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RESEARCH ARTICLE

The Application of Optimal Defaults to Improve Elementary School Lunch Selections: Proof of Concept

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ABSTRACT

BACKGROUND: In this study, we applied behavioral economics to optimize elementary school lunch choices via parent-driven decisions. Specifically, this experiment tested an optimal defaults paradigm, examining whether strategically manipulating the health value of a default menu could be co-opted to improve school-based lunch selections.

METHODS: The design was a randomized comparison of optimal versus suboptimal (standard) default lunch menus for all first-graders in a school district for a period of 1 week. We hypothesized that making the default lunch option healthier, while providing parents the opportunity to access and choose from the standard school menu for their child, would yield more frequent selection of healthier items than when the default option was suboptimal.

RESULTS: Overall, 127 (93%) first-grade children's families participated. Among those families randomized to receive the nutritionally optimized default menu, all but one remained with these options; of those parents randomized to the standard menu (suboptimal default), all parents remained with these options ($X^2 = 123.06$, $df = 1$, $p < .001$).

CONCLUSIONS: The mere positioning of choices, without restricting options, significantly affected which menu items the children received during the test period. Results are proof of concept for a strategy to increase health-promoting school lunch content, procedures, and policies.

Keywords: behavioral economics; school food services; school lunch.

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Within the obesity prevention field, researchers have long-studied methods to alter the content and delivery of food served in schools, to target modifiable variables in the complex pathway to excessive weight gain among children in the United States.[1] School-based studies involving lunch and snack settings have found that increasing the availability of healthier foods promotes their consumption[2]; even simply removing items with low nutritional value improves diet quality.[3-5] Beyond availability, research supports the notion that other factors such as accessibility,[6,7] attractiveness,[8,9] convenience,[10] verbal and visual prompts,[11,12] preordering,[13] and variety[14,15] can all be manipulated to improve the health value of food choices in the school environment. In particular, the Cornell Center for Behavioral Economics in Child Nutrition Program has conducted extensive research on ways to manipulate the school lunch environment to promote better eating, and have synthesized its work and others' into the Smarter Lunchrooms Movement,[16] a resource for schools to apply evidence-based strategies, rooted in behavioral economics, in their food service programs.

One specific strategy from behavioral economics with potential application to childhood obesity prevention and school lunch is *optimal defaults,* a model that capitalizes on the human tendency to remain with a default selection, rather than taking even minimal action to access an alternative.[17-21] Research shows that this choice paradigm exerts a powerful

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influence on multiple individual decisions with relevance to public health, including organ donation[22,23] and vaccination.[24] Several papers have applied this model to obesity prevention at a theoretical level,[25-32] and early published research involving parents and children support this strategy as feasible and effective, at least short term, in the home and restaurant environments.[33-35] Importantly, the optimal defaults paradigm preserves choice and only nudges individuals in a positive direction[18-21,36,37] Thus, policies that extend from this model can represent a compromise position in the tension between childhood obesity prevention, which requires alterations in the food landscape, and eating disorder prevention efforts, which discourage extreme forms of dietary restriction in children and adolescents.

Limited research has been conducted testing the optimal defaults model in the school setting. Just and Wansink,[38] in a review of the application of behavioral economics to improve meal selection in school lunches, describe a default study they conducted in a summer 4-H elementary school program in which they first gave students a lunch that included french fries as the default, with the option of trading the fries for sliced apples with caramel dip; of the 21 children, 20 (95%) remained with the default french fries. In the reverse condition on a different day, in which they presented the ''apple fries'' as the default option on the lunch tray, 21/22 students (96%) requested a switch to the french fries. The authors note the overwhelming preference for french fries that was not mitigated by the default manipulations, concluding that: ''While defaults might work well in cases where preferences are ambiguous or where people don't care, they might not be the solution in the school lunch room.''[38 (p 5)] They conducted another study[39] that involved a similar paradigm with 15 campers ages 6-8, again showing that food type ''trumped'' default manipulations in choice effects.

