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# The Economics of Physical Activity

## Societal Trends and Rationales for Interventions

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**Abstract:** What are Americans doing with their time and their money and what has changed in recent decades? Do changes suggest interventions that will lead to healthier lifestyles? This paper analyzes several different data sets that reveal some surprising (and some less surprising) insights. The big growth areas, both in terms of expenditure and time allocation, have been leisure time and travel/transportation. Leisure-time industries outpace gross-domestic-product growth for both “active” (sporting goods, dance studios, gyms) and “sedentary” industries (spectator sports, cable TV), although industries associated with more sedentary lifestyles grow the fastest. Overall time spent in productive activities, whether at home or work, has declined by several hours each week for both men and women compared to 40 years ago. Reduced physical activity by itself is not a reason for intervening, as many changes improved overall quality of life (even if not necessarily health-related quality of life). But other trends are more likely to reflect poorly functioning markets, leading to worse economic and health outcomes. Market failures that lead to less physical activity or unhealthy nutrition justify interventions, both from an economic and a public health perspective.

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### Introduction

Researchers are increasingly recognizing that changes in dietary and physical activity patterns are driven by changes in the environment and by the incentives that people face.<sup>1–3</sup> Many factors have been suggested as causes of the “obesity epidemic”—automobiles, television, fast food, computer use, vending machines, suburban housing developments, portion sizes, and countless others. Putting a multitude of isolated data points into a coherent picture is a challenging, but necessary, task to assess whether proposed solutions are promising or likely to lead us down a blind alley. Conventional wisdom is an unreliable guide and, as we will see in this paper, some widely held beliefs are incorrect.

Can we identify important and less important behavioral changes over the past decades and relate them to changes in environmental incentives? People face trade-offs in allocating their scarce resources of time and money to best achieve their goals, including health. Studying what people are doing with their time and their money is a good start toward understanding how economic incentives have altered energy intake and energy expenditure in a way that led to weight gain. For

nutrition, extensive and consistent trends have been published, but changes in physical activity, the topic of this paper, remain somewhat more mysterious. Here, we take a look on industry output compiled by the Bureau of Economic Analysis and household surveys conducted over the past 40 years that queried people on how they used their time.

### Time and Money: Where Did They Go?

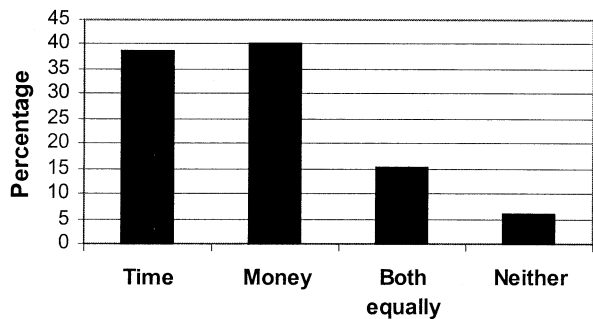
Americans are split almost equally when asked whether they are more concerned about time or money (Figure 1), so we want to look at both changes in time use and changes in where the money is spent.

One data source is the breakdown of industry output compiled by the Bureau of Economic Analysis. Comparable annual data are available from 1987 to 2001, and the figures are adjusted for inflation to show constant 1996 U.S. dollars. Time-use surveys that have been conducted since 1965 are a second main data source for the trends discussed here. For the time period 1965 through 1985, this paper uses published summary statistics from Robinson and Godbey.<sup>4</sup> For more recent trends through 1999, I analyze the microdata from the Family Interaction, Social Capital, and Trends in Time Use Survey.<sup>5</sup> Time-use data are a good starting place to understand what people are doing. In fact, they were found to be so important to track trends that the Bureau of Labor Statistics and the Census Bureau are now collecting time-use data on an ongoing basis. Unfortunately, that data collection has only started in

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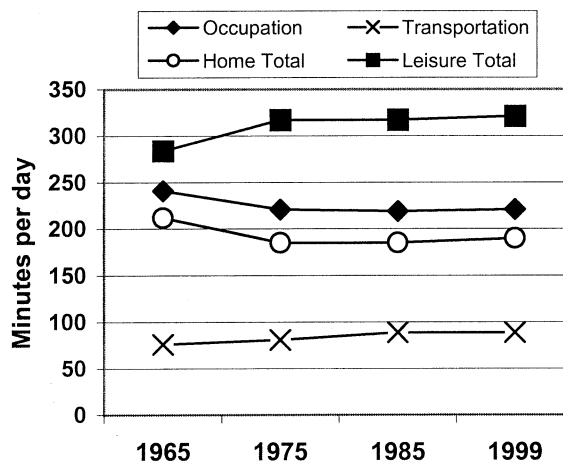
**Figure 1.** Responses to: “In general, are you more concerned about lack of time or lack of money?” (Source: Author’s calculations based on Family Interaction, Social Capital, and Trends in Time Use Survey, 1998–1999.)

2003, and official statistics to track time trends will not be available for past years. We will also take a look at statistics from the 2001 National Household Travel Survey and its predecessors conducted by the Department of Transportation for transportation and the Behavioral Risk Factor Surveillance Surveys (BRFSSs) for leisure-time physical activity and obesity trends.

