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THE PSYCHOLOGY OF FOOD CONSUMPTION †

Strategies for Promoting Healthier Food Choices

By Julie S. Downs, George Loewenstein, and Jessica Wisdom*

Between 1960 and 2004, the proportion of Americans meeting standard criteria for obesity increased from 13 percent to 31 percent (Katherine M. Flegal et al. 2002), and it has been proposed that, if this trend is not reversed, obesity may soon overtake smoking as the leading preventable cause of death (Ali H. Mokdad et al. 2004). Consequently, obesity is now one of the major causes of rising health care costs (Eric A. Finkelstein, Christopher J. Ruhm, and Katherine M. Kosa 2005). Empirical analyses suggest that an increase in caloric intake, rather than a change in calorie expenditure, is responsible for much of the trend (David M. Cutler, Edward L. Glaeser, and Jesse M. Shapiro 2003).

The main policy response to what is often referred to as the "obesity epidemic" has been to enhance access to information. The most prominent example of such a policy is the Nutrition Labeling and Education Act (United States Food and Drug Administration 1994). Recently, the tactic has been receiving more attention after New York City required restaurants with 15 or more outlets to post the caloric content of each food item next to its price on menu boards. Lawmakers and independent companies alike are now following New York City's lead (Kim Severson 2008). However, there is little evidence that information alone does much to improve diet (Jayachandran N. Variyam and John Cawley 2006; Kelli K. Garcia 2007; Clare M. Hasler 2008).

There are many reasons why improving access to information might not improve diet. First, overeating often stems from self-control problems which occur despite full knowledge of consequences (Ted O'Donoghue and Matthew Rabin 2000). Second, people have a limited capacity to process information, so providing more can often be distracting (Herbert A. Simon 1955; Donald A. Norman and Daniel G. Bobrow 1975; René Marois and Jason Ivanoff 2005). Finally, dietary information is likely to improve self-protective behavior only if existing biases encourage unhealthy eating, but the reverse is equally likely. When it comes to smoking, for example, there is evidence that smokers tend to *overestimate* the health risks (W. Kip Viscusi 1990), in which case providing risk information could undermine their motivation to quit.[1]

Responding, in part, to disappointing results from attempts to change behavior via information, not only for diet but for other domains (c.f., James Choi, David Laibson, and Brigitte C. Madrian 2005), behavioral economists have proposed a new approach that operates not via information, but by "nudging" (Richard H. Thaler and Cass R. Sunstein 2008) individual behavior toward self-interest. Termed "asymmetric paternalism" (Colin Camerer et al. 2003) or "libertarian paternalism" (Thaler and Sunstein 2003), this approach has two central

† *Discussants:* Stefano DellaVigna, University of California-Berkeley; Lisa Mancino, US Department of Agriculture; John Cawley, Cornell University.

* Downs: Carnegie Mellon University, 208 Porter Hall, Pittsburgh, PA 15213 (e-mail: downs@cmu.edu); Loewenstein: Carnegie Mellon University, 208 Porter Hall, Pittsburgh, PA 15213 (e-mail: gL20@andrew.cmu.edu); Wisdom: Carnegie Mellon University, 208 Porter Hall, Pittsburgh, PA 15213 (e-mail: jwisdom@cmu.edu). We thank the USDA Economic Research Service and the Center for Behavioral Decision Research at Carnegie Mellon University for financial support, and Stefano DellaVigna for helpful comments.

[1] There is some evidence that information, provided in the right form, can lead to desirable changes in behavior. One study found that providing information about smokers' lung capacity in terms of "lung age" led to greater quit rates than providing the same information as a percent of lung capacity, as is standard (Gary Parkes et al. 2008). The literature on disclosure of risks (Archon Fung, Mary Graham and David Weil 2007) documents numerous cases in which dissemination of information had beneficial effects on consumers and producers of risky products, although it also provides counterexamples.

tenets. First, as embodied by the libertarian term, it is intended to shift behavior in self-interested directions without abridging individuals' ultimate freedom to choose. Second, as embodied in the term "asymmetric," it is intended to help those behaving in a self-destructive fashion without distorting the decisions of those behaving in a self-interested fashion.