The current study investigated optimal defaults in an elementary school lunch program over a 1-week period. In this district, the standard procedure involves parents pre-selecting their child's lunch items in advance. Thus, the manipulation of defaults for the children's menu selections can be done via paperwork-based, antecedent, parent-driven decisions, rather than with children directly at the point of food service. Our unpublished pilot research (under review) has shown a strong effect for defaults in a children's breakfast experiment with parents as decision-makers. Moreover, when children are presented with an optimal default food array selected by the parents—that is, either retained passively when the default choice was optimal, or actively chosen as the alternative when the default choice was suboptimal—children eat an average of 36% of these healthier foods, suggesting that parental choice will translate into child consumption, similar to the amount eaten when children are presented with a suboptimal array (40%). We designed the present study to extend this model to the school lunch arena in a proof-of-concept experiment examining choice behavior among parents of all first-graders in a school district. Specifically, we randomized families to receive either a healthier (optimal) or standard (suboptimal) lunch menu for a test period of 1 week; each condition included options for parents to view, and choose from, the alternate menu. Menu selection (through passive acceptance or active request) was the primary outcome variable. We hypothesized that the provision of a nutritionally optimized school lunch menu as the default, with the option to request the standard lunch menu from which to make alternate selections, would lead to healthier lunch choices by parents, for their children, than the standard lunch menu as the suboptimal default (with the option to request and select from the optimized menu).

METHOD

Participants

The study targeted all first-graders (N = 137) and their parents in a school district that had 2 elementary schools. We were interested in studying a developmental stage in which parents typically make choices on behalf of their children, and children are also likely to assert their preferences. There were no exclusion criteria. Ten families declined participation, resulting in a sample of 127, 63 of whom were randomized to receive the suboptimal menu and 64 the optimal menu. Variables necessary to inform body mass index (BMI; weight in kilograms divided by the square of height in meters) *Z*-score and BMI-for-age percentile

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calculations, per US Centers for Disease Control and Prevention norms (sex, age, height, and weight), were collected earlier in the school year by school personnel and provided to the researchers by the school. Consistent with the school's request, no other individual-level demographic variables were collected for use in this study. The school-provided data for the 127 participating children showed a 52%/48% boy/girl breakdown (N = 66/61) in the sample, with a mean age of 6.73 (SD = 0.41), a mean BMI *Z*-score of 0.48 (SD = 1.08) and mean BMI-for-age percentile of 64.50 (SD = 29.12) during the fall of the academic year. Aggregate public and school data indicated that the overall district's annual median household income was commensurate with average state data but below the median income in the district's county. Racial/ethnic data for the district indicate that approximately 67% of the students are white, 11% are black/African American, 11% are Asian, and 11% are Pacific Islander; across these categories, 18% are Hispanic/Latino.

Procedure

Parents of all children in grade 1 were sent a study information sheet in advance of the experiment commencing. Families were not made aware of our specific hypotheses until a later debriefing communication at the conclusion of the study. Children across both schools were randomized to 1 of the 2 default conditions: a standard/suboptimal weekly lunch menu versus a nutritionally optimized menu. The study menus sent to parents in advance of the test period included clear instructions to decline participation, in which case the child could participate in the normal lunch program; this was still in operation for other grades and nonparticipating first-grade students during the study. All study materials were sent through the school district. Consistent with standard operations in this district for elementary school, parents received an upcoming lunch form with the procedures and formatting to which they were accustomed. Typically, a lunch menu with basic and a la carte options is sent home in advance, and parents select their children's upcoming menu items for the week and return the form to school. If a parent does not make specific selections, the food served to the child defaults to the first entrée item listed on the menu—a system the vendor uses to ensure that sufficient quantities of food are prepared. Whereas parents usually send payment for lunch in an envelope, families received their participating child's lunch free of charge for 1 week as part of the study, while the experiment was operative. All study materials, specifically the early information sheet and the menu mailings, informed parents that the project was sponsoring lunches that week.

