People are getting fat. The rise in obesity rate has been particularly pronounced in the United States since the middle of the 1970s, but has by now extended into many other areas of the world. Several sources of technological change have been singled out as potential explanations for why people have been gaining so much weight. Increased productivity in agriculture has lowered the relative price of food (Darius Lakdawalla, Tomas Philipson, and Jayanta Bhattacharya 2005) while innovations in food processing have reduced the time cost of preparing food (David M. Cutler, Edward L. Glaeser, and Jesse M. Shapiro 2003). Technological change has also affected how people spend their time, in a way that may systematically have reduced calories expended. First, physically less demanding jobs in the service sector have replaced physically more demanding jobs in agriculture and manufacturing. Second, the allocation of time across different activities has changed dramatically over the last few decades: people are spending less time working (decline in labor market work for men, decline in home production work for women) and more time in mainly sedentary forms of leisure, such as watching TV (Mark Aguiar and Erik Hurst 2007).

While the focus so far has been on the relationship between how people spend their time and how many calories they expend, we argue in this paper that there might also be an interesting relationship between how people spend their time and how many calories they consume. Motivating this question is a (at first glance) rather counterintuitive finding from the time use surveys: the fact that people, in the United States at least, are spending less and less time eating. While this could be reconciled with weight gain if people now consume more calories per minute spent eating, recent evidence from a new Eating and Health Module of the American Time Use Survey (ATUS) suggests that this may not be the only explanation. Rather, it appears that a lot of time spent eating and drinking occurs as “secondary” activity (e.g., eating while watching TV, or eating while working). For example, while on an average day in 2006, Americans age 15 and older spent only 67 minutes eating and drinking as a “primary” activity, the total time spent eating or drinking, both as primary and secondary activities, is closer to two hours. Models from psychology suggest that such eating patterns may matter for how much people eat. When eating in high cognitive load situations (e.g., the snacking that occurs when preparing a research report, or when engrossed in a really good film or one’s favorite reality show), people may be more distracted and pay less attention to how much they eat. Brian Wansink (2006) reports on various controlled experiments suggesting that “mindless eating” might be especially common when eating stops being the primary activity. Similarly, Baba Shiv and Alexander Fedorikhin (1999) provide experimental evidence on the positive relationship between cognitive load and the consumption of calorie-dense food (chocolate cake in this case).

Using an original dataset that tracks what people do and what they eat over the course of the day, we show that secondary eating and drinking is not only relevant in terms of time spent, but also in terms of calories consumed. On an average day, half of all daily calories are consumed while also engaged in another task. We then offer two pieces of evidence suggesting that what people do (or not do) when they eat matters for how much they eat. First, we document

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1 This is particularly true for the less educated (see Table VII in Aguiar and Hurst 2007).
that, on higher-calories days, a higher share of calories are consumed while doing something other than eating. Second, focusing on those episodes of time spent watching TV, we offer some preliminary testing of the hypothesis that secondary eating might indeed be more “mindless” than when people’s attention is focused on eating: we show the snacking that occurs while watching TV to be only weakly related to how many calories people consumed in prior hours.

I. Data

A. Survey Instrument

We use data from a new survey we designed in collaboration with the Economic Research Service (ERS) of the US Department of Agriculture (USDA). The survey consisted in two interviews conducted over the phone. The first (recruiting) interview mainly focused on collecting background individual-level information; at the end of this first interview, respondents were asked whether they would be interested in participating in a second, longer (an hour to an hour and a half) interview about a week or so later.

The second interview consisted in three main parts. The first part was a 24-hour recall diary that was inspired by Daniel Khaneman and Alan B. Krueger’s (2006) Day Reconstruction Method (DRM). Specifically, individuals were asked to report how they spent their time the day before (from midnight to midnight), as well as how they felt while engaged in each of the activities they performed. People’s responses regarding which activities they were engaged in at a given point in the day were recorded verbatim, and then categorized using the ATUS code. If an individual reported doing multiple things at the same time (for example, working and eating or watching TV and folding laundry), all these activities were recorded (and not just the primary activity). Also, we coded both the time a given activity started and the time it ended.

