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Dave is an applied microeconomist with primary research areas at the intersection of health and labor economics. His current research examines the demand for electronic cigarettes, the link between welfare policy and longer-term effects on behavioral outcomes for parents and their children, broader non-economic effects of the minimum wage, and labor market effects of the Affordable Care Act. He is also interested in the economics of crime, and is analyzing interventions in the juvenile justice system and how they impact youth recidivism and educational outcomes. Dave's research has been supported by the National Institutes of Health, the Agency for Healthcare Research and Quality, and various research foundations. He is currently serving as an associate editor of *Economics and Human Biology*.

A native of India, Dave grew up in northern New Jersey. He splits his residence between the New York metro area and Boston. In his spare time, he enjoys traveling and hiking, improving his chess, and reading British mystery novels and books on cosmology.

Business Cycle Impacts on Health Behaviors

Dhaval Dave

The unemployment rate more than doubled in the United States during the Great Recession, from 4.4 percent to 10 percent, imposing a heavy financial burden on households. However, whether such economic downturns also impose a health burden is a subject of much debate. Exploiting area-level variation in measures of labor demand, a large literature, starting with Chris Ruhm's seminal work, has explored how the business cycle affects population health.¹

While it may be intuitive to suppose that population health would improve with the macroeconomy, the evidence is surprisingly murky. Some adverse health effects of economic downturns are direct and undisputed, such as increases in psychological stress, depression, and related illnesses, while others are indirect and less clear. Some studies indicate that health is countercyclical, with various measures of mortality, including those from cardiovascular disease and motor vehicle fatalities, declining with reduced economic activity, while others find the opposite.

None of these studies of the link between labor demand and health outcomes presume a direct effect. Rather, the presumption is that labor demand affects workers' environment (for instance, pollution or crowding) or their behavior (for instance, physical activity, diet, tobacco and alcohol use), which then affects health. Health effects may take time to materialize, making it challenging to identify them empirically in the short term. Thus, it is important to examine the intermediate links, that is, effects on health behaviors, which may respond more readily than health itself to changes in households' time and income constraints over

the economic cycle. Examining these proximate pathways also is important for judging the validity of the prior, at times contradictory, evidence on health.

Consider, for instance, the various studies that assess whether area-level unemployment affects obesity. It is presumed that unemployment leads to a change in energy expenditure and/or energy intake, which in turn affects bodyweight. While some studies find that obesity decreases during recessions, others find the opposite, and still others find no consistent effects. Many of these studies use similar methods and data sets. Thus, additional evidence bearing on the separate links in the causal chain would help assess the credibility of the link between labor demand and obesity. Similarly, research has examined the effects of labor demand on heart disease, with one presumed causal pathway being that unemployment leads to less physical exertion which leads to fewer heart attacks.

In a series of papers with Gregory Colman and Inas Kelly, I examine how labor demand affects health behaviors, in order to shed light on the effects of the economic cycle on health.

Energy Expenditure and Time Use

Prior evidence on the effects of unemployment on energy expenditure has been confined to recreational exercise, and has been inconsistent. While recreational exercise is certainly an important behavioral outcome, it constitutes only about 4 percent of total physical activity. Furthermore, in a study with Henry Saffer, Michael Grossman, and Leigh

Ann Leung, I find significant substitution across recreational exercise, work-related physical activity, and other modes of activity.² Thus, it cannot be presumed that, because exercise improves health, if unemployment increases exercise it must also improve health. It is total physical activity, not just recreational exercise per se, which is the salient input into the individual's health production function.

Colman and I study whether shifts in labor demand induce individuals to become more or less physically active.³ We exploit within-state variation in gender-specific employment ratios matched with detailed time diary information from the American Time Use Survey (ATUS) over 2003–10, a period which included the Great Recession. The ATUS is based on a national sample drawn from the Current Population Survey (CPS) and tracks all activities undertaken by the respondent in the past 24 hours. For each activity, in addition to duration, we measure intensity using the Metabolic Equivalent of Task (MET). A unit of MET is defined as the ratio of a person's working metabolic rate relative to his resting metabolic rate.⁴ By combining information on the duration of each activity with its MET value, we are able to group activities and also to construct a standardized and consistent measure of total physical activity or exertion during the day.

