Chapter 4
Children's Physical Activity and Risk of Overweight

Overweight in children is an important nutrition-related problem in the United States. The proportion of overweight children and adolescents has essentially tripled over the last three decades, and an estimated 15 percent are now overweight (CDC/NCHS, 2002). The prevalence of child overweight is especially great among minorities (Strauss and Pollack, 2001). There is also evidence that overweight during childhood continues into adulthood (Guo *et al*., 1994); in adults, overweight and obesity are associated with increased risk for heart disease, diabetes, high blood pressure and stroke, and other diseases. Children's excess food energy intake, discussed in Chapters 2 and 3 of volume 1 of this study, is just one of the factors contributing to this problem.

Sedentary lifestyles and low levels of physical activity may be even more important risk factors for overweight and obesity in children than excess energy intake (Schlicker *et al*., 1994). Factors contributing to reduced physical activity include increased television and video watching and greater use of computers, as well as reduced participation in physical activity classes in school (Anderson *et al*., 1998). In addition to contributing to overweight, a sedentary lifestyle is considered a risk factor for cardiovascular disease according to the American Heart Association (Fletcher *et al*., 1996).

Because of lack of maternal supervision, it was hypothesized that children whose mothers work might watch more television and be less physically active than children with homemaker mothers are. Although these factors may contribute to the development of overweight, the increased financial resources associated with maternal employment might help to provide a stable supply of higher quality food, which could help control a child's weight. This chapter presents results of bivariate analyses of children's physical activity levels and risk of overweight, relative to mothers' employment status.

Outcome measures from the CSFII that assess physical activity level include reported frequency of engaging in vigorous exercise and time spent viewing television or videotapes. Data on vigorous exercise were available for children age 12 to 17. Children's risk of overweight (and underweight) was determined from calculations of BMI, based on reported measures of body weight and height. As discussed below, height and weight data for children under age 12 were not used for this analysis. Results are tabulated for all children and by age and income group; where sample sizes permit, results are also tabulated for the number of adults in the home.[21] In addition, findings from the analysis of children's weight status are presented separately for boys and girls.

Although the observed differences in children's physical activity and risk of overweight by maternal employment are not great, they tend to be in the direction of worse outcomes for children of full-time working mothers relative to children of homemaker mothers. In particular:

- Children age 12 to 17 whose mothers work are equally as likely to engage in daily vigorous exercise as children of homemaker mothers.

[21] For some analyses, it was also not possible to break out children in households with income under 130 percent of the federal poverty level because of small sample sizes.

- Children of full-time working mothers are more likely to watch television (TV) or videos for more than two hours daily than children of homemakers (48 percent *versus* 40 percent).
- Children with both part-time and full-time working mothers, especially those under age 5, are less likely to avoid TV/video watching altogether than children of homemaker mothers.
- Children's TV/video watching is negatively related to household income, although maternal employment does not modify this relationship. About half of all children who reside in households living under 130 percent of poverty spend more than two hours daily on this activity.
- Among 12- to 14-year-olds, children whose mothers work full-time are at significantly greater risk of overweight than children whose mothers are homemakers.
- Adolescent boys tend to be at greater risk of overweight than girls, and lower-income adolescents more so than those in families with higher income. These patterns are not significantly altered across maternal employment categories.

Among children age 12 to 17, the proportion engaging in vigorous daily exercise is the same regardless of mothers' employment status (43 percent). Scattered significant differences are seen across income categories, but they follow no consistent pattern.

Physical Activity Level

The *Dietary Guidelines for Americans* recommend that children get at least 60 minutes of physical activity daily (USDA/HHS and USDA, 2000). The CSFII item on physical activity gauges the frequency of vigorous exercise ("enough to work up a sweat") among 980 adolescents age 12 to 17 years. Overall, about 43 percent of these children exercise daily and 20 percent exercise once a week or less (Exhibit 4.1). The frequency of vigorous exercise varies little by age group or household income.

The proportions of children exercising daily are practically identical across the three maternal employment groups. Counterbalancing patterns are seen across the income groups without any consistent relationship (Exhibit 4.2). For example, among children with household incomes under 185 percent of poverty, those whose mothers work full-time are significantly less likely to exercise daily than those whose mothers do not work (37 percent *versus* 51 percent), whereas among children with incomes over 185 percent of poverty the pattern is reversed (45 percent *versus* 36 percent).

The CSFII also obtained information on the number of hours that children of all ages watched TV or videos, over the same two days for which their food intake was measured. The great majority of children overall (89 percent) watch some TV or videos. Generally, infants and toddlers (age 0 to 4 years) watch TV/videos less than older children.[22] A quarter of infants and toddlers do not watch at all, compared with only 4 to 8 percent in the older groups.