The typical daily school lunch menu includes 2 primary lunch entrées (protein plus grain), 3 alternative lunch entrées (deli sandwich, bagel with cheese, or yogurt and cheese), a ''Trip to the Farm Stand'' where fruits and vegetables are served, and a milk option (1% white, skim, or nonfat chocolate). For feasibility reasons, the study lunches retained all categories with the exception of the 3 alternative lunch entrées, and manipulated only the 2 primary lunch entrées. Thus, the study menus for each day of the experimental week included 2 primary lunch entrées (one meat and one vegetarian) within each condition (optimal or suboptimal) and the standard fruit, vegetable, and milk offerings. The macronutrient comparison profiles of the 2 conditions (Table 1) pertain to the lunch entrées only, as the other offerings (fruit, vegetables, and milk) were held constant across the 2 groups.

In the suboptimal default condition, the menu represented the standard school lunch fare. In the optimal default condition, the menus that the parents received contained nutritionally healthier items that were still consistent with National School Lunch Program (NSLP) requirements under the Healthy Hunger-Free Kids Act (HHFKA)[40]; for these foods, detailed ingredient lists were provided to the food vendor to increase fidelity to the expected preparation procedures and nutritional profiles. Condition, that is the health quality of the menu, was not indicated anywhere in the paperwork sent to parents other than by any face validity of the menu items themselves. Examples of entrées from the standard menu included pizza burger on a whole wheat bun; hot dog with oven fries; and mozzarella sticks with marinara sauce and a whole wheat dinner roll. Entrées from the optimized menu included oven-roasted chicken with brown rice pilaf, whole wheat spaghetti with ground turkey tomato sauce, and vegetarian chili.

In each condition, parents could gain access to the other menu by taking active steps. Specifically, instructions on the study menus provided the option for parents to phone in a request to view an alternate menu. The nature of this alternative array (''standard'' or ''healthier'') was not stated. The alternate menu was sent home to any parent requesting it, and parents could then make entrée selections (meat or vegetarian) from one menu or the other (but not from both). If parents did not actively make entrée elections from either their default or the alternate menu, their children received the first-listed entrée selections (per the usual school lunch protocol) from each day of their default study menu. This system created a clear default condition, with 2 steps required for the child to receive lunch from the nondefault menu: requesting the other menu and then actively opting out of the default option by making selections from the second menu. Therefore, this design capitalized on 2 human decision-making biases: *present-biased preferences*[41] and *status quo* bias.[42] Both menus were served simultaneously during the

Table 1. **Mean Daily Nutritional Breakdown of Lunch Entrées by Condition, Averaging Meat, and Vegetarian Options per Day**

Default	kcal	Fat (g)	Saturated fat (g)	Cholesterol (mg)	Sodium (mg)	Carbohydrates (g)	Protein (g)
Suboptimal	469.45	24.61	8.15	57.50	1188.78	58.07	18.53
Optimal	331.52	10.80	5.70	54.80	786.17	34.46	22.81

same week. Participating children's lunch selections were incorporated into the school's standard tracking system utilized to ensure that each child receives their intended order, with additional assistance from the research team to minimize any incremental burden introduced by the study.

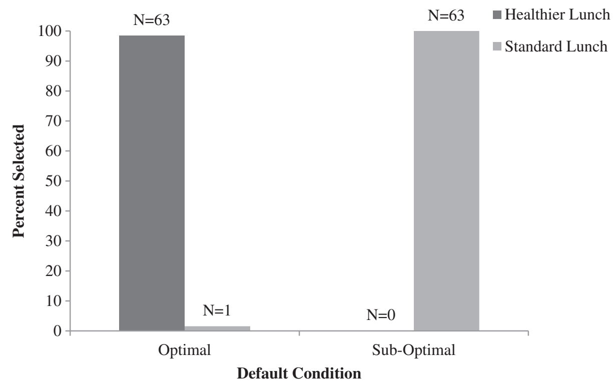
Data Analysis

Data were analyzed with a 2 × 2 Pearson chi-square analysis examining choice (healthy array opted yes/no) by condition (optimal versus suboptimal default).