Figure 1, which compares unadjusted means before and after the recession began in late 2007, summarizes our main results. We find that a reduction in employment increases exercise, and specifically exercise activities which are relatively less vigorous, with a MET value of 4 or lower, such as walking or golfing. The increase in exercise during a recession is consistent with a recession-induced easing of time constraints. We also find that part of the time freed from a decrease in working hours over the recession flows into other time-intensive activities such as housework, childcare, eating and drinking, watching television, and sleeping. Total physical exertion, however,

declines during a recession, as the average individual's loss in work activity is not offset by the increases in exercise and other home-based, mostly low-MET leisure activities.

As a validation check, we find that these effects are concentrated among groups—particularly males who are low-educated or employed in physically demanding occupations—whose employment was most adversely affected by the recent economic collapse. The decrease in physical activity and exertion during an economic downturn may partly explain the positive association often found between unemployment and depression, and also lends some credibility to studies that uncover a procyclical relationship in mortality from cardiovascular causes.

Diet and Food Intake

The flip side to energy expenditure and physical exertion is how a recession affects food intake, a question that I address in a study with Kelly.⁵ We utilize individual-level data from the Behavioral Risk Factor

in subgroup-specific unemployment and employment rates, we find that individuals' food consumption choices systematically vary over the economic cycle, though in ways that defy simple characterization.

Specifically, we find consistent evidence that a higher unemployment rate is associated with reduced frequency of fruit and vegetable consumption, and weak evidence of an increased frequency of consuming snacks and foods relatively dense in calories and fat, such as hamburgers and fried chicken. Together with the ATUS data, the results indicate that reduced employment is associated with an increase in time spent eating and drinking. While this may not necessarily reflect calories consumed, it may reflect an increase in “secondary eating,” that is, snacking while watching television—both of which are activities our studies show tend to increase during a recession.

One issue with the BRFSS measures of consumption of foods such as hamburgers and fried chicken is that they conflate consumption of such foods prepared at home with those consumed in fast food restaurants and other establishments.

Using data from the National Longitudinal Survey of Youth (NLSY), Colman and I specifically assess effects on fast food consumption and find that unemployment reduces the number of fast food meals that respondents consume weekly.⁶ There is considerable heterogeneity in these effects. As with the results for exercise and physical activity, the reductions are larger among males and lower-educated individuals—groups which tend to be

concentrated in boom-and-bust industries such as manufacturing and construction and thus relatively more vulnerable to the adverse employment effects of a recession.

Mechanisms and Intra-Household Spillovers

In these studies, we assess both directly and indirectly the role of various mechanisms that may underlie the

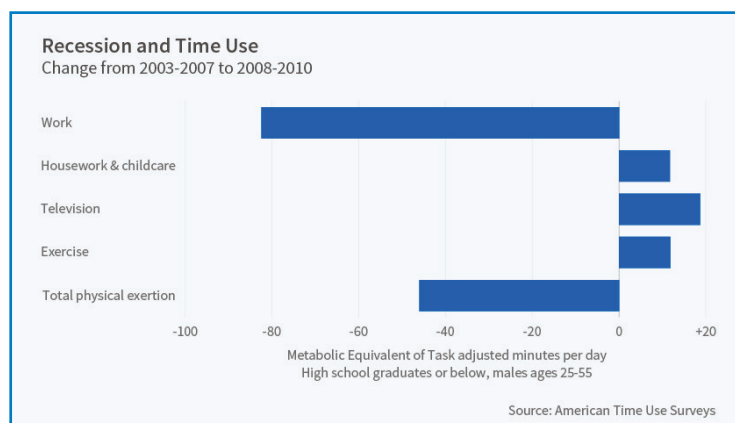


Figure 1

Surveillance System (BRFSS) spanning the 20 years of 1990–2009 and including the comparatively mild 1990–91 and 2001 recessions and the severe 2007–09 downturn. While self-reported measures of types of foods consumed and frequency of consumption in the BRFSS are subject to measurement error and less than ideal, the long time span and the large sample sizes allow us to provide some of the first evidence on this issue. Exploiting within-state variation

observed changes in behaviors. Own job-loss can affect exercise and diet by easing time endowment constraints as well as through a negative income shock. Further, it may lead to loss of health insurance and reduced access to care, which may also impact health behaviors. In prior work, Robert Kaestner and I find evidence of *ex ante* moral hazard whereby loss of coverage may actually lead individuals to behave more healthily, though there is also a counteracting effect from reduced contact with physicians due to loss of health care coverage, which can lead to an increase in unhealthy behaviors.⁷ While these are direct “internal” effects from recession-induced job loss, an economic downturn may, in addition, have external spillovers on health behaviors, conditional on own labor supply. Inability to find work, risk of job loss, and expectations may affect mental health and perceived health status, which may affect behaviors.

