking, so not employed women, but specifically homemakers, have been oversampled while employed women have

been underrepresented. Of the employed women, the largest proportion (17.1%%) work in Food Preparation/Serving-Related or Personal Care/Service occupations, followed closely by Office and Administrative Support occupations (16.8%), Life, Physical, or Social Science or Education, Training and Library occupations (14.1%), Management occupations (12.7%), Sales and Related occupations (10.0%) and Community/Social Service or Healthcare Support occupations (9.2%).

Estimation and Results, Child Obese

As with the U.S., the econometric model will be fit with a probit on the dependent variable that the child is obese, based on mother's occupation category and a variety of other child, mother (including mother's pre-pregnancy weight status), and family characteristics. For the occupation indicators, a mother not being employed is used as the control and is thus excluded from the model. The results of the final estimation are presented in Table 4.5 with marginal effects in Table 4.6. Similar to the U.S., obesity risk varies with ethnicity; Black children in the U.K. are 10.9% more likely to be obese while Pakistani and Bangladeshi children and children of other ethnicities are 3.5% and 6.1%, respectively, more likely to be obese. Unlike in the U.S., obesity risk for children in the U.K. does differ between genders, with girls being 1.4% more likely to be obese; however, the risk of obesity is not impacted based on whether the child was the firstborn of the family. Child age in this model also does not alter the child's risk of obesity. However, the children in the sample are all within about 18 months of age of one another, so there is not a lot of variation in ages to measure. A child's birth weight is positively correlated with obesity risk, with every additional kilo at birth increasing the child's risk of obesity by 2.8%, but the birth weight effect for the group for whom birth weight was missing is not significant (likely because that group is quite small). Additionally and surprisingly, whether and the length of time for which a child was breastfed is not significant in this model, individually or jointly, despite previous studies finding that mothers who work full-time are less likely to breastfeed their children (Hawkins et. al, 2007). The impact of breastfeeding in this analysis appears to be primarily controlled by the mother's level of education, as when the education variables (the mother's NVQ level) are excluded, the length of time breastfed variables are jointly more significant, though still not at the 10% level.

The most significant variables in this model are those that focus on the mother's health and choices before and during pregnancy. As expected, a mother's cigarette use during pregnancy increases her child's risk of obesity (by 3.7%), but the risk of obesity for children whose mothers smoked before becoming pregnant and quit during pregnancy is also increased compared to those children whose mothers never smoked (by 2.0%). It appears that a mother ever choosing to smoke may be an indicator of overall unhealthy choices, but the effect is somewhat mitigated if the mother begins to make healthier choices once pregnant. One surprising effect is regarding a mother's use of alcohol during pregnancy; for mothers who drink alcohol during pregnancy, their children's risk of obesity later in life actually declines by 1.3%. This relationship has not previously been studied and would be interesting for future research. Initially it seemed as though this relationship might be due to the relationship between alcohol use during pregnancy and child's birth weight. However, a test of the correlation between the two revealed no correlation between the two variables (a correlation coefficient of 0.0689).

As in the U.S., including a mother's pre-pregnancy weight status in the analysis provides interesting results. Just as a mother's current weight status has been shown to be correlated with her child's weight status (with overweight or obese mothers having overweight or obese children), a mother's pre-pregnancy weight status also seems to affect her child's likelihood of obesity. A mother being overweight (BMI ≥ 25) or obese (BMI ≥ 30) before she became pregnant with the child increases her child's probability of being obese later in life by 5.4% and 7.7%, respectively. These results are statistically significant at the 1% level for both overweight and obese mothers. The inclusion of a mother's education provides additional interesting results. Of the five possible levels of NVQ plus whether a mother was educated overseas, those mothers with NVQ Levels 3 or 4 are both shown to have children with lower risks of obesity (2.1% and 2.5%, respectively), as compared to mothers with none of the NVQ levels. NVQ Level 3 is roughly equivalent to having graduated from secondary school while NVQ Level 4 is roughly equivalent to having completed some post-secondary education or attaining a post-secondary degree. In this sample, 14.5% and 25%, respectively, of the mothers have attained education equivalent to NVQ Levels 3 and 4. Despite these individual impacts, a joint test of significance of education reveals that it is not jointly significant at the 10% level.

The household effects also provide some interesting details. Children being raised in households with a father figure present are no more or less likely to be obese, but if that father figure is not employed while the mother is, the child's likelihood of being obese decreases by 5.1%. The impact of having another (non-parent) adult (for instance, a grandparent or other family member) in the household is not found to be statistically significant at the 10%, though. At approximately the 12% level, however, having an additional adult in the household is shown to increase the child's risk of obesity by 2.1%. An additional adult in the household could have several impacts on a child's health. It may be that the additional adult lives with the family due to requiring extra care, which would detract from the parents' financial, time and other resources with which to care for the child. It could also be that the additional adult, while potentially not requiring any extra care, is an unhealthy influence on the child's weight status through factors such as additional unhealthy snacks. Interestingly, these three variables (whether there is a male adult in the household, whether that male is not employed while the mother is and whether there is an additional adult in the household) are jointly significant at the 10% level. The level of family income shows a smaller influence on child weight status, with only children of families in the third income quartile having a significantly different risk of obesity. As compared to children of families in the fourth (highest) income quartile, children of families in the third quartile are 1.7% more likely to be obese. Jointly, however, income is not significant at the 10% level.

The country in which the family resides strongly impacts a child's risk of obesity. Northern Ireland is used as the control variable among the countries, and compared to Northern Ireland, children residing in the other three countries are all less likely to be obese. The downward impact on a child's risk of obesity is the largest for children in England (a 5.4% decrease), followed by Scotland (a 4.0% decrease) and then Wales (a 2.9% decrease). This of course implies that children in Northern Ireland are at a higher risk of obesity. Jointly the countries of residence are significant at the 1% level. Whether a child resides in an Urban area, as opposed to one classified as Rural, as well as if this information is not reported are both significant and each increases a child's risk for obesity, by 1.9% and 3.4%, respectively. The Urban effect may be caused by greater access to unhealthy, convenience foods or by the child

potentially doing less physical work, as children in Rural areas may be more likely to help on family farms or with livestock-raising. Finally, the impact of a mother's specific chosen occupation on child obesity turns out to be of no consequence. For mothers who are employed, no one occupation category significantly increases or decreases a child's risk of obesity over another, relative to children of mothers who are not employed for purposes of homemaking or for other reasons. This raises the interesting question as to whether the impact of occupations would be the same if Homemaker was viewed as an occupation category and it plus all the other occupation categories were instead compared to no employment for reasons other than homemaking. The marginal effects of this estimation are given in Table 4.7. As expected, the results on all the variables other than the occupation categories remain the same. With respect to occupations, there is one significant development. Relative to children of mothers who are not employed for reasons other than homemaking, children of mothers in Occupation category 17, Office or Administrative Support occupations, are 2.8% less likely to be obese. However, occupations in this specification are still not jointly significant.

Estimation and Results, Child Overweight

In the model being considered, the dependent variable of interest is childhood obesity; however, there is reason to consider whether the risk factors are similar for children being overweight or obese as opposed to obese only. Again, children who are overweight but not obese face many of the same health consequences as obese children, and some of them may not be very far away from being classified as obese. Thus the econometric model will also be fit to a probit with the dependent variable of "Overweight," an indicator which represents whether the child is at or above the 85^{th} percentile of weight-for-height for his or her age and gender. For occupation categories, all mothers who are not employed, regardless of the reason, will continue to be used as the control and excluded from the analysis. Results for this specification are available in Table 4.8.

Somewhat surprisingly, significance of several of the risk factors for a child being overweight or obese varies from the specification focusing solely on child obesity. The impact of ethnicities changes, with children of mixed or other ethnicities no longer being at an increased risk, which would suggest that children of these ethnicities tend to be obese specifically, not

necessarily only overweight. However, several other variables are shown to affect the child's risk of being overweight or obese when they were not significant on the risk of obesity alone. The children for whom birth weight is not reported are more likely to be overweight, and at a much higher risk than those for whom birth weight is reported (34.7% versus 7.7%), though for those for whom it is reported, birth weight continues to be positively correlated with overweight or obesity risk. A child being breastfed now has the expected impact of decreasing the child's likelihood of being overweight or obese, if the child is breastfed longer than one month, even while controlling for mother's education. Having been breastfed decreases a child's risk of obesity by 2.8%, 3.1% and 2.7%, respectively, for children who are breastfed between one and three months, between three and six months and longer than six months. Jointly, the breastfeeding variables are significant at approximately the 12% level. Somewhat unexpectedly, a child being the firstborn of a family actually increases his or her likelihood of being overweight later in childhood by 2.5%. However, as previously hypothesized, it is possible that when a mother has only one child she chooses to return to employment but after having more children becomes a homemaker. In this case, the firstborn child actually suffers the deleterious effects of mother's employment more so than siblings who come later.

The impact of many of the maternal choices and characteristics before or during pregnancy continue to be significant in this specification. A mother's cigarette use during pregnancy continues to increase her child's risk of being overweight or obese, by 7.1%. If the mother used alcohol during pregnancy or was previously a smoker and stopped due to pregnancy no longer significantly impact her child's weight status. In this specification, though, the indicator of whether the information on a mother using alcohol or cigarettes during pregnancy is not reported is significant. As in all the specifications, a mother herself being overweight or obese before pregnancy increases her child's probability of being overweight or obese, with a mother having been overweight increasing her child's likelihood of also being overweight by 9.5% and a mother having been obese increasing the child's likelihood by 13.7%. The impact of a mother's level of education is maintained in this specification, but the education variables are still not jointly significant.

Interestingly, whether an additional adult besides the parents lives in the household has a significant impact on a child's overweight or obesity risk, increasing it 3.7%. As mentioned previously, this may be due to several factors, including a strain on family resources or potentially unhealthy decisions influenced by the additional adult. In this specification, though, whether the father figure in the house in not employed while the mother is employed is no longer significant. The income variables are neither individually or jointly significant on the child's risk of overweight, including obesity. While living in England or Scotland continues to decrease a child's likelihood of overweight or obesity, by 6.7% and 5.2%, respectively, living in Wales no longer has a significant impact nor does living in an Urban area. Finally, the results on the occupation categories are relatively similar in that most of them are not significant at the 10% level, with the exception of one. Children of mothers who are employed in Community/Social Service or Healthcare Support occupations are 5.1% more likely to be overweight or obese than children of mothers who are not employed. This could stem from several factors, and as with the significant occupations for the U.S., attributes of these occupations that could make them worse on a child's health will be discussed in Chapter 5.

Estimation and Results, by Employment Type

Given the relative insignificance of a mother's specific occupation category on her child's risk of obesity but the past results that the mother's employment increases the child's risk, it is of interest to examine other ways in which the employment of mothers can be categorized to see what aspects of employment are driving this relationship. The MCS data include information on the mother's type of employment, specifically if the mother is self-employed, is an employee of someone else or is a manager/supervisor. If the mother is self-employed or in management, details are provided on the size of the company; this creates a total of seven possible types of employment. A table detailing the seven types along with the percentage of the sample and of the population in each is available in Table A.III.1 in Appendix III.

These occupation types will be used similarly to the occupation categories in an additional specification of the model. A probit on whether a child is obese is fit, using the same child, mother and family characteristics as have been used previously but now using mother's

type of employment instead of her occupation category to capture the employment information. As before, mothers who are not employed (either as Homemakers or for other reasons) will be the control group. Additionally, the employment type Self-Employed in a large organization is a perfect predictor of whether the mother's child is obese, due to only having one observation in the sample, a child who is not obese. Due to the perfection prediction, the variable Self-Employed, Large will be excluded from this specification. The results of this specification are also available in Appendix III, in Table A.III.2.

Besides a few small magnitude changes, all of the other non-employment/occupation independent variables have the same impact on child obesity and at the same significance level. Child ethnicity continues to play an important role with the only difference in this specification being that children who are Pakistani or Bangladeshi or Black are at a slightly lower risk of obesity than in the occupation model. The risk decreases to 3.3%, from 3.5%, for Pakistani and Bangladeshi children while the risk decreases from 10.9% to 10.7% for black children. All of the other child variables have the same impact, with the same magnitude, as in the occupation model. For maternal characteristics, the only variables that see any different effects are pre-pregnancy weight status and the education variables, and again, the only change is one in the magnitudes of the effects. The effect of a mother's pre-pregnancy weight status is largely unchanged; a mother being strictly obese before pregnancy increases her child's risk of obesity by 7.6% in this specification (as opposed to 7.7%). Children of mothers who have education equivalent to NVQ Levels 3 or 4 are still less like to be obese compared to children of mothers with education equivalent to none of the NVQ levels. The risk decreases just slightly, with children of mothers educated at a NVQ Level 3 being 2.3% less likely to be obese (versus 2.1%) and those of mothers educated at a NVQ Level 4 being 2.6% less likely to be obese (as compared to 2.5%). The only household variable that has any different impact is income, with children of families in the third income quartile being 2.0% more likely to be obese compared to children of families in the fourth (highest) income quartile. For reference, this effect was a decrease of 1.7% in the previous specification.

Of the included employment types, two are significant: a child's mother being self-employed in an organization with only one's self or employed as a manager in a large

organization. Children of mothers who are self-employed in an organization with only one's self are 3.1% less likely to be obese as compared to children whose mothers are not employed. It would seem that this employment type, while requiring a good deal of responsibility, would provide the most flexibility for the mother in accommodating family and child needs. This type of employment requires the mother to report to no one but herself unlike the other six types. A child of a mother working as a manager in a large organization (where large is defined to be 25 or more people) is 6.6% more likely to be obese. As previously discussed, this may be due to the level of responsibility that comes with the job. As a manager, the mother may have far more work to do than she has time in the work day, forcing her to bring work home with her. She may also be called at home about issues that arise in the workplace or, depending on the job, even called back into the office or job site after normal working hours or on weekends. The employment types are jointly significant at the 8% level.

Since the country effects have been significant in every variant of the model, the question arises as to whether the impact on child obesity by employment type differs among countries. In order to test this, interaction variables will be created for each of the seven employment types in each of the four countries, for a total of 28 types of employment by country. However, due to small sample sizes for some of the categories, some classifications will be combined. These include all mothers who are self-employed in large organizations, all mothers who are self-employed in small organizations and all mothers who are managers of small organizations in Scotland and Wales. For employment categories, mothers who are not employed, for any reason, will continue to be used as the control group. The results from this specification are available in Table A.III.3 in Appendix III.

The non-employment/occupation variables are again robust to this specification with no significant differences in those variables between this version and the one immediately preceding this, examining child obesity risk by only general employment type. With the addition of country information, the employment variables are jointly significant at the 5.25% level. The results show that the mothers who are self-employed in organizations with only themselves who have children at a lower risk of obesity are specifically those in England. The impact solely of a mother being self-employed in this setting in England is a 4.1% decrease in her child's

likelihood of being obese (this doesn't take into account the additional decrease from living in England). Additionally, the managers of large organizations who are more likely to have obese children are those specifically living in Scotland and Northern Ireland. The impact of this type of employment in Scotland and Northern Ireland, again solely due to the employment type, is an increase of 32.4% in the child's risk of obesity, in each country. Given the impact of living in Scotland on decreasing a child's risk of obesity, this impact will be mitigated some when the collective impact is considered. For children of mothers in large organization management roles in Northern Ireland, though, this impact will be even more detrimental when combined with the already harmful impact of living in Northern Ireland on children's risk of obesity. These country-specific effects suggest something about employment in a company in one country as compared to another. It may be the case that Scottish and Northern Irish companies have less family-friendly policies or that Welsh and English companies have more family-friendly policies (such as flexible working times or more generous leave time – vacation, sick, personal days, etc.). The countries may also have differing proportions of jobs available that do or do not have a deleterious impact on children or the family. All of this suggests that further examination of the impacts by country of residence would be useful.

Table 4.1: Variable Definitions for Variables included in the U.K. Analysis

Variable	Definition
Obese	=1 if the child is obese; =0 otherwise
Overweight	=1 if the child is overweight (or obese); =0 otherwise
ChildAgeMos	The child's age in months, at the time of the interview
FemaleChild	=1 if the child is girl; =0 otherwise
ChildMixedEthnic	=1 if the child is of mixed ethnicity; =0 otherwise
ChildIndian	=1 if the child is Indian; =0 otherwise
ChildPakistBanglad	=1 if the child is Pakistanian or Bangladeshian; =0 otherwise
ChildBlack	=1 if the child is Black or Black British; =0 otherwise
ChildOtherEthnic	=1 if the child is of another named ethnic group, including Chinese; =0 otherwise
MissingBirthWght	=1 if the child's birth weight is not reported; =0 otherwise
ChildBirthWght	The child's birth weight in kilos, for the children for whom birth weight is reported
ChildBreastfed	=1 if the child was breastfed; =0 otherwise
BFLessOneMo	=1 if the child was breastfed for a month or less; =0 otherwise
BFOnetoThreeMos	=1 if the child was breastfed more than one month, up to three months; =0 otherwise
BFThreetoSixMos	=1 if the child was breastfed more than three months, up to six months; =0 otherwise
BFPastSixMos	=1 if the child was breastfed more than six months; =0 otherwise
Firstborn	=1 if the child is the firstborn in the family; =0 otherwise
MissingAlclCigUse	=1 if the mother's alcohol or cigarette use during pregnancy is not reported; =0 otherwise
AlcoholDurPreg	=1 if the mother drank alcohol during pregnancy with the child (and alcohol use is reported); =0 otherwise
CigDurPreg	=1 if the mother smoked cigarettes during pregnancy with the child (and cigarette use is reported); =0 otherwise
StoppedSmoking	=1 if the mother stopped smoking while pregnant with the child; =0 otherwise
MotherAgeBirth	The mother's age, in years, at the time of birth of the child
MotherOverwtPreChild	=1 if the mother was overweight before becoming pregnant with the child; =0 otherwise
MotherObesePreChild	=1 if the mother was obese before becoming pregnant with the child; =0 otherwise
Mother's Education	
MotherNoneEd	=1 if the mother has attained none of the National Vocational Qualification levels; =0 otherwise

Table 4.1: (Continued)

Variable	Definition
MotherNVQ1	=1 if the mother's National Vocational Qualification is Level 1; =0 otherwise
MotherNVQ2	=1 if the mother's National Vocational Qualification is Level 2; =0 otherwise
MotherNVQ3	=1 if the mother's National Vocational Qualification is Level 3; =0 otherwise
MotherNVQ4	=1 if the mother's National Vocational Qualification is Level 4; =0 otherwise
MotherNVQ5	=1 if the mother's National Vocational Qualification is Level 5; =0 otherwise
MotherOverseasEd	=1 if the mother received her education overseas with no equivalent NVQ Level; =0 otherwise
OtherAdultinHH	=1 if there is another adult outside of the mother or father figure living in the household; =0 otherwise
MaleAdultinHH	=1 if the child has both the natural father, a step-father or another parent figure living in the household; =0 otherwise
StayHomeDad	=1 if the mother is employed and the father/step-father/other parent is not; =0 otherwise
FamilyIncome	The family's OECD Equivalized Income in the survey year (2008)
IncomeQ1	=1 if the family's total income is in the first (lowest) quartile; =0 otherwise
IncomeQ2	=1 if the family's total income is in the second quartile; =0 otherwise
IncomeQ3	=1 if the family's total income is in the third quartile; =0 otherwise
IncomeQ4	=1 if the family's total income is in the fourth (highest) quartile; =0 otherwise
Country	
England	=1 if the family resides in England; =0 otherwise
Wales	=1 if the family resides in Wales; =0 otherwise
Scotland	=1 if the family resides in Scotland; =0 otherwise
Northern Ireland	=1 if the family resides in Northern Ireland; =0 otherwise
MissingUrbanRural	=1 if whether the family residence is in an Urban or Rural area is not reported; =0 otherwise
Urban	=1 if the family resides in an Urban area; =0 otherwise
NoWorkOther	=1 if the mother is a not employed but indicates that it is for reasons other than full-time homemaking; =0 otherwise
OccHome	=1 if the mother is a full-time homemaker; =0 otherwise
Occupation Indicators	
Occupation1	=1 if the mother's occupation is *Management;* =0 otherwise

Table 4.1: (Continued)

Variable	Definition
Occupation2_7	=1 if the mother's occupation is *Business/Financial Operations or Legal*; =0 otherwise
Occupation3_4	=1 if the mother's occupation is *Computer/Mathematical or Architecture/Engineering*; =0 otherwise
Occupation5_8	=1 if the mother's occupation is *Life, Physical, or Social Science or Education, Training, or Library*; =0 otherwise
Occupation6_11	=1 if the mother's occupation is *Community/Social Service or Healthcare Support;* =0 otherwise
Occupation9	=1 if the mother's occupation is *Arts, Design, Entertainment, Sports or Media;* =0 otherwise
Occupation10	=1 if the mother's occupation is *Healthcare Practitioner or Technical;* =0 otherwise
Occupation12	=1 if the mother's occupation is *Protective Service or Military;* =0 otherwise
Occupation13_15	=1 if the mother's occupation is *Food Preparation/Serving-Related or Personal Care/Service;* =0 otherwise
Occupation14_1820	=1 if the mother's occupation is *Building/Grounds Cleaning/Maintenance, Farming/Fishing/Forestry, Construction/Extraction, or Installation/Maintenance/Repair;* =0 otherwise
Occupation16	=1 if the mother's occupation is *Sales or Related;* =0 otherwise
Occupation17	=1 if the mother's occupation is *Office or Administrative Support;* =0 otherwise
Occupation21_22	=1 if the mother's occupation is *Production or Transportation/Material Moving;* =0 otherwise