RESULTS

Across the 2 conditions, only 1 family took active steps to view and select from the alternate menu (Figure 1). Specifically, of those randomized to the optimal menu (N = 64), 1 parent requested to view the alternate (suboptimal) menu and opted for the standard lunch selections. All other parents in the optimal condition remained with the healthier menu without requesting to see the alternative menu, 9 of whom (14%) submitted specific daily entrée selections (meat or vegetarian) within the optimal array. Of those randomized to the suboptimal menu (N = 63), no families requested to see the alternate (optimal) menu, and 12 (19%) submitted specific daily entrée selections (meat or vegetarian) within the suboptimal array. Overall, 22 parents (17%) submitted specific menu choices; all other parents defaulted to the first daily menu entrée listed on their default study menu. The chi-square analysis showed a strong effect for defaults, with the optimal menu predicting receipt of the healthier lunch array ($X^2 = 123.06$, df = 1, $p < .001$).

Figure 1. **Parent Lunch Array Selections, via Passive or Active Choice, by Condition**



DISCUSSION

This school-based, analog pilot experiment applied findings from studies of human decision-making to alter the school lunch system, examining how manipulating the health value of the default mode can serve as a critical strategy in improving the quality of elementary students' diet. We predicted that in a school lunch system that relies on parents to antecedently choose their child's menu selections, making the default menu more optimal (less obesogenic) would lead to more frequent choice of healthier food arrays. Results demonstrate that overwhelmingly, when healthier choices were presented as the default option, with the standard lunch a secondary option, parents passively or actively opted for the optimized menu on behalf of their children more often than when the default option was the standard school lunch (with the healthier menu a secondary option). In fact, all but 1 family (98%) randomized to the optimal menu remained with those food choices. This effect is carried not by the health value of the menu, but by the power of defaults, as showcased in the similar rates of defaulting in the suboptimal condition (100%). Our findings are inconsistent with the results and conclusions from the Just and Wansink[38] and Wansink and Just[39] studies, which differed by manipulating defaults directly with children at the point of food service.

Limitations

This study has several limitations. First, the model used in this experiment is generalizable exclusively to schools and age ranges for which a parent-selected lunch menu system is viable. This pilot study targeted only first-grade families in a single school district that already employed a parent-directed selection procedure. However, other research suggests that child-directed preordering procedures can also improve the health value of school lunch selections, even in the context of a free array menu.[13] It is also not known whether the findings would generalize to school districts with greater ethnic and weight diversity or different socioeconomic ranges. Given the limited variability in the outcome variable by condition, an originally planned moderator analysis examining the influence of child weight status on menu choice could not be conducted. Another limitation is that the project ran for a period of only 1 week, and novelty effects cannot be ruled out. We also do not know whether the changes in the NSLP, which were introduced shortly before the study, primed parents to accept the healthier options. This is unlikely to explain the study findings, as default effects were overwhelming regardless of the health valence of the default choice. Finally, this study did not measure the degree to which parent choice translated into child consumption, an important factor that would inform conclusions about uptake, cost-effectiveness, potential health benefits, and sustainability of the optimal defaults model in school lunches. Our prior research on optimal defaults has shown that when children are presented with an optimal breakfast array actively selected or defaulted to by parents, children do eat at least a portion of what is given to them (under review); however, that study design involved parents being present during the meal. A study of direct, default service of fruits and vegetables on elementary school children's lunch trays suggests that consumption of these foods will be increased (and waste reduced) when a default strategy is combined with a reinforcement paradigm.[43] Future experimental research utilizing a longitudinal design, with greater age diversity among students as well as measurements of consumption, waste, and BMI, would be important in developing policy-level changes related to parent-directed optimal defaults in school lunch programs.

Conclusions

This study generated new knowledge pertaining to behavioral economic factors that can influence food choices made by parents on behalf of their children, with potential implications for school-based child health. Personal accountability models of childhood obesity prevention and treatment are generally ineffective and arguably developmentally inappropriate, as youth are embedded in multiple systems that have responsibility for, and that shape, their energy intake and expenditure.[25,27,30] Prior research in multiple domains of behavioral economics indicates that individuals are highly unlikely to circumvent the status quo[17,22-24,36,44] with hypothesized mechanisms including reference dependence, conservation of effort necessary to access the alternative, and implied endorsement of the default option as the sanctioned choice.[23,45,46] The current study provides proof of concept that defaults can be harnessed in the school lunch arena to public advantage.