In recent papers, one of the authors of this paper (George Loewenstein) and his colleagues have been advocating a specific approach to asymmetric paternalism (Loewenstein, Troyen Brennan, and Kevin G. Volpp 2007; Loewenstein, Leslie John, and Volpp forthcoming). The essence of the approach is to *use decision errors that ordinarily hurt people to instead help them*. For example, the status quo bias, the tendency to stick with the current or default option even when superior options are available (William Samuelson and Richard Zeckhauser 1988), can be used to help people if healthy options are made the default. Setting the desired option as the default has been shown to increase retirement savings (Madrian and Dennis Shea 2001) and organ donation rates (Eric Johnson and Daniel Goldstein 2003). Present-biased preferences (O'Donoghue and Rabin 1999), the tendency to place disproportionate weight on immediate outcomes, can likewise be used to "supercharge" incentives in programs that reward people for engaging in farsighted behavior, such as losing weight, by providing frequent, immediate rewards for good behavior (Volpp et al. 2008).

In this paper, we summarize results from two field experiments examining the effects of providing dietary information and of an asymmetrically paternalistic intervention on consumers' selections of food items.[2] The first study (Jessica Wisdom, Julie Downs, and Loewenstein 2009a) compares the impact of providing calorie information to that of making more healthful options more convenient to order. The second study (Wisdom et al. 2009b), which focuses only on information provision, examines whether calorie information reduces calorie intake and, if so, whether its impact depends on the way the information is provided.

[2] The regression tables for all the statistics we report can be found in our online Appendix (available at http://www.aeaweb.org/articles.php?doi=10.1257/aer.99.2.159).

I. Pitting Information against Asymmetric Paternalism: The Sandwich Study

This study aimed to assess the effects of information versus an asymmetrically paternalistic intervention that made more healthful sandwiches slightly more convenient to order. Customers entering a fast-food sandwich shop were offered a free meal (a sandwich, side dish, and drink) in exchange for completing a survey. Those who agreed to participate chose their meal from a menu we provided, then completed the survey. To minimize demand effects, materials were designed to suggest that our interest was in the survey and that the meal choice was incidental.

The experiment, a 2x2x3 factorial design, varied (1) the provision (or not) of a calorie recommendation, which was presented in terms of daily targets for men and women with sedentary versus active lifestyles; (2) the provision (or not) of specific calorie information for all menu items; and (3) the relative convenience of healthful sandwich options (healthful more convenient, unhealthful more convenient, or neither). Subjects were given a binder that contained brief initial instructions, followed by a one-page "featured subs" menu. Depending on the experimental condition, this page contained either the five most caloric sandwich options, the five least caloric options, or a mix. At the bottom of the page, in large letters, subjects were informed that "Additional subs are available in the pamphlet at the back of this binder."

This convenience manipulation plays on two biases, discussed above, that ordinarily promote high calorie intake. *Present-biased preferences* typically encourage unhealthful choices because enjoyment of a meal is immediate whereas the consequent weight gain is delayed. We exploited present-biased preferences by introducing a tiny immediate cost to selecting a sandwich off the additional (nonfeatured) menu (opening the menu at the back of the binder). The *status quo bias* was similarly made to work in consumers' favor by making healthful options the implicit default.

The determinants of participants' choices of low- versus high-calorie sandwiches were examined using logistic regression, and the determinants of total meal calories (including drink and side dish) were examined with OLS. All regressions controlled for gender, age, and race, although the pattern of results is unchanged if these covariates are not included.

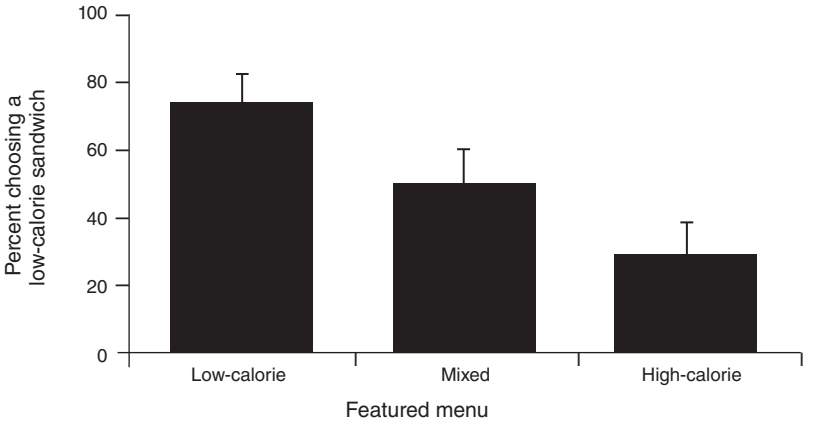

FIGURE 1. PERCENTAGE OF PARTICIPANTS WHO CHOSE A LOW-CALORIE SANDWICH AS A FUNCTION OF THE "FEATURED" (FIRST) MENU
(*Bars indicate two standard errors*)

