

Introduction

The public policy approach to improving the nutritional quality of Americans' diets has relied heavily on disseminating information, such as MyPyramid, about why and how to make food choices that promote health and prevent disease (USDA, 2006). Educational efforts like this may be paying dividends. For example, a 2001 study found that nearly 60 percent of sampled shoppers indicated that their grocery purchases were strongly affected by some health concern and 76 percent felt that healthy eating was a better way to manage their health than medication. These statistics had increased to 80 percent and 86 percent by 2002 (FMI, 2001, 2002). Sales of organic foods increased 17-21 percent per year between 1997 and 2004. Sales of functional/fortified foods increased 34 percent between 2003 and 2004, whereas total food sales increased 2.4 percent over the same period (Food Institute Reports, 2004, 2005). In addition, the large volume of diet books and products sold to American consumers suggests we are aware of diet and health issues, curious about slimming down, and mindful of good health (Ackman, 2005).

While shopper surveys and sales figures imply a national interest in improving diet, aggregate health statistics do not reflect these concerns. As of 2003-04, 66 percent of American adults were overweight and over one-third were also obese. Between 1976 and 2000, the number of individuals classified as obese more than doubled (Centers for Disease Control and Prevention (CDC), 2003).¹ During the same time span, there was a parallel rise in the incidence of diseases highly correlated with poor nutrition and overconsumption: cancer, strokes, heart disease, and diabetes (Surgeon General, 2001). In 2000, obesity accounted for an estimated \$117 billion a year in direct and indirect economic costs; diabetes is estimated to account for another \$132 billion (CDC, 2005).

These conflicting trends highlight a disturbing inconsistency. While Americans demonstrate a concern about eating well and using diet to manage their health, they are getting heavier and increasing their risk of suffering from diet-related illnesses. A rift between long-term objectives and short-term desires can lead to time-inconsistent choices, where people switch their preference for a smaller, yet more immediate, reward over a larger but delayed reward when the time delay between receiving either reward is changed equally. A common example describes an individual who prefers 1 apple right now to 2 apples tomorrow, yet also prefers 2 apples in 51 days to 1 apple in 50 days (Thaler, 1981). Understanding which situations are more conducive to making these seemingly inconsistent choices can improve our understanding of the sometimes tenuous relationship between diet/health knowledge and food choices.

The burgeoning literature on behavioral economics suggests that insights gleaned from economic analysis can be improved by incorporating the presence and level of confounding factors, such as drive states (e.g., hunger, pain, fear), environmental factors, and other short-term circumstances (Loewenstein, 1996, 2000; Laibson, 2001; Read and van Leeuwen, 1998; Herman and Polivy, 2003). In turn, this may clarify how and when intentions are more likely to translate to actual behavior. The model developed by

¹An individual is classified as obese if his or her body mass index (BMI), or ratio of one's weight in kilograms to one's squared height in meters, exceeds 30. An individual with a BMI between 25 and 30 is classified as overweight.

Loewenstein (1996) shows that in the presence of intense visceral factors, such as hunger, thirst, or addiction, an individual will be compelled to make choices that undermine long-term health objectives. Using experimental results in conjunction with Loewenstein's model of visceral factors, Read and van Leeuwen (1998) found subjects' levels of hunger to be significantly correlated with observed inconsistencies. The snacks chosen for immediate consumption were significantly less healthful than those chosen for future consumption, while for both future and immediate consumption, the choices made by hungry individuals were less healthful. Herman and Polivy (2003) also examined whether behavioral economics models might be appropriate for the study of dieting and food choice. They find that when presented with tempting foods, dieters are more likely to display uninhibited eating in the presence of some motivational disruptions, such as emotional arousal, intoxication, or distress.

These findings indicate that there are situations where individuals behave in ways contrary to their own long-term self-interests. As O'Donoghue and Rabin (1999) point out, evidence of present-biased preferences brings up complex questions for public policy. In terms of obesity and poor nutrition, time-consistent preferences assume that an overweight or unhealthful individual may be making an optimal choice if he or she derives more pleasure from unhealthy behaviors than good health. As such, a heavy-handed nutrition policy, like taxing unhealthy foods to raise diet quality, would unambiguously make that person worse off. On the other hand, present-biased preferences assume that, while a person may respond rationally to current situations and make unhealthful choices, finding incentives that would make one less responsive to these situations will improve long-term well-being.

Such findings have important implications for econometric analysis of consumers' food choices. For one, empirical estimation that does not include relevant visceral factors, such as an individual's level of hunger, will yield biased estimates of the relationship between dietary information and food choices. Also, a better understanding of how situational factors affect food choices will strengthen programs aimed at improving diet, nutrition, and health outcomes. Knowing when individuals may be more likely to forgo health concerns might suggest ways to reduce the deleterious impact of such situations, or to identify commitment mechanisms that help individuals make choices that are more in keeping with their own long-term health goals.

Another important implication of the likely relationship between visceral factors and food choices is that analysis over shorter time periods, such as per eating occasion, may uncover important information that is hidden when food choices are aggregated over an entire day or more. Using the Continuing Survey of Food Intakes by Individuals (CSFII) and Diet and Health Knowledge Survey (DHKS) data to analyze food choices on this level transforms what is traditionally a cross-sectional data set into one more akin to a panel data set. This provides an opportunity to employ fixed-effects estimators, and this circumvents some of the endogeneity issues that can plague cross-sectional analysis of food demand. Instrumental variable estimators further reduce problems of endogeneity.