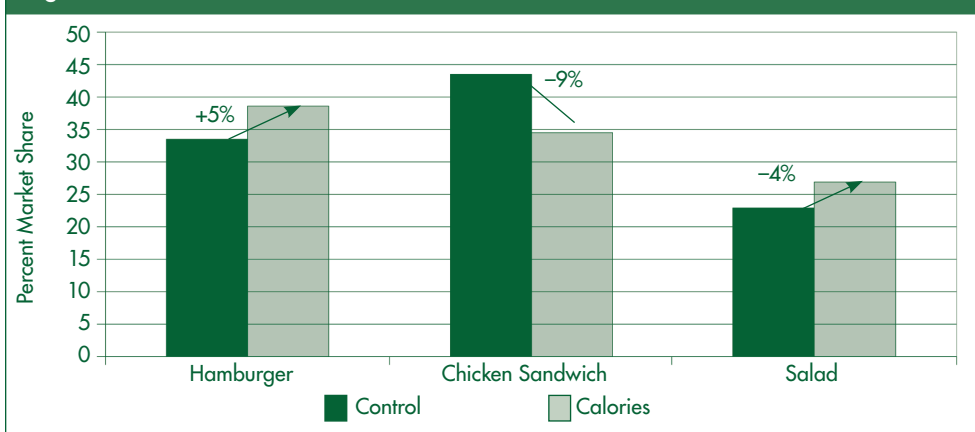


Figure 1. Choices With and Without Calorie Information



calorie content of the less-healthy food products while underestimating the calories of the healthier products. These findings served as a foundation for policy makers who advocated the legislation to make the calorie postings of restaurant chains mandatory.

We challenge the logic of this mandatory calorie-policy legislation. When consumers underestimate the calorie content of the hamburger and have an accurate perception of the calories of the healthier alternative, then posting calorie values makes sense, as some consumers will shift to the lower calorie option while others will stick with their first choice of the hamburger. However, there may be a boomerang effect, and consumers may shift from a chicken sandwich to a hamburger if the calorie content of the healthier option has been underestimated in their minds.

Studies suggest that the reason for the boomerang effect is that consumers relate higher calorie content with better taste. If consumers realize that they overestimated the calorie savings and health gains associated with consuming healthier food, they may update their choice because the new information that reveals the difference in caloric content does not justify the sacrifice of taste (pleasure).

These effects may cause calorie-posting policies to be inefficient, but not because consumers ignore calorie information but, rather, because they act rationally given updated information.

The Effect of Calorie Information on Choice of Fast-food Products

To analyze the effect of information updates on judgments and choices, we used a research design that distinguishes between a control group and two treatment groups—the calorie group and the workout group. The control group viewed a regular menu of a fast-food chain containing a picture of the dish, description (e.g., salad with vinaigrette dressing), and price. The calorie group viewed the same menu plus calorie information. The workout group received the calorie information plus information on the amount of time of a workout activity (e.g., walking) that is needed to burn the calories consumed.

The respondents received a menu that included the three research products: a hamburger, a chicken sandwich, and a green salad, plus French fries and a soft drink as fillers.

Similar to many consumer behavior and psychological studies, we did not make the extra investment to obtain a sample that is representative of the population but, instead, studied the effects of different information manipulations within a population that was easily approachable.

Our main concern was to guarantee randomness of allocation of the population among the control group and treatment groups. The choice of location where subjects were recruited had to

satisfy only one condition—that fast-food outlets were nearby. We screened out consumers who had not eaten at hamburger chains during the past year.

The three experimental surveys were conducted at the university town of Rehovot, Israel. The majority of subjects were students, while others were employees and visitors, including parents. We also interviewed students at a nearby high school (about 20% of the sample) and two workplaces that were near McDonald's and other fast-food outlets.

Overall, we interviewed 511 respondents who were randomly assigned to one of the three experimental groups. Our sample contained 186 males and 325 females. The higher proportion of females to males (63.5 percent) reflected the proportion of female students in the Faculty of Agriculture, Food, and Environment, where the majority of interviews were held.

Regarding responders' ages, 19.3% were below 20 years of age, 22.7% were between 20 and 30 years, 16.6% were between 31 and 40 years, and 41.4% were over 40 years of age. With respect to income, 36.3% had incomes that fell below the national average, 15.7% had average incomes, and 48% had above-average incomes.