There was no main effect on picking a low-calorie sandwich of providing either calorie information ($p = 0.18$) or the daily calorie recommendation ($p = 0.92$), nor was the interaction between these variables significant. In contrast, the convenience manipulation had a strong impact on sandwich choice, such that participants were more likely to choose low-calorie sandwiches when it was more convenient to do so (Figure 1). Compared to the mixed featured menu and adjusted for all other predictors in the regression, those who received the healthful featured menu were 48 percent more likely to choose a low-calorie sandwich ($p < 0.001$), whereas those who received the unhealthful menu were 47 percent less likely ($p < 0.001$).

Adding dieting status (as reported by subjects in the survey) and interactions between dieting status and each of the treatments to the previous regression yielded two new significant effects: (1) Controlling for all other predictors in the model, dieters were considerably more likely to order a low-calorie sandwich (odds ratio (OR) $= 6.64$, $p < 0.05$). However, (2) when provided with calorie information, dieters were substantially *less* likely to order a low-calorie sandwich (OR $= 0.13$, $p < 0.01$). The interaction is somewhat disturbing in its suggestion that providing calorie information increases calorie intake selectively for those attempting to lose weight.

For total meal calories (including drinks and side dishes) there was a marginally significant ($B = -48.05$, $t(289) = -1.67$, $p = 0.10$) beneficial effect of calorie information on calorie intake, but no significant effect of daily calorie recommendation ($p = 0.19$), nor any interaction. The effect of receiving the healthful featured menu significantly decreased total meal calories relative to the mixed menu control condition ($B = -76.65$, $t(289) = -2.25$, $p < 0.05$). However, there was virtually no difference in total meal calories between those given the high-calorie versus the mixed-calorie featured sandwich menu ($p = 0.65$), suggesting that those ordering higher-calorie sandwiches due to receiving the unhealthful menu ordered lower-calorie side dishes and/or drinks.

In sum, the asymmetrically paternalistic convenience manipulation had a substantial and statistically significant calorie-reducing effect across both dieters and nondieters. In contrast, providing calorie information had a limited effect on food choice, and there is some evidence of a perverse, calorie-increasing effect of providing this information to dieters. Calorie information did, however, reduce overall consumption by about 50 calories. If it proves reliable, this modest change could have clinical significance if instantiated daily to multiple meals.

II. The New York City Food Labeling Study

In 2006, the New York City Department of Health passed legislation mandating that, as of July 1, 2007, all food establishments with standardized portions post calorie information on

their menu boards (Department of Health and Mental Hygiene 2006). To test whether this information would affect food choices, we collected data at three locations (a coffee shop in Manhattan and two hamburger restaurant outlets of the same chain, one in Manhattan and the other in Brooklyn), both before and after implementation of the legislation. Researchers stood outside each restaurant during lunch hours. As customers approached, they were informed that they could get paid for turning in their receipt and completing a short survey when they exited. Among other items, the survey asked for additional information that we used to calculate the caloric content of their purchase (e.g., type of milk in a latte). Subjects received five dollars upon providing all requested information (for more detail, see Wisdom et al. 2009b).

In addition to this "natural experiment" examining the impact of calorie posting, we implemented an experimental intervention in which randomly selected subjects were provided, before entering the restaurant, information either about suggested calorie intake *per day* or *per meal* (by dividing the daily recommendations by three). Although calorie intake guidelines, when available, are usually provided at the daily level, we hypothesized that per-meal recommendations would be easier to compare to actual meal choices, and might have a larger impact on behavior.

Using OLS, and running separate analyses for the coffee shop and for each location of the burger restaurant chain, we examined the impact on calories purchased of the legislation (i.e., the posting of calorie information) and the calorie recommendation variables, as well as day of week, age, sex and race.