By themselves, time-use data (or, for that matter, expenditure data) are not sufficient to tell us about behavioral relationships.<sup>6</sup> To estimate behavioral relationships and predict the effects of future environmental changes, we would have to know more about the relative prices and costs of activities. This is not something we can do with existing data, but time-use data can at least tell us what has changed and therefore may suggest some feasible interventions. This paper focuses on how people divide their time between five categories of activities—Sleep, Leisure, Occupation (paid work), Transportation, and Home production (unpaid work)—collectively referred to by the acronym SLOTH. Time-use researchers have much more detailed classification and also group activities slightly differently. The concept of leisure time is similar to “free time” in the time-use literature, although this paper classifies all transportation into its own group, even if it was part of “free time” (e.g., traveling to visit friends) or home productive activities (e.g., travel to grocery store). This reclassification of travel is an important difference to the time research literature.

### Sleep

Sleep is the one category that has remained essentially unchanged during the last 40 years, while there were large shifts in the other activities. Sleep may have been a little bit higher in 1975 than before or after, but there are no trends in any direction that could have affected obesity. The average American spends roughly 8 hours per day napping or sleeping (or at least trying to sleep), a minute less than in 1985, and 4 minutes more than in 1999. Oddly, even though the mean has remained



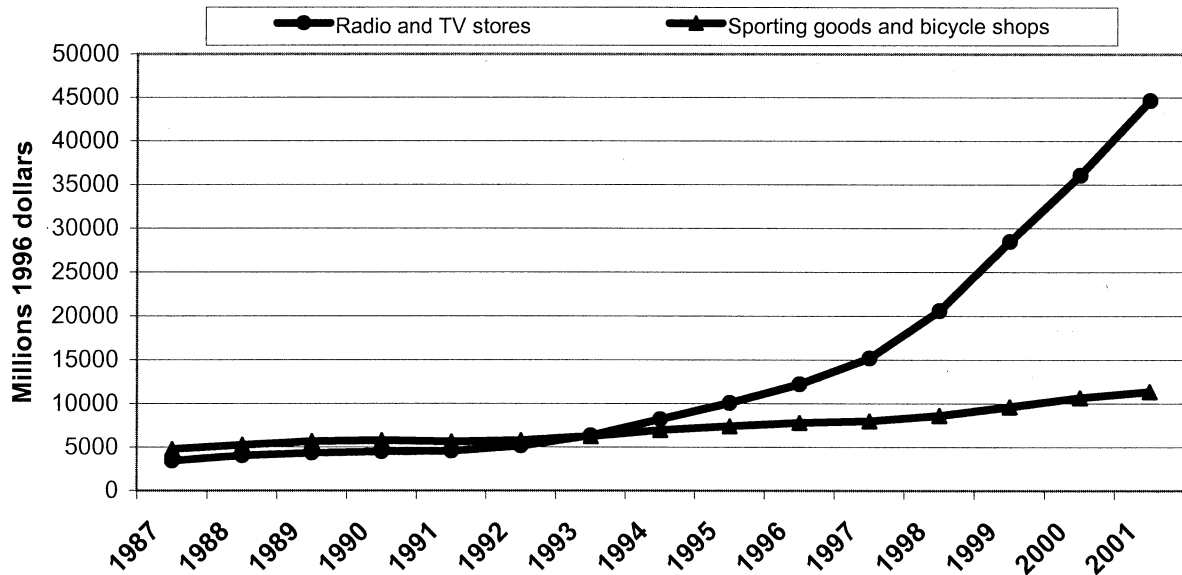
**Figure 2.** Changes in time allocation, 1965 to 1999. (Sources: Robinson and Godbey,<sup>4</sup> and author’s calculations based on Family Interaction, Social Capital, and Trends in Time Use Survey, 1998–1999.)

unchanged, a larger share of people report both high and low hours of sleep.

### Leisure

How are Americans dividing up the remaining 16 hours in a day? Figure 2 shows that there have been large secular changes in the other categories. Leisure time has increased substantially since 1965—by >4 hours per week. Occupation and productive activities at home (cooking, cleaning, repairing things, childcare) have diminished, but transportation has also increased somewhat. Personal care (taking showers, getting dressed) or time spent eating account for the remaining time (roughly 2 hours daily) and are not shown in the Figure 2 because they likely play a very small role in total physical activity. Thus, increasing weight has been accompanied by increased, not reduced, leisure time.

Do these numbers obscure important differences across subgroups? After all, there have been big changes in the labor force participation of women. Hochschild,<sup>7</sup> based on interviews of employed couples in Northern California about 20 years ago, concluded that women work much longer hours and that there is a dramatic “leisure gap.” However, if there is any trend, it has been toward a disappearing leisure gap, which has dropped from a 6-hour difference between employed women and employed men in 1965 to a 2-hour gap.<sup>4</sup> More importantly, “free time” between 1965 and 1985 increased for employed women (7 hours), not-employed women (7 hours), and employed men (3 hours), although it appears to have decreased for not-employed men. (In contrast to “not-employed,” “unemployed” to economists means not working at a paying job and wanting to work at a paying job; only a minority of not-employed are actually unemployed.) Why did free time among not-employed men decrease?



**Figure 3.** Retail sales, sports and television. (Source: U.S. Department of Commerce, Bureau of Economic Analysis, various years, constant dollar output for double-deflated industries.)