[22] It was assumed that proxy respondents for the relatively small share of infants reported to watch TV or videos were referring primarily to videotapes produced specifically for infants.

Exhibit 4.1

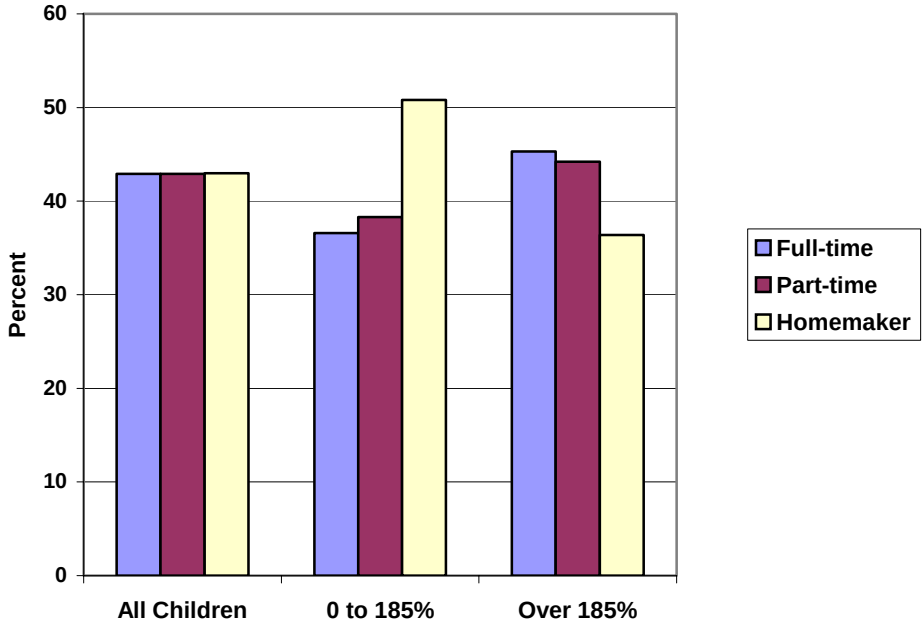
Frequency of Vigorous Exercise

	Maternal Employment Status			
	Full-Time	**Part-Time**	**Homemaker**	**All Children**
All children				
Daily	42.9%	42.9%	43.0%	43.1%
2-6 times per week	36.2	40.0	35.7	36.9
1 time per week or never	20.9	17.1	21.3	20.0
Maximum sample size	541	211	228	980
By age group				
12 to 14 years				
Daily	41.4%	49.6%	42.9%	43.7%
2-6 times per week	38.4	39.7	37.2	38.4
1 time per week or never	20.2	10.7	19.9	17.9
Maximum sample size	260	116	129	505
15 to 17 years				
Daily	44.4%	35.7%	43.1%	42.4%
2-6 times per week	33.9	40.2	34.1	35.2
1 time per week or never	21.7	24.1	22.8	22.4
Maximum sample size	281	95	99	475
By income category				
Up to 185% of poverty				
Daily	36.6%**	38.3%	50.8%	41.5%
2-6 times per week	37.4	45.0**	29.7	36.5
1 time per week or never	26.0	16.7	19.5	22.0
Maximum sample size	162	81	122	365
Over 185% of poverty				
Daily	45.3%*	44.2%	36.4%	43.8%
2-6 times per week	35.8	38.5	40.0	37.1
1 time per week or never	18.8	17.3	23.6	19.1
Maximum sample size	379	130	106	615

*** Statistically significant difference from children whose mothers are homemakers at the 1 percent level.
** Statistically significant difference from children whose mothers are homemakers at the 5 percent level.
* Statistically significant difference from children whose mothers are homemakers at the 10 percent level.

Exhibit 4.2

Daily Vigorous Exercise, by Income Relative to Poverty and Maternal Employment Status



TV/video watching seems negatively related to household income; the proportion of children who watch more than two hours drops from 51 percent in the lowest income households to 41 percent in households living over 185 percent of poverty. The number of adults living in the household is also associated with children's TV/video viewing; 55 percent of children whose mother is the only adult watch more than two hours, compared to 43 percent of children who live with multiple adults.

Children of mothers who work full-time spend significantly more time watching TV/videos than children of homemakers (Exhibit 4.3). About 48 percent of full-time workers' children watch more than two hours of TV/videos, compared to 40 percent of homemakers' children. Furthermore, children of working mothers (both full- and part-time) are significantly less likely to avoid TV/video watching altogether than children of homemakers.