At the coffee shop, there was no impact of the legislation ($B = 11.50$, $t(320) = 0.26$, $p = 0.79$) or of either calorie recommendation. The only significant effect was that African Americans consumed more calories than other groups ($B = 81.62$, $t(320) = 2.04$, $p < 0.05$). For the Manhattan hamburger restaurant, there was again no significant effect of the legislation ($B = 19.49$, $t(568) = 0.34$, $p = 0.73$) and a significant effect of race ($B = 113.10$, $t(568) = 2.68$, $p < 0.01$). At the hamburger restaurant in Brooklyn, however, fewer calories were consumed after the legislation went into effect ($B = -76.61$, $t(466) = -1.96$, $p = 0.05$), and calorie consumption was negatively related to age but not related to race. Furthermore, at the Brooklyn location, in contrast to the sandwich study, there was a marginal but striking interaction between dieting status and legislation ($B = -156.23$, $t(414) = -1.78$, $p = 0.08$) such that dieters tended to be *helped* more than nondieters by the information. Finally, the calories-per-meal recommendation interacted marginally with dieting at both burger restaurants (Brooklyn: $B = 210.13$, $t(414) = 1.82$, $p = 0.07$; Manhattan: $B = 196.63$, $t(414) = 1.81$, $p = 0.07$), such that this recommendation significantly *increased* the caloric intake of dieters relative to nondieters.[3] This study, therefore, provided some evidence that provision of calorie information can have an impact on calorie intake, at least for some populations. Providing calorie targets at either the daily or meal level does not seem to have a beneficial effect, and may even have a perverse effect, on calorie intake.

III. Conclusions

In combination, these studies suggest that providing calorie information may have small effects on food choices, but may also produce perverse effects, such as promoting higher calorie consumption among dieters. Although we don't know why provision of calorie information sometimes had a negative impact on subsets of consumers, one possible reason is related to the previous example of cigarette smoking. People who want to achieve a goal, such as quitting smoking or losing weight, may seek to motivate themselves by exaggerating the threat they face. Thus, dieters may attempt to motivate themselves to choose low-calorie options by inflating their calorie estimates. Providing accurate information may, therefore, lead to a downward revision of calorie estimates, resulting in an increase in calorie intake, as observed in the sandwich study.

In contrast, the asymmetrically paternalistic manipulation of convenience had an effect on sandwich choice (the only decision for which it was implemented) that was sufficiently large to result in fewer total meal calories. Note, however, that these studies examined only the

[3] We couldn't conduct this analysis for the coffee shop data, because we didn't ask about dieting prior to its compliance with the legislation.

impact of the manipulations on a single meal. It is possible that those eating fewer calories, either due to the convenience manipulation or informational intervention, compensated later in the day by snacking more or eating more for dinner. A better test of the impact of such manipulations would measure aggregate food choices over time, as could be done using a longitudinal design.[4]

In combination with other studies (Volpp et al. 2008), the findings reported here point to the potential effectiveness of asymmetrically paternalistic interventions in producing behavior change with a simple nudge, as compared to, or perhaps in combination with, the more fragile and potentially more modest effect of information provision.

REFERENCES

Camerer, Colin, Samuel Issacharoff, George Loewenstein, Ted O'Donoghue, and Matthew Rabin. 2003. "Regulation for Conservatives: Behavioral Economics and the Case for 'Asymmetric Paternalism.'" *University of Pennsylvania Law Review*, 151(3): 101–44.

Choi, James J., David Laibson, and Brigitte C. Madrian. 2005. "Are Empowerment and Education Enough? Underdiversification in 401(k) Plans." *Brookings Papers on Economic Activity,* 36(2005–2): 151–214.

Cutler, David M., Edward L. Glaeser, and Jesse M. Shapiro. 2003. "Why Have Americans Become More Obese?" *Journal of Economic Perspectives,* 17(3): 93–118.

Department of Health and Mental Hygiene, Board of Health. "Notice of Adoption of an Amendment (§81.50) to Article 81 of the New York City Health Code." http://www.nyc.gov/html/doh/downloads/pdf/public/notice-adoption-hc-art81-50.pdf (accessed January 1, 2009).

Finkelstein, Eric A., Christopher J. Ruhm, and Katherine M. Kosa. 2005. "Economic Causes and Consequences of Obesity." *Annual Review of Public Health,* 26: 239–57.

Flegal, Katherine M., Margaret D. Carroll, Cynthia L. Ogden, and Clifford L. Johnson. 2002. "Prevalence and Trends in Obesity Among US Adults, 1999–2000." *JAMA,* 288(14): 1723–27.

Fung, Archon, Mary Graham, and David Weil. 2007. *Full Disclosure: The Perils and Promise of Transparency.* Cambridge, MA: Cambridge University Press.

Garcia, Kelli K. 2007. "The Fat Fight: The Risks and Consequences of the Federal Government's Failing Public Health Campaign". *Yale Law School Faculty Scholarship Series,* Paper 11. http://lsr.nellco.org/yale/fss/papers/11 (accessed January 1, 2009).