That group did not participate much in home production in the past, and therefore did not benefit from declines in that activity, which is the primary reason for increased free time among not-employed women. In fact, there may even be an increase for not-employed men in home productive activities. At the same time, all groups increased transportation/travel time. The trend is also the same when comparing women and men overall, although the numbers differ because of differentially changing labor force participation: Free time between 1965 and 1985 increased by 4.9 hours for women (to a total of 39) and by 4.7 hours (to a total of 40) for men.<sup>4</sup> In contrast to common perceptions, less leisure or “free” time is one hypothesis for the obesity epidemic that has no empirical support.

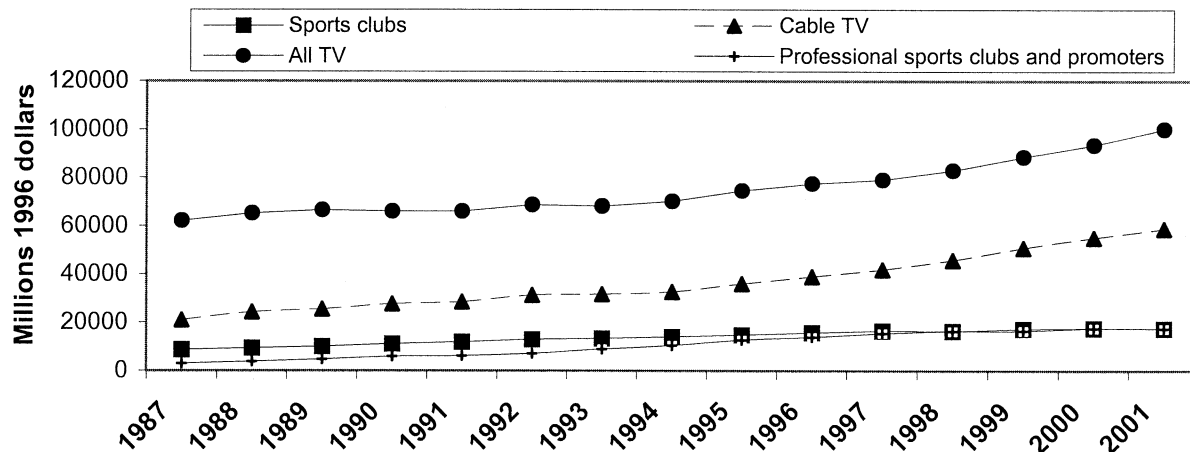
What are possible economic factors behind this change? Technologic change makes (largely sedentary) leisure activities (DVDs, cable TV, games, surround sound) more attractive relative to work or household production; that is, people choose to have (sedentary) leisure time over career advancement through longer work hours or a better-maintained home. Some of the leisure time may also have become more active, of course, and we will look at that below, but today’s tennis rackets, golf clubs, treadmills, or bicycles involve only marginal engineering advances, whereas nothing like cable TV or DVDs was available 40 years ago.

In terms of industry output, the growth of industries associated with leisure time far exceeded gross domestic product (GDP) growth. Between 1987 and 2001, GDP in constant 1996 dollars increased by about 50% (from \$6113 billion to \$9215 billion), whereas retail of sporting goods and bicycles more than doubled (from \$4.7 to \$11.4 billion) (Figure 3). However, this is dwarfed by the

explosive growth of home entertainment retail, an industry that was smaller than sporting goods in 1987 and now is four times as big.

Expenditures related to durable goods are somewhat distant from physical activity, but the same picture appears in services as well. Sports clubs (membership based) also more than doubled, much more than GDP growth, and similar growth rates exist in smaller “active” industries, such as dance studios. However, spectator sports, the sedentary version, experienced a much faster growth: a five-fold increase during the same time period. Television reigns supreme in absolute size, but its growth rate is actually lower than that of spectator sports, although this is due to stagnant traditional television; cable was a major growth industry. There are complementarities between cable television and spectator sports as the popularity of sports channels indicates. Very few leisure industries are stagnant or declining and these few have a decidedly dated feel to them, such as bowling centers or racetrack operations. While Figure 4 shows only a small subset of industries, it captures the general trend very well: Leisure-time industries are growing much faster than the general economy. But within leisure-time industries, those associated with moderate or vigorous physical activity (membership sports clubs, dance studios) have grown more slowly than those associated with sedentary lifestyles (cable TV, spectator sports, video rentals, amusement parks and services).

Industry growth is not the same as time actually spent in an activity. Do more costly sports gadgets really mean more exercise? If they do, it reflects a new relationship between expenditures on durable good and time use in the activities for which these goods are designed.



**Figure 4.** Sports clubs and television. (Source: U.S. Department of Commerce, Bureau of Economic Analysis, various years, constant dollar output for double-deflated industries.)

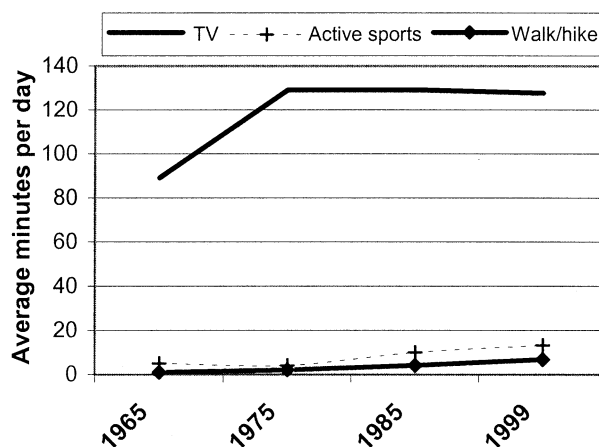
People bought dishwashers or vacuum cleaners not to spend more time doing dishes or cleaning, but to reduce time spent in these activities. Durable goods were substitutes for time in the activities for which these goods were intended. This is very different, for example, from the new golf clubs, which presumably are not bought in order to spend less time golfing.

