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"What is common is alright, we presume," remarked Geoffrey Rose,[1(p427)] and one of the more common associations with population health is food marketing. The widespread, if implicit, presumption that food marketing to adults is alright has now been vigorously challenged in a new and powerful way. Using a novel data set, Bleich and colleagues[2] show an association between changes in restaurant advertising and changes in body mass index (BMI) among adults.

What are we to make of these results? In particular, how strongly can their observational analysis persuade scientists that the ubiquitous food advertising to which we are all commonly exposed is, in fact, not alright? There are already good theoretical reasons to believe that advertising is indeed strongly associated with behavior,[3] and a body of empirical evidence has shown an association of advertising with food choice in short-term experiments[4] and in economic market analyses.[5]

By adding a population-health level analysis, Bleich et al[2] make an important and innovative contribution to our understanding of the role of advertising in health. The market-level data on exposure to restaurant advertising is a major—and largely unique—strength of this important article. It places the focus of population health squarely on a health determinant that is shared by everyone in the community.

It is useful to begin with a clear understanding of what the study does not measure. There is evidence that advertising shows diminishing marginal revenue returns, and by extension it seems reasonable that the association between advertising and obesity (via food consumption) similarly has diminishing marginal returns.[6] What is estimated in the Bleich et al analysis are relatively small movements close to the flat part of this curve. The region of variation in the Bleich et al data is modest. Table 2 in their article shows that the range of data used for estimation is only about 19% of the mean dollar amount for fast food advertising, and 43% for fast casual restaurants and quick-service restaurants. This is not bad variation, but 43% of the mean value is a relatively small part of the entire range of data (22% of the full range of the data if they are normally distributed), and translated through the concave function associating advertising with BMI, this variation in advertising corresponds to relatively little variation in BMI. And of course, this is the full range of variation in advertising—most of the actual variation used for estimation occurs in a range even narrower than that. Moreover, none of the variation begins very close to zero, where the largest marginal impact would be expected. All of this is simply to say that the study measures the marginal association of advertising with BMI, not what would be the much larger mean association of advertising with BMI. This is a crucial distinction: economic theory holds that the last dollar is the one that barely has an effect, so the marginal dollar is much less impactful than the average (mean) dollar. The study likely underestimates the mean association of advertising with BMI by a considerable amount.

The Bleich et al[2] analysis seeks to control for possible confounders in the usual way: by exploiting differences within units of observation to control for unobserved attributes of these units. One hopes that these changes are due to exogenous factors such as new entrants or price competition among established restaurants rather than to plausible endogenous factors such as changing demographics in the counties. Fortunately, there is good reason to believe that the variation in restaurant marketing during this time is indeed exogenous. The period of the study follows a time of substantial growth in fast casual restaurants such as Panera, Wing Stop, and Chipotle. As a restaurant chain seeks to establish itself in new markets, it engages in a media blitz

designed to introduce itself to new customers and differentiate its food from that of existing chains. Once established, advertising can be dialed back. The fast casual restaurant sector established itself in the early 2000s, and by the period of the study by Bleich et al, it was already mature in its original, core markets and maturing in its expansion markets. Presumably these would include the lower-income counties for which Bleich et al identified an association of advertising with BMI. Their Table 2 shows that nearly all of the change in advertising for fast casual restaurants and full service restaurants used in their study were decreases, perhaps corresponding to the scaling back of advertising after the introductory blitz. This explanation provides a plausible reason to believe that the changes exploited here are indeed exogenous and not confounded with underlying individual tastes and preferences. Thus, what the study identifies, accordingly, is not so much the association of changes in advertising with changes in BMI, but rather decreases in advertising associated with decreases in BMI.

The authors are careful to list some of the ways in which the analysis might be biased away from the null. But bias toward the null is present as well. In particular, the study's results do not warrant the conclusion that advertising has no effect in high-income counties nor that it has no effect for fast food restaurants. Although the relevant associations are not significant in this analysis, it is clear that the study is underpowered to identify them. Specifically, the variation in advertising of less than 20% of the mean in the fast food category is likely not enough variation in the main independent variable. And the differences in coefficients between low-income and high-income counties in the associations of fast casual restaurants and full service restaurants with BMI do not achieve statistical significance. Although the authors are right to point out the disproportionate burden of obesogenic advertising in low-income communities, there is no evidence here that those in low-income areas are any more susceptible to such advertising. The issues around power, around variation in the main independent variable, and the marginal rather than mean associations estimated all tend to introduce conservative biases into the results. The associations identified are therefore close to being the lower bounds on what the true impact of restaurant advertising is likely to be.

The Bleich et al study—similar to all studies of ubiquitously experienced exposures—cannot be definitive. Yet science advances not through single, perfect studies but rather through the slow accumulation of imperfect studies, all pointing in the same general direction. This study is a strong contributor to the increasing wave of analyses moving together to show the adverse associations of advertising with population health.

We may never know for sure what the full effects of food advertising on obesity are. Yet given the inferences that can be legitimately if hesitantly drawn from both small-scale experimental studies and large-scale ecological studies, we can be assured that advertising is very common—and it would be wrong to assume that is alright.

ARTICLE INFORMATION

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