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Optimal Defaults in the Prevention of Pediatric Obesity: From Platform to Practice

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Abstract

The term “optimal defaults” refers to imparting pre-selected choices which are designed to produce a desired behavior change. The concept is attractive to policymakers because it steers people toward desirable behaviors while preserving free choice through the ability to opt out. It has been found to be a powerful behavioral determinant in areas such as pension plan enrollment, organ donation, and green energy utilization. We discuss how optimal defaults can be applied to pediatric obesity prevention in several domains including public policy, institutional, private sector, and home environment. Although there are obstacles to overcome in implementing optimal defaults, it is a promising component to incorporate in a multi-level strategy for preventing pediatric obesity.

Keywords

Optimal defaults; Pediatric obesity; Prevention

Introduction

The 300% rise in pediatric obesity in the U.S. during the past 30 years [1] stands to tremendously burden the health care system and impose significant medical risk on our youth. The call for a shift in emphasis from treatment of already obese children to prevention and policy-level changes [2] is logical and timely, as individual-level remediation has failed to stem the epidemic, and few strategies have been shown to effectively prevent weight gain in children [3]. One limitation of the education/motivation approach is that it puts the onus for making these choices on the individual children themselves, rather than addressing a powerful determinant of obesity, namely an

environment abundant in high calorie, low nutrient food with opportunities for sedentary electronic activity obscuring more active choices [4].

Obesity prevention efforts have been divided along core philosophical tensions centering on responsibility being either placed on the individual or the governing agency. Embedded within this issue is the balance between individual freedoms to make healthful or unhealthful lifestyle choices relative to increasing and widespread environmental influences that actively inhibit health promoting choices [2]. On the one hand, a model emphasizing personal responsibility identifies the causes of obesity as lying within the individual including both biological factors and personal choices; to date, the efforts extending from this model have yielded insufficient success relative to the scope of the childhood obesity epidemic [5]. Conversely, a public health model places more emphasis on environmental causes including population factors, the food and exercise landscape, and the built environment (structures constructed and inhabited by people) [3]. A substantial increase in access to high calorie processed foods [6–7], larger portion sizes served at restaurants [5,8], increased sugar content in processed foods [5,9], increased time spent using computers and other portable electronic devices [10], and decreased time for recess and physical education in schools [11,12] have mirrored the rise in obesity, supporting the idea that environmental factors play a large role in the obesity epidemic. However, to date, personal-level models of etiology have dominated both theory and practice in obesity prevention.

The models have different conceptions on how each problem should be addressed, with education, self-control and ultimately treatment being the logical interventions under the personal responsibility model, and prevention and policy changes (e.g. taxation of sugary beverages) representing the public health model [3,5]. Given the limited success of the personal responsibility model and the accumulating data linking environmental changes to population-level weight changes, increased efforts to translate a public health perspective into obesity prevention are needed. Indeed, in other areas of public health such as policies promoting smoking cessation, mandatory car seats for children and seatbelts for adults, helmet laws and increasing the legal drinking age, there has been strong evidence of long-term change [2,13]. These achievements raise the possibility that similar interventions geared toward obesity prevention would also be successful. Yet, the starting place for such a vast undertaking is unclear. Further, given that consumers are reluctant to forego personal freedom [14], public health strategies have been met with resistance. Clearly, there is an urgent need for strategies that integrate these two philosophical positions. Manipulation of default choices, i.e., decisions that are preemptively made for consumers unless they take steps to opt out, represents a compromise between the two; public policies can determine what the optimal default positions are, yet the choice remains with the individual to opt out.

Optimal Defaults

The concept of *optimal defaults* bridges personal choice with public policy and connotes the positioning of choices so they are optimally suited to achieve a positive outcome [15]. Default choices are decisions preemptively made for consumers unless they take steps to opt out. Organizations (or government) inevitably pre-select and present options that affect individual choice [16]. Optimal defaults represent a powerful manipulation that affects