So, what do people actually do with their leisure time? While there have been claims in the general press that Americans are exercising less, time-use data show a small, but consistent, increase in active sports or walking/hiking. Between 1985 and 1999, active sports increased by 20 minutes a week based on time-use data. This is not driven by a small group of heavy exercisers, but the increase represents the “typical” American: In the Behavioral Risk Factor Surveillance Surveys (BRFSSs) from 1990 to 2000 (a very different type of survey than time-use surveys), the median increase in reported physical activity is also 20 minutes a week (my calculations). In fact, although the Centers for Disease Control and Prevention reports in the past have typically suggested that there are no improvements in physical activity,<sup>8</sup> the latest analyses show that the prevalence of no leisure-time physical activity has dropped consistently and is now at the lowest level since data collection started. In the 1988–2002 period, the overall prevalence of no leisure-time physical activity declined approximately seven percentage points.<sup>9</sup> It remains true that most Americans do not meet federal physical activity recommendations to accumulate at least 30 minutes of moderate physical activity most days of the week or 20 minutes of vigorous activity at least three times a week. But declining leisure-time physical activity or exercise does not appear to be a cause of the obesity epidemic.

Despite this noticeable trend toward increasing leisure-time physical activity, exercise is only a small part of leisure-time and of physical activity. Figure 5

provides a more complete perspective. Exercise is barely visible and has increased minimally compared to the time spent and the increase in time spent watching television (not shown are other social activities, reading, attending concerts/museum/theatre). Combining primary and secondary activity (the figure shows only primary activities), the average American spends >20 hours a week watching television (or videos or DVDs), although the largest increase in TV watching occurred prior to 1980. The trend since 1985 is not quite clear because there are two different estimates for the 1990s. Using the 1999 time-use survey (as in Figure 5), there was no increase since 1985, but using a 1995 time-use survey, there was an increase of 1.5 hours/week. For children, however, there has been an unambiguous decline in TV watching between 1981 and 1997.<sup>10</sup>

Even though the largest increase in television watching precedes the “obesity epidemic,” weight measured



**Figure 5.** Time in leisure activities. (Sources: Robinson and Godbey,<sup>4</sup> and author’s calculations based on Family Interaction, Social Capital, and Trends in Time Use Survey, 1998–1999.)

by body mass index (BMI) has been increasing since at least 1971, roughly at a rate of one unit of BMI per decade among adults (my calculations based on National Health and Nutrition Examination Survey [NHANES]). This increase did not show up in fast-changing obesity rates until the late 1980s when a large percentage of the population was near the threshold.

Why the different changes in expenditures and time allocation between sedentary and active leisure time? Could this be the consequence of clever marketing campaigns duping Americans to spend their money preferentially on home electronics and spectator sports? Then why are marketers for kitchen appliances or commercial gyms so much less successful? There must be something new offered by the growing sedentary leisure-time industries that consumers value. Technologic change certainly plays an important role. Nobody buys record players anymore or watches black-and-white television, yet despite the best efforts of commercial sports club, decidedly low-tech activities dominate exercise. In the 2000 BRFSS, almost every other respondent with any leisure-time physical activity listed walking as the primary activity, and running/jogging was a distant second (about 1 in 11). Aerobics classes (1 in 30) and exercise bicycles or rowers (1 in 90) were not contenders.

## Occupation

As shown in Figure 2, time spent in occupational activities has declined, due primarily to a decline in the size of the work week, which is consistent with information from employers. In contrast, surveys that ask people to estimate average weekly hours worked (rather than asking people to provide a chronologic description of the previous day, as in the time-use data) have not shown this trend.<sup>11</sup> The lack of sensitivity of traditional surveys to detect trends in work hours was an important reason why the Bureau of Labor Statistics has started to collect time-use data.<sup>11,12</sup> The decline in work hours also holds individually for employed men, employed women, not-employed men, and not-employed women, at least through the mid 1980s. In the 1990s, there has been little change or possibly even a small increase, coinciding with a booming economy. In contrast to leisure time, changes in labor-force participation led to a qualitatively different aggregation for all women: Even though work hours declined for employed women and for not-employed women, so many more women are now working that work hours for women overall have increased. But this was offset by an even larger decline in home production to account for the substantial increase in leisure time among all women.

If occupation activities were more physically demanding than leisure-time activities, the declining time at work could have led to an energy imbalance. But if this were an

important factor, we should see lower weight gain for women (increasing hours) than for men (decreasing hours), which we do not. It is more likely that occupation plays a minor role because the days when occupation meant hard physical labor are long over, at least for most Americans. Since the 19th century, technologic change has made paid work less energy intensive. Some economists have suggested that this trend in occupational demands is a primary explanation for increasing obesity rates.<sup>13</sup> But the time frame does not seem right for this story either, because the largest occupational shifts preceded the obesity epidemic by several decades. All occupational explanations for weight gain are difficult to reconcile with the fact that the elderly, children, and individuals who are not in the labor force have the same obesity trends as individuals in the labor force. Overall, occupation does not seem to be the smoking gun to explain recent changes in obesity.