We assess the role of some of these pathways in explaining the changes in observed food consumption choices. We find that, to varying degrees, shifts in household income, time constraints, and mental health status play important roles. With respect to reduced fast food consumption associated with unemployment, we find that this mostly reflects the greater availability of time for cooking rather than less income available to purchase fast food. This is supported by data from the ATUS, which show that the time spent on meal preparation is positively associated with the unemployment rate. For these behaviors, we do not find insurance coverage to be an important mediator, possibly due to the counteracting incentives noted above, and partly due to the increase in public coverage buffering the drop in private coverage. We also assess whether shifts in the relative prices of food over the business cycle can explain any substantial part of the link between unemployment and food consumption, and generally do not find this to be the case, with the caveat that measuring the relative prices of food is subject to multiple challenges.

One point generally overlooked in the literature is the possibility of external effects due to intra-household spill-

overs. For married or cohabiting couples, for instance, a spouse’s job-loss can affect a respondent’s behavior due to joint household production even if their own labor supply remains unchanged. Using the ATUS, Colman and I assess the importance of such spousal spillover effects.

Due to the segregation of genders across industries and sectors and to the much stronger adverse employment effects on male-dominated sectors during the recent recession, there is substantial within-state variation in each gender’s employment ratio independent from the other. Exploiting this variation, we find some evidence of spousal spillovers. Where the husband’s and wife’s time are substitute inputs—for instance, housework, child-care, and shopping—one spouse’s job loss reduces the other spouse’s time use in these activities. Thus, spousal job-loss allows the spouse to take over some of these activities, and frees up the other spouse’s time which then appears to be spent on personal care, socializing and relaxing, and sleeping. The presence of these and other external effects also underscores why it is not appropriate to use area-specific labor demand shocks as instrumental variables for own labor supply to identify effects on health behaviors and outcomes.

Average Population Effect versus ‘Treatment-on-the-Treated’

An important issue that arises in this literature relates to the interpretation of effect sizes, and whether they are economically significant. In most of these studies, including some of our own, area-level measures of labor demand are linked to person-level data. What is being estimated is a reduced-form or average population effect (APE), which conflates those who are affected and those who are not affected by the recession. For instance, we find that a one percentage point decrease in the employment-to-population ratio increases time spent exercising by 0.27 minutes per day, an effect which is precisely estimated but appears to be very small. This APE is expected to be small, however, since most individuals are not affected and do not lose their jobs during a recession. This also poses

a challenge in this literature, as very large sample sizes are required to reliably detect it. If we assume that the effect is being realized only for individuals who lose their jobs during a recession, then this APE translates into a treatment-on-the-treated (TOT) effect of a 27-minute increase in time spent exercising, a meaningful effect size.

Consider the effect on total physical exertion for low-educated males, the group most affected by the recent economic downturn. We find that total physical activity declines by between 5.1 and 6.3 MET-adjusted minutes for every one percentage point decrease in the employment-to-population ratio. Again, if the effect is the result of changes in behavior only of those who become unemployed, this translates into a decline in total daily physical exertion of about 21 to 24 percent for the average laid-off individual. If there are external spillovers of the depressed labor demand on other individuals, then the TOT will be smaller. For instance, if we assume that the external effects are as large as the “internal” effects—so for instance, the recession affects as many other individuals as those who lose their jobs—then this implies a reduction in total physical exertion of 10 to 12 percent a day.

When studying individuals’ food consumption choices, we find indirect evidence of these external effects. That is, a higher rate of unemployment does not just affect food consumption among those who actually lose their jobs, but also among those “at risk” of becoming unemployed during a recession based on their socioeconomic characteristics. Specifically, we find a 3 to 6 percent reduction in the frequency of consuming fruits and vegetables among “at risk” individuals. These effect sizes are 6 to 10 times larger than what we find for the average person. With respect to the frequency of fast food consumption, using longitudinal data and a different identification strategy, described below, we estimate the effect of own unemployment, and thus a direct TOT effect for those laid off. Here, we find that own unemployment reduces the number of fast food meals respondents consume by about half a meal per week—a sizeable 29 percent decrease relative to the baseline mean.