Table 4.2: Definition of Child Ethnicity Groups in the MCS Data, by Country

White
England: White - British, White - Irish, Any other White background
Wales: White - Welsh, White - other British, White - Irish, Any other White background
Scotland: White - Scottish, White - other British, White - Irish, Any other White background
N. Ireland: White, Irish Traveller
Mixed
England: Mixed - White and Black Caribbean, Mixed - White and Black African, Mixed - White and Asian, Any other mixed background
Wales: Mixed - White and Black Caribbean, Mixed - White and Black African, Mixed - White and Asian, Any other mixed background
Scotland: Any mixed background
N. Ireland: --
Indian
England: Asian/Asian British - Indian
Wales: Asian/Asian British - Indian
Scotland: 'Asian/Asian Scottish - Indian
N. Ireland: Indian
Pakistani and Bangladeshi
England: Asian/Asian British - Pakistani, Asian/Asian British - Bangladeshi
Wales: Asian/Asian British - Pakistani, Asian/Asian British - Bangladeshi
Scotland: Asian/Asian Scottish - Paksitani, Asian/Asian Scottish - Bangladeshi
N. Ireland: Pakistani, Bangladeshi
Black or Black British
England: Black/Black British - Caribbean, Black/Black British - African, Any Other Black background
Wales: Black/Black British - Caribbean, Black/Black British - African, Any Other Black background
Scotland: Black/Black Scottish - Caribbean, Black/Black Scottish - African, Any Other Black background
N. Ireland: Black Caribbean, Black African, Black Other
Other Ethnic group (including Chinese and Other)
England: Chinese, Any other Asian background, Any other background
Wales: Chinese, Any other Asian background, Any other background
Scotland: Asian/Asian Scottish - Chinese, Any other Asian background, Any other background
N. Ireland: Chinese, Mixed ethnic group, Any other background

Table 4.3: Classification of National Vocational Qualifications (NVQ) into Levels, as Defined in the MCS Data

NVQ Level 1
CSE below grade 1/GCSE or O Level below grade C; SCE Standard; Ordinary grades below grade 3 or Junior Certificate below grade C
NVQ Level 2
O Level or GCSE grade A-C; SCE Standard; Ordinary grades 1-3 or Junior Certificate grade A-C
NVQ Level 3
A/AS/S Levels/SCE Higher; Scottish Certificate Sixth Year Studies; Leaving Certificate or equivalent
NVQ Level 4
First Degree (including B.Ed.) Diplomas in higher education and other higher education qualifications Teaching qualifications for schools or further education (below degree level)
NVQ Level 5
Higher Degree and Postgraduate qualifications Post-graduate Diplomas and Certificates

Table 4.4: Summary Statistics for Variables Included in the U.K. Analysis

Variable	Obs	Mean	Std. Dev.	Min	Max
Obese	7860	0.1042	0.3055	0	1
Overweight	7860	0.2429	0.4288	0	1
ChildHeight (in cm)	7860	123.39	5.64	87	144.8
ChildWeight (in kilos)	7860	25.51	5.07	13.2	81
BMI (kg/m^2)	7860	16.65	2.43	10.11	44.63
ChildAgeMos	7860	86.87	2.97	77.79	96.69
FemaleChild	7860	0.4949	0.5000	0	1
ChildMixedEthnic	7860	0.0296	0.1696	0	1
ChildIndian	7860	0.0233	0.1508	0	1
ChildPakistBanglad	7860	0.0805	0.2721	0	1
ChildBlack	7860	0.0361	0.1866	0	1
ChildOtherEthnic	7860	0.0131	0.1137	0	1
MissingBirthWght	7860	0.0017	0.0406	0	1
ChildBirthWght (in kilos)	7847	3.33	0.60	0.39	7.23
ChildBreastfed	7860	0.6660	0.4717	0	1
BFLessOneMo	7860	0.2120	0.4087	0	1
BFOnetoThreeMos	7860	0.1639	0.3702	0	1
BFThreetoSixMos	7860	0.1202	0.3252	0	1
BFPastSixMos	7860	0.1710	0.3765	0	1
Firstborn	7860	0.4031	0.4905	0	1
MissingAlclCigUse	7860	0.0004	0.0195	0	1
AlcoholUseBefPreg	7860	0.2805	0.4493	0	1
CigDurPreg	7860	0.1807	0.3848	0	1
StoppedSmoking	7860	0.1312	0.3376	0	1
MotherAgeBirth	7860	27.86	6.02	14	51
ValidBMI	7860	0.9020	0.2973	0	1
MotherHeight (in meters)	7090	1.63	0.07	1.22	2.06
MotherWtBeforePreg (in kilos)	7090	63.38	13.05	28	151.5
MotherBMIBeforePreg (kg/m^2)	7090	23.71	4.63	11.65	59.18
MotherOverwtPreChild	7860	0.2683	0.4431	0	1
MotherObesePreChild	7860	0.0846	0.2783	0	1
MotherNoneEd	7860	0.1510	0.3581	0	1
MotherNVQ1	7860	0.0849	0.2787	0	1
MotherNVQ2	7860	0.2830	0.4505	0	1
MotherNVQ3	7860	0.1449	0.3520	0	1
MotherNVQ4	7860	0.2510	0.4336	0	1
MotherNVQ5	7860	0.0482	0.2142	0	1
MotherOverseasEd	7860	0.0369	0.1885	0	1

Table 4.4: (Continued)

Variable	Obs	Mean	Std. Dev.	Min	Max
OtherAdultinHH	7860	0.0714	0.2575	0	1
MaleAdultinHH	7860	0.7539	0.4307	0	1
StayHomeDad	7860	0.0131	0.1137	0	1
FamilyIncome	7784	333.87	217.91	11.67	1282.54
IncomeQ1	7860	0.2476	0.4316	0	1
IncomeQ2	7860	0.2476	0.4316	0	1
IncomeQ3	7860	0.2512	0.4311	0	1
IncomeQ4	7860	0.2536	0.4325	0	1
England	7860	0.6581	0.4744	0	1
Wales	7860	0.1448	0.3519	0	1
Scotland	7860	0.1089	0.3115	0	1
Northern Ireland	7860	0.0882	0.2836	0	1
MissingUrbanRural	7860	0.1971	0.3978	0	1
Urban	7860	0.6729	0.4692	0	1
NoWorkOther	7860	0.0774	0.2672	0	1
OccHome	7860	0.5266	0.4993	0	1
Occupation Categories					
Occupation1	7860	0.0501	0.2182	0	1
Occupation2_7	7860	0.0163	0.1266	0	1
Occupation3_4	7860	0.0048	0.0694	0	1
Occupation5_8	7860	0.0560	0.2299	0	1
Occupation6_11	7860	0.0363	0.1869	0	1
Occupation9	7860	0.0052	0.0720	0	1
Occupation10	7860	0.0212	0.1442	0	1
Occupation12	7860	0.0034	0.0585	0	1
Occupation13_15	7860	0.0676	0.2510	0	1
Occupation14_1820	7860	0.0202	0.1408	0	1
Occupation16	7860	0.0394	0.1947	0	1
Occupation17	7860	0.0664	0.2490	0	1
Occupation21_22	7860	0.0090	0.0946	0	1

Table 4.5: Probit Estimates of the Impact of Maternal Occupation on Whether Child is Obese in the U.K. (z-statistics in parentheses)

Variable	*Obese*		Variable	*Obese*	
ChildAgeMos	0.009	(1.31)	*OtherAdultinHH*	0.116	(1.54)
FemaleChild	0.083**	(2.09)	*MaleAdultinHH*	-0.038	(-0.73)
ChildMixedEthnic	0.177	(1.56)	*StayHomeDad*	-0.399*	(-1.78)
ChildIndian	0.002	(0.01)	*IncomeQ1*	-0.024	(-0.31)
ChildPakistBanglad	0.187**	(2.26)	*IncomeQ2*	0.026	(0.39)
ChildBlack	0.494***	(5.09)	*IncomeQ3*	0.104*	(1.72)
ChildOtherEthnic	0.305*	(1.85)	*England*	-0.303***	(-3.38)
MissingBirthWght	0.268	(0.49)	*Wales*	-0.191**	(-2.01)
ChildBirthWght	0.168***	(4.78)	*Scotland*	-0.277***	(-3.07)
BFLessOneMo	-0.060	(-1.11)	*MissingUrbanRural*	0.191**	(2.01)
BFOnetoThreeMos	0.056	(0.96)	*Urban*	0.116*	(1.77)
BFThreetoSixMos	-0.081	(-1.11)	*Occupation1*	0.048	(0.50)
BFPastSixMos	-0.058	(-0.88)	*Occupation2_7*	-0.160	(-0.89)
Firstborn	0.018	(0.39)	*Occupation3_4*	0.018	(0.06)
MissingAlclCigUse	1.009	(1.35)	*Occupation5_8*	-0.103	(-1.05)
AlcoholDurPreg	-0.082*	(-1.74)	*Occupation6_11*	0.070	(0.68)
CigDurPreg	0.203***	(3.76)	*Occupation9*	0.005	(0.02)
StoppedSmoking	0.116*	(1.89)	*Occupation10*	0.099	(0.71)
MotherAgeBirth	0.006	(1.55)	*Occupation12*	-0.213	(-0.56)
MotherOverwtPreChild	0.297***	(6.06)	*Occupation13_15*	-0.047	(-0.57)
MotherObesePreChild	0.377***	(5.50)	*Occupation14_1820*	0.014	(0.10)
MotherNVQ1	0.005	(0.06)	*Occupation16*	-0.013	(-0.12)
MotherNVQ2	-0.021	(-0.33)	*Occupation17*	-0.140	(-1.57)
MotherNVQ3	-0.136*	(-1.76)	*Occupation21_22*	0.090	(0.46)
MotherNVQ4	-0.155**	(-2.09)	*Constant*	-2.763***	(-4.46)
MotherNVQ5	-0.026	(-0.22)			
MotherOverseasEd	-0.053	(-0.48)			

Joint Tests of Significance: Chi^2 statistic given, with ($Pr>Chi^2$)in parentheses	
Occupations	6.97 (0.9038)
Education	8.91 (0.1790)
Income	5.27 (0.1529)
Pseudo R^2	0.0537
Number of Observations	7860

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10% level

Table 4.6: Probit Marginal Effects of the Impact of Maternal Occupation on Whether Child is Obese in the U.K. (z-statistics in parentheses)

Variable	*Obese*			Variable	*Obese*	
ChildAgeMos	0.001	(1.31)		*OtherAdultinHH*	0.021	(1.54)
FemaleChild	0.014**	(2.09)		*MaleAdultinHH*	-0.006	(-0.73)
ChildMixedEthnic	0.033	(1.56)		*StayHomeDad*	-0.051*	(-1.78)
ChildIndian	0.000	(0.01)		*IncomeQ1*	-0.004	(-0.31)
ChildPakistBanglad	0.035**	(2.26)		*IncomeQ2*	0.004	(0.39)
ChildBlack	0.109***	(5.09)		*IncomeQ3*	0.017*	(1.72)
ChildOtherEthnic	0.061*	(1.85)		*England*	-0.054***	(-3.38)
MissingBirthWght	0.053	(0.49)		*Wales*	-0.029**	(-2.01)
ChildBirthWght	0.028***	(4.78)		*Scotland*	-0.040***	(-3.07)
BFLessOneMo	-0.010	(-1.11)		*MissingUrbanRural*	0.034**	(2.01)
BFOnetoThreeMos	0.010	(0.96)		*Urban*	0.019*	(1.77)
BFThreetoSixMos	-0.013	(-1.11)		*Occupation1*	0.008	(0.50)
BFPastSixMos	-0.009	(-0.88)		*Occupation2_7*	-0.024	(-0.89)
Firstborn	0.003	(0.39)		*Occupation3_4*	0.003	(0.06)
MissingAlclCigUse	0.284	(1.35)		*Occupation5_8*	-0.016	(-1.05)
AlcoholDurPreg	-0.013*	(-1.74)		*Occupation6_11*	0.012	(0.68)
CigDurPreg	0.037***	(3.76)		*Occupation9*	0.001	(0.02)
StoppedSmoking	0.020*	(1.89)		*Occupation10*	0.018	(0.71)
MotherAgeBirth	0.001	(1.55)		*Occupation12*	-0.031	(-0.56)
MotherOverwtPreChild	0.054***	(6.06)		*Occupation13_15*	-0.008	(-0.57)
MotherObesePreChild	0.077***	(5.50)		*Occupation14_1820*	0.002	(0.10)
MotherNVQ1	0.001	(0.06)		*Occupation16*	-0.002	(-0.12)
MotherNVQ2	-0.004	(-0.33)		*Occupation17*	-0.022	(-1.57)
MotherNVQ3	-0.021*	(-1.76)		*Occupation21_22*	0.016	(0.46)
MotherNVQ4	-0.025**	(-2.09)				
MotherNVQ5	-0.004	(-0.22)				
MotherOverseasEd	-0.009	(-0.48)				
Joint Tests of Significance: Chi^2 statistic given, with ($Pr>Chi^2$)in parentheses						
Occupations	6.97 (0.9038)					
Education	8.91 (0.1790)					
Income	5.27 (0.1529)					
Pseudo R^2	0.0537					
Number of Observations	7860					

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10% level

Table 4.7: Probit Marginal Effects of the Impact of Maternal Occupation (including being a Homemaker) on whether Child is Obese in the U.K. (z-statistics in parentheses)

Variable	*Obese*			Variable	*Obese*	
ChildAgeMos	0.001	(1.31)		*OtherAdultinHH*	0.020	(1.52)
FemaleChild	0.014**	(2.08)		*MaleAdultinHH*	-0.006	(-0.70)
ChildMixedEthnic	0.033	(1.57)		*StayHomeDad*	-0.051*	(-1.78)
ChildIndian	0.000	(0.01)		*IncomeQ1*	-0.004	(-0.33)
ChildPakistBanglad	0.035**	(2.29)		*IncomeQ2*	0.004	(0.37)
ChildBlack	0.108***	(5.06)		*IncomeQ3*	0.017*	(1.71)
ChildOtherEthnic	0.061*	(1.85)		*England*	-0.054***	(-3.40)
MissingBirthWght	0.054	(0.50)		*Wales*	-0.029**	(-2.04)
ChildBirthWght	0.028***	(4.79)		*Scotland*	-0.040***	(-3.10)
BFLessOneMo	-0.010	(-1.13)		*MissingUrbanRural*	0.035**	(2.04)
BFOnetoThreeMos	0.010	(0.97)		*Urban*	0.019*	(1.77)
BFThreetoSixMos	-0.013	(-1.11)		*OccupationHome*[1]	-0.009	(-0.72)
BFPastSixMos	-0.009	(-0.87)		*Occupation1*	0.000	(0.02)
Firstborn	0.003	(0.36)		*Occupation2_7*	-0.030	(-1.08)
MissingAlclCigUse	0.287	(1.36)		*Occupation3_4*	-0.004	(-0.09)
AlcoholDurPreg	-0.013*	(-1.75)		*Occupation5_8*	-0.023	(-1.27)
CigDurPreg	0.037***	(3.73)		*Occupation6_11*	0.004	(0.21)
StoppedSmoking	0.020*	(1.88)		*Occupation9*	-0.006	(-0.13)
MotherAgeBirth	0.001	(1.54)		*Occupation10*	0.009	(0.36)
MotherOverwtPreChild	0.054***	(6.05)		*Occupation12*	-0.036	(-0.67)
MotherObesePreChild	0.076***	(5.47)		*Occupation13_15*	-0.015	(-0.90)
MotherNVQ1	0.000	(0.03)		*Occupation14_1820*	-0.005	(-0.21)
MotherNVQ2	-0.004	(-0.39)		*Occupation16*	-0.009	(-0.48)
MotherNVQ3	-0.022*	(-1.82)		*Occupation17*	-0.028*	(-1.70)
MotherNVQ4	-0.026**	(-2.16)		*Occupation21_22*	0.007	(0.21)
MotherNVQ5	-0.006	(-0.30)				
MotherOverseasEd	-0.009	(-0.49)				

Joint Tests of Significance: Chi2 statistic given, with (Pr>Chi2)in parentheses

Occupations	7.49 (0.9141)
Education	9.18 (0.1639)
Income	5.29 (0.1516)

[1] Excluded employment category Is not employed for reasons other than being a homemaker

Pseudo R2	0.0538
Number of Observations	7860

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10% level

Table 4.8: Probit Marginal Effects of the Impact of Maternal Occupation on whether Child is Overweight in the U.K. (z-statistics in parentheses)

Variable	*Overweight*		Variable	*Overweight*	
ChildAgeMos	0.001	(0.46)	*OtherAdultinHH*	0.037*	(1.88)
FemaleChild	0.040***	(4.10)	*MaleAdultinHH*	-0.020	(-1.56)
ChildMixedEthnic	0.039	(1.30)	*StayHomeDad*	-0.029	(-0.66)
ChildIndian	0.011	(0.32)	*IncomeQ1*	0.017	(0.90)
ChildPakistBanglad	0.047**	(2.16)	*IncomeQ2*	0.012	(0.70)
ChildBlack	0.150***	(5.14)	*IncomeQ3*	0.022	(1.52)
ChildOtherEthnic	0.036	(0.79)	*England*	-0.067***	(-2.99)
MissingBirthWght	0.347**	(2.37)	*Wales*	-0.027	(-1.19)
ChildBirthWght	0.077***	(8.79)	*Scotland*	-0.052**	(-2.51)
BFLessOneMo	0.000	(-0.03)	*MissingUrbanRural*	0.028	(1.19)
BFOnetoThreeMos	-0.028*	(-1.95)	*Urban*	0.011	(0.68)
BFThreetoSixMos	-0.031*	(-1.82)	*Occupation1*	0.029	(1.18)
BFPastSixMos	-0.027*	(-1.76)	*Occupation2_7*	0.042	(1.02)
Firstborn	0.025**	(2.23)	*Occupation3_4*	0.019	(0.26)
MissingAlclCigUse	0.464*	(1.70)	*Occupation5_8*	-0.007	(-0.31)
AlcoholDurPreg	-0.015	(-1.34)	*Occupation6_11*	0.051*	(1.85)
CigDurPreg	0.071***	(5.07)	*Occupation9*	0.006	(0.08)
StoppedSmoking	0.020	(1.28)	*Occupation10*	0.028	(0.79)
MotherAgeBirth	0.001	(1.11)	*Occupation12*	-0.120	(-1.42)
MotherOverwtPreChild	0.095***	(7.37)	*Occupation13_15*	-0.008	(-0.39)
MotherObesePreChild	0.137***	(6.67)	*Occupation14_1820*	0.046	(1.28)
MotherNVQ1	-0.016	(-0.78)	*Occupation16*	-0.015	(-0.58)
MotherNVQ2	-0.017	(-1.07)	*Occupation17*	-0.008	(-0.39)
MotherNVQ3	-0.043**	(-2.37)	*Occupation21_22*	0.081	(1.56)
MotherNVQ4	-0.030*	(-1.69)			
MotherNVQ5	-0.019	(-0.70)			
MotherOverseasEd	-0.014	(-0.50)			

Joint Tests of Significance: Chi^2 statistic given, with ($Pr>Chi^2$)in parentheses	
Occupations	13.43 (0.4154)
Education	6.35 (0.3855)
Income	2.42 (0.4899)
Pseudo R^2	0.0494
Number of Observations	7860

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10% level

CHAPTER 5: ANALYSIS OF CHARACTERISTICS OF MATERNAL OCCUPATIONS

As previously discussed, very little is currently known about the mechanisms that underlie the relationship between maternal employment and child obesity. Since the relationship between maternal career choice and child obesity has not before been extensively studied, even less is known about the mechanisms underlying this relationship. Hence, there is interest in trying to determine what factors about specific occupations make a mother's participation in a given one any more or less likely to increase her child's risk of obesity. Understanding these mechanisms increases the likelihood that this information can be used to set appropriate and effective policies.

Data Source

Exploring the mechanisms underlying the relationship between maternal career choice and child obesity requires finding data that describe the characteristics of all possible occupations being considered. The U.S. Department of Labor/Employment and Training Administration (USDOL/ETA) has developed a database of such characteristics in the Occupational Information Network (O*Net), which has replaced the Dictionary of Occupation Titles. O*Net provides information on 277 occupation-specific traits (or "descriptors") for hundreds of occupations. The occupations are based on the U.S. Standard Occupational Classification (SOC) system, which is maintained by the Bureau of Labor Statistics. The U.S. SOC system is the primary occupation-classifying system used by U.S. Federal statistical agencies when collecting and analyzing occupation-related data. The SOC contains 840 detailed occupations, which are broken down even further into a total of 974 occupations in the O*Net-SOC taxonomy.