An important social trend during the 1980s that economists often emphasize is increasing wage inequality by education, with the real wages of high school dropouts declining, the real wages of high school graduates stagnant, and substantial growth in the wages of college graduates.<sup>14</sup> Because real wages of high school dropouts are lower than in the past, whereas those of college graduates are higher, the opportunity cost of leisure time differs by educational attainment. College-educated individuals have an incentive to spend more time in occupational and less time in leisure-time activities than high school graduates or dropouts. But not everything else is equal, and there may be an income effect that counters the “price” effect of higher real wages. When real wages per hour drop, some people may even increase hours worked “to make ends meet.” Descriptively, the price effect dominates. In the 1999 Family Interaction, Social Capital, and Trends in Time Use data, individuals with high school education or less report 15 more minutes of leisure daily than individuals with more than high school education, but not a college degree. In contrast, individuals with a college or postgraduate degree report 29 minutes less. The qualitative result holds for both men and women separately. Opportunity costs can change the relative allocation of leisure-time activities, and economists hypothesize that individuals with higher wages invest a higher proportion of their leisure time in health-promoting activities than individuals with lower wages. Indeed, controlling for total leisure time, the high school education-only group watches 10 more minutes of TV daily than the middle education group, whereas the college-educated group watches 12 minutes less. That difference is split into a variety of other activities, but a big chunk goes into active sports: 7.5 minutes less for the high school group compared to the middle group versus 2.5 minutes more for the college group.

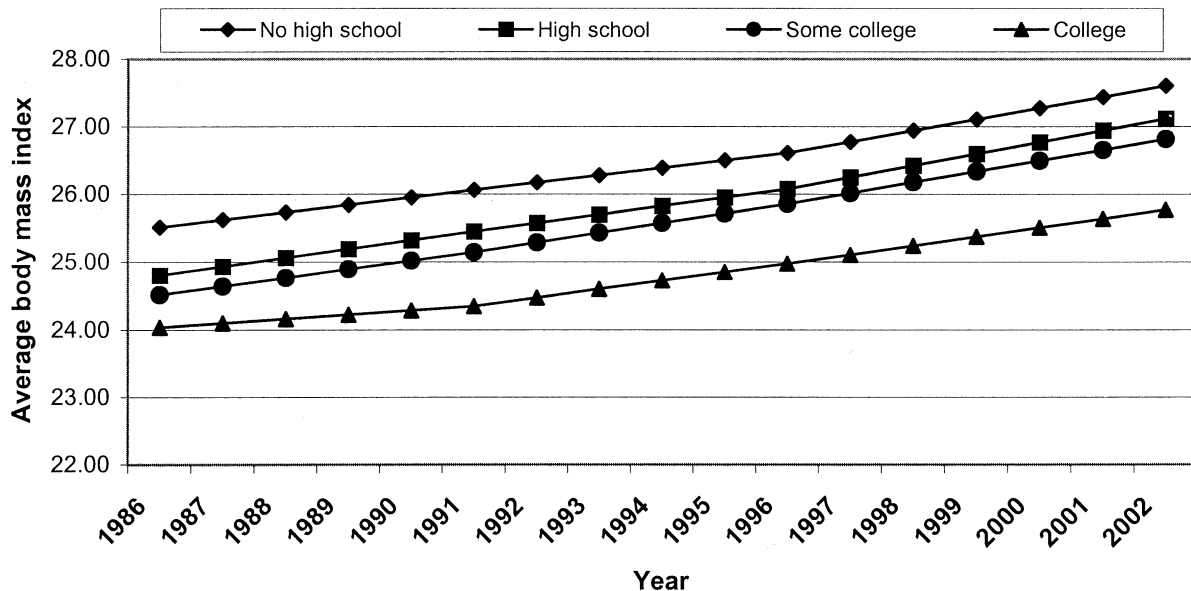


Figure 6. Prevalence of obesity by education. (Source: Truong and Sturm.<sup>31</sup>)

Although these economic explanations apply to cross-sectional differences in the population, such as the prevalence of obesity by educational achievement, the problem is that they do not fit very well with observed obesity trends. While there are big differences in the prevalence of obesity by educational status (for both men and women) or by household income (women only) at any point in time, sociodemographic characteristics do not explain increases over time. In fact, regardless of how we split the data, we find generally parallel trends in weight gain or BMI increase, by race/ethnicity, gender, income, education, and labor market status, similar to Figure 6, which is by educational achievement. Using a different data set (NHANES), Cutler et al.<sup>15</sup> have reached a similar conclusion. To understand the obesity epidemic, we need to identify changes that affect the entire population in very similar ways. Changes that affect only a subgroup of the U.S. population (e.g., a shift between occupations with different energy requirements or changes in real wages by educational achievement) can be only minor secondary causes; hypotheses that rely on cross-sectional differences between subgroups, such as income differences, have even less explanatory power for secular weight gain.

### Transportation

Transportation is part of everyday life, not only in order to get to work, but also to run (or drive) errands, go out for dinner, or see friends. It could also be a key factor of changes in physical activity because small shifts in travel modes noticeably alter energy expenditure. Americans spend over 10 hours a week traveling, about equally split into transportation related to occupation

(work commute), home activities (child care/shopping/personal care), and leisure-time activities. Transportation time, together with leisure time, has increased at the expense of occupation and household activities, with particularly large increases before 1985 (Figure 7).