Hasler, Clare M. 2008. "Health Claims in the United States: An Aid to the Public or a Source of Confusion?" *The Journal of Nutrition,* 138(6): 1216S – 1220S.

Johnson, Eric, and Daniel Goldstein. 2003. "Do Defaults Save Lives?" *Science*, 302: 1338–39.

Loewenstein, George, Leslie John, and Kevin Volpp. Forthcoming. "Using Decision Errors to Help People Help Themselves." In *Behavioral Foundations of Public Policy,* ed. Eldar Shafir. New York: Russell Sage Foundation Press.

Loewenstein, George, Troyen Brennan, and Kevin Volpp. 2007. "Asymmetric Paternalism to Improve Health Behaviors." *JAMA*, 298(20): 2415–17.

Madrian, Brigitte C., and Dennis F. Shea. 2001. "The Power of Suggestion: Inertia in 401(k) Participation and Savings Behavior." *Quarterly Journal of Economics,* 116(4): 1149–1187.

Marois, René, and Jason Ivanoff. 2005. "Capacity Limits of Information Processing in the Brain." *Trends in Cognitive Science,* 9(6): 296–305.

Mokdad, Ali H., James S. Marks, Donna F. Stroup, and Julie L. Gerberding. 2004. "Actual Causes of Death in the United States, 2000." *JAMA,* 291(10): 1238–45.

Norman, Donald A., and Daniel G. Bobrow. 1975. "On Data-limited and Resource-limited Processes." *Cognitive Psychology,* 7(1): 44–64.

O'Donoghue, Ted, and Matthew Rabin. 1999. "Doing It Now or Later." *American Economic Review*, 89(1): 103–24.

O'Donoghue, Ted, and Matthew Rabin. 2000. "The Economics of Immediate Gratification." *Journal of Behavioral Decision Making,* 13(2): 233–50.

Parkes, Gary, Trisha Greenhalgh, Mark Griffin, and Richard Dent. 2008. "Effect on Smoking Quit Rate of Telling Patients their Lung Age:

[4] A similar criticism applies to studies demonstrating an impact of default contribution rates on saving for retirement. Without information about other financial activities, such as credit card debt, there is no way of knowing whether the overall impact of increased default contribution rates is to increase total saving.

The Step2quit Randomised Controlled Trial." *British Medical Journal,* 336(7644): 598–600.

Samuelson, William, and Richard Zeckhauser. 1988. "Status Quo Bias in Decision Making." *Journal of Risk and Uncertainty*, 1(1): 7–59.

Severson, Kim. 2008. "Calories Do Count." *The New York Times*, October 28. http://www.nytimes.com/2008/10/29/dining/29calories.html?_r=1&scp=2&sq=calorie%20 (accessed January 1, 2009).

Simon, Herbert A. 1955. "A Behavioral Model of Rational Choice." *Quarterly Journal of Economics,* 69(1): 99–118.

Sunstein, Cass R., and Richard H. Thaler. 2003. "Behavioral Economics, Public Policy, and Paternalism: Libertarian Paternalism." *American Economic Review*, 93(2): 175–79.

Thaler, Richard H., and Cass R. Sunstein. 2008. *Nudge: Improving Decisions About Health, Wealth, and Happiness*. New Haven, CT: Yale University Press.

United States Food and Drug Administration. 1994. "Nutrition Labeling. http://www.fda.gov/ora/inspect_ref/igs/nleatxt.html (accessed January 1, 2009).

Variyam, Jayachandran N., and John Cawley. 2006. "Nutrition Labels and Obesity." National Bureau of Economic Research Working Paper W11956.

Viscusi, W. Kip. 1990. "Do Smokers Underestimate Risks?" *Journal of Political Economy,* 98(6): 1253–69.

Volpp, Kevin G., Leslie K. John, Andrea B. Troxel, Laurie Norton, Jennifer Fassbender, and George Loewenstein. 2008. "Financial Incentive-Based Approaches for Weight Loss." *JAMA,* 300(22): 2631–637.

Wisdom, Jessica, Julie S. Downs, and George Loewenstein. 2009a. "Promoting Healthy Choices: Information vs. Convenience." Unpublished.

Wisdom, Jessica, Julie S. Downs, George Loewenstein, and Brian Wansink. 2009b. "Calorie Posting in New York City: The Effect of Point-of-Purchase Information on Food Choice." Unpublished.