Members of the control group were asked about their estimation of the calorie content of the three research products considered. The results showed that they overestimated the calorie content of the hamburger and the chicken sandwich, but their estimation of the calories of the salad was not biased. This confirms the findings in the literature that consumers overestimate the calories in calorie-rich foods. Furthermore, the magnitude of overestimation was higher for the hamburger than for the chicken sandwich. Given this pattern of overestimation, it is likely that consumers will shift their demand from the chicken sandwich to the salad if the benefit of weight control

is stronger than pleasure and vice versa. They will shift to the hamburger if they assign a greater importance to pleasure than to the goal of weight control.

The actual calorie difference between the hamburger and the chicken sandwich is quite small—368 and 318, respectively. The difference of only 50 calories may result in a boomerang effect. Figure 1 presents the choices of the three products with and without calorie information and confirms that the boomerang effect, indeed, occurred.

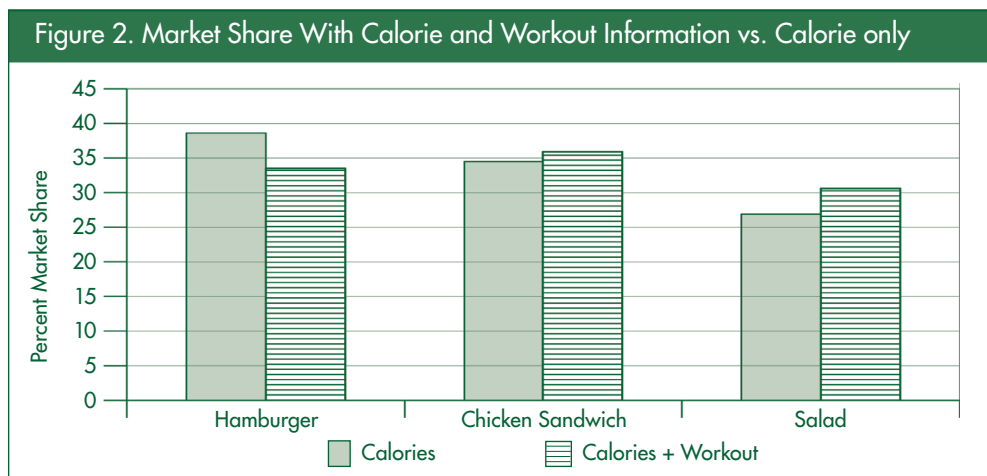
The results suggest that calorie information lowered the demand for the chicken sandwich while the demand for the hamburger and the salad increased

However consumers' response to calorie information is expected to be sensitive to additional information that allows better interpretation of the basic facts. When calorie information was coupled with workout information that specified the time needed to burn calories consumed, it provided a price tag on the extra calories of the hamburger in terms of calorie-reduction efforts.

Figure 2 compares the market shares of the three fast-food products between the two information manipulations—calories only and calories plus workout efforts. The additional information led to a decline in the demand for the chicken sandwich and a transition mostly to the salad but also to the hamburger. The calories and workout information did not change the consumption of the hamburger compared to the control group but led to a major shift from the chicken sandwich to the salad. The additional information on workout time, which visualized the cost of calorie consumption, corrected the undesired results (from the standpoint of the designer).

Gender Effect

The literature suggests that there are differences in preference between genders, resulting from differences in metabolism and energy demand, as



well as attitude toward risk, health, and appearance. Therefore, men tend to have a higher preference for the hamburger (more energy) and women, the salad (less fat). Indeed, in the control group, 60% of men preferred hamburgers; 35%, chicken; and 5%, salad. Few women selected the hamburger, and the rest were divided between the chicken sandwich and the salad. When only the calorie information was available, both men and women shifted from the chicken sandwich to the hamburger. With additional information about workout time, men shifted to the chicken sandwich and women shifted to the salad.

Discussion

Policy makers, physicians, and concerned family members are interested in designing strategies that will encourage people to make healthier nutritional choices. For example, with concerns about obesity, it may be desirable to induce the transition to healthier, leaner foods.

A basic assumption is that the provision of calorie information will lead to improved choices. But behavioral economics suggests that consumers' perceptions are sometimes inaccurate. In our case, they tended to overestimate the extra calories in the hamburger relative to chicken. Thus, when provided with only the calorie content, there was a boomerang effect—a shift away from the leaner option. Only when

additional information was provided about the costs in terms of choice, additional required workout time to burn the calories in the case of our experiment, did individuals correct themselves and increase their selection of leaner food. This suggests that providing only partial information may lead to an undesirable outcome. To make a wise choice, consumers need both the basic facts as well as the implications.

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