choice and influences behavior. Specifically, research has demonstrated a default-influenced response bias to stay with an existing, pre-selected, or easier choice, rather than seeking out an available alternative. From their work investigating the effect of “opt in” versus “opt out” pension plan enrollment, Choi and colleagues [15,17] found higher rates of enrollment for companies who automatically enrolled employees in pension plans (85%) versus those whose employees were not automatically enrolled (26–43%). Countries in which citizens are automatically enrolled as organ donors (but can opt out) have a 98% organ donation rate compared to a 15% rate in countries where citizens must activate enrollment [18,19]. During the 1980s and 1990s, the German towns of Wustenhagen and Schonau changed the default power source offered to customers to predominantly “green” energy resulting in 94 and 99% of their respective populations remaining with the green source. In other German towns where the default power source was brown, only 1% elected to switch to a “green” energy source [20]. The influence of defaults has also been demonstrated in additional areas such as choosing a car insurance plan [21], purchasing a car [22], establishing corporate laws [23], and electing to receive email marketing [24]. The tendency for people to accept default choices can be explained by a more general status quo bias in decision-making [25,26]. Contributing factors may include inertia, lack of time to investigate options, or the perception that the default option was chosen to promote the greater good [16]. Given this well-established pattern of human behavior, manipulation of default choices could also be a powerful strategy to impact individual health-related behaviors related to obesity, an idea that Kelly Brownell and colleagues have brought to the forefront of the public debate regarding government regulations as a pillar of obesity prevention [3,5,13,27].

Application to Obesity Prevention

In obesity prevention research, the term *optimal defaults* mean engineering the food and exercise environments so that the default choices are non-obesogenic, and ideally health promoting [3,5,27]. Currently, many societal defaults are set to a suboptimal or deficient capacity with regard to obesity prevention. For example, unhealthy foods (e.g., fast foods) and beverages (e.g., soda) are more available, accessible, and affordable than healthy foods in poor neighborhoods [28], making it *easier* to choose health-impairing foods and *harder* to choose health-promoting foods. In some cases resetting even one parameter such as cost can change the default. Studies have shown that if soda were to be heavily taxed, it would be less affordable, increasing the likelihood that healthier drinks (e.g. water) would become the default [5]. There is a strong argument to be made that since the major contributing forces of obesity in genetically vulnerable individuals are presumed to be largely environmental, we must introduce policy changes to make the environment less toxic [6]. Implementing optimal defaults is one logical strategy for reversing this trend [3,5]. While no published studies have directly tested the concept of optimal defaults in obesity prevention, research supports the proposition that people eat more when food is presented in larger portions [29–31], and when food is readily available and visible [32,33]. Clearly, default factors affect both quantity of food consumption and food choice.

Since defaults exist at many levels affecting both food and exercise, resetting default choices can have a broad impact on weight regulation. The challenge for researchers and policy-makers is to use this knowledge to craft interventions that maximize these effects to improve

food choices, reduce overall energy intake, and increase energy expenditure. Optimal defaults is a sound framework in which to accomplish this, as it is theoretically driven (from behavioral economics and the science of decision making), it provides a clear and executable roadmap for change, and it speaks to the multi-determined, socio-ecological conceptualization of pediatric obesity.

The challenge is that the manipulation of default choices in the arenas of eating and exercise is far from straightforward. In contrast to issues of organ donation in which individuals can either opt in or opt out, food and exercise choices are rarely unidimensional and binary. Instead, the environmental variables that affect health behaviors are typically multidimensional and interactive. In addition, individuals navigate multiple systems daily including home, school or work settings, and public areas, all of which are saturated with promotion and access to unhealthful dietary choices. Decisions that create the default landscape need to be made about both behaviors (e.g., playing at the playground versus watching television) and environments (e.g., what types of foods are available at home), and they need to be made at societal, private sector, institutional, and individual/family levels. With these added complexities, what is the best strategy for moving the concept of optimal defaults from theory to practice for the prevention of childhood obesity?

Manipulation of effort or cost to obtain a given choice may be one option or mechanism to influence health behavior. The broader literature on behavioral economics and obesity has examined the nature of choice, testing how hard individuals are willing to work for alternative options. For example, researchers have tested how manipulating food costs influences dietary choices and found that when the cost of healthful foods rises, individuals are likely to replace them with unhealthful choices [34–36]. Similarly, other studies tested the ability to substitute activities for food and found that when costs for snack foods and alternatives (i.e., sedentary activity or fruits and vegetables) were equal, participants chose snack foods; however, when the price of snack foods increased, participants were more likely to switch to alternatives [37]. The impact of such strategies is potentially great as even small changes in behaviors can make a difference in energy intake and expenditure and can significantly improve health outcomes [38].