Part two of the second interview consisted in a 24-hour dietary recall. Specifically, respondents were asked about everything they ate and drank yesterday, and when each food or drink was consumed. To assure the best quality of the dietary intake data, we use the USDA Automated Multiple Pass Method (AMPM) for collecting food intake; this method takes respondents through several steps designed to improve their recall of the previous day’s consumption. While we have collected very rich data on the types of food people eat, for this paper we focus on only one summary nutritional variable: energy (calories).

Given the structure of both the time use survey and dietary recall, we can construct a unique database that maps each activity from the time use survey into the food or drinks that were consumed while engaged in this activity.

In the final part of the second interview, respondents were asked to report their height and weight, which we use to compute BMI. They were also asked several questions aimed at describing their relationship with food (dieting behavior, guilt about overeating, thinking about food, optimal weight, whether they thought they ate too much or too little the day before etc…), which we plan to incorporate into future analysis.

B. Sample

Individuals were recruited to participate in the survey using a random-digit dialing (RDD) method. Only women over 18 years of age

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3 Survey respondents were given a list of adjectives describing various positive and negative moods and asked, for each of these moods, whether it described how they felt while engaged in the activity. For the purpose of this paper, though, we do not make use of the mood information that was collected at this stage of the survey.

4 Respondents first provide an uninterrupted list of all foods and beverages consumed; next interviewers probe for foods that are frequently forgotten, by category (e.g., alcoholic beverages, sweets, savory snacks, etc.); then foods are grouped into eating occasions; next detailed information is collected about portion sizes, additions to the food, and other details; and then a final review is conducted to collect any other foods not remembered earlier. The dietary recall interview itself takes 20 to 30 minutes, and validation studies of the method have shown that it yields calorie and nutrient intake measures that closely approximate laboratory measures.

5 The food intake data were then sent through the Post Interview Processing System (PIPS) and coded using the SurveyNet system (version 3.14) and version 2.0 of the Food and Nutrient Database for Dietary Studies (FNDDS), supplied by the USDA Agriculture Research Service (ARS).

6 We have replicated the analysis below using total fat or total sugar instead of calories, and found very similar patterns.
were invited to participate. In total, 593 women completed the recruiting interview, which corresponded to about a 25 percent response rate. Of these 593 people, 475 agreed to participate in the second interview. In the end, the main interview was completed with 85 percent of the respondents who agreed to be called back for a second interview. This translates into in a final sample of 400 women, and an overall response rate of 17 percent.

Maybe not surprisingly given the method of recruitment and the length of the second interview, the sample of respondents is disproportionately old and out of the workforce. The average woman in the sample is 51 years old (minimum = 18; maximum = 93; standard deviation 16). Twenty percent of the respondents are retired, and only 2 percent are students; 54 percent are working for pay. Average household income is $55,000. Sixty-four percent are currently married and the average household size (including the respondent herself) is 2.5. The average BMI is 27.7. Sixty percent of the respondents are overweight (BMI > 25) and 30 percent are obese (BMI > 30); less than 10 percent of the respondents have a BMI of 20 or less.

II. Analysis

Using the ATUS code, we categorize what people do over the course of the day into the following categories: going to bed/sleeping, personal care, home production, caring for and helping others (including child care), work, education, shopping, using services (including professional services, personal care services, and household services), participating in voluntary or civic or religious activities, socializing, relaxation and leisure (excluding watching TV and attending art and sporting events), watching TV, attending art and sporting events, participating in sports or exercise, being on the phone, traveling, and of course eating and drinking. Given our interest in better understanding what other activities people might be engaged in when they eat, we code as “eating and drinking” those times when a given respondent is only reporting to be eating and/or drinking. So, for example, if someone reports “snacking when watching TV,” we code this activity as “watching TV.” There are many instances for which the time use data indicate that solely noneating activities were performed during a given time period and yet, according to the dietary recall, some eating did occur during this time period. In those instances, we assume that the dietary recall data are correct and that the respondent simply omitted to indicate that eating also occurred during that time period.