The O*Net data are collected in two stages. First, a random sample of businesses that employ individuals in the specific occupations is selected. Next, a random sample of individuals in the occupations in those businesses is targeted. Data are collected from those workers using standardized questionnaires. The information collected has been divided into four separate questionnaires, and each survey participant is randomly assigned to only one questionnaire, in order to reduce the burden of information required from any one individual. However, all participants provide work task and demographic information. Finally, occupational analysts

complete the information on required abilities, using the data provided by the survey respondents. Among the many traits described for each occupation are the abilities required for, the skills developed and utilized in, the work activities performed in and the work context of each specific occupation. It is these four areas that will provide possible characteristics of specific occupations that may determine the mechanisms underlying the maternal occupation choice and child obesity relationship.

Selected Variables

O*Net provides a plethora of possible characteristics to consider when studying the attributes of occupations that matter for children's health, specifically weight status. However, the focus here will be on the attributes that have been hypothesized to matter to this relationship, specifically responsibility level of, time use within and the physical nature of an occupation. As discussed previously, a mother with greater responsibility in her job may be more likely to go to the office outside of typical working hours or take work home with her. A mother's time use in her job relates to the regularity or duration of work days/weeks as well as the specific uses of time during those work days; if she is required to frequently alternate among tasks or use email in her job, it's more likely she may again be taking work home with her or be distracted when at home. Finally, a mother with a more physically-demanding job may ultimately be more fatigued at the end of a work day, making her more likely to turn to passive parenting and supervision techniques, such as fast food or the television. Additionally, it is interesting to ask whether there are characteristics of an occupation that can positively affect the relationship between a mother's occupation and her child(ren)'s health. For this reason, variables reflecting support of the parenting relationship within an occupation and development of skills that are complementary to parenting will also be identified.

O*Net data are categorized hierarchically into subsets of subcategories of categories. At the highest level, the relevant attributes will be pulled from the Worker Characteristics, the Worker Requirements and the Occupational Requirements. Within each of these categories are subcategories, which are divided further still. The variables that will be used in this analysis come, at the most foundational level, from the following categories: Abilities (specifically cognitive abilities), Skills (content, systems and resource management skills), Work Activities

(mental processes and interacting with others) and Work Context (interpersonal relationships, physical work conditions and pace and scheduling). Additionally, the Support variable of interest is available from the Work Values subset of the Interests category. For more details on the originating categories and selected variables, see Appendix IV. From these categories, 18 specific traits are chosen, that describe the five areas discussed above that may underlie the maternal career choice and child obesity relationship. See Table 5.1 for descriptions of these traits. The expected impact of the 18 traits will be discussed below.

For the *Responsibility* aspects of an occupation there are six key attributes chosen from O*Net: Importance of Judgment and Decision Making, Level of Making Decisions and Solving Problems, Level of Speaking, Level of Assisting and Caring for Others, Deal with Unpleasant or Angry People and Contact with Others. For a mother in whose job it is more important to be exercising judgment and making decisions, there may be one of two effects. The mother may want a break from all the decision-making when she gets home and thus may rely on more passive parenting and supervision techniques. Conversely, this skill may be complementary to parenting; as a mother becomes experienced at judgment and decision-making in the work place, it may carry over into her home life, providing benefits to the child. A similar argument can be made for jobs that require a high level of making decision and solving problems. However, as the level at which these skills are used gets increasingly higher, the mother may be moving into positions of increasing responsibility at work, which as discussed earlier may have a deleterious effect on her child's health status. More speaking in a job will likely be positively correlated with child's risk of obesity. Often one must prepare for such speaking in advance, which may be done at home, in the evenings or on the weekends, taking away from time with the child. It may also be more mentally exhausting as it requires a lot of time being "on the spot" at work and may lead to some mental fatigue by the end of the day. Mothers who spend a large portion of their day assisting and caring for others may be emotionally drained by the end of a work day, leaving less capacity to supervise or care for children. Similarly, mothers who are dealing with unpleasant or angry people frequently throughout the day may face some emotional fatigue from the strain and stress of those interactions. Finally, mothers who have extensive contact with others during the day may face the same kind of emotional fatigue.

However, this result may depend largely on both the type of contact (face-to-face versus telephone, for instance) as well as the personality type of the mother. Extroverted people generally enjoy contact with others, so for them this attribute could actually be energizing, leading to even better parenting at the end of a work day.

For the *Time Use* aspects of an occupation there are five key attributes chosen from O*Net: Work Schedules, Duration of Typical Work Week, Electronic Mail, Importance of Time Management and Importance of Time Sharing. The work schedules and duration of a typical work week would seem to have quite straightforward impacts on child obesity. As a mother's work schedule is more irregular, it would seem that child obesity risk would increase. As has previously been shown, as the number of hours that a mother works in a typical week increases so too does her child's risk of obesity. Frequent use of email in a job is likely to extend a mother's workday. It is often difficult to get a day's work completed and address all of the email that one receives, so it is likely that mothers may be completing their work email correspondence at home. The importance of time management and time sharing in a job do not seem to have easily predictable relationships with child obesity. It may be that mothers for whom it is important to manage time well and to shift easily between activities at work carry those skills over to the home environment. However, these factors may also present a "burn-out" rate when used so frequently during the day that mothers do not desire to use them at home as well. Greater use of time sharing specifically may also lead to mothers who are so used to doing multiple things at once that they are no longer comfortable focusing on only one thing, which could be detrimental for their children.

For the *Physical Nature* aspects of an occupation there are three key attributes: Spending time walking and running; spending time kneeling, crouching, stooping or crawling; and spending time bending or twisting the body. The effects of all three of these characteristics would seem to be straightforward to predict. Each requires some level of physical activity, which is tiring and likely leaves less energy for supervision of and play with children. The last two also require working in difficult physical positions which may lead to physical injuries or disabilities, also reducing a mother's ability to supervise and care for her child.

Occupational attributes that may have a positive impact on child's health (Complementary Skills and Support) will also be considered. For the *Complementary Skills* aspects of an occupation there are three key attributes: Level of Active Listening, Level of Training and Teaching Others, and Importance of Selective Attention. All three seem to develop competencies that would also be beneficial in parenting. Both active listening and selective attention develop in mothers the ability to be wholly present in their current setting. This means when mothers are home with their children, the mothers are likely more in tune with their children's needs as well as what is most beneficial for them. Training and teaching seems to be a natural fit to parenting; the competencies developed and perfected on the job should lead to healthier parent-child relationships, which should lead to healthier children overall. The only unpredictable aspect of these three attributes is if any of them may contribute to emotional or mental fatigue that would carry over into the home. Finally, for the *Support* aspect of an occupation there is one key attribute that measures whether the occupation has supportive management. It would seem that for mothers who can answer this question in the affirmative, it will be better for their children's long-term health and weight status. Supportive management is more likely to be understanding about the strains of being a parent in addition to an employee and to make accommodations to mitigate the challenges. This may be especially beneficial to those employees who are themselves supervisors or managers who likely have greater time commitments and responsibilities.

Data

The majority of the variables being used in the analysis have been described previously, in Chapters 3 and 4. However, it is worth mentioning specifically how the O*Net variables are measured. When an O*Net respondent answers the questionnaire, he or she ranks each of the listed attributes on a discrete scale as they specifically apply to the respondent's job. The minimum and maximum of the scale varies, based on the attribute being described. For variables for which the importance of the attribute to the job is being measured, the scale has a minimum of 1 and a maximum of 5. These variables in this analysis include Judgment and Decision Making, Time Management, Time Sharing and Selective Attention. The variables measuring the level of the attribute being used in the job are on a scale of 0 (minimum) to 7

(maximum). The included level variables are Making Decision and Solving Problems, Speaking, Assisting and Caring for Others, and Active Listening. Of the remaining nine variables, Support is considered an "Extent" variable (the extent to which management is supportive) and is measured on a scale of 1 (minimum) to 7 (maximum) and the other eight are considered "Context" variables. The Context variables have a minimum of 1 and a maximum of 5 and include Deal with Unpleasant or Angry People, Contact with Others, Work Schedules, Duration of Typical Work Week, Electronic Mail, and all three of the Physical Nature attributes. Descriptive summary statistics of the O*Net variables are given in Table 5.2 for the U.S. and in Table 5.3 for the U.K. The summary statistics for the remaining non-employment/occupation variables were given previously, in Tables 3.5 and 4.4.

Estimation and Results

The econometric models will continue to be fit with a probit on the dependent variable that the child is obese, based on the same child, mother (including mother's weight status), and family characteristics but substituting these 18 occupational traits for the occupation categories. Since these occupational attributes are not observed for women who are not employed, the Homemakers category will be included along with the 18 occupational traits. In the U.S. specification the variable indicating that a mother is employed but has not reported her occupation will also be included as, again, the O*Net variables are not known for these employed mothers. Everything else in this specification remains the same as the original specification for each of the U.S. and the U.K. The results are presented in Tables 5.4 and 5.5 for the U.S. and in Tables 5.7 and 5.8 for the U.K. The U.K. results will be discussed first as they are overall less informative.

For the U.K., as expected, this specification gives almost exactly the same results on the non-employment/occupation variables, with only the magnitudes of some of the effects varying slightly. Girls tend to have a higher likelihood of obesity as do children who are Pakistani, Bangladeshi, black or of other ethnicities. Child birth weight continues to be positively correlated with the probability of a child being obese as does a mother smoking before or during pregnancy. As before, alcohol use by the mother during pregnancy is negatively correlated with the risk of the child being obese as in the mother being educated at a NVQ

equivalent level of 3 or 4, as compared to not having an education equivalent to any of the NVQ levels. A mother's pre-pregnancy weight status continues to be robust to all specifications, significantly impacting her child(ren)'s weight status(es) with mothers who were overweight or obese before pregnancy having children who are more likely to be obese later in childhood. Household composition continues to be significant only through the child having a father figure present in the household who is not employed while the mother is employed, which continues to decrease the child's likelihood of being obese. The family's income and country of residence as well as whether that residence is Urban or Rural continue to have the same impacts. Family income quartile is not jointly significant despite children in the third income quartile being at a greater risk of obesity compared to children in the fourth (highest) quartile. Living in any country besides Northern Ireland decreases a child's risk of obesity relative to living in Northern Ireland while living in an Urban area increases the risk.

Finally, very little is significant with regards to the job attributes, much like the results on the occupation categories. Only one individual attribute is statistically significant, if the mother spends time kneeling, crouching, stooping or crawling. For every reported one-point increase (on a five-point scale) in how much time a mother spends kneeling or crawling, her child's likelihood of being obese decreases 3.5%. Several different joint tests are calculated, none of which are significant. Jointly all 18 job attributes are not significant but neither are the attributes by groups (Responsibility, Time Use, Physical Nature, and Complementary Skills) or by group calculated at their means. Overall it appears the neither a mother being employed in a specific occupation nor attributes of that occupation have much explanatory power on child obesity.

The U.S. results on job attributes have much more explanatory power. Many of the results on the non-employment/occupation variables are similar to the specification using occupation categories. Black children are at a slightly lower increased risk (13.1%) of being obese in this specification but at an increased risk nonetheless. Obesity risk continues to decrease with age but increase with birth weight or especially if birth weight is not reported. In this specification, children who are breastfed between one and three months are also significantly at a lower risk of obesity (6.3% less) along with children who are breastfed three to

six months (7.9% less). However, the breastfeeding variables are still not jointly significant at the 10% level. A child being the firstborn in a family decreases his or her risk of obesity (by 5.3%).

Having an older mother at birth continues to decrease obesity risk for the child later in life, by 1.1% for every year older the mother is at the child's birth, while mother's cigarette use during pregnancy increases obesity risk for the child by 7.2%. A mother's use of alcohol during pregnancy is still not significant in this specification. A mother being overweight or obese (BMI ≥ 25) or strictly obese (BMI ≥ 30) before she became pregnant with the child continues to be highly significant in increasing the child's probability of being obese, doing so by 7.4% and 11.3% for overweight and strictly obese, respectively. Interestingly, the impact from before pregnancy overweight mothers is larger in this specification while the impact from pre-pregnancy obese mothers is smaller. The impact of a mother's education is still the same as well with mothers who have any of a Bachelor's, Master's or Doctorate degree having children at a lower risk of obesity. Additionally, the variable indicating that the mother has education other than one of the listed degrees is significant and decreases a child's risk of obesity, the magnitude of which is between the impacts from a mother having a Master's or a Doctorate degree. The education variables are jointly significant at the 1% level.

The presence of a male adult in the household in addition to the mother and whether that male adult is not employed while the mother is employed continue to not be significant individually or jointly at the 10% level. The region in which the family resides is similarly insignificant though residing in an Urban area still makes a child less likely to be obese. The family income variables also have similar effects with only the second quartile being significant individually and income overall not being jointly significant. Finally, the Homemaker and "Other" occupation categories (for which the O*Net attributes are not known) are not statistically significant with the inclusion of the O*Net occupation characteristics.

In analyzing the characteristics of occupations that have an impact on child obesity, there are some informative and interesting results, both individually and jointly. The individual results will be discussed first followed by a discussion of the joint results. For the *Responsibility* attributes, five of the six are significant, while the level at which a mother is required to assist

and care for others in her job does not seem to impact her child's risk of obesity. The children of mothers working in jobs with greater levels of decision-making and problem-solving, speaking, and dealing with unpleasant or angry people are at a higher risk of obesity, which are all as expected. For mothers in jobs where judgment and decision-making are important and in which there is greater contact with others, their children have a lower risk of obesity. It may be that having a job in which judgment and decision-making are important means that a mother also has more say over her duties, hours and responsibilities and thus is able to ensure that her job does not impact her child(ren). For mothers who spend greater time in contact with others at work it may become a complementary skill in that they get better at dealing with all people, including their own children. The impact may also be partially due to the effect that was hypothesized earlier that the mothers are actually energized by their interactions with others at work and carry that energy over to their parenting.

The attributes of occupations dealing with time use present the most surprising results. The two attributes that seemed the most likely to be important as well as the easiest for which to predict the results are not significant. Neither the regularity of a mother's work schedules nor the number of hours typically worked (duration) are significant in this analysis. This may partially be due to less variation among the observations in the sample for each of these attributes. On a scale of 1 to 5, the average for the work schedule variable is 1.18 with a maximum of only 2.12, indicating that most mothers in the sample have fairly regular work schedules. Similarly, on a scale of 1 to 5, the average response for the duration of the work week in this sample is 2.10 with a maximum of 2.93, suggesting that the sampled mothers are working fairly moderate weekly hours. As predicted, though, the frequency with which a mother must use email in her job is significant and the children of mothers who must use email more often have a greater likelihood of being obese. The other time variables, the importance of time management and the importance of time sharing, are not significant at the 10% level. The physical nature of the job has the expected impact, though only for one of the selected attributes. Children of mothers who must spend more time bending and twisting at work are more likely to be obese, which as discussed earlier likely leads to physical fatigue and the potential for injury, both of which would impact a mother's parenting ability.

Finally, the attributes of occupations that are expected to potentially have a positive impact on children's health primarily perform as expected, though not entirely. Mothers who do a great deal of active listening at work, who spend their time training and teaching others and for whom it is important to have selective attention seem to carry those skills over to their parenting as well, as higher levels of active listening or teaching and training and greater importance of selective attention required by a mother in her job all lead to a lower risk of obesity in her child. Surprisingly, the amount of support provided by management is not statistically significant; however, this may be due to the fact that in the U.S. many company policies still address very little about home or family life.

While the individual job attribute variables are together jointly significant at the 1% level, the more interesting narrative comes from examining these job attributes jointly in the four original groups that were hypothesized to affect a child's risk of obesity: Responsibility, Time Use, Physical Nature and Complementary Skills. Thus, the variables are grouped accordingly and joint tests of significance are performed on each group. A second set of joint tests will also be conducted on the variables at their means. Results of all joint tests of significance are given in Table 5.5. In the first set of tests, in which each group of job attributes is examined to determine joint significance, three of the four groups are jointly significant. The attributes in the Responsibility and Complementary Skills groups are jointly significant at the 1% level while those in the Physical Nature groups are jointly significant at the 5% level. When the tests are performed on the variables at their means, slightly different results are obtained. The job attributes in the Physical Nature and Complementary Skills groups are also significant at their means, at the 5% and 1% levels, respectively. However, the attributes within the Responsibility group are not jointly significant at their means but the attributes making up the Time Use group are jointly significant at their means, at the 5% level.

Overall, the attributes of a mother's job certainly have explanatory power on her child(ren)'s risk of obesity. In order to be able to say something about the magnitude of these effects, standard deviation-weighted marginal effects are calculated and are available in Table 5.6. These marginal effects provide the impact on a child's obesity risk from a specific job attribute if the child's mother experiences a one standard deviation increase in the specific job

attribute as required by her job. The standard deviation-weighted marginal effects are calculated for each individual attribute, summed to a group level and then summed overall as well. If the level or importance of every job attribute in the model increased by one standard deviation, then the Responsibility group would cause a 15.7% increase in a child's probability of being obese, the Time Use group would cause a 10.4% increase, the Physical Nature group would cause a 7.9% increase and the Complementary Skills group would cause a 15.4% decrease in a child's probability of being obese. Overall the one standard deviation increase in the level or importance of every job attribute would increase a child's risk of obesity by 18.6%.

Finally, given the significant results for the U.S. of both some occupation categories and the O*Net job attributes collectively, examining how these job attributes vary by the occupation categories is of interest. The means of the job attributes by occupation category are available in Table 5.9. Recall the occupation categories for the U.S. that were shown to have significant impacts on child obesity were Occupation Categories 2 and 7, Business or Financial Operations or Legal occupations, Category 17, Office or Administrative Support occupations, and Categories 21 and 22, Production or Transportation or Material Moving occupations. A mother working in an occupation in any of these categories reduced her child's likelihood of being obese. When examining the O*Net attributes for each of these occupation categories, it is helpful to examine whether the mean of the attribute for the specific categories falls within one standard deviation of the overall mean. In order to explain why a mother working in some occupations is better for her child's health than others, it is specifically useful to note occupations with below-average requirements of the attributes that drive up obesity risk and above-average requirements of the attributes that drive down obesity risk. For Occupation Categories 21 and 22, several attributes fall outside of one standard deviation. Occupations in these categories are low in the level of required speaking and email, both of which increase a child's obesity risk, while they are high in the amount of contact a mother must have with others, which decreases a child's obesity risk. Meanwhile, Occupation Categories 2 and 7 have a greater than one standard deviation below the mean required level of bending and twisting the body, which increases a child's risk of obesity.

This analysis can be expanded further to evaluate the job attributes that fall more than one-half a standard deviation from the mean. In this case, Occupation Categories 2 and 7 are relatively high in both the importance of judgment and decision-making and level of required active listening, both attributes of a job that decrease a child's likelihood of obesity. Occupation Category 17 is relatively low in the required levels of making decisions and solving problems and of bending or twisting the body, both of which increase a child's risk of obesity. Additionally, Occupation Category 17 has a level of contact with others that is above one-half a standard deviation above the mean, an attribute that decreases a child's likelihood of obesity. Finally recall that a mother working in occupations in Category 16, Sales or Related occupations, decreased her child's likelihood of being overweight or obese. Category 16 occupations are relatively low in the required level of making decisions and solving problems and in the amount of email, both of which increase a child's risk of obesity, while also being relatively high in the amount of contact a mother has with others, which decreases her child's risk of obesity. There was also one Occupation Category in the U.K. for which a mother working in an occupation in that category increases a child's likelihood of being overweight or obese, Occupation Categories 6 and 11, Community or Social Service or Healthcare Support occupations. While the O*Net attributes were not individually significant for the U.K., occupations in Categories 6 and 11 are relatively high in the level of assisting and caring for others and in dealing with unpleasant or angry people, both of which had positive marginal effects (though again, not significant at the 10% level).

Overall these results suggest that it may not be purely the mother's choice of occupation that impacts her child(ren)'s health but the attributes that are specific to that occupation. The U.S. results especially would indicate that regardless of the occupation field, certain jobs share attributes that may be detrimental to family life, and more specifically a child's health, but that other attributes are actually beneficial to both. In this analysis on only the occupations that have a significant impact on child obesity, the level of problem-solving and decision-making, of speaking, of email use and of bending and twisting the body prove to be especially detrimental to the health of children, with higher levels required by a mother's job increasing her child's risk of obesity and lower levels decreasing it. On the other hand, the

importance of judgment and decision-making, the amount of contact with others and the level of required active listening seem to be beneficial to a child's health, as increases in any of them actually decrease the child's risk of obesity. This analysis provides some useful insights, but there is still work to be done in determining the underlying mechanisms of the relationship between maternal employment, specifically by occupation, and child obesity.

Table 5.1: Descriptions of Occupational Traits from O*Net

Element Name	Description
Responsibility	
Judgment and Decision Making, Importance	The importance to the job of being able to consider the relative costs and benefits of potential actions to choose the most appropriate one.
Making Decisions and Solving Problems, Level	The level at which the job requires one to analyze information and evaluate results to choose the best solution and solve problems.
Speaking, Level	The level of talking to others to convey information effectively that is required by the job.
Assisting and Caring for Others, Level	The level of personal assistance, medical attention, emotional support, or other personal care required to be provided to others such as coworkers, customers, or patients.
Deal With Unpleasant or Angry People	How frequently the worker must deal with unpleasant, angry, or discourteous individuals as part of the job requirements.
Contact With Others	How much the worker is required to be in contact with others (face-to-face, by telephone, or otherwise) in order to perform the job.
Time Use	
Work Schedules	Regularity of the work schedules for this job.
Duration of Typical Work Week	Number of hours typically worked in one week.
Electronic Mail	How often electronic mail (email) is used in this job.
Time Management, Importance	The importance to the job of being able to manage one's own time and the time of others.
Time Sharing, Importance	The importance of being able to shift back and forth between two or more activities or sources of information (such as speech, sounds, touch, or other sources).
Physical Nature	
Spend Time Walking and Running	How much this job requires walking and running.
Spend Time Kneeling, Crouching, Stooping, or Crawling	How much this job requires kneeling, crouching, stooping or crawling.
Spend Time Bending or Twisting the Body	How much this job requires bending or twisting the body.