Such choice paradigms differ in critical respects from an “opt out” paradigm (i.e., in which the default is more accessible and requires the individual to opt out of the sanctioned choice to gain access to the alternative). For example, the food cost simulations mimic a situation in which an individual views a menu and has to pay more for certain menu options. When optimal defaults are manipulated, the individual is automatically served a default meal and has to take active steps to cancel that meal and access an alternate selection. Prior research in multiple domains of behavioral economics indicates that individuals are highly unlikely to circumvent a default choice [17,39]. While the optimal defaults model has proven to yield powerful effects in other areas of public policy [40,41] its successful application to sustained obesity prevention remains untested.

Application to Pediatric Obesity Prevention

There are a number of reasons to research how effective optimal defaults are with children. First, children stand to benefit most from changes to default decisions. While children are more vulnerable to systemic forces over which they have little control relative to adults (e.g., parents' food shopping choices, school lunch and physical activity programs), this passive state creates an opportunity for these same systems to reset defaults to be health promoting for youth. Parents can be empowered to set healthier defaults at home, and research can inform school policies in the food and exercise domains. Examples of these environmental opportunities for resetting defaults include parents manipulating food availability, and schools creating healthy default menus for children's lunches and establishing after-school physical activity enrollment as the default. Thus, manipulating the default choices of children to be health-promoting can test whether employing optimal defaults can have robust effects on weight regulation. Not only would such choice manipulation influence behavior, but it may shape children's preferences.

Public Policy Change Opportunities

At the public policy level, there have been efforts directed toward preventing obesity in the population at large including children [42]. Optimal defaults in the arena of food consumption may involve alterations to portion size, packaging, availability, and price. The current environmental default favors widely available high caloric processed foods served in large portions at affordable prices. In contrast, restructuring the food environment through public policy change favors changes in one or more of these areas in an attempt to lower rates of obesity [31,43]. Examples include incentivizing restaurants who limit caloric levels of meals, taxing energy-dense "junk foods" and sugar-based drinks [27], and altering agriculture subsidies.

Public policy changes limiting the ease of access to suboptimal choices can impact health-related choices. New York City has implemented laws banning *trans* fats and requiring restaurants to provide nutritional information [27]. In the fall of 2011, Denmark passed a "fat tax" on saturated fats, effectively adding 12 cents to the price of a bag of chips and 40 cents to the cost of a hamburger. Although the outcome of the tax has yet to be determined, there is estimated to be an approximate 8% reduction in saturated fat intake [44].

Governments can also influence food prices through subsidies given to farmers. In the U.S., the vast majority of farm subsidies are given for five crops: corn, wheat, soybeans, cotton and rice with much of the soybean and corn crops being used as feed for the meat, dairy, and egg industries. However, there are no subsidies for growing fruits and vegetables, which are considered "specialty crops" [45–47]. In fact, farmers can incur heavy financial penalties for growing "forbidden fruits and vegetables" on acreage designated for subsidized crops [48]. This is in sharp contrast to the new recommendations for daily nutritional intake [49], which propose that half of one's plate be filled with fruits and vegetables. Implementation of these new guidelines will be challenged by such inverse economic support relative to health principles, as individual food choices are inevitably driven by cost. Thus, redirecting subsidies to fruits and vegetable crops would change defaults not only at the farming level,

but also downstream at the consumer level by virtue of default decisions as influenced by personal economics.

There is empirical support for the position that default conditions within the built environment, defined as the physical infrastructure and land design of a city [50], predict exercise frequency. Compact cities where the default modes of transportation involve walking have more active citizens and consequently lower obesity rates than cities where people drive to their destinations [51,52]. Similarly, people living in more walkable neighborhoods have a higher likelihood of physical activity and lower rates of obesity [53–57]. Residents living in areas of New York City that were considered pedestrian-friendly (greater population density, greater access to subway and bus stops) had lower BMIs compared to New Yorkers whose neighborhoods were not as pedestrian-friendly [58]. Communities can strategically construct the built environment through policies. Planning and zoning regulations can require roads that are accessible for multiple users including drivers, bikers, and pedestrians. Further, tax policies can be created to support community recreational facilities. In the context of exercise, optimal defaults imply that families do not have to do extra work to be active: they merely have to participate in what is readily available.