Unfortunately, the existing time-use data cannot tell us much more about physical activity within transportation because there is no breakdown by travel mode. Other data sources, notably the Nationwide Personal Transportation Survey, have shown a consistent shift from walking or biking to driving as a percentage of trips taken, but the number of trips has also increased. There are comparability issues with the new 2001 National Household Travel Survey, which has added more prompts and detail about walking and biking in the survey. Because of this methods effect, we cannot really calculate more recent walking/biking trends. There seem to be no good data to provide better

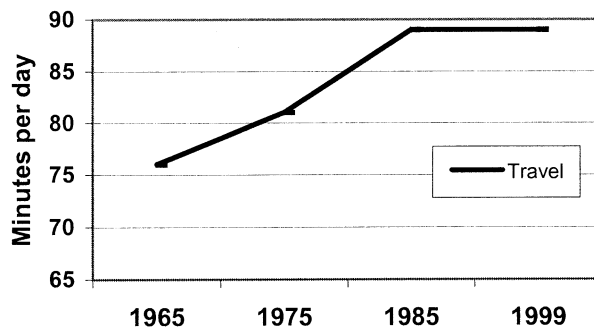


Figure 7. Travel, minutes per day, 1965 to 1999. (Sources: Robinson and Godbey,<sup>4</sup> and author's calculations based on Family Interaction, Social Capital, and Trends in Time Use Survey, 1998–1999.)

information on physical activity within transportation (it is not captured by the large health surveys that focus on leisure-time physical activity only).

Since 1969, commuting to and from work reduced its share of total trips from about one in three trips to one in six trips.<sup>16</sup> The biggest growth has been in trips for social or recreational purposes, including trips to the gym/play sports/exercise, to a bar/hang out, go to a museum/park/library, and visit friends. Trips for these purposes increased by about 100 more trips per person per year between 1990 and 2001.<sup>16</sup> Other trip categories that have increased are shopping and family/personal business. It may be socially beneficial for many reasons other than individual energy expenditure if a larger share of those trips did not involve automobiles, particularly in the “go to bar/hang out” category.

In order to get there, however, the incentives must be so that individuals prefer making this choice themselves. That is where the environment and economic incentives matter, and no educational campaign can counter their effects. The real price of gasoline has fallen steadily since the 1970s, which exacerbates the bias toward driving instead of walking or bicycling. But increased traffic on streets—and most of the increase in numbers of trips between 1990 and 2000 involved automobiles—makes walking and biking more dangerous and far less pleasant, thus providing even more reason to drive more. While driving provides private benefits that exceed private costs (otherwise people would not choose to drive), it imposes substantial external costs on others.<sup>17</sup> The growth of traffic and congestion, in turn, leads to multilane streets, suburbanization, and even fewer incentives to walk or bike because nearby destinations to walk to are also disappearing. The effects of street design and land-use patterns on walking have been documented in the planning literature,<sup>18–20</sup> but there are no national data that could be used to assess the total effect of suburban development on physical activity over time. A few cross-sectional data points based on national data are available, namely how suburban sprawl affects physical activity related to work commute and leisure-time walking.<sup>20,21</sup> Possibly as a consequence, more sprawling urban development is also associated with higher rates of obesity<sup>21</sup> and the development of chronic medical problems.<sup>22</sup> But as we have just seen with the cross-sectional association between obesity and education or other socioeconomic factors, cross-sectional results provide little information about time trends and can be very misleading about the causes of the obesity epidemic.

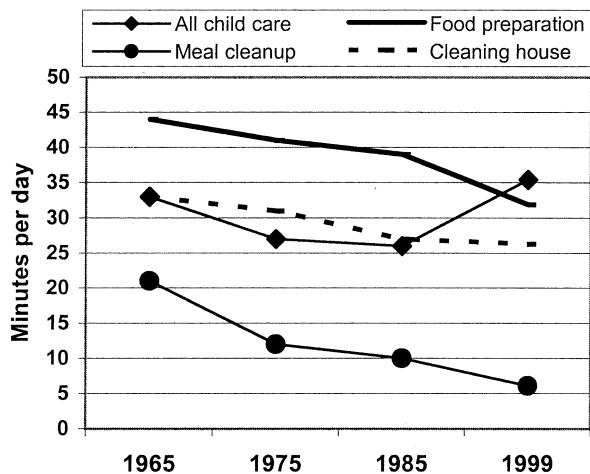
The difficulty at this point is to assess the role of transportation changes in the obesity epidemic, and existing data are limited. Incidental physical activity, like walking to the video store or walking children to school, may play a larger role for energy expenditure than leisure-time exercise. For instance, if a person walks instead of drives for 20 minutes 5 days a week, say two half-mile trips, the difference in energy levels

between these two activities could easily exceed 20,000 calories, or 6 pounds in a year. This type of physical activity, secondary to, say, dropping kids off at school or buying milk at a corner store, is hard to make up with purposeful exercise. But even if there were no strong association between changing travel patterns and weight increase, the transportation area may offer the most promising interventions from an economic perspective: Transportation patterns depend to a large extent on public goods, and there are large externalities associated with individual automobile use.