Infants and toddlers are the source of the pattern noted above that children of working mothers are less likely to avoid TV/video viewing altogether than children of homemaker mothers: 22 to 23 percent *versus* 28 percent in this age group. The other finding noted for all age groups combined, that children of full-time working mothers are substantially more likely to watch more than two hours of TV/videos per day than their counterparts, is mainly attributable to the viewing behavior of 5- to 14-year-olds. Patterns for older adolescents do not vary markedly by maternal employment status (Exhibit 4.4).

Exhibit 4.3

Hours of Television/Video Viewing

	Maternal Employment Status			
	Full-Time	**Part-Time**	**Homemaker**	**All Children**
All children				
None	9.6%***	10.8%*	13.0%	10.9%
Under 2 hours	42.0**	46.9	46.9	44.5
Over 2 hours	48.4***	42.3	40.1	44.5
Maximum sample size	4,344	2,132	3,622	10,098
By age group				
0 to 4 years				
None	23.0%***	21.7%***	28.2%	24.7%
Under 2 hours	44.7	47.3*	43.7	44.8
Over 2 hours	32.3***	31.0	28.2	30.4
Maximum sample size	2,613	1,352	2,572	6,537
5 to 11 years				
None	3.4%**	4.4%	6.0%	4.4%
Under 2 hours	42.6**	49.4	50.8	46.6
Over 2 hours	54.0***	46.2	43.3	49.0
Maximum sample size	1,179	568	817	2,564
12 to 14 years				
None	3.8%	6.5%	6.7%	5.2%
Under 2 hours	31.9**	39.2	46.2	37.4
Over 2 hours	64.4**	54.3	47.0	57.4
Maximum sample size	269	117	134	520
15 to 17 years				
None	6.6%	11.1%	9.1%	8.0%
Under 2 hours	46.5	48.4	43.7	46.4
Over 2 hours	46.8	40.5	47.2	45.6
Maximum sample size	283	95	99	477
By income category				
Under 130% of poverty				
None	10.2%*	10.5%	12.3%	11.4%
Under 2 hours	38.5	39.3	35.6	37.5
Over 2 hours	51.3	50.2	52.1	51.1
Maximum sample size	966	549	1,507	3,022
130 to 185% of poverty				
None	9.7%**	13.6%	12.8%	11.7%
Under 2 hours	34.0***	40.9**	50.7	40.6
Over 2 hours	56.3***	45.5*	36.5	47.7
Maximum sample size	585	304	576	1,465
Over 185% of poverty				
None	9.4%***	10.0%**	14.0%	10.6%
Under 2 hours	44.4***	50.6	54.1	48.1
Over 2 hours	46.2***	39.4**	31.9	41.3
Maximum sample size	2,793	1,279	1,539	5,611