Primary prevention strategies specifically targeting childhood obesity represent a transition toward more optimal defaults at the policy level. Limits on low nutrition food and beverage advertising targeting children has been found in Australia to be a highly cost effective approach to pediatric obesity prevention [42,59]. Going further to ban these advertisements on multiple platforms visible to children (including sports events and vending machines) would be even better [13]. In 2009, changes to the Women, Infants, and Children (WIC) food package administered by the USDA included allowing only whole-grain bread and low- or reduced-fat milk, limiting juice and high fat cheese, and providing coupons for fruits and vegetables [60]. Recently, in the U.S., standards for nutrition in school lunches have been improved requiring that every child take a fruit or vegetable [61,62], increasing the variety of vegetables offered, instituting age-appropriate calorie limits, increasing whole grains, and imposing strict limits on sugar, fat, saturated fat, and sodium. Similarly, the European Union (EU) School Fruit Scheme provides fruit and vegetables to 6–10 year old children attending schools free of charge [42]. At the local level, in the U.S., the percentage of school districts that required elementary schools to teach physical education increased from 82.6 percent in 2000 to 93.6 percent in 2012 [63].

Resetting Defaults in the Private Sector

To reverse the rise in childhood obesity, government policies must be combined with corporate action. Companies in the food sector can reformulate products to improve their nutrition profiles and package their products to promote appropriate size portions. For example, some major cereal companies have pledged to decrease the amount of sugar in their child-targeted cereals to 9 grams or fewer per serving [64] although not all cereals meet this standard [65].

In the quick service restaurant sector (84% of parents admit to feeding their children from fast food restaurants at least once per week [66]) Burger King has changed its policy on children's meals so that milk and apples are provided as the default [67]. McDonald's New Zealand has teamed with Weight Watchers to present healthy options on their extra value meal menu [68]. Consumers are offered Weight Watcher-approved meals as the default, including a side salad instead of French fries and water or diet soft drinks instead of sugared sodas, with the option to substitute suboptimal choices. Although these are positive steps, fast food restaurants generally feature predominantly high calorie, high fat options on their menus, especially in default paradigms such as pre-packaged value meal combinations. One easily implementable change would be making water the default drink served with all fast food meals, while still allowing individuals to opt out for sugary drinks [69].

Corporations and restaurants can also provide more appropriate portion sizes, in line with recommendations to decrease overall calorie consumption. From 1977 to 1996, portion sizes of high calorie foods increased by approximately 49 kcal to 133 kcal per item [43]. Because individuals are typically not aware of the number of calories consumed, the packaging and container size provide a "biasing consumption norm" [31]. Even when educated about packaging and contextual cues, individuals still tend to consume entire portions from larger containers [32,33]. On the other hand, manipulation of portion size designed to reduce overall snack food intake (for example, cookies and crackers sold in 100-calorie packages) can reduce overall consumption [70]. Combined, this body of evidence suggests that manipulations in the default mode of food presentation may have significant effects on caloric consumption.

In children, food packaging and branding have also been shown to affect how much children like the food [71] and the amount they consume at a meal [72–74]. By applying to fruits and vegetables the same manipulations traditionally used to induce children to consume high calorie snacks and cereals, the food service industry has the opportunity to improve the default food choices. Children like foods more if they are presented in a package decorated with a cartoon character [71]. Keller et al. [74] have tested the impact of pairing fruits and vegetables with a child's favorite cartoon character and including collectable stickers inside the packaging. By using these simple marketing strategies, they demonstrated a ~2 serving per day increase in total fruit and vegetable intake and a decrease in BMI-z scores from baseline in young children who were low fruit and vegetable consumers and at risk for obesity. Such findings provide useful ideas for how parents and food companies can improve food options directed at children.

School-Based Change Opportunities

Schools offer an excellent opportunity for implementing optimal defaults directed at obesity prevention, as school-aged children consume between 19–50% of their daily calories at school and have the opportunity to engage in multiple forms of exercise (physical education classes, outdoor recess, intra- and extra-mural sports) during and after the school day [75].

Two clear opportunities for implementation of optimal defaults in the school systems are within school lunch programs and afterschool physical activity programming. In the U.S., most schools and their vendors create lunch menus that meet government standards while catering to cost and expected palatability of children, missing opportunities to use default paradigms to increase consumption of fruits and vegetables and shape children's tastes toward healthier food. For younger children, standard and a la carte menu selections are often made in advance by parents; for older children and adolescents, selections are primarily consumer-driven in the school lunch line. Within these frameworks, schools typically employ a relatively "free-form" selection process. Given the multitude of variables that influence food choice, selections are inevitably shaped by explicit and implicit factors. Studies have shown that accessibility and availability are the most important determinants of whether children consume fruits and vegetables [76,77]. Moreover, in schools, greater accessibility to high calorie foods can reduce fruit and vegetable intake [78,79] while removing unhealthy snacks can increase healthier snack consumption [80]. Presenting default, healthy array lunches and continuing to present them as children's tastes and preferences adjust accordingly has the potential to increase healthy eating, even when an alternative option is available but requires more effort to access.

