Reducing Environmental Risks to Modify Lifestyle Behaviors

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It has been more than 10 years since the Diabetes Prevention Program (DPP) reported that changes in diet and physical activity resulted in a larger reduction in the incidence of type 2 diabetes than medication alone (1). We have acquired abundant and well-replicated scientific evidence from national and international multisite, multiyear intervention trials showing the benefits of lifestyle change for health, yet prevention programs and healthier behaviors are not being widely adopted and translated to reach the population at large.

Consequently, the prevalence of diabetes and associated risk factors has continued to increase. Between 1999 and 2010, the prevalence of hyperglycemia increased from 12.9 to 19.9%. The portion of the population having a waist size above the recommended threshold also increased from 45.4 to 56.1%, indicating a rise in the rate of abdominal obesity (2). Among the U.S. elderly Medicare population, diabetes is estimated to have increased by 1.69% per year between 1999 and 2005 (3). The co-occurrence of two or more lifestyle-related chronic conditions also increased between 2002 and 2009 by 2% (4).

Successfully disseminating lifestyle interventions requires overcoming many challenges—screening and recruiting individuals, providing instruction, promoting adherence, and supporting maintenance. When the interventions are long and complex, as was the case with the DPP, which had a core curriculum of 16 weekly educa-

tion sessions, these challenges and costs can be overwhelming.

Group interventions that have been developed to reduce costs and reach a larger population may not be able to replicate the magnitude of impact of the original DPP. For example, a community-based lifestyle intervention program in Pennsylvania yielded a <20% reduction in diabetes and no change in complications rates (5).

Even if the efficacy of the DPP can be maintained in programs that can be widely disseminated, an estimated 86 million Americans now have prediabetes (6). Reaching that many people not only would require the training of thousands of instructors, but also the personal motivation and interest of individuals with prediabetes. The odds of being able to scale a multisession class to reach millions of people are relatively small, especially given that most people with prediabetes are unaware of their condition.

However, the nature of the programs themselves may also limit their impact. For example, people with insight and motivation are more likely to attend the numerous classes (7), but not all would be able to absorb all of the information provided (8). As a result, only a small percentage of self-selected individuals take full advantage of health promotion opportunities (9,10).

Furthermore, even among the most motivated individuals, maintenance of health behaviors tends to decline over time, as people fatigue in their efforts to resist the

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environmental forces that promote less healthy behaviors (11,12). As a result, it is difficult for most people to maintain weight loss and other healthy habits such as physical activity and abstinence from tobacco and alcohol (13,14).

Yet, the behaviors that are recommended for the prevention of diabetes and other chronic diseases are relevant for all, regardless of whether they have prediabetes (15). Recommendations to prevent chronic diseases by adopting a moderate lifestyle apply to all people; these include consuming a balanced diet rich in fruits, vegetables, and fiber and low in sugars, saturated fats, processed meats, and low-nutrient foods; engaging in regular moderate to vigorous physical activity (16); limiting the use of alcohol; and avoiding harmful substances such as tobacco and other drugs (17).

If meaningful and lasting change in population health behavior is desired, then the current lifestyle intervention approach to disease prevention has its sights on the wrong risk factors. Rather than focusing on the health behaviors of individuals and encouraging individuals to change, we should consider identifying and mitigating the upstream environmental conditions that underlie these behaviors. This approach has been highly effective in other fields such as injury prevention, for which changing the design of consumer products has resulted in fewer unintended injuries. For example, requiring childproof medicine bottles has reduced poisoning deaths among children by 75% (18). Through mandated changes in car design (e.g., safety belts and airbags) and population-wide regulations regarding the use of child car seats and the minimum drinking age, traffic fatalities have declined by 40% (19).

Focusing on the health behaviors of individuals is likely to have a relatively poor population-level outcome because individual levels of capacity and motivation vary considerably

(20). When it is up to individuals to make behavior changes on their own, those with more resources, greater abilities, and fewer life burdens will have the greatest capacity to capitalize on the health advice provided (8). Individual-level lifestyle interventions, therefore, are likely to widen health disparities rather than alleviate them (21). In contrast, when conditions are changed (e.g., limiting the number of alcohol outlets or requiring that drinking water meet minimum standards), everyone benefits regardless of their personal resources and abilities (22).

There are already numerous policies and practices targeting environmental conditions that are designed to protect Americans from exposure to tobacco- and alcohol-related harm (23). These include 1) limited accessibility (making the products inconvenient to procure and use by limiting where they can be sold); 2) taxes (effectively increasing the product price); 3) multiple regulations governing use and consumption, including smoke- and alcohol-free workplaces; and 4) frequent reminders of the harms associated with use. The institution of these protective practices does not require action by individuals. Rather, they serve to constrain, but not ban, individuals' use of alcohol and tobacco. As a consequence, tobacco- and alcohol-related morbidity has been declining (24,25).

Protective practices could be used similarly to promote physical activity and better dietary habits. Products, places, and conditions relevant to diet and physical activity should be designed and regulated with an eye toward safety and health; every possible safeguard should be considered to reduce potential harm.

We should identify environmental risk factors for chronic diseases such as cardiovascular disease and diabetes and target them for mitigation (26). Dietary risk factors include 1) large portion sizes (27), 2) excessive variety, 3) convenience,

4) positioning and marketing of unhealthy products, and 5) absence of prominent and graphic warnings of negative impact. Risk factors for physical inactivity include 1) sedentary employment that does not offer regular physical activity breaks (28), 2) sedentary entertainment that does not prompt physical activity at regular intervals (28), and 3) absence of marketing, positioning, programs/events, and reminders encouraging physical activity (29).

Although there is already a movement to focus on environmental factors and policy change, actual uptake and implementation is limited. Under Mayor Mike Bloomberg, the New York City Board of Health tried unsuccessfully to implement caps on available serving sizes of sugar-sweetened beverages (30). The Institute of Medicine has issued reports and guidelines to accelerate progress in obesity prevention, but their recommendations are limited to the public sector (31). One reason for the limited enthusiasm for making necessary changes to protect individuals from an obesogenic environment is the unfounded belief that regulation is unnecessary because individuals should have the capacity to control themselves and change their own behaviors, regardless of the conditions they face (32).

Although lifestyle changes have been considered largely a matter of personal responsibility, the degree to which the environment increases the burden on individuals who have to take steps to avoid ambient risks is under-appreciated. We can all recognize that a road in disrepair, with multiple potholes or ditches, would lead to a high rate of traffic accidents. However, a similar situation exists in our food environment. With candy at every cash register and portion sizes exceeding what the average person needs, we should expect to see poor dietary outcomes (33). If tempting foods were not ubiquitous and portion sizes were limited to what is appropriate for individual needs, it is

likely that fewer people would suffer from overweight and obesity (34). Similarly, the larger societal environment also favors a sedentary lifestyle, with reliance on cars and electronic media dominating leisure-time entertainment.

Without protection from the environmental risks underlying chronic diseases, each person has to make a substantial effort to ignore or overcome the challenges that can lead to overconsumption and a sedentary lifestyle. Given our inability to change population health with lifestyle interventions alone, it is time to switch our research focus away from lifestyle intervention to target the upstream conditions that underlie human behaviors (31,35,36).

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Duality of Interest

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