## Home Production

There has been a trend in the United States toward smaller household sizes because of lower fertility rates and increased numbers of single-parent households. Smaller households enjoy fewer economies of scale in home production than larger families. Preparing food at home involves fixed time with every meal that differs little with the number of persons served, whereas eating out involves the same marginal costs for each person. This difference in “technology” combined with demographic change alone would have shifted incentives toward less home production. In addition, changes in relative wages and prices of prepared food are likely to have reduced the value of time previously spent preparing food at home and cleaning up. In 1970, Americans spent one third of their food dollars on food away from home. This percentage grew to 39% in 1980, 45% in 1990, and 47% in 2001.<sup>23</sup> Away-from-home foods tend to be energy denser and contain more fats and sugars than foods at home, and portion size tends to be overly large as well. U.S. Department of Agriculture researchers have calculated that if food away from home had the same quality as food at home in 1995, Americans would have consumed 197 fewer calories per day, and reduced their fat intake to 31.5% of calories from fat (instead of 33.6%).<sup>24</sup> In fact, that difference by itself is larger than the energy imbalance that was necessary to create the obesity epidemic.

Why would the location of consumption so dramatically alter nutritional content? Information problems at the point of consumption are probably part of the reason. If individuals lack information about nutritional content at the point of consumption, it is not surprising that competition is focused on the dimensions that consumers can evaluate easily: price, portion size, and taste, at least with repeat purchases. This type of market failure is well known to every economist since Nobel Laureate George Akerlof’s “lemon paper.”<sup>25</sup> Akerlof argued that if quality is an important dimension but cannot be assessed by a buyer, competition will be on the dimensions that are observed and drive out higher-quality products even if they would be preferred by buyers with more complete information. When



**Figure 8.** Time-use trends for home productive activities, 1965 to 1999. (Sources: Robinson and Godbey,<sup>4</sup> and author's calculations based on Family Interaction, Social Capital, and Trends in Time Use Survey, 1998–1999.)

informational problems are sufficiently severe, regulation is needed for an efficiently working market.

Technologic change has also generated a host of devices such as washing machines, electric irons, and microwave ovens that have decreased the energy intensity of home production and, probably even more important, the amount of time needed to achieve the same output. Home appliances are generally intended to be substitutes for time, and money spent on these durable goods has an effect different from money spent on durable leisure-time goods, whether sporting goods or home entertainment, which are likely to be complements to how individuals use their time. Retail sales of home appliances have increased only slightly faster than GDP; in 1996 dollars, home appliance retail sales grew from \$2.7 to \$4.5 billion from 1987 to 2001, a much smaller growth than for any of the industries associated with leisure time. Home entertainment retail was not much larger than appliance retail in 1987, but became ten times larger in 2001.

In terms of time use, we see no trend in childcare, which went down and up again. That is at least partially related to the baby boom echo, which is now subsiding (Figure 8). While these aggregate statistics could obscure important subpopulation differences, more-detailed studies of families found generally no decrease in time interacting with children as a consequence of maternal employment.<sup>26</sup> Thus, a reduction of parental time is not a likely explanation for why children are getting fatter.

However, time must come from somewhere and there are substantial decreases in time cooking or cleaning. Some of the early decrease in home production time is likely to be related to the diffusion of new appliances (e.g., microwaves or dryers), but this is unlikely to be an important factor in recent years, and instead reflects a

shift away from home production. For cooking and meal cleanup, there certainly is not much that has changed in terms of technology, and the particularly large drop for cooking reflects access to more prepared foods and eating out. While the changes in home production are likely to be associated with the obesity epidemic, the causal pathway would run through energy intake—the food rather than the physical activity side. As important as this is for overall energy balance, the decline in energy expenditure is probably minor and arguably was countered by the increase in leisure-time physical activity that is more strenuous than food preparation or meal cleanup, the two categories that experienced the largest drop.

## Discussion

Studying time-allocation and expenditure patterns over the past decades, we see some surprising and some not-so-surprising trends. The big growth areas, in terms of both expenditure and time allocation, have been leisure time and travel/transportation. Leisure-time industries outpace GDP growth for both “active” (sporting goods, dance studios, gyms) and “sedentary” industries (spectator sports, cable TV), although industries associated with more sedentary lifestyles grew the fastest. Overall time spent in productive activities, whether at home or work, has declined by several hours each week for both men and women compared to 40 years ago.

Surprisingly, Americans nevertheless perceive themselves under more time pressure than before, even as they watch 20 hours of TV weekly. This psychological phenomenon has been documented in the same surveys that found increased leisure time and remains a puzzle.<sup>4</sup> Is time speeding up in modern society? Or is television a black hole that makes time disappear? This is an interesting debate, but outside the scope of this paper, and arguably less relevant for energy expenditure, which depends on actual time in an activity. The myth of the “overworked American” is widespread, but the fact is that Americans have gained weight while having more and more leisure time.

A limitation of the broad picture discussed here is that different subpopulations may have had different experiences, and we know little about that. The time-use surveys have too few observations to study minorities or the elderly separately because estimates become too imprecise to be meaningful for smaller subgroups. As far as obesity is concerned, however, data show very similar time trends in weight gain across sociodemographic groups, suggesting either that physical activity is not that important or that trends in physical activity are also similar across groups. Data about adults provide no information about youth and that is a group that clearly warrants a separate analysis.<sup>11</sup>

Some readers will expect a judgment on whether the obesity epidemic is caused by declining physical activity

or increased energy intake. A few years ago, a study published in the *British Medical Journal* entitled, "Obesity in the UK: Gluttony or Sloth?"<sup>27</sup> energized this debate. In that case, the authors came down on the "sloth" side for the United Kingdom. But is this question any more meaningful than the nature versus nurture debate? Disciplinary training tends to split nutrition and physical activity, a tendency reflected in this journal supplement, but this division seems arbitrary, at least to economists and many other social scientists. Decisions about time and money allocation are not separable because goods and services can be complements or substitutes for time. Even the most mundane daily activities have strong interactions. Snacking on salty potato chips or peanuts may be enjoyable while watching TV, but few people will try that while jogging or biking. A grocery-shopping list often tells a lot about planned activities for the evening or weekend, suggesting that the "nutrition" versus "activity" split is arbitrary when people make decisions about how to allocate time and money. The decline in home production time affects energy expenditure, the physical activity side, but also the energy intake side.