Table 5.1: (Continued)

Element Name	Description
Complementary Skills	
Active Listening, Level	The level at which the job requires one to give full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
Training and Teaching Others, Level	The level of identifying the educational needs of others, developing formal educational or training programs or classes, and teaching or instructing others that is required by the job.
Selective Attention, Importance	The importance of being able to concentrate on a task over a period of time without being distracted.
Support	
Support	Occupations that satisfy this work value offer supportive management that stands behind employees. Corresponding needs are Company Policies, Supervision: Human Relations and Supervision: Technical.

Table 5.2: Summary Statistics for O*Net Variables Included in the U.S. Analysis

Variable, U.S.	Obs	Mean	Std. Dev.	Min	Max
Responsibility Attributes					
JudgmentImportance	973	3.31	0.53	1.53	4.95
MakeDecisionsLevel	973	3.91	0.95	1.28	6.15
SpeakingLevel	973	4.04	0.73	1.33	5.73
AssistCareOthersLevel	973	3.31	1.12	0.88	6.26
DealwAngryPeople	973	3.26	0.50	1.84	4.95
ContactwOthers	973	4.57	0.33	2.59	5
Time Use Attributes					
WorkSchedule	973	1.18	0.17	1	2.12
DurationWorkWk	973	2.10	0.42	1.05	2.93
Email	973	3.29	1.26	1.02	5
TimeMgmtImportance	973	3.65	0.51	1.97	4.76
TimeSharingImportance	973	2.68	0.33	1.25	3.63
Physical Nature Attributes					
WalkingRunning	973	2.55	0.79	1.08	4.71
KneelingCrawling	973	1.68	0.49	1	3.33
BendingTwisting	973	2.08	0.71	1.08	4.37
Complementary Skills/Support					
ActiveListeningLevel	973	4.28	0.69	1.86	5.95
TrainingTeachingLevel	973	3.09	0.99	0.79	5.71
SelAttentionImportance	973	3.11	0.26	2.13	4
Support	973	4.43	0.75	2	6

Table 5.3: Summary Statistics for O*Net Variables Included in the U.K. Analysis

Variable, U.K.	Obs	Mean	Std. Dev.	Min	Max
Responsibility Attributes					
JudgmentImportance	3113	3.10	0.58	0	4.74
MakeDecisionsLevel	3113	3.57	1.05	0	6.12
SpeakingLevel	3113	3.80	0.78	0	5.73
AssistCareOthersLevel	3113	3.26	1.09	0	6.26
DealwAngryPeople	3113	3.21	0.49	0	4.81
ContactwOthers	3113	4.56	0.44	0	5
Time Use Attributes					
WorkSchedule	3113	1.17	0.17	0	2.29
DurationWorkWk	3113	1.96	0.45	0	2.87
Email	3113	3.07	1.26	0	5
TimeMgmtImportance	3113	3.50	0.57	0	4.61
TimeSharingImportance	3113	2.65	0.39	0	3.88
Physical Nature Attributes					
WalkingRunning	3113	2.66	0.86	0	4.71
KneelingCrawling	3113	1.85	0.59	0	3.49
BendingTwisting	3113	2.21	0.75	0	4.37
Complementary Skills/Support					
ActiveListeningLevel	3113	4.04	0.80	0	5.87
TrainingTeachingLevel	3113	2.92	0.90	0	5.71
SelAttentionImportance	3113	3.05	0.30	0	3.88
Support	3113	4.23	0.71	2	6

Table 5.4: Probit Marginal Effects of the Impact of O*Net Occupation Characteristics on whether Child is Obese in the U.S. (z-statistics included in parentheses)

Variable	*Obese, U.S.*		Variable	*Obese, U.S.*	
ChildAgeMos	-0.003***	(-5.11)	*IncomeQ1*	0.062	(1.31)
FemaleChild	-0.023	(-0.93)	*IncomeQ2*	0.091**	(2.07)
ChildHispanic	0.045	(1.23)	*IncomeQ3*	0.027	(0.67)
ChildBlack	0.131***	(3.50)	*Northeast*	0.024	(0.65)
MissingBirthWght	0.326***	(3.06)	*NorthCentral*	-0.024	(-0.70)
ChildBirthWght	0.002**	(2.38)	*West*	0.005	(0.14)
BFLessOneMo	-0.010	(-0.24)	*Urban*	-0.080**	(-2.46)
BFOnetoThreeMos	-0.063*	(-1.76)	*OccupationHome*	-0.026	(-0.12)
BFThreetoSixMos	-0.079**	(-2.05)	*OccupationOther*	0.048	(0.20)
BFPastSixMos	-0.041	(-1.16)	*JudgmentImp*	-0.127**	(-2.15)
Firstborn	-0.053*	(-1.74)	*MakeDecisLev*	0.102***	(3.05)
MissingAlclCigUse	0.004	(0.08)	*SpeakLev*	0.181***	(2.67)
AlcoholDurPreg	-0.013	(-0.40)	*AssistOthersLev*	0.018	(0.78)
CigDurPreg	0.072*	(1.74)	*AngryPeople*	0.089*	(1.74)
MotherAgeBirth	-0.011*	(-1.74)	*ContactwOthers*	-0.206***	(-3.07)
MotherOverwtPreChild	0.074**	(2.00)	*WorkSchedule*	0.039	(0.39)
MotherObesePreChild	0.113**	(2.38)	*DurationWorkWk*	-0.026	(-0.43)
MotherHSGrad	0.002	(0.05)	*Email*	0.043*	(1.69)
MotherAssocGrad	-0.063	(-1.24)	*TimeMgmtImp*	0.034	(0.63)
MotherCollegeGrad	-0.115**	(-2.27)	*TimeSharingImp*	0.109	(1.62)
MotherMastersGrad	-0.131**	(-2.36)	*WalkRun*	0.056	(1.58)
MotherDoctorateGrad	-0.160*	(-1.93)	*KneelCrawl*	-0.042	(-0.84)
MotherOtherEd	-0.140*	(-1.74)	*BendTwist*	0.078*	(1.72)
MaleAdultinHH	-0.030	(-0.90)	*ActListenLev*	-0.114**	(-2.16)
StayHomeDad	-0.072	(-1.21)	*TrainTeachLev*	-0.055**	(-2.13)
			SelAttentionImp	-0.133*	(-1.65)
			Support	0.018	(0.70)
Pseudo R^2	0.1810				
Number of Observations	1225				

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10% level

Table 5.5: Joint Tests of Significance for the Probit Estimation of the Impact of O*Net Occupation Characteristics on whether Child is Obese in the U.S.

Variables	Chi^2 statistic	$Pr>Chi^2$	Significance
Job Attributes	36.650	0.0058	***
Education	19.64	0.0032	***
Income	4.750	0.1912	
Job Attributes, by Group			
Responsibility	25.080	0.0003	***
Time Use	5.960	0.3098	
Physical Nature	8.170	0.0427	**
Complementary Skills	13.520	0.0090	***
Job Attributes, by Group, at the Mean of Each			
Responsibility	0.120	0.7342	
Time Use	4.110	0.0427	**
Physical Nature	6.490	0.0108	**
Complementary Skills	10.670	0.0011	***

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10% level

Table 5.6: Standard-Deviation Weighted Marginal Effects of O*Net Job Attribute Groups in the U.S.

Job Attributes	Marginal Effect	Std. Dev.	SD Weighted Marginal Effect
Responsibility			**0.1573**
JudgmentImp	-0.127	0.53	-0.0678
MakeDecisLev	0.102	0.95	0.0971
SpeakLev	0.181	0.73	0.1312
AssistOthersLev	0.018	1.12	0.0200
AngryPeople	0.089	0.50	0.0445
ContactwOthers	-0.206	0.33	-0.0679
Time Use			**0.1035**
WorkSchedule	0.039	0.17	0.0065
DurationWorkWk	-0.026	0.42	-0.0111
Email	0.043	1.26	0.0545
TimeMgmtImp	0.034	0.51	0.0174
TimeSharingImp	0.109	0.33	0.0362
Physical Nature			**0.0789**
WalkRun	0.056	0.79	0.0441
KneelCrawl	-0.042	0.49	-0.0202
BendTwist	0.078	0.71	0.0549
Complementary Skills			**-0.1538**
ActListenLev	-0.114	0.69	-0.0785
TrainTeachLev	-0.055	0.99	-0.0543
SelAttentionImp	-0.133	0.26	-0.0347
Support	0.018	0.75	0.0137
Overall			**0.1858**

Table 5.7: Probit Marginal Effects of the Impact of O*Net Occupation Characteristics on whether Child is Obese in the U.K. (z-statistics included in parentheses)

Variable	*Obese, U.K.*		Variable	*Obese, U.K.*	
ChildAgeMos	0.001	(1.31)	*StayHomeDad*	-0.052*	(-1.85)
FemaleChild	0.015**	(2.22)	*IncomeQ1*	-0.004	(-0.28)
ChildMixedEthnic	0.033	(1.59)	*IncomeQ2*	0.005	(0.42)
ChildIndian	0.002	(0.07)	*IncomeQ3*	0.017*	(1.70)
ChildPakistBanglad	0.036**	(2.33)	*England*	-0.052***	(-3.28)
ChildBlack	0.106***	(4.99)	*Wales*	-0.028**	(-1.96)
ChildOtherEthnic	0.060*	(1.82)	*Scotland*	-0.039***	(-3.02)
MissingBirthWght	0.057	(0.52)	*MissingUrbanRural*	0.033**	(1.96)
ChildBirthWght	0.028***	(4.84)	*Urban*	0.018*	(1.69)
BFLessOneMo	-0.011	(-1.23)	*OccupationHome*	-0.009	(-0.74)
BFOnetoThreeMos	0.010	(0.98)	*JudgmentImp*	0.002	(0.08)
BFThreetoSixMos	-0.014	(-1.21)	*MakeDecisLev*	0.016	(0.90)
BFPastSixMos	-0.010	(-0.92)	*SpeakLev*	-0.040	(-1.15)
Firstborn	0.003	(0.39)	*AssistOthersLev*	0.006	(0.55)
MissingAlclCigUse	0.288	(1.36)	*AngryPeople*	0.028	(1.36)
AlcoholDurPreg	-0.013*	(-1.67)	*ContactwOthers*	-0.038	(-1.43)
CigDurPreg	0.037***	(3.78)	*WorkSchedule*	-0.051	(-1.14)
StoppedSmoking	0.021*	(1.94)	*DurationWorkWk*	0.012	(0.45)
MotherAgeBirth	0.001	(1.61)	*Email*	0.000	(0.02)
MotherOverwtPreChild	0.054***	(6.01)	*TimeMgmtImp*	0.029	(1.28)
MotherObesePreChild	0.076***	(5.44)	*TimeSharingImp*	0.016	(0.48)
MotherNVQ1	0.000	(0.03)	*WalkRun*	0.027	(1.55)
MotherNVQ2	-0.004	(-0.34)	*KneelCrawl*	-0.035*	(-1.68)
MotherNVQ3	-0.021*	(-1.72)	*BendTwist*	-0.008	(-0.40)
MotherNVQ4	-0.025**	(-2.12)	*ActListenLev*	0.002	(0.09)
MotherNVQ5	-0.009	(-0.47)	*TrainTeachLev*	-0.003	(-0.19)
MotherOverseasEd	-0.009	(-0.50)	*SelAttentionImp*	0.030	(0.73)
OtherAdultinHH	0.021	(1.59)	*Support*	-0.013	(-1.11)
MaleAdultinHH	-0.006	(-0.68)			
Pseudo R^2	0.0558				
Number of Observations	7860				

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10% level

Table 5.8: Joint Tests of Significance for the Probit Estimation of the Impact of O*Net Occupation Characteristics on whether Child is Obese in the U.K.

Variables	Chi^2 statistic	$Pr>Chi^2$	Significance
Job Attributes	17.610	0.4814	
Education	8.460	0.206	
Income	5.100	0.165	
Job Attributes, by Group			
Responsibility	8.530	0.2015	
Time Use	3.310	0.6523	
Physical Nature	0.381	0.2832	
Complementary Skills	1.700	0.7913	
Job Attributes, by Group, at the Mean of Each			
Responsibility	1.190	0.2762	
Time Use	0.760	0.3830	
Physical Nature	0.080	0.7832	
Complementary Skills	0.080	0.7712	

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10% level

Table 5.9: Means of O*Net Job Attributes in the U.S. by Occupation Categories

	O*Net Job Attributes																	
Occupation Category	JudgmentImp	MakeDecisLev	SpeakLev	AssistOthersLev	AngryPeople	ContactwOthers	WorkSchedule	DurationWorkWk	Email	TimeMgmtImp	TimeSharingImp	WalkRun	KneelCrawl	BendTwist	ActListenLev	TrainTeachLev	SelAttentionImp	Support
Occupation1	3.90	5.09	4.39	3.25	3.34	4.65	1.17	2.65	4.64	3.96	2.76	2.00	1.35	1.50	4.44	3.86	3.17	4.92
Occupation2_7	3.74	4.48	4.48	2.30	3.03	4.42	1.15	2.33	4.53	3.83	2.36	1.75	1.28	1.41	4.84	3.22	3.15	4.51
Occupation3_4	3.59	5.03	4.36	2.19	2.58	4.27	1.18	2.41	4.76	3.73	2.47	1.84	1.58	1.56	4.68	3.42	3.18	4.76
Occupation5_8	3.32	4.23	4.73	3.64	3.08	4.64	1.11	2.18	3.77	4.11	2.75	2.54	1.78	1.96	4.86	4.33	3.18	4.03
Occupation6_11	3.32	3.97	4.04	4.94	3.59	4.65	1.14	1.93	2.82	3.57	2.62	2.96	1.87	2.37	4.60	3.30	3.06	4.57
Occupation9	3.51	4.28	4.33	2.21	2.66	4.29	1.47	2.09	3.88	4.03	2.55	2.15	1.46	1.86	4.57	2.62	3.14	3.11
Occupation10	3.56	4.72	4.19	5.27	3.61	4.79	1.12	1.76	2.97	3.38	2.82	2.90	1.72	2.37	4.38	4.01	3.26	5.40
Occupation12	2.95	4.02	3.15	3.35	3.33	4.22	1.09	1.82	2.39	2.83	2.30	2.63	1.43	2.00	3.58	2.33	3.03	4.27
Occupation13_15	3.04	3.06	3.59	3.58	3.21	4.56	1.25	1.65	1.66	3.41	2.96	3.26	2.23	2.80	3.68	2.61	3.04	3.82
Occupation14_1820	2.81	2.19	3.01	2.19	2.66	3.97	1.28	1.95	2.02	3.26	2.31	3.95	2.81	3.64	3.29	2.35	2.73	3.44
Occupation16	3.27	3.25	4.04	2.65	3.54	4.70	1.35	2.08	2.57	3.54	2.71	3.05	1.60	1.94	4.04	2.44	2.92	4.03
Occupation17	3.00	3.34	3.84	2.88	3.32	4.66	1.10	2.08	3.78	3.58	2.70	2.02	1.42	1.79	4.20	2.19	3.15	4.61
Occupation21_22	3.01	3.50	3.03	2.46	2.93	4.09	1.25	2.17	1.85	3.33	2.48	3.00	1.87	2.94	3.46	2.78	3.03	4.55
Average	3.31	3.93	3.94	3.15	3.14	4.45	1.20	2.08	3.20	3.58	2.60	2.62	1.72	2.17	4.20	3.04	3.08	4.31

CHAPTER 6: CONCLUSION

The results of this analysis provide more insight into factors contributing to the increases in childhood obesity in the U.S. and the U.K. Specifically, matched mother-child data are utilized for both to analyze the impact of maternal occupation as well as maternal health and choices surrounding pregnancy. In each country or group of countries, previous results are supported while new factors are discovered. In both countries, child race or ethnicity is found to be an important contributing factor to child obesity, with children who are black in the U.S. and those who are black, Pakistani, Bangladeshi or of other ethnicities in the U.K. all being at a higher risk of obesity, though the impact appears to be more drastic in the U.S. Similarly, higher weight at birth is found to be positively correlated with higher risk of obesity later in childhood with children in the U.K. seeing a larger impact from this variable.

Some child characteristics are found to be significant in only of the U.S. or the U.K. Girls in the U.K. are slightly but significantly more likely to be obese in the U.K. while child obesity does not differ by gender in the U.S. However, several other child characteristics are significant only in the U.S. These include child age, whether the child was breastfed as well as whether the birth weight is reported for the child. An increase in a child's age or having been breastfed, mostly specifically past three months, is associated with a decrease in child's risk of obesity later in childhood. Despite evidence to the contrary in health literature, breastfeeding rates were actually similar between the samples in the data, with 68.1% of children in the U.S. being breastfed and 66.6% in the U.K. The effect on child obesity of missing birth weight in the data is interesting. The children in the U.S. for whom no birth weight is reported are actually more likely to suffer childhood obesity later in life and quite substantially so. This may have something to do with care by the child's mother. If she could not remember or chose not to answer questions about the child's birth circumstances, it could indicate inattentiveness in other areas of parenting as well. The absence of an age effect in the U.K. may have more to do with the lack of variation in ages in the sample. By design, the children in the MCS data were all between six and a half and eight years of age as of the 2008 survey while children in the NLSY ranged from just over two to fifteen years of age at the 2008 survey.

Some of the more fascinating results are those relating to the mother's health and choices before or during pregnancy. Maternal age is significant only in the U.S., with a mother being older at the time of her child's birth decreasing the child's risk of obesity later on, while maternal age is not significant in the U.K. These effects may be related to the specific samples used in the analysis; in these samples, women in the U.S. are, on average, older at the time of their children's births than are women in the U.K., with the average age in the U.S. being 35 years and the average age in the U.K. being just under 28 years. However, there is also less variability in ages in the U.S. than in the U.K. with maternal age at birth in the U.S. ranging from 29 years to 45 years and in the U.K. ranging from 14 years to 51 years of age. Recall that this is largely a factor of the respective survey designs. The women in the NLSY are the primary survey participants and were surveyed beginning in the late 1970s so naturally by 2008 they will be older on average. The children in the MCS are the primary survey participants with mothers' information being collected secondarily so there is no limit or predictable pattern to maternal ages in the U.K. sample. The results on smoking during pregnancy are the reverse of the maternal age results, though, being significant in the U.K. only. In the U.K., a mother smoking during pregnancy increases her child's later risk of obesity, even though a slightly higher proportion of women report smoking during pregnancy in the U.S. (19% for the U.S. and 18% for the U.K.). Additionally mothers who smoked before pregnancy but quit because of it still have children at a higher risk of obesity, though not as high as if they had continued smoking.

A more surprising effect is regarding a mother's use of alcohol during pregnancy. Of the women who report whether they used alcohol, a much higher proportion of women respond in the affirmative that they drank during pregnancy in the U.S., with 40.2% of mothers in the U.S. and 28.1% of mothers in the U.K. having done so However, alcohol use by mothers during pregnancy is not a significant variable for children's weight statuses in the U.S., but for mothers in the U.K. who drink alcohol during pregnancy, their children's risk of obesity later in life actually declines. Initially this was thought to be due to potential correlation between alcohol use during pregnancy and birth weight; however, the two variables are not correlated with one another. The relationship between mother's alcohol use during pregnancy and child outcomes later in life, specifically weight status, has not extensively been studied in the Economics

literature and would be interesting for future research. This result seems especially complex, given that alcohol use during pregnancy is generally seen as an unhealthy choice, but here it is decreasing the risk of obesity for the child later in childhood, which is actually a healthier outcome. Specifically it would be beneficial to examine the difference in this relationship among various countries, as the recommendations on drinking during pregnancy vary among different countries. The International Center for Alcohol Policies (ICAP) has examined the international guidelines on drinking during pregnancy, and for the U.S. and the U.K. specifically, they have found differences in the recommendations. In the U.S., both the Department of Health and Human Services (HHS) and the Department of Agriculture (USDA) advise that women who are pregnant, who are breastfeeding or who may become pregnant should not consume any alcoholic beverages (ICAP, 2009). In the U.K., the recommendation is slightly more relaxed, with the U.K. Department of Health, Royal College of Obstetricians and Gynaecologists and the National Institute for Health and Clinical Excellence (NICE) all advising that abstaining from alcohol while pregnant is the safest route but that at most women should drink no more than one to two U.K. units once or twice a week (where a U.K. unit of alcohol is 8 grams or 10 milliliters of pure alcohol in a drink) (ICAP 2009). The differences in these recommendations are especially surprising since the U.K. recommendations seems a bit more lenient but yet more mothers in the U.S. report drinking alcohol during pregnancy.