In schools where parents pre-select the lunch choices for their children, an optimally healthy default menu can be presented to parents, requiring them actively to request access to a more standard menu (the suboptimal choice) for an alternate selection. "Live" selections by students themselves in school lunch lines can also be crafted accordingly, with a default healthy tray of food presented and access to alternate selections requiring greater wait, expense, or other inconveniences. In these scenarios, free choice –within the limits of government requirements for school lunch programs – is fundamentally preserved, while the default is positioned to improve student welfare. While offering students healthy options for school lunch is not a new approach, utilizing an optimal default paradigm to frame this choice is novel; an optimized default lunch menu in combination with a financial or time cost for accessing the less healthy choice has not been studied or implemented. In a proof-of-concept study of this paradigm tested using a school district's existing lunch menu pre-selection system, parents of first graders overwhelmingly chose the default option that was presented (either standard or optimal), rather than "opt out" which involved calling to request additional menu choices and then actively making selections from that secondary menu [81].

For children, increasing the proportion of exercise time during the school day has positive effects on overall activity levels [82–84] and BMI. The most successful studies were those that increased the amount of time spent in moderate to vigorous physical activity [85]. In fact, Fogelholm et al. [86] concluded that the majority of randomized trials do not include the necessary time spent in physical activity to be successful. Furthermore, the most successful changes in body mass index, endurance and increased activity level were found in interventions that lasted two years [87–89]. Hesketh et al. [90] further suggest adding a parent component, to expand upon gains made at school. These findings imply that for default changes to be effective, they should involve substantive increases in time spent in physical activity, spanning multiple years, with a parent component to increase activity levels in the home. Although in many districts the school day is tightly scheduled, there are

others (albeit a relatively small number) who have managed to include daily gym classes for all students (e.g. 3.8% of elementary schools, 7.9% of middle schools, and 2.1% of high schools) while still having time for other mandated scholastic courses [91].

After-school physical activity programming currently requires active enrollment on the part of parents and students. If this was reversed, and enrollment in physical activity programs or aftercare was the default (with opt-out permitted), energy expenditure could be improved. Such a model would work best with a partial preference design in which athletes could select specific sports, while non-athletes would be automatically enrolled in a program that does not require specific athletic skills (such as a challenge-course program that includes elements such as wall climbing and team-building exercises, like *Project Adventure*). Modifying afterschool care programs to default to physical activity and expanding after-school municipal sports programs by making automatic enrollment the default choice may increase the likelihood of energy expenditure for children whose parents need or elect after-school programming.

To make the aforementioned changes in schools, it is important that input from all key stakeholders, especially families, be considered. This may be accomplished through involvement of elected officials (school boards in smaller towns) or school based parent-teacher organizations. From a research standpoint, community-based participatory research paradigms may be employed to examine how best to incorporate parent and student input into crafting and testing the effects of these programs.

Home-Based Change Opportunities

In the home, setting up optimal defaults involves making healthy choices easily available and unhealthy choices either unavailable or more difficult to obtain. Establishing optimal defaults inevitably falls upon parents who typically purchase all the food, plan the meals, control food storage and placement, and provide equipment and space for exercise. Importantly, altering the home environment by limiting availability of high-sugar and high-fat foods, increasing availability of fruits and vegetables, and eliminating sugar-sweetened beverages has been an important component of family-based treatments for pediatric obesity [40,41,92–97]. In one study where a component of the intervention involved increasing availability of healthful foods in the home, there was a significant decrease in child BMI, suggesting that re-setting the default home food environment had a positive effect [33]. Parent-focused interventions can affect children's food and exercise choices such as increasing water [98], fruit and vegetable [99,100] consumption, and active play [101,102]. Pediatricians are well placed to support these parent-focused interventions as they often maintain longstanding relationships with families, are knowledgeable about the consequences of overweight, and can be highly influential regarding decisions impacting children's health. Moreover, it would be a welcomed partnership between preventative, multi-systems initiatives, and pediatricians who too often face the challenge of reversing existing and worsening obesity in their patients.