Exhibit 4.3

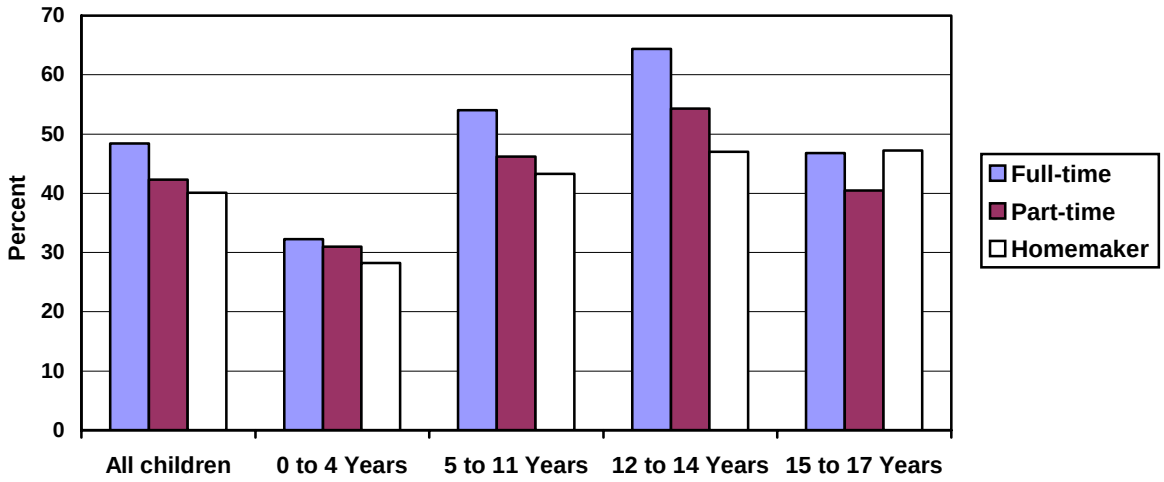
Hours of Television/Video Viewing

	Maternal Employment Status			
	Full-Time	Part-Time	Homemaker	All Children
By number of adults				
One				
None	7.9%	9.4%	7.0%	8.3%
Under 2 hours	38.4*	37.8	30.8	37.1
Over 2 hours	53.7*	52.8*	62.2	54.5
Maximum sample size	634	214	323	1,171
Multiple				
None	9.9%***	10.7%**	13.7%	11.4%
Under 2 hours	42.7**	48.2	48.3	45.7
Over 2 hours	47.3***	41.0	38.0	43.0
Maximum sample size	3,710	1,918	3,299	8,927

*** Statistically significant difference from children whose mothers are homemakers at the 1 percent level.
** Statistically significant difference from children whose mothers are homemakers at the 5 percent level.
* Statistically significant difference from children whose mothers are homemakers at the 10 percent level.

Exhibit 4.4

More Than Two Hours of TV/Video Viewing, by Maternal Employment Status



Variation in household income does not modify the general relationship between TV/video watching and mother's employment status, except in the poorest households where about half of children in all three groups watch more than two hours per day on average. In single-adult households, however, children of working mothers are actually somewhat less likely to watch more than two hours per day

than children of homemakers (53 to 54 percent *versus* 62 percent, $p < 0.10$). The patterns of TV/video watching among children in multiple-adult households are similar to those for all children.

Taken together, the findings that infants and preschool children with working mothers are less likely to avoid watching TV/videos altogether than children of homemakers **and** consume higher levels of food energy (see Chapters 2 and 3) suggest they are a group that may be at risk for overweight.

Body Mass Index and Risk of Overweight

The Centers for Disease Control and Prevention (CDC, 2001) have developed age- and gender-specific distributions of BMI for children to define:

- Underweight: BMI below the 5th percentile;
- At risk of overweight: BMI at or above the 85th percentile; and
- Overweight: BMI at or above the 95th percentile.[23]

The CSFII collected data on young children's height and weight from adult proxies, whereas children age 12 to 17 reported their own height and weight. Only the self-reported values were found to be of sufficiently high quality to analyze.[24] Because of the small sample sizes, it was not possible to cross children's age with gender in these analyses.

Using the CDC definitions, 12 percent of the adolescents are overweight, and 28 percent are at risk of overweight (Exhibit 4.5). Risk of overweight is about equally prevalent among older and younger adolescents, but is substantially more prevalent among boys than girls—33 *versus* 23 percent. As many other studies have found, risk of overweight is more prevalent among lower than higher income children. Underweight is rare in all groups, and shows little variation by subgroup.

Risk of overweight does not differ significantly by maternal employment status for all adolescents combined. Compared to children of homemakers, children of full-time working mothers are a little more likely, and children of part-time mothers a little less likely, to be at risk of overweight. This pattern is seen consistently for both genders and in both income groups, mostly without achieving statistical significance. The pattern appears most strikingly among 12- to 14- year-olds, for whom risk of overweight is significantly higher for children of full-time working mothers than for children of homemakers (36 *versus* 25 percent). The relationship is mildly reversed for older adolescents (Exhibit 4.6).

[23] CDC has recently revised the definition for "at risk of overweight" to include only those children with BMIs between the 85th and 95th percentiles (CDC, 2002).

[24] Based on the authors' review of the reported values, and preliminary analyses of the validity of self-reported height and weight using NHANES-III data conducted by Marilyn Townsend at the University of California, April 2002. Proxy-reported heights in the CSFII were implausibly concentrated at rounded values such as 24 inches, 30 inches, and 36 inches.

Exhibit 4.5

Overweight, Overweight/At Risk for Overweight, and Underweight, Based on BMI[a]