As expected, mother's weight status plays an important role in determining a child's weight status in each region. These results look specifically at mother's weight status prior to becoming pregnant with the child, which has not been studied as extensively as mother's current weight status impacts. In both the U.S. and the U.K., children of mothers who were overweight or obese before becoming pregnant have a higher chance of being obese. The impacts are relatively large overall but are larger in the U.S. than in the U.K. A woman who is overweight or obese before pregnancy increases her child's likelihood of obesity by 6.2% and 5.4%, respectively, in the U.S. and in the U.K. For women who were strictly obese before pregnancy, the increase in risk of obesity for a child climbs to 13.5% and 7.7% in the U.S. and the U.K., respectively. Overall in these samples more women in the U.S. have damaging weight statuses than in the U.K. In the U.S., 30.0% of women were overweight or obese (BMI ≥ 25)

before becoming pregnant and 12.9% were specifically obese (BMI ≥ 30), with an average pre-pregnancy BMI of 25.6 kg/m^2. In the U.K., 26.8% of women were overweight or obese (BMI ≥ 25) before becoming pregnant and 8.5% were specifically obese (BMI ≥ 30), with an average pre-pregnancy BMI of 23.7 kg/m^2.

The education impacts are more difficult to compare between the two regions since the variables representing maternal education are represented differently. The U.S. maternal education variable is represented by highest degree attained while highest NVQ level achieved is used for the U.K. maternal education variable. It appears that the women in the U.S. sample are slightly better educated with 41.9% having only graduated from high school, 33.7% having been to some or graduated from college and 11.7% having obtained a postgraduate degree. Based on the closest equivalencies found, 14.5% of the mothers in the U.K. sample have the equivalent education of having graduated from high school, 25.1% have attended some or graduated from college and 4.8% have a postgraduate degree. However, the impacts of maternal education on child obesity seem fairly similar with more maternal education in either region being associated with a lower risk of obesity for a child. The results are only jointly significant in the U.S. and have a much larger impact, with mothers with Bachelor's, Master's or Doctorate degrees seeing 9.8%, 12.5% or 15.0% decreases in their children's risks of obesity. Interestingly, in the U.K., maternal education seems to at least partially control for the usual result that babies who are breastfed are less likely to become obese as children, which was not found to be a significant impact for children in the U.K. in these specifications.

The family and household effects on child obesity are somewhat similar across the two regions. In the U.S., it does not seem to matter for child obesity in which part of the country a family resides while in the U.K. residing in any of the three countries other than Northern Ireland is associated with a decrease in child obesity risk, relative to living in Northern Ireland. The impact of living in an Urban area has the opposite result between the two regions; however, the Urban variables are also defined differently. In the U.S., an Urban area counts as living in one of two, quite different, types of municipalities – a city or its adjacent territory with a total population of at least 50,000 people or simply a place with population greater than 2500. In the U.K., an Urban area is defined as any city or town with more than 10,000 people.

Based on these definitions, living in an Urban area in the U.S. decreases a child's risk of obesity quite significantly (by 8.6%) while living in an Urban area in the U.K. increases a child's risk of obesity slightly (by 1.9%). Having a father figure present in the household does not affect a child's risk of obesity in either the U.S. or the U.K. but this impact appears to be largely controlled for by the inclusion of family incomes. Household composition, with regards to number of parents, is similar between the U.S. and the U.K. with 23.4% of children in the U.S. and 24.6% of children in the U.K. not having a father figure present in the household. The U.K. does have the interesting result that for those children with a father figure present who is not employed while the mother is employed, the probability of childhood obesity decreases by 5.1%. The impact of family income appears to be relatively similar between the U.S. and the U.K. In neither country are the income quartiles jointly significant but in each, there is one quartile for which a family being in it, increases a child's risk of obesity as compared to being in the highest income quartile. In the U.S. a child's family being in the second income quartile increases the child's risk of obesity by 8.3% while in the U.K. a child's family being in the third income quartile increases the child's risk of obesity by 1.7%, both as compared to the family being in the fourth (highest) income quartile.

Finally, the impact of maternal occupation on child obesity provides some of the most interesting comparative results. In the U.S. several occupations of mothers were shown to have significant impacts on child obesity, including, if the mother is employed in a Business or Financial Operations or Legal occupation, an Office or Administrative Support occupation, or a Production or Transportation or Material Moving occupation. If a mother is employed in any of these occupations, her child(ren)'s risk of obesity declines, as compared to the mother not being employed. The mother being in a Business or Financial Operations or Legal occupation has the largest impact on a child's obesity risk (-13.7%), followed by being in an Office or Administrative Support occupation (-11.0%) or a Production or Transportation or Material Moving occupation (10.0%). In the U.K. no specific occupation category is significant on the likelihood of the child being obese. However, in another specification, it was shown that some types of maternal employment matter more than others for the child's risk of obesity compared to the mother not being employed. The children of mothers employed as managers in "large

establishments" (employing 25 or more people) are at a greater risk of obesity. More specifically, this risk is highest for mothers who are managers in larger companies in Scotland and Northern Ireland. Children of mothers who are self-employed in organizations with only themselves, however, are at a lower risk of obesity, specifically in England.

From a policy point-of-view, it may be possible to use policy interventions to help mitigate some of the negative impacts of these specific occupations. However, in order to do so, it would be necessary to know what characteristics of the occupations are driving the relationship. The comprehensive O*Net database is utilized to try to discover some of these characteristics for the U.S. and the U.K. Characteristics are chosen from the O*Net database that seem most likely to impact the mother's ability to provide a healthy environment for her child(ren). The possible factors are broadly broken down into four main areas: the mother's level of responsibility at her job, her time use on the job, the physical nature of the job and complementary skills that she is gaining though the job. The results of this analysis for both the U.S. and the U.K. show that many of the previously described child, maternal or household characteristics that influence child obesity are robust to this specification as well.

The results on the job attributes vary substantially between the two regions, though. In the U.S. the 18 individual job attributes are shown to be jointly significant at the 1% level. In groups (Responsibility, Time Use, Physical Nature, and Complementary Skills), the Responsibility, Physical Nature and Complementary Skills attributes are shown to be jointly significant, and at their means, the Time Use attributes are significant (though the Responsibility attributes are not). Overall, as the required level or importance of the attributes within the Responsibility, Time Use or Physical Nature groups increases in a job, the risk of obesity for a child whose mother is employed in such a job also increases. As the required level or importance of the attributes included in the Complementary Skills group increase, though, the risk of obesity for a child whose mother is employed in one such job actually decreases, implying that the mother is gaining an advantage that relates to her children's health by using these specific attributes at work. In order to gain some insight into the magnitude of the impact of these attributes, standard-deviation weighted marginal effects are computed. The marginal effects give the impact on a child's risk of obesity if the child's mother is employed in a job in

which the level or importance of every one of the 18 attributes increases by one standard deviation. The results suggest that a one standard deviation increase in all of the Responsibility, Time Use and Physical Nature attributes leads to 15.7%, 10.4% and 7.9% increases in the child's risk of obesity, respectively, while a one standard deviation increase in all of the Complementary Skills attributes leads to 15.4% decrease in the child's risk of obesity (16.8% if the Complementary Skills attributes only are considered, excluding the Support variable). Overall this implies an 18.6% increase in a child's probability of being obese from a one standard deviation increase in all 18 of the O*Net attributes, which again are shown to be jointly significant at the 1% level.

The results also suggest an interesting comparative relationship between the U.S. and the U.K. Much like the occupation specification, specific job attributes are not shown to jointly significantly affect child obesity in the U.K. This seems to imply that children's health in the U.K. is overall less affected by attributes of a mother's job than is children's health in the U.S. This may be due to the U.K. having generally more family-friendly employment policies in place such that individual occupations or job attributes impact the home life less. The policies applicable to a family at the time of a child's birth, in terms of maternity or paternity leave, definitely differ. In the U.S. mothers are guaranteed 12 weeks of unpaid leave after the birth (or adoption) of a baby through the Family Medical Leave Act (FMLA). In order to quality for FMLA, the mother must have been with her current employer for at least one year and the employer must have at least 50 workers with a 75 mile radius of the primary location (Ray, 2008). In the U.K. mothers are guaranteed 52 weeks of maternity leave, with 39 weeks of the 52 being fully paid leave. Fathers in the U.K. also get two weeks of paid paternity leave. Each parent also has the option of taking an additional 13 weeks of unpaid parental leave, bringing the total possible leave for a two-parent family to 80 total weeks (with just over half of that being paid leave) upon the addition of a new child to the family (Ray, 2008). There are also other benefits available to women during their pregnancies. Clearly, these parental leave policy differences may be indicative of other employment policies differences with regards to their family-friendliness. More work is needed in this area, to examine the impact of policy differences between the two regions on children's health.

APPENDIX I: OCCUPATION CATEGORIES, AS DEFINED IN THE ATUS

For more information on the Census 2002 occupation codes, go to http://www.bls.gov/cps/cpsoccind.htm

Category	Code	Occupation
1:	**Management occupations (Codes: 0010-0430)**	
	0010	Chief executives
	0020	General and operations managers
	0030	Legislators
	0040	Advertising and promotions managers
	0050	Marketing and sales managers
	0060	Public relations managers
	0100	Administrative services managers
	0110	Computer and information systems managers
	0120	Financial managers
	0130	Human resources managers
	0140	Industrial production managers
	0150	Purchasing managers
	0160	Transportation, storage, and distribution managers
	0200	Farm, ranch, and other agricultural managers
	0210	Farmers and ranchers
	0220	Construction managers
	0230	Education administrators
	0300	Engineering managers
	0310	Food service managers
	0320	Funeral directors
	0330	Gaming managers
	0340	Lodging managers
	0350	Medical and health services managers
	0360	Natural sciences managers
	0400	Postmasters and mail superintendents
	0410	Property, real estate, and community association managers
	0420	Social and community service managers
	0430	Managers, all other
2:	**Business and financial operations occupations (Codes: 0500-0950)**	
	0500	Agents and business managers of artists, performers, and athletes
	0510	Purchasing agents and buyers, farm products
	0520	Wholesale and retail buyers, except farm products
	0530	Purchasing agents, except wholesale, retail, and farm products
	0540	Claims adjusters, appraisers, examiners, and investigators
	0560	Compliance officers, except agriculture, construction, health and safety, and transportation
	0600	Cost estimators

Category Code	Occupation
0620	Human resources, training, and labor relations specialists
0700	Logisticians
0710	Management analysts
0720	Meeting and convention planners
0730	Other business operations specialists
0800	Accountants and auditors
0810	Appraisers and assessors of real estate
0820	Budget analysts
0830	Credit analysts
0840	Financial analysts
0850	Personal financial advisors
0860	Insurance underwriters
0900	Financial examiners
0910	Loan counselors and officers
0930	Tax examiners, collectors, and revenue agents
0940	Tax preparers
0950	Financial specialists, all other
3:	**Computer and mathematical occupations (Codes: 1000-1240)**
1000	Computer scientists and systems analysts
1010	Computer programmers
1020	Computer software engineers
1040	Computer support specialists
1060	Database administrators
1100	Network and computer systems administrators
1110	Network systems and data communications analysts
1200	Actuaries
1210	Mathematicians
1220	Operations research analysts
1230	Statisticians
1240	Miscellaneous mathematical science occupations
4:	**Architecture and engineering occupations (Codes: 1300-1560)**
1300	Architects, except naval
1310	Surveyors, cartographers, and photogrammetrists
1320	Aerospace engineers
1330	Agricultural engineers
1340	Biomedical engineers
1350	Chemical engineers
1360	Civil engineers
1400	Computer hardware engineers
1410	Electrical and electronics engineers

Category	Code	Occupation
	1420	Environmental engineers
	1430	Industrial engineers, including health and safety
	1440	Marine engineers and naval architects
	1450	Materials engineers
	1460	Mechanical engineers
	1500	Mining and geological engineers, including mining safety engineers
	1510	Nuclear engineers
	1520	Petroleum engineers
	1530	Engineers, all other
	1540	Drafters
	1550	Engineering technicians, except drafters
	1560	Surveying and mapping technicians
5:	**Life, physical, and social science occupations (Codes: 1600-1960)**	
	1600	Agricultural and food scientists
	1610	Biological scientists
	1640	Conservation scientists and foresters
	1650	Medical scientists
	1700	Astronomers and physicists
	1710	Atmospheric and space scientists
	1720	Chemists and materials scientists
	1740	Environmental scientists and geoscientists
	1760	Physical scientists, all other
	1800	Economists
	1810	Market and survey researchers
	1820	Psychologists
	1830	Sociologists
	1840	Urban and regional planners
	1860	Miscellaneous social scientists and related workers
	1900	Agricultural and food science technicians
	1910	Biological technicians
	1920	Chemical technicians
	1930	Geological and petroleum technicians
	1940	Nuclear technicians
	1960	Other life, physical, and social science technicians
6:	**Community and social services occupations (Codes: 2000-2060)**	
	2000	Counselors
	2010	Social workers
	2020	Miscellaneous community and social service specialists
	2040	Clergy
	2050	Directors, religious activities and education

Category	Code	Occupation
	2060	Religious workers, all other
7:		**Legal occupations (Codes: 2100-2150)**
	2100	Lawyers
	2110	Judges, magistrates, and other judicial workers
	2140	Paralegals and legal assistants
	2150	Miscellaneous legal support workers
8:		**Education, training, and library occupations (Codes: 2200-2550)**
	2200	Postsecondary teachers
	2300	Preschool and kindergarten teachers
	2310	Elementary and middle school teachers
	2320	Secondary school teachers
	2330	Special education teachers
	2340	Other teachers and instructors
	2400	Archivists, curators, and museum technicians
	2430	Librarians
	2440	Library technicians
	2540	Teacher assistants
	2550	Other education, training, and library workers
9:		**Arts, design, entertainment, sports, and media occupations (Codes: 2600-2960)**
	2600	Artists and related workers
	2630	Designers
	2700	Actors
	2710	Producers and directors
	2720	Athletes, coaches, umpires, and related workers
	2740	Dancers and choreographers
	2750	Musicians, singers, and related workers
	2760	Entertainers and performers, sports and related workers, all other
	2800	Announcers
	2810	News analysts, reporters and correspondents
	2820	Public relations specialists
	2830	Editors
	2840	Technical writers
	2850	Writers and authors
	2860	Miscellaneous media and communication workers
	2900	Broadcast and sound engineering technicians and radio operators
	2910	Photographers
	2920	Television, video, and motion picture camera operators and editors
	2960	Media and communication equipment workers, all other
10:		**Healthcare practitioner and technical occupations (Codes: 3000-3540)**
	3000	Chiropractors

Category Code	Occupation
3010	Dentists
3030	Dietitians and nutritionists
3040	Optometrists
3050	Pharmacists
3060	Physicians and surgeons
3110	Physician assistants
3120	Podiatrists
3130	Registered nurses
3140	Audiologists
3150	Occupational therapists
3160	Physical therapists
3200	Radiation therapists
3210	Recreational therapists
3220	Respiratory therapists
3230	Speech-language pathologists
3240	Therapists, all other
3250	Veterinarians
3260	Health diagnosing and treating practitioners, all other
3300	Clinical laboratory technologists and technicians
3310	Dental hygienists
3320	Diagnostic related technologists and technicians
3400	Emergency medical technicians and paramedics
3410	Health diagnosing and treating practitioner support technicians
3500	Licensed practical and licensed vocational nurses
3510	Medical records and health information technicians
3520	Opticians, dispensing
3530	Miscellaneous health technologists and technicians
3540	Other healthcare practitioners and technical occupations
11:	**Healthcare support occupations (Codes: 3600-3650)**
3600	Nursing, psychiatric, and home health aides
3610	Occupational therapist assistants and aides
3620	Physical therapist assistants and aides
3630	Massage therapists
3640	Dental assistants
3650	Medical assistants and other healthcare support occupations
12:	**Protective service occupations (Codes 3700-3950)**
3700	First-line supervisors/managers of correctional officers
3710	First-line supervisors/managers of police and detectives
3720	First-line supervisors/managers of fire fighting and prevention workers
3730	Supervisors, protective service workers, all other

Category Code	Occupation
3740	Fire fighters
3750	Fire inspectors
3800	Bailiffs, correctional officers, and jailers
3820	Detectives and criminal investigators
3830	Fish and game wardens
3840	Parking enforcement workers
3850	Police and sheriff's patrol officers
3860	Transit and railroad police
3900	Animal control workers
3910	Private detectives and investigators
3920	Security guards and gaming surveillance officers
3940	Crossing guards
3950	Lifeguards and other protective service workers
13:	**Food preparation and serving related occupations (Codes: 4000-4160)**
4000	Chefs and head cooks
4010	First-line supervisors/managers of food preparation and serving workers
4020	Cooks
4030	Food preparation workers
4040	Bartenders
4050	Combined food preparation and serving workers, including fast food
4060	Counter attendants, cafeteria, food concession, and coffee shop
4110	Waiters and waitresses
4120	Food servers, nonrestaurant
4130	Dining room and cafeteria attendants and bartender helpers
4140	Dishwashers
4150	Hosts and hostesses, restaurant, lounge, and coffee shop
4160	Food preparation and serving related workers, all other
14:	**Building and grounds cleaning and maintenance occupations (Codes: 4200-4250)**
4200	First-line supervisors/managers of housekeeping and janitorial workers
4210	First-line supervisors/managers of landscaping, lawn service, and groundskeeping workers
4220	Janitors and building cleaners
4230	Maids and housekeeping cleaners
4240	Pest control workers
4250	Grounds maintenance workers
15:	**Personal care and service occupations (Codes: 4300-4650)**
4300	First-line supervisors/managers of gaming workers
4320	First-line supervisors/managers of personal service workers
4340	Animal trainers
4350	Nonfarm animal caretakers
4400	Gaming services workers

Category Code	Occupation
4410	Motion picture projectionists
4420	Ushers, lobby attendants, and ticket takers
4430	Miscellaneous entertainment attendants and related workers
4460	Funeral service workers
4500	Barbers
4510	Hairdressers, hairstylists, and cosmetologists
4520	Miscellaneous personal appearance workers
4530	Baggage porters, bellhops, and concierges
4540	Tour and travel guides
4550	Transportation attendants
4600	Child care workers
4610	Personal and home care aides
4620	Recreation and fitness workers
4640	Residential advisors
4650	Personal care and service workers, all other
16:	**Sales and related occupations (Codes: 4700-4960)**
4700	First-line supervisors/managers of retail sales workers
4710	First-line supervisors/managers of non-retail sales workers
4720	Cashiers
4740	Counter and rental clerks
4750	Parts salespersons
4760	Retail salespersons
4800	Advertising sales agents
4810	Insurance sales agents
4820	Securities, commodities, and financial services sales agents
4830	Travel agents
4840	Sales representatives, services, all other
4850	Sales representatives, wholesale and manufacturing
4900	Models, demonstrators, and product promoters
4920	Real estate brokers and sales agents
4930	Sales engineers
4940	Telemarketers
4950	Door-to-door sales workers, news and street vendors, and related workers
4960	Sales and related workers, all other
17:	**Office and administrative support occupations (Codes: 5000-5930)**
5000	First-line supervisors/managers of office and administrative support workers
5010	Switchboard operators, including answering service
5020	Telephone operators
5030	Communications equipment operators, all other
5100	Bill and account collectors

Category Code	Occupation
5110	Billing and posting clerks and machine operators
5120	Bookkeeping, accounting, and auditing clerks
5130	Gaming cage workers
5140	Payroll and timekeeping clerks
5150	Procurement clerks
5160	Tellers
5200	Brokerage clerks
5210	Correspondence clerks
5220	Court, municipal, and license clerks
5230	Credit authorizers, checkers, and clerks
5240	Customer service representatives
5250	Eligibility interviewers, government programs
5260	File clerks
5300	Hotel, motel, and resort desk clerks
5310	Interviewers, except eligibility and loan
5320	Library assistants, clerical
5330	Loan interviewers and clerks
5340	New accounts clerks
5350	Order clerks
5360	Human resources assistants, except payroll and timekeeping
5400	Receptionists and information clerks
5410	Reservation and transportation ticket agents and travel clerks
5420	Information and record clerks, all other
5500	Cargo and freight agents
5510	Couriers and messengers
5520	Dispatchers
5530	Meter readers, utilities
5540	Postal service clerks
5550	Postal service mail carriers
5560	Postal service mail sorters, processors, and processing machine operators
5600	Production, planning, and expediting clerks
5610	Shipping, receiving, and traffic clerks
5620	Stock clerks and order fillers
5630	Weighers, measurers, checkers, and samplers, recordkeeping
5700	Secretaries and administrative assistants
5800	Computer operators
5810	Data entry keyers
5820	Word processors and typists
5830	Desktop publishers
5840	Insurance claims and policy processing clerks