While parents are engaged as primary agents of change in obesity treatment [96,103,104], there is a surprising paucity of research investigating the effect of solely targeting parents in

childhood obesity *prevention*. From the framework of optimal defaults, such changes would be tailored specifically to influence selection so that the parent or child would have to work harder for or take active steps to access the unhealthy choice. For instance, if parents bring healthy snacks from home on outings, these become the default option as the parent is less likely to stop, wait in line, or pay for obesogenic alternatives. While the premise of optimal defaults does not introduce different goals for behavioral change relative to family-based interventions, it does offer an organizing framework that may help parents think about choice and availability differently. Importantly, it can be implemented within a primary prevention framework, rather than targeting high risk or already-obese children.

Parents need to be empowered to implement optimal defaults in the home environment. For some families, the current culture of permissive parenting, with parent behavior shaped by negative reinforcement (e.g. giving children a cookie to stop the whining), has created a reverse power differential in the home with children dictating the terms of meals, snacks, and recreational activities [105–107]. For others, lack of parent monitoring and competing family stressors make monitoring of habits difficult and the priority placed on healthy eating relatively devalued. Helping parents learn the premise and strategies of optimal defaults is promising because once the structure is in place, debate and negotiation may be lowered, as options are limited. Even if public and school policies are improved to reflect optimal defaults with regard to health behaviors in youth, parents often make the final decisions on behalf of their offspring and so must be enlisted as the ultimate agents of change, particularly for younger children [108].

Challenges in Implementing Optimal Defaults

In many respects, implementing optimal defaults to alter the food and exercise environment represents an attractive component of obesity prevention in children. Nonetheless, there are significant challenges that must be overcome for this to be accomplished. First, the sheer complexity of the multi-systemic factors that influence obesity means that addressing all or even most of them will require large scale changes in many areas at multiple levels. Aside from the complexity, many of these factors do not easily lend themselves to a simple default-opt out paradigm. A multimodal public policy approach will ultimately be necessary, including shifts toward a greater restriction in choice, or legal measures or tax disincentives aimed at reducing marketing of and access to unhealthy food products for children [27,31,43,109–111]. Like the optimal default paradigm, many of these strategies preserve ultimate personal choice while encouraging health-promoting options; others uniformly restrict choice. A similar combination of public policy measures has successfully curbed cigarette smoking among youth [112].

Altering the food and exercise landscapes to create optimal defaults would be costly to the public initially, but would arguably be offset in the long term by health care cost savings in the context of obesity reduction. Beyond this challenge, instituting more optimal defaults would also mean that corporations that manufacture high sugar or other calorie dense foods and their corresponding agricultural interests would lose sales and revenue. It is inevitable that these interests would attempt to block moves toward optimal defaults by such activities as lobbying lawmakers to take their side and even attempting to rally consumers to their

cause through advertising. When an 18% tax on sugar sweetened carbonated beverages was proposed in New York State, manufacturers of these beverages launched an advertising campaign depicting the tax as a financial drain on working families. In addition, soft drink giant PepsiCo threatened to relocate their corporate headquarters outside of the New York area [113]. Hence, the substantial financial resources that these interests could bring to thwarting efforts to change the status quo represents a significant obstacle to making healthier food choices the default.

Another obstacle to implementing optimal defaults involves making changes at the individual and family levels. The parenting capacities necessary for parents to guide or implement better choices for their offspring likely include a combination of knowledge, skills, and an authoritative parenting style. It will not be enough to simply encourage parents to create an optimal default-rich home environment without also defining what optimal is and helping parents assume a style of parenting in which they make informed decisions on behalf of their children, while simultaneously teaching children how to develop health-related skills for future independence.

Finally, although the concept of optimal defaults is attractive as an obesity prevention strategy, there have been only a few preliminary efforts to conduct proof of concept research [114]. Similarly, for newer initiatives such as Denmark's "fat" tax it is too early to assess whether there has been a significant effect on BMI. At present, there are no published studies investigating the effectiveness of default based programs on preventing pediatric obesity either in the short- or long-term. Hence, at present, the effectiveness of this approach lacks empirical support and remains theoretical.

Conclusion

Although health-promoting optimal default implementation faces several challenges, there is impetus from many quarters to combat childhood obesity. Governments at all levels, school systems, corporations, organizations, communities, and families share the concern about childhood obesity and are pushing for a shift toward healthier eating and increased exercise. Similar to what happened with cigarette smoking during the past half century [115], we can hope that the concern over the health and well-being of our children will spur changes at many levels which will gain momentum and have both direct and interactive effects, with the end result being reduced incidence of pediatric obesity. Given its powerful effects in other domains of public health policy, optimal defaults represents an important – albeit one – tool in the overall arsenal of obesity prevention strategies for youth that can aid in curbing the epidemic.

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