Columns 1 to 3 of Table 1 summarize how the average respondent in our sample spent her recall day. Column 1 pools all days, while columns 2 and 3 focus on weekdays and weekend days respectively. If a respondent did not engage in a given activity over the course of the day, we assign zero minutes to that activity for that respondent. Across all days, the largest block of time is spent sleeping (nearly 500 minutes). In this sample, home production accounts for 158 minutes and work 147 minutes. About one hour and twenty minutes is spent traveling over the course of the day. Respondents socialize an average of 50 minutes per day. Relaxation and leisure time is dominated by watching TV (167 minutes). On average, people report spending a little less than an hour (57 minutes) eating or drinking in isolation of any other activity. Not surprisingly, more time is spent working during weekdays (177 minutes; 404 minutes conditional on doing any work that day) than during weekend days. The extra time spent working is mainly taken out of sleep, home production, socializing, and watching TV; people also spent less time “only eating” during week days than weekend days (53 minutes versus 69 minutes).

Columns 3 and 6 of Table 1 describe how the calories consumed by the average respondent over the course of the day are distributed across the various activities. Average reported daily calories in our sample is 2,050, with a minimum just below 400 and a maximum of about 7,750 (standard deviation = 890). Again, we show activity means both pooling all days (column 4) and separating weekdays and weekend days (columns 5 and 6, respectively). If a respondent did not engage in a given activity over the course of the day, we assign zero calories to that activity for that respondent.

About 920 calories, or 46 percent of total daily calories, are consumed while “only eating.” The remaining calories intakes are spread across various activities. About 220 calories, or 11 percent of the daily total, are consumed

7 Ninety-nine of the 400 recall days were weekend days (81 Sundays and 18 Saturdays).
while watching TV. About half of the episodes of TV watching are associated with some caloric intake; conditional on some calories being consumed while watching TV, an average 450 calories are consumed in front of the TV. Individuals also “snack” a lot while engaged in home production (195 calories) and while traveling (127 calories). The subsequent largest blocks of caloric intakes take place while working (112 calories) and while socializing (112 calories). During weekend days, people consume a larger share of their caloric intake while “only eating” (1,115 calories, or 52 percent of the daily total). Over the weekend, more calories are consumed when socializing (about 200 calories) than when watching TV (despite the longer time spent in front of the TV over the weekend). Calories consumed while doing chores or traveling are pretty much the same between weekdays and weekend days.

While the patterns in Table 1 are interesting because of the rich picture they paint of how respondents eat, they may be of little relevance when it comes to explaining how much respondents eat. It is possible that the allocation of calories across activities is neutral when it comes to total caloric intake over the course of the day. In contrast with this view, we show in Table 2 that there is in fact a clear positive correlation between how much people eat over the course of the day and the share of eating that is secondary. The unit of observation in Table 2 is the survey respondent. We correlate the fraction of total daily calories consumed while only eating and/or drinking with measures of total calories consumed during the day. The correlations reported in Table 2 are conditional on the logarithm of the respondent’s age, a dummy for working status, the logarithm of household size, and dummies for day of the week.8

Column 1 shows that there is a negative relationship between the fraction of total calories consumed while only eating and/or drinking and the logarithm of total daily calories;
the relationship is, however, not statistically significant. A much clearer pattern emerges when we single out high-calories days. Column 2 shows that on days where total calories are above 2,500 (26 percent of the observations), the share of calories consumed while also engaged in other activities is 8 percent larger. On days where total calories are above 3,000 (11.5 percent of the observations), the share consumed while also engaged in other activities is nearly 13 percent larger (column 3).

We also investigated whether there is a relationship between fraction of total daily calories consumed while only eating and individual BMI. While we find that overweight people consume more of their daily calories while engaged in other activities, the relationship is both economically weak (only a 2 percentage point difference) and statistically insignificant. There is, however evidence suggesting that high-calories days involve an especially high share of secondary eating for overweight people, compared to only 10 percent more for people who are not overweight.

We also studied which activities contribute for a larger share of total daily calories on high-calories days (more than 3,000 calories). We highlight some of our main findings. Among people who are overweight, there is a sharp increase in the share of calories consumed while doing chores (from 8 to 15 percent); the share of calories consumed while socializing also increases (from 4 to 6 percent); we also observe moderate increases (never more than 2 percent) in the share of calories consumed while relaxing at home, watching TV, caring for others, or shopping. Among people who are not overweight, the largest change is with respect to the share of calories consumed when socializing (from 5 to 12 percent); there are also increases in shares of calories consumed while working (3 percent increase) and while doing chores (2 percent increase). Interestingly, people who are not overweight tend to eat a smaller share of their daily calories while in front of the TV, or while relaxing at home, on high-calories days.