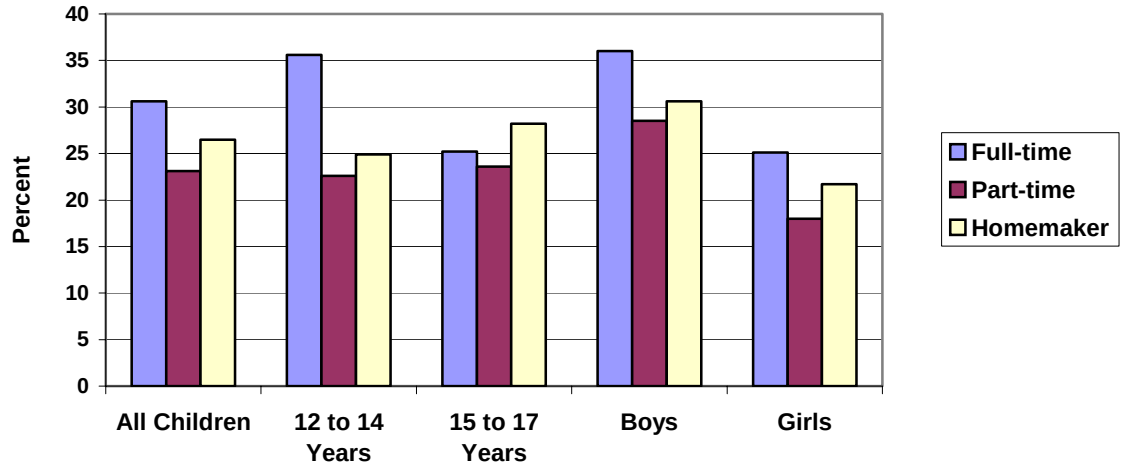
	Maternal Employment Status			
	Full-Time	Part-Time	Homemaker	All Children
All children				
Overweight	13.5%	7.8%	11.4%	11.7%
Overweight/At risk	30.6	23.1	26.5	27.7
Underweight	3.0	3.3	3.1	3.0
Maximum sample size	540	207	217	964
By age group				
12 to 14 years				
Overweight	13.7%	7.5%	10.1%	11.3%
Overweight/At risk	35.6**	22.6	24.9	29.8
Underweight	2.7	1.4	1.7	2.2
Maximum sample size	260	116	120	496
15 to 17 years				
Overweight	13.2%	8.2%	12.8%	12.2%
Overweight/At risk	25.2	23.6	28.2	25.5
Underweight	3.4	5.2	4.6	4.0
Maximum sample size	280	91	97	468
By gender				
Boys				
Overweight	17.0%	9.3%	12.3%	14.2%
Overweight/At risk	36.0	28.5	30.6	32.6
Underweight	2.9	2.7	3.7	3.0
Maximum sample size	266	101	123	490
Girls				
Overweight	9.9%	6.3%	10.4%	9.1%
Overweight/At risk	25.1	18.0	21.7	22.6
Underweight	3.2	3.9	2.5	3.1
Maximum sample size	274	106	94	474
By income category				
Up to 185% of poverty				
Overweight	14.4%	11.9%	15.9%	14.4%
Overweight/At risk	35.0	27.7	32.0	32.5
Underweight	4.9	3.0	4.6	4.4
Maximum sample size	159	78	110	347
Over 185% of poverty				
Overweight	12.7%	5.5%	7.8%	10.5%
Overweight/At risk	29.0	20.6	22.3	25.5
Underweight	2.4	3.2	2.1	2.4
Maximum sample size	381	129	107	617

a According to the CDC, overweight in children is defined as a BMI at or above the 95th percentile for age and sex; at risk for overweight (which includes overweight) is defined as a BMI at or above the 85th percentile; underweight is indicated by a BMI below the 5th percentile.

*** Statistically significant difference from children whose mothers are homemakers at the 1 percent level.
** Statistically significant difference from children whose mothers are homemakers at the 5 percent level.
* Statistically significant difference from children whose mothers are homemakers at the 10 percent level.

Exhibit 4.6

Risk of Overweight Among Adolescents, by Maternal Employment Status



Although 12- to 14-year-old children whose mothers work full-time do not tend to consume more food energy than children whose mothers are homemakers, they are, as noted above, the group most likely to spend over 2 hours a day watching TV or videos (64 percent *versus* 54 and 47 percent for children of part-time and homemaker mothers; Exhibit 4.3).

Summary

Comparisons of children's physical activity level and weight status show a mild tendency toward worse outcomes for children whose mothers work full-time relative to children of homemakers. At almost all ages, children of full-time working mothers spend more time in sedentary activities, specifically TV and video viewing, than children of nonworking mothers. The reported frequency of engaging in vigorous exercise, however, does not vary with maternal employment, at least for 12- to 17-year-olds. With regard to overweight, children 12 to 14 years old (but not age 15 to 17) were at significantly greater risk if their mothers work full-time. Unfortunately, data on exercise levels and reliable data for calculating BMI were not available for children under age 12. The potential for associations between mothers' work status and their children's exercise frequency and risk of overweight cannot be ruled out for younger children.