Category Code	Occupation
5850	Mail clerks and mail machine operators, except postal service
5860	Office clerks, general
5900	Office machine operators, except computer
5910	Proofreaders and copy markers
5920	Statistical assistants
5930	Office and administrative support workers, all other
18:	**Farming, fishing, and forestry occupations (Codes: 6000-6130)**
6000	First-line supervisors/managers of farming, fishing, and forestry workers
6010	Agricultural inspectors
6020	Animal breeders
6040	Graders and sorters, agricultural products
6050	Miscellaneous agricultural workers
6100	Fishers and related fishing workers
6110	Hunters and trappers
6120	Forest and conservation workers
6130	Logging workers
19:	**Construction and extraction occupations (Codes: 6200-6940)**
6200	First-line supervisors/managers of construction trades and extraction workers
6210	Boilermakers
6220	Brickmasons, blockmasons, and stonemasons
6230	Carpenters
6240	Carpet, floor, and tile installers and finishers
6250	Cement masons, concrete finishers, and terrazzo workers
6260	Construction laborers
6300	Paving, surfacing, and tamping equipment operators
6310	Pile-driver operators
6320	Operating engineers and other construction equipment operators
6330	Drywall installers, ceiling tile installers, and tapers
6350	Electricians
6360	Glaziers
6400	Insulation workers
6420	Painters, construction and maintenance
6430	Paperhangers
6440	Pipelayers, plumbers, pipefitters, and steamfitters
6460	Plasterers and stucco masons
6500	Reinforcing iron and rebar workers
6510	Roofers
6520	Sheet metal workers
6530	Structural iron and steel workers
6600	Helpers, construction trades

Category Code	Occupation
6660	Construction and building inspectors
6700	Elevator installers and repairers
6710	Fence erectors
6720	Hazardous materials removal workers
6730	Highway maintenance workers
6740	Rail-track laying and maintenance equipment operators
6750	Septic tank servicers and sewer pipe cleaners
6760	Miscellaneous construction and related workers
6800	Derrick, rotary drill, and service unit operators, oil, gas, and mining
6820	Earth drillers, except oil and gas
6830	Explosives workers, ordnance handling experts, and blasters
6840	Mining machine operators
6910	Roof bolters, mining
6920	Roustabouts, oil and gas
6930	Helpers--extraction workers
6940	Other extraction workers
20:	**Installation, maintenance, and repair occupations (Codes: 7000-7620)**
7000	First-line supervisors/managers of mechanics, installers, and repairers
7010	Computer, automated teller, and office machine repairers
7020	Radio and telecommunications equipment installers and repairers
7030	Avionics technicians
7040	Electric motor, power tool, and related repairers
7050	Electrical and electronics installers and repairers, transportation equipment
7100	Electrical and electronics repairers, industrial and utility
7110	Electronic equipment installers and repairers, motor vehicles
7120	Electronic home entertainment equipment installers and repairers
7130	Security and fire alarm systems installers
7140	Aircraft mechanics and service technicians
7150	Automotive body and related repairers
7160	Automotive glass installers and repairers
7200	Automotive service technicians and mechanics
7210	Bus and truck mechanics and diesel engine specialists
7220	Heavy vehicle and mobile equipment service technicians and mechanics
7240	Small engine mechanics
7260	Miscellaneous vehicle and mobile equipment mechanics, installers, and repairers
7300	Control and valve installers and repairers
7310	Heating, air conditioning, and refrigeration mechanics and installers
7320	Home appliance repairers
7330	Industrial and refractory machinery mechanics
7340	Maintenance and repair workers, general

Category Code	Occupation
7350	Maintenance workers, machinery
7360	Millwrights
7410	Electrical power-line installers and repairers
7420	Telecommunications line installers and repairers
7430	Precision instrument and equipment repairers
7510	Coin, vending, and amusement machine servicers and repairers
7520	Commercial divers
7540	Locksmiths and safe repairers
7550	Manufactured building and mobile home installers
7560	Riggers
7600	Signal and track switch repairers
7610	Helpers--installation, maintenance, and repair workers
7620	Other installation, maintenance, and repair workers
21:	**Production occupations (Codes: 7700-8960)**
7700	First-line supervisors/managers of production and operating workers
7710	Aircraft structure, surfaces, rigging, and systems assemblers
7720	Electrical, electronics, and electromechanical assemblers
7730	Engine and other machine assemblers
7740	Structural metal fabricators and fitters
7750	Miscellaneous assemblers and fabricators
7800	Bakers
7810	Butchers and other meat, poultry, and fish processing workers
7830	Food and tobacco roasting, baking, and drying machine operators and tenders
7840	Food batchmakers
7850	Food cooking machine operators and tenders
7900	Computer control programmers and operators
7920	Extruding and drawing machine setters, operators, and tenders, metal and plastic
7930	Forging machine setters, operators, and tenders, metal and plastic
7940	Rolling machine setters, operators, and tenders, metal and plastic
7950	Cutting, punching, and press machine setters, operators, and tenders, metal and plastic
7960	Drilling and boring machine tool setters, operators, and tenders, metal and plastic
8000	Grinding, lapping, polishing, and buffing machine tool setters, operators, and tenders, metal and plastic
8010	Lathe and turning machine tool setters, operators, and tenders, metal and plastic
8020	Milling and planing machine setters, operators, and tenders, metal and plastic
8030	Machinists
8040	Metal furnace and kiln operators and tenders
8060	Model makers and patternmakers, metal and plastic
8100	Molders and molding machine setters, operators, and tenders, metal and plastic
8120	Multiple machine tool setters, operators, and tenders, metal and plastic
8130	Tool and die makers

Category Code	Occupation
8140	Welding, soldering, and brazing workers
8150	Heat treating equipment setters, operators, and tenders, metal and plastic
8160	Lay-out workers, metal and plastic
8200	Plating and coating machine setters, operators, and tenders, metal and plastic
8210	Tool grinders, filers, and sharpeners
8220	Metalworkers and plastic workers, all other
8230	Bookbinders and bindery workers
8240	Job printers
8250	Prepress technicians and workers
8260	Printing machine operators
8300	Laundry and dry-cleaning workers
8310	Pressers, textile, garment, and related materials
8320	Sewing machine operators
8330	Shoe and leather workers and repairers
8340	Shoe machine operators and tenders
8350	Tailors, dressmakers, and sewers
8360	Textile bleaching and dyeing machine operators and tenders
8400	Textile cutting machine setters, operators, and tenders
8410	Textile knitting and weaving machine setters, operators, and tenders
8420	Textile winding, twisting, and drawing out machine setters, operators, and tenders
8430	Extruding and forming machine setters, operators, and tenders, synthetic and glass fibers
8440	Fabric and apparel patternmakers
8450	Upholsterers
8460	Textile, apparel, and furnishings workers, all other
8500	Cabinetmakers and bench carpenters
8510	Furniture finishers
8520	Model makers and patternmakers, wood
8530	Sawing machine setters, operators, and tenders, wood
8540	Woodworking machine setters, operators, and tenders, except sawing
8550	Woodworkers, all other
8600	Power plant operators, distributors, and dispatchers
8610	Stationary engineers and boiler operators
8620	Water and liquid waste treatment plant and system operators
8630	Miscellaneous plant and system operators
8640	Chemical processing machine setters, operators, and tenders
8650	Crushing, grinding, polishing, mixing, and blending workers
8710	Cutting workers
8720	Extruding, forming, pressing, and compacting machine setters, operators, and tenders
8730	Furnace, kiln, oven, drier, and kettle operators and tenders
8740	Inspectors, testers, sorters, samplers, and weighers

Category Code	Occupation
8750	Jewelers and precious stone and metal workers
8760	Medical, dental, and ophthalmic laboratory technicians
8800	Packaging and filling machine operators and tenders
8810	Painting workers
8830	Photographic process workers and processing machine operators
8840	Semiconductor processors
8850	Cementing and gluing machine operators and tenders
8860	Cleaning, washing, and metal pickling equipment operators and tenders
8900	Cooling and freezing equipment operators and tenders
8910	Etchers and engravers
8920	Molders, shapers, and casters, except metal and plastic
8930	Paper goods machine setters, operators, and tenders
8940	Tire builders
8950	Helpers--production workers
8960	Production workers, all other
22:	**Transportation and material moving occupations (Codes: 9000-9750)**
9000	Supervisors, transportation and material moving workers
9030	Aircraft pilots and flight engineers
9040	Air traffic controllers and airfield operations specialists
9110	Ambulance drivers and attendants, except emergency medical technicians
9120	Bus drivers
9130	Driver/sales workers and truck drivers
9140	Taxi drivers and chauffeurs
9150	Motor vehicle operators, all other
9200	Locomotive engineers and operators
9230	Railroad brake, signal, and switch operators
9240	Railroad conductors and yardmasters
9260	Subway, streetcar, and other rail transportation workers
9300	Sailors and marine oilers
9310	Ship and boat captains and operators
9330	Ship engineers
9340	Bridge and lock tenders
9350	Parking lot attendants
9360	Service station attendants
9410	Transportation inspectors
9420	Other transportation workers
9500	Conveyor operators and tenders
9510	Crane and tower operators
9520	Dredge, excavating, and loading machine operators
9560	Hoist and winch operators

Category Code	Occupation
9600	Industrial truck and tractor operators
9610	Cleaners of vehicles and equipment
9620	Laborers and freight, stock, and material movers, hand
9630	Machine feeders and offbearers
9640	Packers and packagers, hand
9650	Pumping station operators
9720	Refuse and recyclable material collectors
9730	Shuttle car operators
9740	Tank car, truck, and ship loaders
9750	Material moving workers, all other

APPENDIX II: U.K. SOC 1990 OCCUPATION CODES AND CATEGORIES

Code	Occupation Title
1	**Managers and senior officials**
10	*General managers and administrators in national and local government, large companies and organisations.*
100	General administrators; national government (Assistant Secretary/Grade 5 and above)
101	General managers; large companies and organisations
102	Local government officers (administrative and executive functions)
103	General administrators; national government (HEO to Senior Principal/Grade 6)
11	*Production managers in manufacturing, construction, mining and energy industries.*
110	Production, works and maintenance managers
111	Managers in building and contracting
112	Clerks of works
113	Managers in mining and energy industries
12	*Specialist managers*
120	Treasurers and company financial managers
121	Marketing and sales managers
122	Purchasing managers
123	Advertising and public relations managers
124	Personnel, training and industrial relations managers
125	Organisation and methods and work study managers
126	Computer systems and data processing managers
127	Company secretaries
13	*Financial institution and office managers, civil service executive officers*
130	Credit controllers
131	Bank, Building Society and Post Office managers (except self-employed)
132	Civil Service executive officers
139	Other financial institution and office managers n.e.c.
14	*Mangers in transport and storing*
140	Transport managers
141	Stores controllers
142	Managers in warehousing and other materials handling
15	*Protective service officers*
150	Officers in UK armed forces
151	Officers in foreign and Commonwealth armed forces
152	Police officers (inspector and above)
153	Fire service officers (station officer and above)
154	Prison officers (principal officer and above)

Code	Occupation Title
155	Customs and excise, immigration service officers (customs: chief preventive officer and above; excise: surveyor and above)
16	*Managers in farming, horticulture, forestry and fishing*
160	Farm owners and managers, horticulturists
169	Other managers in farming, horticulture, forestry and fishing n.e.c.
17	*Mangers and Proprieters in service industries*
170	Property and estate managers
171	Garage managers and proprietors
172	Hairdressers' and barbers' managers and proprietors
173	Hotel and accommodation managers
174	Restaurant and catering managers
175	Publicans, innkeepers and club stewards
176	Entertainment and sports managers
177	Travel agency managers
178	Managers and proprietors of butchers and fishmongers
179	Managers and proprietors in service industries n.e.c.
19	*Mangers and administrators NEC*
190	Officials of trade associations, trade unions, professional bodies and charities
191	Registrars and administrators of educational establishments
199	Other managers and administrators n.e.c.
2	**Professional occupations**
20	*Natural scientists*
200	Chemists
201	Biological scientists and biochemists
202	Physicists, geologists and meteorologists
209	Other natural scientists n.e.c.
21	*Engineers and technologists*
210	Civil, structural, municipal, mining and quarrying engineers
211	Mechanical engineers
212	Electrical engineers
213	Electronic engineers
214	Software engineers
215	Chemical engineers
216	Design and development engineers
217	Process and production engineers
218	Planning and quality control engineers
219	Other engineers and technologists n.e.c.
22	*Health professionals*
220	Medical practitioners

Code	Occupation Title
221	Pharmacists/pharmacologists
222	Ophthalmic opticians
223	Dental practitioners
224	Veterinarians
23	*Teaching professionals*
230	University and polytechnic teaching professionals
231	Higher and further education teaching professionals
232	Education officers, school inspectors
233	Secondary (and middle school deemed secondary) education teaching professionals
234	Primary (and middle school deemed primary) and nursery education teaching professionals
235	Special education teaching professionals
239	Other teaching professionals n.e.c.
24	*Legal Professionals*
240	Judges and officers of the Court
241	Barristers and advocates
242	Solicitors
25	*Business and financial professionals*
250	Chartered and certified accountants
251	Management accountants
252	Actuaries, economists and statisticians
253	Management consultants, business analysts
26	*Architects, town planners and surveyors*
260	Architects
261	Town planners
262	Building, land, mining and 'general practice' surveyors
27	*Librarians and related professionals*
270	Librarians
271	Archivists and curators
29	*Professional occupations NEC*
290	Psychologists
291	Other social and behavioural scientists
292	Clergy
293	Social workers, probation officers
3	**Associate professional and technical occupations**
30	*Scientific technicians*
300	Laboratory technicians
301	Engineering technicians
302	Electrical/electronic technicians
303	Architectural and town planning technicians

Code	Occupation Title
304	Building and civil engineering technicians
309	Other scientific technicians n.e.c.
31	*Draughtspersons, quantity and other surveyors*
310	Draughtspersons
311	Building inspectors
312	Quantity surveyors
313	Marine, insurance and other surveyors
32	*Computer analyst/programmers*
320	Computer analyst/programmers
33	*Ship and aircraft officers, air traffic planners and controllers*
330	Air traffic planners and controllers
331	Aircraft flight deck officers
332	Ship and hovercraft officers
34	*Health associate professionals*
340	Nurses
341	Midwives
342	Medical radiographers
343	Physiotherapists
344	Chiropodists
345	Dispensing opticians
346	Medical technicians, dental auxiliaries
347	Occupational and speech therapists, psychotherapists, therapists n.e.c.
348	Environmental health officers
349	Other health associate professionals n.e.c.
35	*Legal associate professionals*
350	Legal service and related occupations
36	*Business and financial associate professionals*
360	Estimators, valuers
361	Underwriters, claims assessors, brokers, investment analysts
362	Taxation experts
363	Personnel and industrial relations officers
364	Organisation and methods and work study officers
37	*Social welfare associate professionals*
370	Matrons, houseparents
371	Welfare, community and youth workers
38	*Literary, artistic and sports professionals*
380	Authors, writers, journalists
381	Artists, commercial artists, graphic designers
382	Industrial designers

Code	Occupation Title
383	Clothing designers
384	Actors, entertainers, stage managers, producers and directors
385	Musicians
386	Photographers, camera, sound and video equipment operators
387	Professional athletes, sports officials
39	*Associate professional and technical occupations NEC*
390	Information officers
391	Vocational and industrial trainers
392	Careers advisers and vocational guidance specialists
393	Driving instructors (excluding HGV)
394	Inspectors of factories, utilities and trading standards
395	Other statutory and similar inspectors n.e.c.
396	Occupational hygienists and safety officers (health and safety)
399	Other associate professional and technical occupations n.e.c.
4	**Administrative and secretarial occupations**
40	*Administrative/clerical officers and assistants in civil service and local government*
400	Civil Service administrative officers and assistants
401	Local government clerical officers and assistants
41	*Numerical clerks and cashiers*
410	Accounts and wages clerks, book-keepers, other financial clerks
411	Counter clerks and cashiers
412	Debt, rent and other cash collectors
42	*Filing and record clerks*
420	Filing, computer and other records clerks (including legal conveyancing)
421	Library assistants/clerks
43	*Clerks (Not otherwise specified)*
430	Clerks (n.o.s.)
44	*Stores and despatch clerks, store keepers*
440	Stores, despatch and production control clerks
441	Storekeepers and warehousemen/women
45	*Secretaries, personal assistants, typists and word processor operators*
450	Medical secretaries
451	Legal secretaries
452	Typists and word processor operators
459	Other secretaries, personal assistants, typists, word processor operators n.e.c.
46	*Receptionists, telephonists and related occupations*
460	Receptionists
461	Receptionist/telephonists
462	Telephone operators

Code	Occupation Title
463	Radio and telegraph operators, other office communication system operators
49	*Clerical and secretarial occupations NEC*
490	Computer operators, data processing operators, other office machine operators
491	Tracers, drawing office assistants
5	**Skilled trades occupations**
50	*Construction Trades*
500	Bricklayers, masons
501	Roofers, slaters, tilers, sheeters, cladders
502	Plasterers
503	Glaziers
504	Builders, building contractors
505	Scaffolders, stagers, steeplejacks, riggers
506	Floorers, floor coverers, carpet fitters and planners, floor and wall tilers
507	Painters and decorators
509	Other construction trades n.e.c.
51	*Metal machining, fitting and instrument making trades*
510	Centre, capstan, turret and other lathe setters and setter-operators
511	Boring and drilling machine setters and setter-operators
512	Grinding machine setters and setter-operators
513	Milling machine setters and setter-operators
514	Press setters and setter-operators
515	Tool makers, tool fitters and markers-out
516	Metal working production and maintenance fitters
517	Precision instrument makers and repairers
518	Goldsmiths, silversmiths, precious stone workers
519	Other machine tool setters and setter-operators n.e.c. (including CNC setter-operators)
52	*Electrical/electronic trades*
520	Production fitters (electrical/electronic)
521	Electricians, electrical maintenance fitters
522	Electrical engineers (not professional)
523	Telephone fitters
524	Cable jointers, lines repairers
525	Radio, TV and video engineers
526	Computer engineers, installation and maintenance
529	Other electrical/electronic trades n.e.c.
53	*Metal forming, welding and related trades*
530	Smiths and forge workers
531	Moulders, core makers, die casters
532	Plumbers, heating and ventilating engineers and related trades

Code	Occupation Title
533	Sheet metal workers
534	Metal plate workers, shipwrights, riveters
535	Steel erectors
536	Barbenders, steel fixers
537	Welding trades
54	*Vehicle trades*
540	Motor mechanics, auto engineers (including road patrol engineers)
541	Coach and vehicle body builders
542	Vehicle body repairers, panel beaters
543	Auto electricians
544	Tyre and exhaust fitters
55	*Textiles, garments and related trades*
550	Weavers
551	Knitters
552	Warp preparers, bleachers, dyers and finishers
553	Sewing machinists, menders, darners and embroiderers
554	Coach trimmers, upholsterers and mattress makers
555	Shoe repairers, leather cutters and sewers, footwear lasters, makers and finishers, other leather making and repairing
556	Tailors and dressmakers
557	Clothing cutters, milliners, furriers
559	Other textiles, garments and related trades n.e.c.
56	*Printing and related trades*
560	Originators, compositors and print preparers
561	Printers
562	Bookbinders and print finishers
563	Screen printers
569	Other printing and related trades n.e.c.
57	*Woodworking trades*
570	Carpenters and joiners
571	Cabinet makers
572	Case and box makers
573	Pattern makers (moulds)
579	Other woodworking trades n.e.c.
58	*Food preparation trades*
580	Bakers, flour confectioners
581	Butchers, meat cutters
582	Fishmongers, poultry dressers

Code	Occupation Title
59	*Other craft and related operations NEC*
590	Glass product and ceramics makers
591	Glass product and ceramics finishers and decorators
592	Dental technicians
593	Musical instrument makers, piano tuners
594	Gardeners, groundsmen/groundswomen
595	Horticultural trades
596	Coach painters, other spray painters
597	Face trained coalmining workers, shotfirers and deputies
598	Office machinery mechanics
599	Other craft and related occupations n.e.c.
6	**Personal service occupations**
61	*Security and protective service occupations*
610	Police officers (sergeant and below)
611	Fire service officers (leading fire officer and below)
612	Prison service officers (below principal officer)
613	Customs and excise officers, immigration officers (customs: below chief preventive officer; excise: below surveyor)
614	Traffic wardens
615	Security guards and related occupations
619	Other security and protective service occupations n.e.c.
62	*Catering occupations*
620	Chefs, cooks
621	Waiters, waitresses
622	Bar staff
63	*Travel attendants and related occupations*
630	Travel and flight attendants
631	Railway station staff
64	*Health and related occupations*
640	Assistant nurses, nursing auxiliaries
641	Hospital ward assistants
642	Ambulance staff
643	Dental nurses
644	Care assistants and attendants
65	*Childcare and related occupations*
650	Nursery nurses
651	Playgroup leaders
652	Educational assistants
659	Other childcare and related occupations n.e.c.