Instead, a more promising debate and research agenda should focus on whether interventions targeting physical activity or nutrition are desirable. Economists and public health practitioners approach this issue very differently, but both perspectives are important in the policy process. According to an economic view, government and regulatory interventions are needed only when there are market failures, such as externalities, under-provision of public goods and services, or information problems/lack of rationality (the last being particularly important for protecting children and adolescents). When there are no market failures, there is no need for policy interventions. The economic approach parallels the broad ideologic orientation of U.S. society, which values individual choice more highly, whether in consumer sovereignty, property rights, or religion, for example, than other Western democracies, say Germany or France. This principle of individual freedom, opportunity, and choice permeates existing laws and institutions. Federal agencies that want to impose new regulations, for example, have to follow the regulatory planning and review guidelines that were developed under President Clinton's Executive Order 12866.<sup>28</sup> The guidelines ask that an analysis for any proposed regulatory action should "determine whether there exists a market failure that is likely to be significant. In particular, the analysis should distinguish actual market failures from potential market failures that can be resolved at relatively low cost by market participants."<sup>28</sup>

In contrast, a clinical or public health view focuses on health: Intervene if health could be improved, regardless of other consequences. Expert opinion determines desirable time-use or money allocations based on their

effects on health; consumer sovereignty or individual choice has no major role. Public health and economics are not always at loggerheads, and the most successful public health interventions also have a strong economic justification—and maybe it is the consonance of health and economic reasons that made them successful. Few would question the importance of a clean water supply (a public good) or of controlling infectious diseases (reducing externalities).

Are there areas in nutrition and physical activity where the two views coincide? Can we identify market failures and propose efficient remedies? In nutrition, the lack of information at the point of consumption (e.g., restaurants) seems quite problematic, and may be the explanation for the quality gap between food at home and away from home. Nutritional content may not have been an important quality dimension when commercially prepared meals accounted for a small fraction of total food, but this changed with the reduction in home production. If the market unravels on the unobserved content/quality dimension, competition will focus on the observed dimensions—amount, price, and taste—all of which lead to increased use of sugar, fat, and salt. Better information at the point of the consumption could reduce this market failure. Using information takes effort, but there is no need for everybody to be perfectly informed.

Children are not yet able to make informed decisions in many areas, which suggests at least a careful look at proposed regulations or interventions. Particularly problematic are also the distortions on the production side through subsidies for products that are not necessarily particularly healthful, such as corn subsidies that reduce the costs of animal feed and corn syrup. Relative prices have also been changing in unhelpful ways, although it is unclear how much could be ascribed to policies. Since the 1982–1984 period, fresh produce, for example, has doubled in relative price compared to caloric sweeteners or fats.<sup>29</sup> But other than information problems and market distortions created by agricultural policies, it is much harder to come up with good arguments or evidence of other market failures in the food area. If adults want to drink (unsubsidized) sugar water, economists would say, let them drink cheap sugar water. This is not a market failure that calls for taxation or prohibition. Unlike alcohol consumption, which imposes large external costs that far exceed taxes,<sup>30</sup> the consumption of sugar water does not impose substantial costs on innocent bystanders.

Market failures seem to be much more prominent in the physical activity area. Markets will not work for physical activity when public goods are needed and under-provided or there are externalities. Are neighborhoods safe and pleasant to walk/bike to school, store, and work? Are there even stores or schools within walking distance to residences? Where are the parks and playgrounds? There are no good private substitutes for this broader environment, which is most important

for transportation, but also for childcare (parks, playground) or exercise. While it is possible to find commercial alternatives for some activities (e.g., private gyms as substitutes for public parks and play fields), there are undesirable distributional consequences because these alternatives are less available to low-income individuals. Externalities are another major issue. There are large private benefits to driving, but driving makes walking/biking unpleasant and dangerous to others. Aside from obvious externalities, like noise and air pollution, every additional driver creates costs on others through congestion and increased likelihood of accidents. These social costs of driving are currently not reflected in gasoline or car prices.

Not every trend toward sedentary time use reflects a market failure. Firms will provide products if there is demand, whether for physical activity or sedentary entertainment. Industry growth reflects demand and market reaction, and markets can be successful for private goods, such like gyms or exercise equipment, or DVD players. Nevertheless, there are many areas in physical activity where outcomes are not socially optimal from both an economic and health perspective, especially in the area of transportation.

## Conclusion

There have been large changes in what Americans do with their time, most notably a shift away from time in occupation and home production to leisure time and transportation. Leisure-time industries grow faster than GDP, including "active" industries, but sedentary industries grow fastest. There are likely market failures in areas like transportation where economic and public health perspectives may lead to similar recommendations.

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