Longitudinal Evidence

Colman and I provide some of the first longitudinal evidence on these questions.⁸ We specifically consider the effects of individuals' job loss on their health behaviors, using alternate measures — becoming unemployed during a recession, becoming unemployed because of being laid off, becoming unemployed due to plant or business closure — that are plausibly exogenous, based on data from the 1979 NLSY Cohort and the Panel Study of Income Dynamics (PSID). The use of longitudinal information allows us to address several lingering questions in the literature.

For instance, if recessions reduce smoking, cross-sectional data have a difficult time determining whether this reflects light smokers quitting or heavy smokers cutting back. Responses may also vary based on the duration of unemployment. Recent job losers will change their behavior little if they expect to be re-employed, whereas if they expect joblessness to last, they will adjust to a possibly prolonged decline in income and increase in non-work time. Longitudinal data also allow us to control for potential compositional selection arising from interstate migration that may be correlated with job prospects and health.

Consistent with our work with the ATUS, we find that becoming unemployed is associated with a small increase in recreational exercise but a substantial drop in total physical activity. These effects are more pronounced with longer unemployment duration. We also find some suggestive evidence for other health behaviors including a moderate decrease in smoking. Prior evidence on the effect of unemployment on smoking has been mixed, and our longitudinal evidence suggests that this may be due to heterogeneity across various margins. Among females, job loss is associated with an increase in the probability of being a current smoker, consistent with a decline in smoking cessation or relapse into smoking among for-

mer smokers due to stress. However, both males and females who were heavy smokers at baseline tend to somewhat reduce their cigarette consumption, consistent with an income effect. A longer unemployment duration is also associated with a greater likelihood of delaying a doctor visit, which may reflect individuals delaying or postponing utilization until they have a job and health care coverage.

Prior research on the effects of unemployment on the body mass index (BMI) has either found small effects on both sides or no effects. This may reflect that the true effect, if it exists, is simply too small to measure in a population-based sample. Thus, there is also some value in being able to measure energy expenditure (proxied by exercise and physical activity), energy intake (proxied by consumption of fast food, snacks, and other food), and the net effect (BMI) for the same individual over time. Our interpretation of the joint results of physical activity, fast food consumption, and BMI is that both energy expenditure and energy intake tend to decline after a job loss, leaving observed BMI unchanged or only slightly higher, mostly among previously obese individuals, even with prolonged unemployment.

Conclusion

The research presented here shows that the effects of unemployment and risk of job loss on health behaviors are complex and multi-faceted, and cannot necessarily be reduced to broad generalizations along the form of recessions leading individuals to engage in more or less healthy lifestyles. Different behaviors vary in terms of their relative intensity of time- versus market-purchased inputs, and thus respond differently to shifts in resource constraints over the economic cycle. While our work yields some insights on these relationships, it only touches on a few behavioral outcomes and processes at play linking the broader macroeconomy to micro-level choices. In light of the far-reaching effects

of the recent economic downturn, interest in these questions has reemerged among economists and research along these lines will help inform efforts to determine the true economic costs of recessions and the appropriate policy responses.

¹ See for instance C. Ruhm, "Health Effects of Economic Crises," NBER Working Paper No. 21604, October 2015. [Return to text](#)

² H. Saffer, D. Dave, M. Grossman, and L. Leung, "Racial, Ethnic, and Gender Differences in Physical Activity," *Journal of Human Capital*, 7(4), 2013, pp. 378–410. [Return to text](#)

³ G. Colman and D. Dave, "Exercise, Physical Activity, and Exertion over the Business Cycle," *Social Science & Medicine*, 93(c), 2013, pp. 11–20. [Return to text](#)

⁴ One MET represents the energy it takes to sit quietly, which for the average adult represents about one calorie per every 2.2 pounds of body weight per hour; walking, for instance, has a MET value of 2. [Return to text](#)

⁵ D. Dave and I. Kelly, "How Does the Business Cycle Affect Eating Habits?" *Social Science & Medicine*, 74(2), 2012, pp. 254–62. [Return to text](#)

⁶ G. Colman and D. Dave, "Unemployment and Health Behaviors over the Business Cycle: A Longitudinal View," NBER Working Paper No. 20748, December 2014. [Return to text](#)

⁷ D. Dave and R. Kaestner, "Health Insurance and Ex Ante Moral Hazard: Evidence from Medicare," *International Journal of Health Care Finance and Economics*, 9(4), 2009, pp. 367–90. [Return to text](#)

⁸ G. Colman and D. Dave, "Unemployment and Health Behaviors over the Business Cycle: A Longitudinal View," NBER Working Paper No. 20748, December 2014. [Return to text](#)