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Editorial

Growing Our Kids in “Healthy Soil”: New Research on Environmental Influences on Children’s Food Intake

If you live in France and you want to make good wine, you will focus on “terroir,” the sum of everything in the environment—soil, temperature, rainfall, topography—which affects the growth of your grapes. Obviously, people are a lot more complicated than grapes, but the analogy may be a useful one when we think about the development of the children in our society. Our present generation is growing up unhealthy. Childhood obesity continues to be on the rise, currently at 18% among adolescents [1], possibly leading to a generation of children with shorter lifespans than their parents [2].

During the search for environmental conditions that could have precipitated this epidemic, researchers have found that nowadays portion sizes are much larger [3], energy-dense foods with fewer nutrients are cheaper and readily available [4,5], and there are ample opportunities to purchase high calorie foods from fast food outlets and vending machines [6,7]. Additionally, there are also fewer places for kids to play, particularly in low-income neighborhoods [8], and a lot more children, particularly younger ones, are being exposed to electronic media such as television programs, videos and computer games [9].

However, it is still hard to argue that environmental conditions are at the root of the obesity problem, or know which ones need to be addressed, without knowing how they influence eating and activity behaviors, the proximal determinants of weight gain. Understanding the important connection between environment and dietary intake is the subject of two articles in this issue of the *Journal of Adolescent Health*. In the first of these articles, Powell and Han evaluate the consumption behavior of adolescents and its relationship to food prices and food outlet availability in their neighborhoods [10]. Their sample of children, 12–18 years of age, was obtained from the nationally representative 2002–2003 Child Development Supplement of the Panel Study of Income Dynamics. With information obtained from zip codes, they were able to match food price data from area grocery stores and fast food outlets that were obtained in a different survey. They also matched the concentration of food stores and restaurants, obtained from commercially-available business directories, in the zip code areas of these adolescents.

It is well known that the prices faced by individuals affect the amounts that they purchase. In fact, a substantial amount of the economics literature has been dedicated to quantifying this relationship, which is typically expressed as “demand elasticity,” a statistic that describes, in terms of percentage, the change in demand for a product for a given change in its price. Among adolescents from low-income households, Powell and Han found that a 1% increase in the price of fast food was associated with a 2% increase in the weekly consumption frequency of non-meat protein products. That is, increases in the prices of hamburgers and other foods available at fast food outlets were associated with more frequent consumption of beans, peanut butter, and other non-meat protein sources. The logic described in this result is simple and appealing, raise the price of a food, and kids (or their parents) will find a substitute. The authors also found a weak, but statistically significant, association between vegetable consumption among low-income adolescents and the presence of supermarkets in their neighborhoods.

There are limitations to this article, as has been readily pointed out by the authors. The study was cross-sectional in nature, thus the relationships between environment and consumption are not necessarily causal. The dietary instrument did not provide information on actual amounts, but rather the frequency (days per week) in which foods belonging to different groups were consumed. However, the results obtained in this study are consistent with the developing literature on this topic. Previously, using panel data Powell has shown that fast food prices are inversely related to adolescent body mass index (BMI) [11], whereas fruit and vegetable prices are positively related. Analyzing panel data on younger children, Sturm and Datar also found a positive relationship between fruit and vegetable prices and BMI gain [12]. These published data demonstrate how economic logic dovetails with our broad understanding of diet and weight. Individuals will consume less of a food when the price is higher. All things being equal, a lower intake of energy-dense fast food is likely to result in a lower BMI. When the prices of fruits and vegetables are low, their consumption rate may increase. If

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children substitute these foods for other energy-dense foods, their weight gain could be kept in check.

In the second article in this issue on the links between environment and consumption, Rovner et al focused on the school environment, specifically, foods available in school vending machines [13]. They used data from the 2005–2006 U.S. Health Behavior in School Aged Children survey, which provided a national probability sample comprising students of grades 6th through 10th. A food frequency questionnaire was used to obtain information on the weekly consumption frequency of fruits, vegetables, candies, soft drinks, and chips by students, whereas school administrators were asked to complete a questionnaire on foods sold in the vending machines. The authors found that availability of fruits and vegetables in school vending machines was positively associated with the consumption of these foods by younger students (grades 6–8), after controlling for gender, grade, family affluence, and level of school poverty. The association between availability and consumption was found to be even stronger for chocolates and other candies. However, there were no significant associations between consumption and availability of foods in vending machines for the older students (grades 9–10).

Similar to the first article, the research conducted by Rovner et al also had limitations related to the dietary instrument and cross-sectional nature of the study. However, their results are broadly consistent with evidence from more localized studies, which also indicated that the food environment in school is linked to consumption. For example, a Minnesota study found that snack vending machine availability in schools was associated with a decreased consumption of fruits among seventh graders [14]. In a study on middle schools in Washington, consumption of sugar-sweetened beverages was positively associated with their availability in vending machines and other school venues [15].

These new studies provide additional evidence on the environmental links to behaviors that can lead to childhood obesity. Their approaches were complementary, with one characterizing the neighborhood environments of children by food prices and outlet availability, and the second describing school environments with respect to foods being offered in vending machines. Findings of both studies are nuanced. Powell and Han found evidence of a relationship between prices and consumption among low-income adolescents, but not in the general population. Rovner et al observed an association between consumption and food availability in school vending machines among younger students, but not in older ones. However important these studies are, there is much more work to be done, both in understanding how environmental conditions affect our behaviors and in translating these findings into successful policies and programs to improve these conditions.

The magnitude of our society's childhood overweight problem is astounding, with more than one-third of school-age children and adolescents being currently overweight or obese [1]. Therefore, cultivating fertile grounds for the optimal growth of the children in our society has become imperative. The usefulness of this agricultural metaphor may extend beyond its ability to convey how growth outcomes are inextricably tied to environmental conditions. More than a century ago, the land grant college system created a federally funded, state-based approach for teaching, research, and extension to improve the agricultural sector [16]. For an agricultural society, a federal investment on such a grand scale was a wise one, resulting in large productivity gains and economic benefits to the society [17]. Currently, in a post-industrial information age, where food is available every-

where and obtaining it requires little physical effort, we need a similarly grand investment. Although there are important current examples of public and private investment in this type of obesity work [18–20], much more will be needed to ensure that all our children will have a healthy growth on U.S. soil.

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