Code	Occupation Title
66	*Hairdressers, beauticians and related occupations*
660	Hairdressers, barbers
661	Beauticians and related occupations
67	*Domestic staff and related occupations*
670	Domestic housekeepers and related occupations
671	Housekeepers (non-domestic)
672	Caretakers
673	Launderers, dry cleaners, pressers
69	*Personal and protective service occupations NEC*
690	Undertakers
691	Bookmakers
699	Other personal and protective service occupations n.e.c.
7	**Sales and customer service occupations**
70	*Buyers, brokers and related agents*
700	Buyers (retail trade)
701	Buyers and purchasing officers (not retail)
702	Importers and exporters
703	Air, commodity and ship brokers
71	*Sales representatives*
710	Technical and wholesale sales representatives
719	Other sales representatives n.e.c.
72	*Sales assistants and checkout operators*
720	Sales assistants
721	Retail cash desk and check-out operators
722	Petrol pump forecourt attendants
73	*Mobile, market and door-to-door salespersons and agents*
730	Collector salespersons and credit agents
731	Roundsmen/women and van salespersons
732	Market and street traders and assistants
733	Scrap dealers, scrap metal merchants
79	*Sales occupations NEC*
790	Merchandisers
791	Window dressers, floral arrangers
792	Telephone salespersons
8	**Process, plant and machine operatives**
80	*Food , drink and tobacco process operatives*
800	Bakery and confectionery process operatives
801	Brewery and vinery process operatives
802	Tobacco process operatives

Code	Occupation Title
809	Other food, drink and tobacco process operatives n.e.c.
81	*Textiles and tannery process operatives*
810	Tannery production operatives
811	Preparatory fibre processors
812	Spinners, doublers, twisters
813	Winders, reelers
814	Other textiles processing operatives
82	*Chemicals, paper, plastics and related process operatives*
820	Chemical, gas and petroleum process plant operatives
821	Paper, wood and related process plant operatives
822	Cutting and slitting machine operatives (paper products etc)
823	Glass and ceramics furnace operatives, kilnsetters
824	Rubber process operatives, moulding machine operatives, tyre builders
825	Plastics process operatives, moulders and extruders
826	Synthetic fibre makers
829	Other chemicals, paper, plastics and related process operatives n.e.c.
83	*Metal making and treating process operatives*
830	Furnace operatives (metal)
831	Metal drawers
832	Rollers
833	Annealers, hardeners, temperers (metal)
834	Electroplaters, galvanisers, colour coaters
839	Other metal making and treating process operatives n.e.c.
84	*Metal working process operatives*
840	Machine tool operatives (including CNC machine tool operatives)
841	Press stamping and automatic machine operatives
842	Metal polishers
843	Metal dressing operatives
844	Shot blasters
85	*Assemblers/line workers*
850	Assemblers/lineworkers (electrical/electronic goods)
851	Assemblers/lineworkers (vehicles and other metal goods)
859	Other assemblers/lineworkers n.e.c.
86	*Other routine process operatives*
860	Inspectors, viewers and testers (metal and electrical goods)
861	Inspectors, viewers, testers and examiners (other manufactured goods)
862	Packers, bottlers, canners, fillers
863	Weighers, graders, sorters
864	Routine laboratory testers

Code	Occupation Title
869	Other routine process operatives n.e.c.
87	*Road transport operatives*
870	Bus inspectors
871	Road transport depot inspectors and related occupations
872	Drivers of road goods vehicles
873	Bus and coach drivers
874	Taxi, cab drivers and chauffeurs
875	Bus conductors
88	*Other transport and machinery operatives*
880	Seafarers (merchant navy); barge, lighter and boat operatives
881	Rail transport inspectors, supervisors and guards
882	Rail engine drivers and assistants
883	Rail signal operatives and crossing keepers
884	Shunters and points operatives
885	Mechanical plant drivers and operatives (earth moving and civil engineering)
886	Crane drivers
887	Fork lift and mechanical truck drivers
889	Other transport and machinery operatives n.e.c.
89	*Plant and machine operatives NEC*
890	Washers, screeners and crushers in mines and quarries
891	Printing machine minders and assistants
892	Water and sewerage plant attendants
893	Electrical, energy, boiler and related plant operatives and attendants
894	Oilers, greasers, lubricators
895	Mains and service pipe layers, pipe jointers
896	Construction and related operatives
897	Woodworking machine operatives
898	Mine (excluding coal) and quarry workers
899	Other plant and machine operatives n.e.c.
9	**Elementary occupations**
90	*Other occupations in agriculture, forestry and fishing*
900	Farm workers
901	Agricultural machinery drivers and operatives
902	All other occupations in farming and related
903	Fishing and related workers
904	Forestry workers
91	*Other occupations in mining and manufacturing*
910	Coal mine labourers
911	Labourers in foundries

Code	Occupation Title
912	Labourers in engineering and allied trades
913	Mates to metal/electrical and related fitters
919	Other labourers in making and processing industries n.e.c.
92	*Other occupations in construction*
920	Mates to woodworking trades workers
921	Mates to building trades workers
922	Rail construction and maintenance workers
923	Road construction and maintenance workers
924	Paviors, kerb layers
929	Other building and civil engineering labourers n.e.c.
93	*Other occupations in transport*
930	Stevedores, dockers
931	Goods porters
932	Slingers
933	Refuse and salvage collectors
934	Driver's mates
94	*Other occupations in communication*
940	Postal workers, mail sorters
941	Messengers, couriers
95	*Other occupations in sales and services*
950	Hospital porters
951	Hotel porters
952	Kitchen porters, hands
953	Counterhands, catering assistants
954	Shelf fillers
955	Lift and car park attendants
956	Window cleaners
957	Road sweepers
958	Cleaners, domestics
959	Other occupations in sales and services n.e.c.
99	*Other occupations NEC*
990	All other labourers and related workers
999	All others in miscellaneous occupations n.e.c.

APPENDIX II: (CONTINUED)

Crosswalk for U.K. SOC 1990 Occupation Codes to the U.S. Census 2002 Occupation Codes

Listed for the 196 distinct occupations in the 4th Sweep of the MCS

SOC 1990 Code	SOC 1990 Occupation Title	Census 2002 Code	Census Occupation Title
101	General managers; large companies and organisations	0020	General and Operations Managers
102	Local government officers (administrative and executive functions)	0030	Legislators
110	Production, works and maintenance managers	0140	Industrial Production Managers
120	Treasurers and company financial managers	0120	Financial Managers
121	Marketing and sales managers	0050	Marketing and Sales Managers
122	Purchasing managers	0150	Purchasing Managers
123	Advertising and public relations managers	0040	Advertising and Promotions Managers
		0060	Public Relations Managers
124	Personnel, training and industrial relations managers	0130	Human Resources Managers
126	Computer systems and data processing managers	0110	Computer and Information Systems Managers
127	Company secretaries	5700	Secretaries and Administrative Assistants
130	Credit controllers	0830	Credit Analysts
		0910	Loan Counselors and Officers
131	Bank, Building Society and Post Office managers (except self-employed)	0120 0400	Financial Managers Postmasters and Mail Superintendents
132	Civil Service executive officers	0420	Social and Community Service Managers
139	Other financial institution and office managers n.e.c.	0100 0120	Administrative Services Managers Financial Managers
140	Transport managers	0160	Transportation, Storage, and Distribution Managers
141	Stores controllers	0700	Logisticians
154	Prison officers (principal officer and above)	3800	Bailiffs, Correctional Officers, and Jailers
160	Farm owners and managers, horticulturists	0200	Farm, Ranch, and Other Agricultural Managers
		0210	Farmers and Ranchers

SOC 1990 Code	SOC 1990 Occupation Title	Census 2002 Code	Census Occupation Title
169	Other managers in farming, horticulture, forestry and fishing n.e.c.	0200	Farm, Ranch, and Other Agricultural Managers
170	Property and estate managers	0410	Property, Real Estate, and Community Association Managers
172	Hairdressers' and barbers' managers and proprietors	4320	First-Line Supervisors/Managers of Personal Service Workers
		4500	Barbers
		4510	Hairdressers, Hairstylists, and Cosmetologists
173	Hotel and accommodation managers	0340	Lodging Managers
174	Restaurant and catering managers	0310	Food Service Managers
175	Publicans, innkeepers and club stewards	0310	Food Service Managers
		0340	Lodging Managers
176	Entertainment and sports managers	0500	Agents and Business Managers of Artists, Performers, and Athletes
177	Travel agency managers	4710	First-Line Supervisors/Managers of Non-Retail Sales Workers
		4830	Travel Agents
179	Managers and proprietors in service industries n.e.c.	0430	Managers, All Other
190	Officials of trade associations, trade unions, professional bodies and charities	0420	Social and Community Service Managers
191	Registrars and administrators of educational establishments	0230	Education Administrators
199	Other managers and administrators n.e.c.	0430	Managers, All Other
201	Biological scientists and biochemists	1610	Biological Scientists
209	Other natural scientists n.e.c.	1760	Physical Scientists, All Other
210	Civil, structural, municipal, mining and quarrying engineers	1360	Civil Engineers
		1500	Mining and Geological Engineers, Including Mining Safety Engineers
212	Electrical engineers	1410	Electrical and Electronics Engineers
214	Software engineers	1020	Computer Software Engineers
218	Planning and quality control engineers	1430	Industrial Engineers, Including Health and Safety
219	Other engineers and technologists n.e.c.	1530	Engineers, All Other
220	Medical practitioners	3060	Physicians and Surgeons
221	Pharmacists/pharmacologists	3050	Pharmacists
222	Ophthalmic opticians	3040	Optometrists

SOC 1990 Code	SOC 1990 Occupation Title	Census 2002 Code	Census Occupation Title
230	University and polytechnic teaching professionals	2200	Postsecondary Teachers
231	Higher and further education teaching professionals	2200	Postsecondary Teachers
232	Education officers, school inspectors	0230	Education Administrators
233	Secondary (and middle school deemed secondary) education teaching professionals	2320	Secondary School Teachers
234	Primary (and middle school deemed primary) and nursery education teaching professionals	2300 2310	Preschool and Kindergarten Teachers Elementary and Middle School Teachers
235	Special education teaching professionals	2330	Special Education Teachers
239	Other teaching professionals n.e.c.	2340	Other Teachers and Instructors
241	Barristers and advocates	2100	Lawyers
242	Solicitors	2100	Lawyers
250	Chartered and certified accountants	0800	Accountants and Auditors
251	Management accountants	0800	Accountants and Auditors
252	Actuaries, economists and statisticians	1200	Actuaries
		1230	Statisticians
		1800	Economists
253	Management consultants, business analysts	0710	Management Analysts
260	Architects	1300	Architects, Except Naval
261	Town planners	1840	Urban and Regional Planners
270	Librarians	2430	Librarians
271	Archivists and curators	2400	Archivists, Curators, and Museum Technicians
290	Psychologists	1820	Psychologists
292	Clergy	2040	Clergy
293	Social workers, probation officers	2010	Social Workers
		2020	Miscellaneous Community and Social Service Specialists
300	Laboratory technicians	3300	Clinical Laboratory Technologists and Technicians
301	Engineering technicians	1550	Engineering Technicians, Except Drafters
303	Architectural and town planning technicians	1560	Surveying and Mapping Technicians
309	Other scientific technicians n.e.c.	1900	Agricultural and Food Science Technicians
		1910	Biological Technicians
		1920	Chemical Technicians

SOC 1990 Code	SOC 1990 Occupation Title	Census 2002 Code	Census Occupation Title
309	Other scientific technicians n.e.c. (continued)	1930	Geological and Petroleum Technicians
		1940	Nuclear Technicians
		1960	Other Life, Physical, and Social Science Technicians
310	Draughtspersons	1540	Drafters
320	Computer analyst/programmers	1000	Computer Scientists and Systems Analysts
		1010	Computer Programmers
340	Nurses	3130	Registered Nurses
341	Midwives	3260	Health Diagnosing and Treating Practitioners, All Other
342	Medical radiographers	3320	Diagnostic Related Technologists and Technicians
343	Physiotherapists	3160	Physical Therapists
344	Chiropodists	3000	Chiropractors
346	Medical technicians, dental auxiliaries	3310	Dental Hygienists
		3320	Diagnostic Related Technologists and Technicians
		3410	Health Diagnosing and Treating Practitioner Support Technicians
347	Occupational and speech therapists, psychotherapists, therapists n.e.c.	3150	Occupational Therapists
		3230	Speech-Language Pathologists
		3240	Therapists, All Other
348	Environmental health officers	1740	Environmental Scientists and Geoscientists
349	Other health associate professionals n.e.c.	3650	Medical Assistants and Other Healthcare Support Occupations
350	Legal service and related occupations	2140	Paralegals and Legal Assistants
		2150	Miscellaneous Legal Support Workers
360	Estimators, valuers	0600	Cost Estimators
361	Underwriters, claims assessors, brokers, investment analysts	0540	Claims Adjusters, Appraisers, Examiners, and Investigators
		0840	Financial Analysts
		0860	Insurance Underwriters
362	Taxation experts	0940	Tax Preparers
363	Personnel and industrial relations officers	0620	Human Resources, Training, and Labor Relations Specialists
364	Organisation and methods and work study officers	1220	Operations Research Analysts

SOC 1990 Code	SOC 1990 Occupation Title	Census 2002 Code	Census Occupation Title
370	Matrons, houseparents	4640	Residential Advisors
371	Welfare, community and youth workers	2020	Miscellaneous Community and Social Service Specialists
380	Authors, writers, journalists	2840	Technical Writers
		2850	Writers and Authors
381	Artists, commercial artists, graphic designers	2600	Artists and Related Workers
		2630	Designers
382	Industrial designers	2630	Designers
383	Clothing designers	2630	Designers
384	Actors, entertainers, stage managers, producers and directors	2700	Actors
		2710	Producers and Directors
		2740	Dancers and Choreographers
		2750	Musicians, Singers, and Related Workers
386	Photographers, camera, sound and video equipment operators	2910	Photographers
		2920	Television, Video, and Motion Picture Camera Operators and Editors
		2960	Media and Communication Equipment Workers, All Other
387	Professional athletes, sports officials	2720	Athletes, Coaches, Umpires, and Related Workers
390	Information officers	0100	Administrative Services Managers
391	Vocational and industrial trainers	2200	Postsecondary Teachers
		2310	Elementary and Middle School Teachers
		2320	Secondary School Teachers
392	Careers advisers and vocational guidance specialists	2000	Counselors
393	Driving instructors (excluding HGV)	2340	Other Teachers and Instructors
396	Occupational hygienists and safety officers (health and safety)	3540	Other Healthcare Practitioners and Technical Occupations
399	Other associate professional and technical occupations n.e.c.	3540	Other Healthcare Practitioners and Technical Occupations
400	Civil Service administrative officers and assistants	5220	Court, Municipal, and License Clerks
		5250	Eligibility Interviewers, Government Programs
401	Local government clerical officers and assistants	5220	Court, Municipal, and License Clerks
		5250	Eligibility Interviewers, Government Programs

SOC 1990 Code	SOC 1990 Occupation Title	Census 2002 Code	Census Occupation Title
410	Accounts and wages clerks, book-keepers, other financial clerks	5120	Bookkeeping, Accounting, and Auditing Clerks
		5140	Payroll and Timekeeping Clerks
411	Counter clerks and cashiers	4720	Cashiers
		4740	Counter and Rental Clerks
412	Debt, rent and other cash collectors	5100	Bill and Account Collectors
420	Filing, computer and other records clerks (including legal conveyancing)	5260	File Clerks
		5420	Information and Record Clerks, All Other
421	Library assistants/clerks	5320	Library Assistants, Clerical
430	Clerks (n.o.s.)	5860	Office Clerks, General
440	Stores, despatch and production control clerks	5600	Production, Planning, and Expediting Clerks
		5610	Shipping, Receiving, and Traffic Clerks
441	Storekeepers and warehousemen/women	5620	Stock Clerks and Order Fillers
450	Medical secretaries	5700	Secretaries and Administrative Assistants
451	Legal secretaries	5700	Secretaries and Administrative Assistants
452	Typists and word processor operators	5820	Word Processors and Typists
459	Other secretaries, personal assistants, typists, word processor operators n.e.c.	5930	Office and Administrative Support Workers, All Other
460	Receptionists	5400	Receptionists and Information Clerks
462	Telephone operators	5010	Switchboard Operators, Including Answering Service
		5020	Telephone Operators
463	Radio and telegraph operators, other office communication system operators	5030	Communications Equipment Operators, All Other
490	Computer operators, data processing operators, other office machine operators	5800	Computer Operators
		5810	Data Entry Keyers
		5900	Office Machine Operators, Except Computer
501	Roofers, slaters, tilers, sheeters, cladders	6240	Carpet, Floor, and Tile Installers and Finishers
		6330	Drywall Installers, Ceiling Tile Installers, and Tapers
		6510	Roofers
		6520	Sheet Metal Workers
507	Painters and decorators	8810	Painting Workers

SOC 1990 Code	SOC 1990 Occupation Title	Census 2002 Code	Census Occupation Title
509	Other construction trades n.e.c.	6260	Construction Laborers
		6420	Painters, Construction and Maintenance
512	Grinding machine setters and setter-operators	8000	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators,
518	Goldsmiths, silversmiths, precious stone workers	8750	Jewelers and Precious Stone and Metal Workers
523	Telephone fitters	7020	Radio and Telecommunications Equipment Installers and Repairers
529	Other electrical/electronic trades n.e.c.	7100	Electrical and Electronics Repairers, Industrial and Utility
		7110	Electronic Equipment Installers and Repairers, Motor Vehicles
552	Warp preparers, bleachers, dyers and finishers	8360	Textile Bleaching and Dyeing Machine Operators and Tenders
		8420	Textile Winding, Twisting, and Drawing Out Machine Setters, Operators, and
553	Sewing machinists, menders, darners and embroiderers	8320	Sewing Machine Operators
554	Coach trimmers, upholsterers and mattress makers	8450	Upholsterers
556	Tailors and dressmakers	8350	Tailors, Dressmakers, and Sewers
569	Other printing and related trades n.e.c.	8250	Prepress Technicians and Workers
		8260	Printing Machine Operators
571	Cabinet makers	8500	Cabinetmakers and Bench Carpenters
580	Bakers, flour confectioners	7800	Bakers
590	Glass product and ceramics makers	8920	Molders, Shapers, and Casters, Except Metal and Plastic
591	Glass product and ceramics finishers and decorators	8910	Etchers and Engravers
594	Gardeners, groundsmen/groundswomen	4250	Grounds Maintenance Workers
595	Horticultural trades	6050	Miscellaneous Agricultural Workers
599	Other craft and related occupations n.e.c.	8960	Production Workers, All Other
610	Police officers (sergeant and below)	3850	Police and Sheriff's Patrol Officers
612	Prison service officers (below principal officer)	3800	Bailiffs, Correctional Officers, and Jailers

SOC 1990 Code	SOC 1990 Occupation Title	Census 2002 Code	Census Occupation Title
613	Customs and excise officers, immigration officers (customs: below chief preventive officer; excise: below surveyor)	0930	Tax Examiners, Collectors, and Revenue Agents
614	Traffic wardens	3840	Parking Enforcement Workers
615	Security guards and related occupations	3920	Security Guards and Gaming Surveillance Officers
619	Other security and protective service occupations n.e.c.	3950	Lifeguards and Other Protective Service Workers
620	Chefs, cooks	4000	Chefs and Head Cooks
		4020	Cooks
621	Waiters, waitresses	4110	Waiters and Waitresses
622	Bar staff	4040	Bartenders
630	Travel and flight attendants	4550	Transportation Attendants
640	Assistant nurses, nursing auxiliaries	3600	Nursing, Psychiatric, and Home Health Aides
641	Hospital ward assistants	3600	Nursing, Psychiatric, and Home Health Aides
642	Ambulance staff	9110	Ambulance Drivers and Attendants, Except Emergency Medical Technicians
643	Dental nurses	3640	Dental Assistants
644	Care assistants and attendants	3650	Medical Assistants and Other Healthcare Support Occupations
650	Nursery nurses	4600	Child Care Workers
651	Playgroup leaders	4600	Child Care Workers
652	Educational assistants	2540	Teacher Assistants
659	Other childcare and related occupations n.e.c.	4600	Child Care Workers
660	Hairdressers, barbers	4500	Barbers
		4510	Hairdressers, Hairstylists, and Cosmetologists
661	Beauticians and related occupations	4510	Hairdressers, Hairstylists, and Cosmetologists
		4520	Miscellaneous Personal Appearance Workers
670	Domestic housekeepers and related occupations	4230	Maids and Housekeeping Cleaners
671	Housekeepers (non-domestic)	4220	Janitors and Building Cleaners

SOC 1990 Code	SOC 1990 Occupation Title	Census 2002 Code	Census Occupation Title
673	Launderers, dry cleaners, pressers	8300	Laundry and Dry-Cleaning Workers
		8310	Pressers, Textile, Garment, and Related Materials
691	Bookmakers	8230	Bookbinders and Bindery Workers
699	Other personal and protective service occupations n.e.c.	4650	Personal Care and Service Workers, All Other
701	Buyers and purchasing officers (not retail)	0530	Purchasing Agents, Except Wholesale, Retail, and Farm Products
702	Importers and exporters	0520	Wholesale and Retail Buyers, Except Farm Products
		0530	Purchasing Agents, Except Wholesale, Retail, and Farm Products
710	Technical and wholesale sales representatives	4850	Sales Representatives, Wholesale and Manufacturing
719	Other sales representatives n.e.c.	4960	Sales and Related Workers, All Other
720	Sales assistants	4740	Counter and Rental Clerks
		4750	Parts Salespersons
		4760	Retail Salespersons
721	Retail cash desk and check-out operators	4720	Cashiers
722	Petrol pump forecourt attendants	9360	Service Station Attendants
730	Collector salespersons and credit agents	0930	Tax Examiners, Collectors, and Revenue Agents
731	Roundsmen/women and van salespersons	9130	Driver/Sales Workers and Truck Drivers
732	Market and street traders and assistants	4950	Door-To-Door Sales Workers, News and Street Vendors, and Related Workers
790	Merchandisers	4900	Models, Demonstrators, and Product Promoters
791	Window dressers, floral arrangers	2630	Designers
792	Telephone salespersons	4940	Telemarketers
800	Bakery and confectionery process operatives	7835	Food and Tobacco Roasting, Baking, and Drying Machine Operators and Tenders Food Batchmakers
809	Other food, drink and tobacco process operatives n.e.c.	7830	Food and Tobacco Roasting, Baking, and Drying Machine Operators and Tenders
		7850	Food Cooking Machine Operators and Tenders