IMPLICATIONS FOR SCHOOL HEALTH

Study findings support the feasibility of utilizing optimal defaults in elementary school lunch choices, in the context of parent-driven choices, as evidenced in part by the rarity of parental requests for the standard menu in the healthier condition (N = 1, 0.02%). The overall rate of participation in the study was higher than benchmark data—provided by the school's food vendor—on typical weekly rates of first-graders' participation in the school lunch program (93% vs 55%, respectively); this difference was likely driven by the study's financial sponsorship of lunches for the experimental week and it is not known whether a naturalistic introduction of an optimal default system would lead to increased, decreased, or unchanged demand for school lunch. Notably, the rates of declining the study were identical—and markedly low-across the 2 default conditions (7%), indicating that neither the health value of nor familiarity with the menu items influenced participation in lunch. Importantly, the preservation of choice inherent in the optimal default model may increase buy-in for and engagement in healthy eating. Some early public response to the HHFKA/NSLP policies was negative, with restriction of choice cited as a key objection.[47,48] In this study, beyond the option to select from 1 of the 2 menus, parents could select specific items within each menu, per standard procedures in the school (an option utilized by 17% of the sample—7% from the optimal menu and 10% from the suboptimal menu).

Our experience conducting this study suggests that 1 major barrier to the feasibility of implementing an optimal default lunch paradigm would be if differential procedures were utilized across grades within the same elementary school. Our first attempt at conducting this experiment had to be aborted when school personnel inadvertently distributed the general school lunch mailing to families of our target population of first-graders, despite instructions from the district superintendent and the investigators. In the current study implementation, 1 district elementary school followed the study procedures with full adherence; the other initially sent the correct study mailing to first-grade families, and then later, accidentally also sent them the general school lunch mailing. Whereas this error occurred only after parents had received the correct study menus and after the study data collection window had passed (thus, not compromising the integrity of the findings), it did cause confusion among those families and for the food vendor, and speaks to the need for consistency in procedures within an entire school body. Other long-term implementation challenges to optimal defaults in school lunches include the time and expertise required to develop healthier menus that meet all HHFKA/NSLP guidelines; the preparation of these foods; and the need for a parallel, more standard menu that is always available, to preserve choice inherent in the optimal default paradigm. Moreover, it is unknown whether the 2-step process required in this study to access the nondefault menus would raise parental objections over time. Alternatively, this more complex procedure—consistent with other default paradigm implementation[24, 44]—could be particularly advantageous for nudging elementary-school parents to remain long term with better, lower-effort default options for their children's school lunches.

While requiring replication in a longitudinal design, results have implications for crafting strategic school-based childhood obesity prevention policies that do not rely on restrictive feeding practices. The optimal default model can work synergistically with HHFK regulations, which have been shown to improve the nutritional quality of school lunches.[49-51] Optimal defaults could also conceivably shift social norms for quality school meals, via mechanisms of implied school endorsement of healthy defaults, and social comparison related to the likely selection of healthy defaults by most individuals. By extension, optimal defaults in school lunches would increase children's exposure to healthier foods, which in turn facilitates the development of healthier eating preferences.[52] Notably, healthy eating, obesity prevention, and eating disorder prevention are compatible aims for public health policies,[53,54] and corresponding well-studied interventions carry positive crossover effects among these domains.[55-60] The optimal defaults model can capitalize on nested decision-making capacities across school and family systems levels, with positive impact on the health quality of the foods served to students.

Human Subjects Approval Statement

The district's Board of Education granted permission to conduct this research in its schools. The study was reviewed and approved, and deemed to meet criteria for a waiver of consent/assent, by the Fairleigh Dickinson University Institutional Review Board (approval number PT-2013/02-001001003).

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