We finish with a very preliminary attempt at more directly testing for the idea that secondary eating might indeed be more “mindless” than primary eating. Because of space constraints, we focus on contrasting “eating only” episodes with the eating that takes place while watching TV. Our test consists in relating how many calories are consumed during either a TV-watching episode or an eating-only episode to how many calories are consumed during “only eating” episodes.

Table 2—Relationship between Total Daily Calories and Fraction of Calories Consumed while “Only Eating”

<table>
<thead>
<tr>
<th>Sample</th>
<th>All</th>
<th>BMI &gt; 25</th>
<th>BMI ≤ 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log (total daily calories)</td>
<td>−0.046</td>
<td>[0.035]</td>
<td></td>
</tr>
<tr>
<td>More than 2,500 calories</td>
<td>−0.084</td>
<td>[0.034]*</td>
<td></td>
</tr>
<tr>
<td>More than 3,000 calories</td>
<td>−0.134</td>
<td>[0.047]**</td>
<td>−0.155</td>
</tr>
<tr>
<td>Sample size</td>
<td>397</td>
<td>397</td>
<td>397</td>
</tr>
<tr>
<td>R²</td>
<td>0.06</td>
<td>0.07</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Notes: Additional controls included are: the logarithm of the respondent’s age, a dummy for working status, the logarithm of household size, and dummies for day of the week. Standard errors are in brackets.

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Note that the relationship between individual BMI and total daily calories is very weak in these data. The median overweight woman consumed 1,942 calories on the recall day, while the median nonoverweight woman consumed 1,866 calories on the recall day. Means are 2,067 and 2,051, respectively.
calories people consumed in prior hours. Under the view that eating in front of the TV is more “mindless,” we hypothesize that prior eating will be less of a factor in determining how much people eat while watching TV than when focusing on what they are eating.

Our results are presented in Table 3. The unit of observation is a time use episode and the dependent variable in all regressions is the number of calories consumed during that episode (including zeros). The sample in columns 1 and 3 are all eating-only episodes in the time use data; the sample in columns 2 and 4 are all TV-watching episodes in the time use data. We summarize prior eating with how many calories were consumed in the preceding 2 hours (nothing, fewer than 300 calories, or more than 300 calories), or the preceding 6 hours (nothing, fewer than 800 calories, or more than 800 calories). We include controls for the duration of the activity (mean is 27 minutes for eating-only episodes, 73 minutes for TV-watching episodes), and dummies for hour of the day. In all regressions, the missing category for prior calories consumed is the intermediate category.

Table 3 shows that people who have not consumed any calories over the last two (columns 1 and 2) or last six hours (columns 3 and 4) eat more during the time use episode. This is true for both eating-only episodes and TV-watching episodes. The most striking finding in Table 3 is that whether people ate a moderate or a larger amount in the prior two or six hours does not seem to affect how much they eat in front of the TV. In contrast, people who already ate large amounts in the prior hours eat much less during an eating-only episode.

While this is a very coarse preliminary test that needs to be refined and extended to other time use categories, the patterns we observe are strongly consistent with the idea that secondary eating might be more “mindless” (or at least less related to how hungry or full one should feel because of prior eating) than primary eating.

### III. Conclusion

Because technology has made it so much easier to consume food in any place and at any time, secondary eating may be a much more relevant phenomenon today than it was in the past. Understanding better how people consume when their mind is not solely focused on food may therefore be an important piece of the puzzles that surround the rise in obesity over the last few decades. In future work, we plan to
better understand the drivers of secondary eating. In particular, we have collected rich data on individual-specific levels of overall well-being, self-control, and stress; it will be interesting to see whether secondary eating behaviors are systematically related to these individual characteristics. We also plan to empirically explore the relationship between high-frequency mood changes and both primary and secondary eating over the course of the day. The rich data we have collected on how people feel (both positive and negative affects) as they are engaged in various activities will allow us to track how mood swings relate to eating.

REFERENCES