SOC 1990 Code	SOC 1990 Occupation Title	Census 2002 Code	Census Occupation Title
811	Preparatory fibre processors	8360	Textile Bleaching and Dyeing Machine Operators and Tenders
		8400	Textile Cutting Machine Setters, Operators, and Tenders
840	Machine tool operatives (including CNC machine tool operatives)	7900	Computer Control Programmers and Operators
		7960	Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and
		8010	Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and P
		8120	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic
850	Assemblers/lineworkers (electrical/electronic goods)	7720	Electrical, Electronics, and Electromechanical Assemblers
859	Other assemblers/lineworkers n.e.c.	7750	Miscellaneous Assemblers and Fabricators
862	Packers, bottlers, canners, fillers	9640	Packers and Packagers, Hand
863	Weighers, graders, sorters	8740	Inspectors, Testers, Sorters, Samplers, and Weighers
864	Routine laboratory testers	8760	Medical, Dental, and Ophthalmic Laboratory Technicians
869	Other routine process operatives n.e.c.	8950	Helpers--Production Workers
872	Drivers of road goods vehicles	9130	Driver/Sales Workers and Truck Drivers
873	Bus and coach drivers	9120	Bus Drivers
874	Taxi, cab drivers and chauffeurs	9140	Taxi Drivers and Chauffeurs
899	Other plant and machine operatives n.e.c.	9150	Motor Vehicle Operators, All Other
900	Farm workers	6050	Miscellaneous Agricultural Workers
902	All other occupations in farming and related	6050	Miscellaneous Agricultural Workers
929	Other building and civil engineering labourers n.e.c.	6260	Construction Laborers
941	Messengers, couriers	5510	Couriers and Messengers
952	Kitchen porters, hands	4030	Food Preparation Workers
		4140	Dishwashers
953	Counterhands, catering assistants	4050	Combined Food Preparation and Serving Workers, Including Fast Food

SOC 1990 Code	SOC 1990 Occupation Title	Census 2002 Code	Census Occupation Title
953	Counterhands, catering assistants (Continued)	4060	Counter Attendants, Cafeteria, Food Concession, and Coffee Shop
954	Shelf fillers	5620	Stock Clerks and Order Fillers
955	Lift and car park attendants	9350	Parking Lot Attendants
958	Cleaners, domestics	4230	Maids and Housekeeping Cleaners
959	Other occupations in sales and services n.e.c.	4960	Sales and Related Workers, All Other

APPENDIX III: U.K. SPECIFICATION BY TYPES OF EMPLOYMENT ON CHILD OBESITY

Table A.III.1: Employment Types

Employment Type	Percentage of Sample	Percentage of Population
Self-employed: Large Establishment (25+)	0.03	0.1
Self-employed: Small Establishment(1-24)	1.4	1.4
Self-employed : No Employees	9.0	9.4
Manager: Large Establishment (25+)	4.9	5.2
Manager: Small Establishment(1-24)	3.6	3.9
Foreman or Supervisor	13.3	13.4
Employee	67.8	66.6

Table A.III.2: Probit Marginal Effects of the Impact of Maternal Employment Type on Whether Child is Obese in the U.K. (z-statistics included in parentheses)

Variable	*Obese*		Variable	*Obese*	
ChildAgeMos	0.001	(1.28)	*MotherNVQ1*	0.001	(0.06)
FemaleChild	0.014**	(2.13)	*MotherNVQ2*	-0.004	(-0.39)
ChildMixedEthnic	0.033	(1.56)	*MotherNVQ3*	-0.023*	(-1.88)
ChildIndian	0.000	(0.01)	*MotherNVQ4*	-0.026**	(-2.20)
ChildPakistBanglad	0.033**	(2.19)	*MotherNVQ5*	-0.009	(-0.49)
ChildBlack	0.107***	(5.04)	*MotherOverseasEd*	-0.008	(-0.47)
ChildOtherEthnic	0.061*	(1.84)	*OtherAdultinHH*	0.022	(1.63)
MissingBirthWght	0.052	(0.48)	*MaleAdultinHH*	-0.005	(-0.61)
ChildBirthWght	0.028***	(4.75)	*StayHomeDad*	-0.051*	(-1.80)
BFLessOneMo	-0.010	(-1.11)	*IncomeQ1*	-0.001	(-0.06)
BFOnetoThreeMos	0.010	(1.01)	*IncomeQ2*	0.008	(0.70)
BFThreetoSixMos	-0.013	(-1.10)	*IncomeQ3*	0.020**	(1.99)
BFPastSixMos	-0.009	(-0.85)	*England*	-0.054***	(-3.40)
Firstborn	0.003	(0.40)	*Wales*	-0.029**	(-2.01)
MissingAlclCigUse	0.284	(1.35)	*Scotland*	-0.040***	(-3.08)
AlcoholDurPreg	-0.013*	(-1.68)	*MissingUrbanRural*	0.034**	(2.01)
CigDurPreg	0.037***	(3.78)	*Urban*	0.019*	(1.75)
StoppedSmoking	0.020*	(1.88)	*SelfEmployedSmall*	-0.028	(-0.65)
MotherAgeBirth	0.001	(1.52)	*SelfEmployedSelf*	-0.031*	(-1.69)
MotherOverwtPreChild	0.054***	(6.01)	*ManagerLarge*	0.066**	(2.42)
MotherObesePreChild	0.076***	(5.45)	*ManagerSmall*	-0.022	(-0.79)
			Supervisor	0.005	(0.33)
			Employee	-0.005	(-0.64)

Joint Tests of Significance: Chi^2 statistic given, with ($Pr>Chi^2$)in parentheses

Employment	11.41 (0.0766)
Education	9.38 (0.1531)
Income	5.96 (0.1137)
Pseudo R^2	0.0546
Number of Observations	7859

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10% level

Table A.III.3: Probit Marginal Effects of the Impact of Maternal Employment Type by Country on Whether a Child is Obese in the U.K. (z-statistics included in parentheses)

Variable	*Obese*		Variable	*Obese*	
ChildAgeMos	0.001	(1.29)	*IncomeQ1*	0.000	(-0.02)
FemaleChild	0.014**	(2.14)	*IncomeQ2*	0.008	(0.72)
ChildMixedEthnic	0.032	(1.53)	*IncomeQ3*	0.021**	(2.04)
ChildIndian	0.000	(-0.01)	*England*	-0.044**	(-2.47)
ChildPakistBanglad	0.029*	(1.91)	*Wales*	-0.030*	(-1.80)
ChildBlack	0.104**	(4.93)	*Scotland*	-0.047***	(-2.91)
ChildOtherEthnic	0.058*	(1.78)	*MissingUrbanRural*	0.036*	(1.80)
MissingBirthWght	0.047	(0.44)	*Urban*	0.018*	(1.72)
ChildBirthWght	0.027**	(4.66)	*SelfEmployedSmall*	-0.029	(-0.66)
BFLessOneMo	-0.011	(-1.22)	*EnglishSESelf*	-0.041*	(-1.91)
BFOnetoThreeMos	0.010	(1.03)	*WelshSESelf*	-0.022	(-0.47)
BFThreetoSixMos	-0.012	(-1.04)	*ScottishSESelf*	0.034	(0.59)
BFPastSixMos	-0.009	(-0.85)	*NIrishSESelf*	-0.039	(-0.64)
Firstborn	0.002	(0.27)	*EnglishMngrLarge*	0.021	(0.68)
MissingAlclCigUse	0.281	(1.34)	*WelshMngrLarge*	-0.004	(-0.07)
AlcoholDurPreg	-0.012	(-1.61)	*ScottishMngrLarge*	0.324***	(3.27)
CigDurPreg	0.037**	(3.74)	*NIrishMngrLarge*	0.324**	(2.48)
StoppedSmoking	0.021*	(1.90)	*EnglishMngrSmall*	-0.029	(-0.87)
MotherAgeBirth	0.001	(1.55)	*ScottWelshMngrSmall*	-0.056	(-1.00)
MotherOverwtPreChild	0.054**	(6.05)	*NIrishMngrSmall*	0.116	(1.09)
MotherObesePreChild	0.075**	(5.42)	*EnglishSupervisor*	0.005	(0.25)
MotherNVQ1	0.001	(0.07)	*WelshSupervisor*	0.034	(0.80)
MotherNVQ2	-0.004	(-0.36)	*ScottishSupervisor*	0.025	(0.53)
MotherNVQ3	-0.022*	(-1.82)	*NIrishSupervisor*	-0.055	(-1.22)
MotherNVQ4	-0.026**	(-2.23)	*EnglishEmployee*	-0.016	(-1.60)
MotherNVQ5	-0.009	(-0.48)	*WelshEmployee*	0.016	(0.82)
MotherOverseasEd	-0.009	(-0.49)	*ScottishEmployee*	0.015	(0.59)
OtherAdultinHH	0.022	(1.62)	*NIrishEmployee*	0.011	(0.40)
MaleAdultinHH	-0.005	(-0.53)			
StayHomeDad	-0.049*	(-1.70)			
Joint Tests of Significance: Chi^2 statistic given, with ($Pr>Chi^2$)in parentheses					
Employment	31.20 (0.0525)				
Education	9.47 (0.1490)				
Income	6.12 (0.1061)		*** Significant at the 1% level		
Pseudo R^2	0.054		** Significant at the 5% level		
Number of Observations	7859		* Significant at the 10% level		

APPENDIX IV: CATEGORIZATION AND DESCRIPTIONS OF OCCUPATION TRAITS FROM O*NET

Selected traits are in italics, with originating categories directly preceding them

Element ID	Element Name	Description
1	**Worker Characteristics**	**Worker Characteristics**
1.A	**Abilities**	Enduring attributes of the individual that influence performance
1.A.1	Cognitive Abilities	Abilities that influence the acquisition and application of knowledge in problem solving
1.A.1.g	Attentiveness	Abilities related to application of attention
1.A.1.g.1	*Selective Attention*	The ability to concentrate on a task over a period of time without being distracted.
1.A.1.g.2	*Time Sharing*	The ability to shift back and forth between two or more activities or sources of information (such as speech, sounds, touch, or other sources).
1.B	**Interests**	**Preferences for work environments and outcomes**
1.B.2.e	*Support*	Occupations that satisfy this work value offer supportive management that stands behind employees. Corresponding needs are Company Policies, Supervision: Human Relations and Supervision: Technical.
2	**Worker Requirements**	Worker Requirements
2.A	**Basic Skills**	Developed capacities that facilitate learning or the more rapid acquisition of knowledge
2.A.1	Content	Background structures needed to work with and acquire more specific skills in a variety of different domains
2.A.1.b	*Active Listening*	Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
2.A.1.d	*Speaking*	Talking to others to convey information effectively.
2.B	**Cross-Functional Skills**	Developed capacities that facilitate performance of activities that occur across jobs
2.B.4	Systems Skills	Developed capacities used to understand, monitor, and improve socio-technical systems
2.B.4.e	*Judgment and Decision Making*	Considering the relative costs and benefits of potential actions to choose the most appropriate one.
2.B.5	Resource Management Skills	Developed capacities used to allocate resources efficiently
2.B.5.a	*Time Management*	Managing one's own time and the time of others.

Element ID	Element Name	Description
4	**Occupational Requirements**	Occupational Requirements
4.A	**Generalized Work Activities**	General types of job behaviors occurring on multiple jobs
4.A.2	Mental Processes	What processing, planning, problem-solving, decision-making, and innovating activities are performed with job-relevant information?
4.A.2.b	Reasoning and Decision Making	What decisions are made and problems solved in performing this job?
4.A.2.b.1	*Making Decisions and Solving Problems*	Analyzing information and evaluating results to choose the best solution and solve problems.
4.A.4	Interacting With Others	What interactions with other persons or supervisory activities occur while performing this job?
4.A.4.a	Communicating and Interacting	What interactions with other people occur while performing this job?
4.A.4.a.5	*Assisting and Caring for Others*	Providing personal assistance, medical attention, emotional support, or other personal care to others such as coworkers, customers, or patients.
4.A.4.b	Coordinating, Developing, Managing, and Advising	What coordinating, managerial, or advisory activities are done while performing this job?
4.A.4.b.3	*Training and Teaching Others*	Identifying the educational needs of others, developing formal educational or training programs or classes, and teaching or instructing others.
4.C	**Work Context**	Physical and social factors that influence the nature of work
4.C.1	Interpersonal Relationships	This category describes the context of the job in terms of human interaction processes
4.C.1.a	Communication	Types and frequency of interactions with other people that are required as part of this job.
4.C.1.a.2	Communication Methods	How frequently does this job require the use of the following communication methods?
4.C.1.a.2.h	*Electronic Mail*	How often do you use electronic mail in this job?
4.C.1.a.4	*Contact With Others*	How much does this job require the worker to be in contact with others (face-to-face, by telephone, or otherwise) in order to perform it?
4.C.1.d	Conflictual Contact	Amount of conflict that the worker will encounter as part of this job

Element ID	Element Name	Description
4.C.1.d.2	*Deal With Unpleasant or Angry People*	How frequently does the worker have to deal with unpleasant, angry, or discourteous individuals as part of the job requirements?
4.C.2	Physical Work Conditions	This category describes the work context as it relates to the interactions between the worker and the physical job environment
4.C.2.d	Body Positioning	Amount of time the worker will spend in a variety of physical positions on this job
4.C.2.d.1	Time Spent in Body Positions	How much time in a usual work period does the worker spend:
4.C.2.d.1.d	*Spend Time Walking and Running*	How much does this job require walking and running?
4.C.2.d.1.e	*Spend Time Kneeling, Crouching, Stooping, or Crawling*	How much does this job require kneeling, crouching, stooping or crawling?
4.C.2.d.1.h	*Spend Time Bending or Twisting the Body*	How much does this job require bending or twisting your body?
4.C.3	Structural Job Characteristics	This category involves the relationships or interactions between the worker and the structural characteristics of the job
4.C.3.d	Pace and Scheduling	Description of the role that time plays in the way the worker performs the tasks required by this job
4.C.3.d.4	*Work Schedules*	How regular are the work schedules for this job?
4.C.3.d.8	*Duration of Typical Work Week*	Number of hours typically worked in one week.

REFERENCES

Anderson, Patricia M. 2012. “Parental employment, family routines and childhood obesity” Economics and Human Biology, 10(4): 340-351.

Anderson, Patricia M., Butcher, Kristin F., and Levine, Phillip B. 2003. “Maternal Employment and Overweight Children” Journal of Health Economics, 22(3): 477–504.

Bouchard, Claude. 1997. “Obesity in Adulthood – The Importance of Childhood and Parental Obesity” New England Journal of Medicine 337(13): 926–927.

Cawley, John and Feng Liu. 2007. “Maternal Employment and Childhood Obesity: A Search for Mechanisms in Time Use Data” NBER Working Paper 13600.

Centers for Disease Control and Prevention/National Center for Health Statistics (CDC/NCHS). 2010. “Prevalence of Obesity among Children and Adolescents: United States, Trends 1963-1965 through 2007-2008”. NCHS Health E-Stat, available at: http://www.cdc.gov/nchs/data/hestat/obesity_child_07_08/obesity_child_07_08.htm.

Centers for Disease Control and Prevention/National Center for Health Statistics (CDC/NCHS). 2010. “Prevalence of Overweight, Obesity and Extreme Obesity among Adults: United States, Trends 1960-1962 through 2007-2008”. NCHS Health E-Stat, available at: http://www.cdc.gov/nchs/data/hestat/obesity_adult_07_08/obesity_adult_07_08.htm.

Chia, Yee Fei. 2008. “Maternal Labor Supply and Childhood Obesity in Canada: Evidence from the NLSCY” Canadian Journal of Economics, 41: 217–242.

Chinn, Susan and Roberto J. Rona. 2001. “Prevalence and Trends in Overweight and Obesity in Three Cross Sectional Studies of British Children, 1974-94” BMJ, 322: 24-26.

Dietz, William H. 1997. “Periods of Risk in Childhood for the Development of Adult Obesity – What do We Need to Learn?” Journal of Nutrition 127: 1884–1886.

Fertig, Angela, Gerhard Glomm, and Rusty Tchernis. 2009. “The Connection between Maternal Employment and Childhood Obesity: Inspecting the Mechanisms” Review of Economics of the Household, 7(3): 227-255.

Finkelstein, Eric A., Christopher J. Ruhm and Katherine M. Kosa. 2005. "Economic Causes and Consequences of Obesity" Annual Review of Public Health, 26: 239-257.

Gilman, Matthew W., Sheryl L. Rifas-Shiman, Carlos A. Camargo Jr., Catherine S. Berkey, A.Lindsay Frazier, Helaine R.H. Rockett, Alison E. Field and Graham A. Colditz. 2001. “Risk of Overweight among Adolescents who were Breastfed as Infants” Journal of the American Medical Association, 285(19): 2461-2467.

Gortmaker, Steven L., Aviva Must, James M. Perrin, Arthur M. Sobol, and William H. Dietz. 1993. "Social and Economic Consequences of Overweight in Adolescence and Young Adulthood" The New England Journal of Medicine, 329(14): 1008-1012.

Hansen, Kirsten. 2012. "Millennium Cohort Study: First, Second, Third and Fourth Surveys: A Guide to the Datasets" (7th ed.). Centre for Longitudinal Studies, Institute of Education, University of London, London, England.

Hansen, Kirsten, Elizabeth Jones, Heather Joshi and David Budge. 2010. "Millennium Cohort Study Fourth Survey: A User's Guide to Initial Findings" (2nd ed.). Centre for Longitudinal Studies, Institute of Education, University of London, London, England.

Harrington, Brad, Fred Van Deusen and Jennifer Sabatini Fraone. 2013. "The New Dad: A Work (and Life) in Progress". Boston College Center for Work & Family, Boston College, Boston, Massachusetts. Available at: http://www.bc.edu/content/bc/centers/cwf/news/TheNewDad.html.

Hawkins, Summer S., Lucy J. Griffiths, Carol Dezateux, and Catherine Law. 2007. "Maternal Employment and Breast-feeding Initiation: Findings from the Millennium Cohort Study" Paediatric and Perinatal Epidemiology, 21: 242–247.

Hawkins, Summer S., T.J. Cole and Catherine Law. 2008. "Maternal Employment and Early Childhood Overweight: Findings from the UK Millennium Cohort Study" International Journal of Obesity, 32: 30–38.

International Center for Alcohol Policies (ICAP). 2009. "International Guidelines on Drinking and Pregnancy". ICAP Tables, available at: http://www.icap.org/Table/InternationalGuidelinesOnDrinkingAndPregnancy.

Liu, Echu, Cheng Hsiao, Tomoya Matsumoto, and Shinyi Chou. 2009. "Maternal Full-Time Employment and Overweight Children: Parametric, Semi-Parametric, and Non-Parametric Assessment" Journal of Econometrics, 152(1): 61-69.

Lobstein, T.J., W.P. James, T.J. Cole. 2003. "Increasing Levels of Excess Weight among Children in England" International Journal of Obesity, 27: 1136-1138.

National Centre for Social Research, Department of Epidemiology and Public Health at the Royal Free and University College Medical School. 1996. "Health Survey for England 1995." The Stationery Office, London, England.

National Centre for Social Research, Department of Epidemiology and Public Health at the Royal Free and University College Medical School. 2006. "Forecasting Obesity to 2010." The Stationery Office, London, England. Available at: http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsStatistics/DH_4138630

Office for National Statistics, Labour Market Division. 2002. “Women in the Labour Market: Results from the Spring 2001 LFS” National Statistics Feature, Labour Market Trends, March 2002: 109-127.

Office for National Statistics, Labour Market Division. 2011. “Mothers in the Labour Market, 2011” ONS Publication, Datasets. Available at: http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-227710.

Ray, Rebecca. 2008. “A Detailed Look at Parental Leave Policies in 21 OECD Countries.” CEPR: Center for Economic and Policy Research, Washington, DC. Available at: http://www.cepr.net/documents/publications/parental-app_2008_09.pdf

Strauss, Richard S. and Judith Knight. 1999. “Influence of the Home Environment on the Development of Obesity in Children” Pediatrics, 103(6): 85-95.

United States Bureau of the Census. 2000. “Statistical Abstract of the United States, 2000.” Government Printing Office, Washington, DC.

von Hinke Kessler Scholder, Stephanie. 2008. “Maternal Employment and Overweight Children: Does Timing Matter?” Health Economics, 17: 889–906.

von Kries, Rudiger, Berthold Koletzko, Thorsten Sauerwald, Erika von Mutius, Dietmar Barnert, Veit Grunert and Hubertus von Voss. 1999. “Breastfeeding and Obesity: Cross Sectional Study” British Medical Journal, 319(7203): 147-150.

Wolf, Anne M. 2002. "Economic Outcomes of the Obese Patient" Obesity Research, 10(1): 58-62.